

3 | Technical Chapter

Development of the Test

Prior to the development of the CASE-MH, the authors published the Attention Test Linking Assessment to Services (ATLAS; Anderson & Post, 2007) for the identification of ADHD in children and adolescents. One component of this seven-part-instrument is the Comorbidity Screener which has proved to be a reliable and valuable measure in the identification of comorbid disorders often related to ADHD.

The current test, the CASE-MH, was developed from the item set of the ATLAS, with the following modifications of some items:

- Items were revised for use in an adult population.
- Items were removed and others added and evaluated for assessment of adults.
- In order to have a broader perspective of each disorder, items were also added from other psychological theories, including Social Learning Theory and Individual Psychology.
- Items were designed after investigating and researching various diagnostic documents from NIH, the ICD and the DSM.
- Several scales were changed to reflect adult mental health disorders. For example, the Oppositional Defiant Disorder Scale, which is a category for children and adolescents, was modified for adults forming the Antisocial Personality Disorder scale (See Appendix F, Experimental Scales). Due to many indicating that they have Social Anxiety diagnoses, a Social Anxiety scale was added. Later, a Substance Abuse Scale was also added due to the importance of its assessment in any adult mental health test.

Development of the CASE-MH proceeded as follows:

The total sample was approximately 1,400 individuals divided between the studies listed

below. In the original pilot study, the initial item set was administered to a little over 300 individuals from the United States via an internet data collection site. From this data, item analyses were conducted and items were modified for this test. Specific findings from this data collection noted that several individuals in the sample reported a diagnosis of Social Anxiety Disorder. Due to the prevalence of this disorder, a need was demonstrated and a scale was later developed.

A second pilot data collection included over 400 individuals using the revised test. Again, test items were analyzed and several were removed due to low correlations with the items from concomitant scales or if they did not contribute sufficiently to scale consistency.

The items that remained after the modifications, based on the data from the second pilot, were administered to 610 individuals. Some items were then removed from the test due to low correlations with the total scale, insufficient increments in Cronbach's alpha, or poor item fit, as defined by WINSTEPS, a one parameter IRT program (Winsteps, 2005). A couple of items were removed that met the statistical criterion but that statistically and heuristically strongly fit another scale.

The revised and final set of items were submitted for peer review by mental health professionals including: Psychiatry, clinical psychology, clinical social work, and counseling psychology. Using the following criteria: lack of clarity or misleading content, questionable content, redundant questions or items that better fit other scales. The reviewers' analyses led to the removal of a few of items.

This final set of items were then administered to individuals with identified mental health disorders. A very small number of items that were determined to lack sufficient predictive validity for their specific mental health disorder were removed resulting in the final item set.*

* There can be small inflations in these correlations due to selective retention of higher correlating items based on this sample.

Populations:

The samples used in the results include both the reliability and the validity sample. The reliability sample was the final item development sample of 610 individuals from an on-line data collection. All individuals in the validity sample of 63 individuals had at least one professionally diagnosed mental health disorder and all received mental health/psychological services at the time of testing. Field researchers primarily selected individuals with multiple disorders.

The full norming sample, consisting of both the reliability and validity sample, included 673 individuals (not including the pilot samples), had the following characteristics:

Variable Levels	N	Relative Frequency (%)
Sex/Gender		
Male	222	32.99
Female	451	67.01
Age		
18 – 20	1	0.15
21 - 30	44	6.54
31 – 40	204	30.31
41 – 50	183	27.19
51 – 60	102	15.16
61 – 70	97	14.41
71 – up	41	6.09
U.S.A Geographical Region		
Midwest	132	19.61
Northeast	185	27.49
South	232	34.47
West	124	18.42
Race		
Asian	26	3.86
Black	58	8.62
Caucasian	565	83.95
Native American	4	0.59
Other race	1	0.15
No race given	18	2.67
Ethnicity		
Hispanic	51	8.02
Non-Hispanic	595	88.41
No ethnicity given	24	3.57

Reliability:

The reliabilities of the different scales are based upon the final item set from the 610-person community-based reliability sample that included 145 individuals who self-identified as having one of the assessed mental disorders and 465 who reported no disorders. The reported reliability is Cronbach's alpha within a scale across the reliability sample*. These reliabilities were:

Scale	Reliability
Obsessive Compulsive Disorder (OCD)	.84
Depression	.89
Bipolar Disorder	.86
Post-traumatic Stress Disorder (PTSD)	.90
Generalized Anxiety Disorder (GAD)	.90
Substance Abuse	.91
Social Anxiety Disorder	.90
Attention Deficit Hyperactive Disorder (ADHD)	.90
ADHD Subscales	
Total Inattentive	.97
Attention	.92
Concentration	.89
Organization	.93
Divided Attention	.90
Total Impulsive/Hyperactive	.93
Impulsive	.91
Hyperactive	.90
Experimental Scales (see Appendix)	
Autism	.88
Antisocial Personality Disorder (ASPD)	.90

The overall reliability of the core scales (non-ADHD subscales) is .90, calculated as the mean of core scales transformed with Fischer Z-transformation (Corey, Dunlap, & Burke, 1998).

Validity

Validity correlations are based on the validity sample of 63 individuals with diagnosed mental health disorders. This is a biserial correlation between scale score and a dichotomous score (has a specific mental disorder or does not have that mental disorder). Biserial correlations are restricted in their power and range with greater restriction as one moves further from a 50/50

division of the sample in terms of number with the specific disorder vs. the number without the specific disorder. The correlations were adjusted for bipolar correlation attenuation. The curve of this attenuation can be seen in Nunnally (1978, p. 133). This was adjusted using the biserial table included in WINSTEPS (2005). This procedure for adjusting the values has been used in many projects and is used by many test publishers..

The adjusted validity coefficients for the scales were:

Scale	Reliability
Obsessive Compulsive Disorder (OCD)	.82
Depression	.59*
Bipolar Disorder	.81
Post-traumatic Stress Disorder (PTSD)	.88
Generalized Anxiety Disorder (GAD)	.76
Substance Abuse Disorder (no specific Minimal score for risk of the disorder and too small a sample).	
Social Anxiety Disorder	.85
Attention Deficit Hyperactive Disorder (ADHD)	.79

* We hypothesize that the lower correlation is related to endorsement by individuals with other comorbid disorders and overlapping symptoms such as bereavement, complicated grief, situational depression, etc.

Validity statistics

Accuracy of identification is calculated using sensitivity, specificity and hit rate on the validity sample. This is based on the table and formulas included below:

	From Diagnosis	
From Test	Has Disorder	Doesn't Have Disorder
Positive	True Positive (TP)	False Positive (FP)
Negative	False Negative (FN)	True Negative (TN)

1. Sensitivity is defined as: $\text{Sensitivity} = \text{TP} / (\text{TP} + \text{FN})$
2. Specificity is defined as: $\text{Specificity} = \text{TN} / (\text{TN} + \text{FP})$
3. Hit rate is defined as: $\text{Hit Rate} = (\text{TP} + \text{TN}) / (\text{TP} + \text{TN} + \text{FP} + \text{FN})$
4. Precision is defined as $\text{Precision} = \text{TP} / (\text{TP} + \text{FP})$

The following were the accuracy statistics for a single Minimum score for risk of the disorder for the test scales. These are considered as suggested Minimum score for risk of the disorder and the user should explore scores very close to the Minimum score for risk of the disorder and may decide to slightly modify the Minimum score for risk of the disorder to meet their specific populations.

Rather than calling the suggested score a “cut score” we are using a less specific label called a Minimum score for “risk” of the disorder. This is the score that includes most individuals with the disorder and that provides a reasonable “hit rate, sensitivity, specificity and precision.”

Scale	Minimum score for risk of the disorder	Hit Rate %	Sensitivity	Specificity	Precision
Obsessive Compulsive Disorder (OCD)	9	83	56	91	69
Depression	5	68	71	61	76
Bipolar Disorder	4	89	60	94	67
Post-traumatic Stress Disorder (PTSD)	5	87	88	85	93
Generalized Anxiety Disorder (GAD)	6	84	88	84	84
Substance Abuse Disorder *	See below				
Social Anxiety Disorder	6	87	75	93	83
Attention Deficit Hyperactive Disorder (ADHD)	29	87	74	95	89

* If any items are endorsed, they should be explored. Nearly 2/3 of the general sample endorsed no items on the scale and nearly 82% endorsed two or less items. If anyone answers more than 2 items there is definitely a risk of the disorder.

Intercorrelations Between Scales

There is a substantial amount of correlation and overlap of symptoms in the way individuals answered the test. We can always expect multiple comorbidities in any mental health sample and several overlapping symptoms are common between disorders. Therefore, we can expect that this pattern of response is frequently due, in part, to individuals with co-occurring disorders answering the diagnostic questions. This co-occurring variability should be taken into consideration when completing a diagnosis as it is often challenging to obtain a clear differentiation between disorders. To aid in the interpretations of comorbidities, the following table is provided. This table is based upon the norming sample.

	ADHD	OCD	Depression	Bipolar	PTSD	GAD	Substance	Social Anxiety
ADHD	1							
OCD	.460	1						
Depression	.487	.439	1					
Bipolar	.533	.592	.643	1				
PTSD	.392	.423	.557	.525	1			
GAD	.499	.582	.747	.701	.613	1		
Substance	.275	.225	.288	.391	.234	.278	1	
Social Anxiety	.424	.425	.617	.512	.505	.671	.220	1

Note: Correlations with Substance Abuse Scale are low due to limited endorsements of substance abuse items and hence a skewed distribution. Other scales have a distribution not substantially different from normality.

1-Parameter Logistic Item Response Theory (1-PL IRT)

Item response theory (IRT) focuses on the item rather than just test-level data as does Classical Test Theory (CTT). It is based upon the performance of an individual, with a certain amount of a trait (latent trait), on each item of a measure. The probability that an individual will respond in a certain way on an item is based on an individual's underlying latent trait, in this case, the strength of the disorder within the individual. IRT has become the primary method in which test scores are analyzed whenever there is a comparison between scales, adding of scales, examining of item fit within scales and for several other purposes.

In psychometrics, IRT is a framework to establish scoring, examine how well items fit their scale and improve accuracy. It is considered an improvement over CTT. 1-Parameter Logistic IRT is used to determine item fit and (among other reasons) is used when a test is to be hand scored and will use tabled values. As guessing is not seen as important in a mental health diagnostic test, little is gained in using more

parameters than the amount of a trait (in IRT terminology, often referred to as ability).

The model used in this test is the Rasch model for the first seven clinical scales. Rasch 1PL-IRT is used because it allows tabling data and because a guessing parameter has no purpose in a mental health test. It is not used with the ADHD scales as they are polytomous rating scales. The distributions of the subscales are far from normal using the norming sample and therefore this approach cannot be used (Masters, 1982; Bond & Fox, 2001). 1-PL IRT was used extensively in the scale development, especially for examining item fit to scale. This was mentioned earlier in this chapter. 1-PL IRT score estimates for the clinical scales are included in Appendix E.

ADHD subscales

Comparisons across ADHD subscales are necessary to determine the pattern of ADHD. Comparisons between the ADHD subscales can also be useful in examining the content of the patterns in the determination of which of the subscales are of greatest concern. To allow the clinician to do this, percentiles are provided to compare the patterns and subscales. Percentiles to examine the patterns of ADHD are found in Appendix C and percentiles to examine the scores for the subscales on the content of the patterns are found in Appendix D.

There are three basic patterns of ADHD in the Diagnostic and Statistical Manual V (2013): Inattentive, Hyperactive/Impulsive and Combined. Knowledge of which pattern likely to be found in a specific individual is necessary to be able to optimally assist the individual with appropriate therapy and interventions. To determine the ADHD pattern for a completed form, the difference between the percentage of the summed Inattentive and the percentage of the summed Hyperactive/Impulsive subscales need to be examined. If percentile for the total of the Inattentive subscales is relatively similar to the percentage for the

total of the Hyperactive/Impulsive subscales, the individual is likely to present with the Combined Pattern ADHD. If the individual has a substantially higher percentile on the total of the Inattentive subscales the individual is likely to have the Inattentive Pattern ADHD. If the individual has a substantially higher percentile on the total of the Hyperactive/Impulsive subscales, the individual is likely to show the Hyperactive/Impulsive Pattern ADHD. While there is no specific Minimum score for risk of the disorder, the therapist is provided with percentile scores to aid in the interpretation of the results. One should use clinical judgment and consider other diagnostic clinical information/documentation.

To be user friendly, percentiles are provided because the different subscales have different numbers of items and distributions. By examining the percentiles for each subscale for the Inattentive or the Hyperactive/Impulsive subscales one can obtain some idea of which domain in that pattern of ADHD is likely to cause the most difficulty for the client. If one has a substantially higher percentile relative to the other subscales, it is likely to be the area where there is the greatest difficulty within that pattern of ADHD.

Factor analyses of the scales

Principal Axis Factoring was used to examine the dimensionality of the scales (Stark, et.al., 2005). The purpose of this method was to examine the existence of one primary latent factor in each scale. This method was most important for the ADHD subscales. Each Inattentive subscale clearly had only one primary factor. In the Impulsive/Hyperactive combined subscale there were two factors but these factors were extremely highly correlated.

Exploratory factor analysis was used to examine the content of the scales for interpretation. Using exploratory factor analysis and other data, models were developed for confirmatory factor analysis. The models were run using confirmatory factor

analysis and model fit was examined using Tests of exact fit: CFI, TLI, and RMSEA were used to examine scale content. Based on the results of these analyses, the best fitting model was used (only heuristically sensible models were tested). The subscales are discussed in

the chapter entitled: What the CASE-MH Scales Assess (Chapter 4). Typically, the highest loading independent item was used to label the subscale. These items are discussed in the What the CASE-MH Scales Assess chapter that also discusses the dimensions of the disorder.

4 | What the CASE-MH Scales Assess

To understand the results of the test, one needs to know the construction of the eight scales. By having a thorough understanding of the scales the clinician will gain a more optimal understanding of the client's issues. This chapter provides a discussion of the content of the scales and an examination of possible comorbidities. Finally, the items most highly and least correlating with each scale are provided as reference points to highlight most and least discriminating items. Statistical methods used to determine the structure of the scales are found at the end of this section. These include investigations of dimensionality and confirmatory analysis.

Group 1 - Obsessive Compulsive Disorder (OCD) Scale

Overall, this scale addresses tics, compulsions, obsessions, ordering, rituals, and the existence of personal and specific behavioral patterns. The Obsessive Compulsive Disorder scale of the CASE-MH assesses four areas: 1. Personal types of obsessions and belief systems, 2. Repetitive performance compulsions, 3. Tics, and 4. Rigid placement of items.

Factors	Items (weighting most heavily on the factors)
1. Personal types of obsessions and belief systems	6, 7, 8, 11, 12, 13
2. Repetitive performance	10, 14, 15, 16
3. Tics	1, 3, 5
4. Rigid placement of items	2, 4

As the literature points out, with OCD there exists a high level of comorbidity with other disorders (Sadock et al., 2014). One international study (Pallaenti et al., 2011), reported ten times the rate of comorbidities in individuals with OCD than in the general population. It was also reported that 23% of individuals with Bipolar Disorder were comorbid for OCD. We recommend that the clinician provide a thorough evaluation of additional disorders with a high score on OCD by including an examination of the Bipolar Scale, Depression Scale, Generalized Anxiety Disorder, Social

Anxiety Disorder, ADHD Impulsive Subscale, and the PTSD Scale. High correlations with all of these scales were found in the research for the CASE-MH, as well as in the psychiatric literature, found in Pallaenti et al. (2011).

It is important that other disorders such as Antisocial Personality Disorders, Psychotic Disorders and Eating Disorders, are considered in any evaluation. Other spectral disorders might also be considered, such as Body Dysmorphic Disorder, Hoarding Disorder, Trichotillomania, Excoriation Disorder, or Tic Disorder (Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, 2013). Individuals with those aforementioned disorders are likely to have elevated scores on the OCD scale. While those disorders are not specifically addressed in this OCD scale, the clinician should consider these disorders within this spectrum when evaluating results from this scale (see Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, 2013).

Strength of Correlation	Item	Correlation
Item with highest correlation (with total scale)	Do you often worry excessively about not getting things done in a manner you believe it should be done?	.633
Item with lowest correlation (with total scale)	Do you often have repetitive tics, throat clearing facial grimacing, shoulder motions, etc.?	.446

Group 2 – Depression (Unipolar Depression)

The Depression Scale measures two aspects of this disorder: 1. Helplessness, hopelessness, and suicidal ideation and 2. Physical and behavioral aspects of depression. Included in the scale are items examining discouragement, inferiority, negative views of self, hopelessness/helplessness, suicidal thoughts, and sadness. This scale primarily examines the symptoms of Major Depressive Disorder though these symptoms may also be found in other patterns of unipolar depression. This scale also examines other common aspects of depression such as low energy,

fearfulness, and inability to take steps “to move forward.” The scale does not establish severity but rather the presence of the disorder.

Factors	Items
Helpless, hopelessness and suicidal ideation	18, 19, 24, 25, 26, 28, 29
Physical and behavioral aspects of depression	17, 20, 21, 22, 23, 27

With the evaluation for depression, suicide is always a potential risk, therefore, two items were included to examine suicidality (suicidal thoughts and preoccupation with death, items 24 and 25). These items should be closely examined for individuals with a high score on the Depression Scale. They should also be examined when an individual scores high on some of the scales where there is typically a high suicidal risk such as with Bipolar Disorder and PTSD. On the CASE-MH, it was found that Unipolar Depression was highly comorbid with several of the other disorders addressed by this assessment. These include Anxiety Disorders, Substance Abuse Disorder, ADHD, OCD and PTSD. Individuals with Bipolar Disorder may have higher scores on this Depression scale due to depressive symptoms of bipolar disorder.

Strength of Correlation	Item	Correlation
Item with highest correlation	Do you have a sense of helplessness?	.752
Item with lowest correlation	Do you have a preoccupation with death?	.532

Group 3 - Bipolar Disorder

The Bipolar Disorder Scale includes two types of items: 1. Symptoms of mania and 2. Symptoms of combined mania and depression. This scale primarily assesses mood and activity fluctuations with items addressing high and low energy, racing thoughts, need for sleep, euphoria, negative mood, and emotions. This scale also assesses significant behaviors such as irritability, sprees (i.e. shopping), and mood swings. Symptoms of Bipolar Disorders rather than the milder mood episodes of Cyclothymia are examined.

Factors	Items
Symptoms of mania	31, 32, 33, 34, 35, 36, 37, 38, 39
Symptoms of combined mania and depression	40, 41, 42

Bipolar disorder needs to be differentiated from Unipolar Depression where hypomanic or manic symptoms may be seen but often with a shorter duration of time. In cases of Unipolar Depression with manic features, manic symptoms are typically of low frequency, of shorter duration and include a narrower range of symptoms (See Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, 2013). Individuals with Bipolar Disorder may show some elevation on the Unipolar Depression Scale as these scales are highly intercorrelated. In the National Comorbidity Survey Replication Study (as reported by Merikangas et al., 2007), Bipolar Disorder was highly comorbid with Anxiety Disorders, including GAD, Social Anxiety Disorder, and PTSD. The results of the CASE-MH results are consistent with those findings. The Merikangas et al. (2007) study also found substantial comorbidities with other anxiety disorders, especially Panic Disorder. Krishnan (2005) reviewed studies finding high comorbidities with Substance Abuse and ADHD, which was consistent with the finding of the CASE-MH.

Strength of Correlations	Item	Correlation
Item with highest correlation	At times are you overly excitable or excessively talkative?	.725
Item with lowest correlation	Are there times when you have a decreased need for sleep?	.529

Group 4 - Post-Traumatic Stress Disorder (PTSD)

The Post Traumatic Stress Disorder Scale primarily assesses the experience of traumatic events and the behavioral implications. While being relatively unitary, the scale includes: 1. Avoidance of situations related to the trauma, 2. Intrusive thoughts related to living with the trauma, and 3. Reliving the trauma.

Factors	Items
Avoidance of situations tied to trauma	44, 48, 51, 52
Intrusive thoughts related to living with the trauma	45, 49, 50, 53
Reliving the trauma	43, 46, 47

Several other disorders may appear similar to PTSD such as Depression and Bipolar Disorder and need to be assessed and considered as a comorbidity in the initial interview. During the interview process and while reviewing the results of the CASE-MH, one should consider when the symptoms occurred prior to or after the trauma. Depressive Disorders generally do not include intrusive symptoms of avoidance or the trauma. OCD may include the intrusive thoughts, but these are rarely related to a traumatic event. Common comorbid disorders include: Depression, Bipolar Disorder, Anxiety Disorders, and Substance Abuse (see Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, 2013).

Several comorbid disorders are extremely common with PTSD as was found in Brady (1997), where 80% of individuals have at least one other psychiatric disorder. Brady et al. (2000), reported Depression was the most common disorder followed by Substance Abuse and then anxiety disorders. While the authors of the CASE-MH found a lower comorbidity for Substance Abuse, Depression was the most frequent comorbid disorder followed by Anxiety Disorders.

Strength of Correlation	Item	Correlation
Item with highest correlation	Do you try to avoid situations related to a past traumatic event?	.773
Item with lowest correlation	Does it often feel like the past traumatic event keeps occurring?	.550

Group 5 - Generalized Anxiety Disorder (GAD)

The Generalized Anxiety Disorder Scale examines three specific aspects of the disorder: 1. Worrying that “bad things” are going to happen and 2.

Being overwhelmed and unable to face potentially negative events. This scale primarily assesses excessive worrying, avoidance of anxiety producing settings, being overwhelmed, and difficulty coping when faced by anxiety producing situations. The scale also has questions assessing excessive reactions to events, worrying and excessive tenseness.

Factor	Items
Worrying that bad things are going to happen	54, 55, 56, 59, 60, 61
Being overwhelmed and unable to face potentially negative events	63, 64, 65

A thorough examination of the GAD results relative to item responses on other anxiety scales (Social Anxiety and OCD) is recommended. It is also recommended that the endorsed items on the Substance Abuse Scale be fully examined. This disorder can resemble Substance Abuse and therefore, it is important to examine the individual responses to the items on the Substance Abuse scale. It is also important to assess the use of the types of substances used. Often anxiety is a characteristic of alcohol and amphetamine abuse (Kushner, et.al., 2009). Substantial anxiety can also be found in PTSD (Lesser, 2009).

Again, a differential diagnosis examines all aspects of anxiety. Substantial anxiety may also be due to the impact of PTSD (Price et. al., 2019) and it is necessary to examine if the anxiety is better explained by PTSD. Generalized Anxiety Disorder is commonly seen in Depression and at times masks other disorders. Often both Depression and Anxiety can be diagnosed as the disorders have considerable common incidence and genetics (Kalin, 2020; Demirkan et al. 2011). It is very common for the two disorders to be comorbid. Simon (2009) reported that 67% of individuals with Generalized Anxiety Disorder are comorbid for Unipolar Depressive Disorder, 17% Bipolar Disorder, and only 16% had no comorbidities. Other Anxiety and Substance Disorders are also common. Other than Depressive Disorders, Social Anxiety Disorder was found in 24% of individuals in a study by Brawman-Mintzner et al. (1993). These

findings were consistent with the CASE-MH where it was found that the GAD scale correlated highly with Social Anxiety.

Strength of Correlation	Item	Correlation
Item with highest correlation	At times does your worrying wear you out mentally or physically?	.749
Item with lowest correlation	Do you experience minor negative errors as being catastrophes and negative repercussions will occur?	.61

Group 6 – Substance Abuse

The Substance Abuse Scale contains items related to: 1. Inability to cope and refrain from using substances and 2. Seeking help to stop using and illegal use. This scale assesses: Use of substances, DUIs, having attempted to stop using but not being successful, guilt, starting the day by using the substance, seeking help in order to deal with the abuse, and substance use interfering with relationships. These are generally highly intercorrelated.

Factor	Items
Inability to cope and stop using substances	68, 69, 70, 71, 72
Seeking help to stop using and illegal use	66, 67, 73, 74, 75, 76

This scale is not specific for which substances are being abused. There is some variation in the symptoms based on the substance, though the scale assesses behaviors that are typical patterns found with most abuse. Identification of specific substances used is typically a part of a diagnostic label (refer to the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition, 2013, or the ICD 10, 2012-2023).

Substance use disorders, especially Alcohol Abuse, are commonly comorbid with ADHD, Anxiety, Depression, PTSD, Bipolar Disorder and Antisocial Personality Disorder in addition to other anxiety disorders (Castillo-Carniglia et al., 2019). Also, one should consider the possibility of the use of multiple substances.

Strength of Correlation	Item	Correlation
Item with highest correlation	Has anyone ever told you that they are concerned about your drinking or drug use?	.832
Item with lowest correlation	Have you received a citation for DUI or driving while intoxicated due to the use of alcohol or drugs?	.60

Group 7 – Social Anxiety Disorder

This scale is highly unitary, assessing feelings of inadequacy and perceived negative judgments from others in social situations. More specifically, the Social Anxiety Disorder Scale assesses emotions such as fear, distress, avoidance, fear of being observed, problems in the initiation of conversations, and fear of speaking and being judged. These are clearly related and fit one factor.

It is sometimes difficult to know when the strength of the symptoms is better described as shyness. Social Anxiety, rather than shyness, is indicated by the CASE-MH when individuals endorse enough items to surpass the suggested Minimum score for risk of the disorder. An examination of test responses will assist in determining the possibility of shy character traits. Individuals likely experiencing Social Anxiety typically endorsed a great number of items on this scale.

It has been found that there are a high level of comorbid disorders with Social Anxiety Disorder. In a European study, Lecrubier et al. (2000) reported that 70 – 80% of individuals with Social Anxiety Disorder had at least one other comorbid psychiatric disorder with mood disorders being the most common. A literature review by Koyuncu et al. (2019) indicated that mood disorders were the most common comorbidity followed by bipolar disorders and anxiety disorders such as Generalized Anxiety Disorder. Magin et al. (2000) found that 23.8 % of individuals with social phobia (social anxiety disorder) had comorbid GAD. While the European study (Lecrubier et al., 2000) found that Depression was the primary

comorbidity. In a United States epidemiological study, Grant, et al. (2005), found that GAD was the most common comorbidity followed by Bipolar I, and Avoidant and Dependent Personality Disorders. In CASE-MH data, it was found that scores on the Social Anxiety Disorder scale correlated most highly with GAD, followed by Depression, and then Bipolar Disorder.

One specific disorder that needs to be considered along with Social Anxiety Disorder is GAD. GAD is usually related to worries about ongoing relationships with others, rather than being evaluated by others or performance in a setting. It is often useful to examine items endorsed by an individual on these GAD and Social Anxiety Scales in order to determine whether the primary disorder is GAD or Social Anxiety Disorder. Clients may endorse items like avoiding anxiety producing situations and experiencing minor errors as being a catastrophe and yet may not rise to the level of a comorbid disorder. However, if they identify many GAD items it would suggest a possible comorbidity of GAD. At this point, the authors believe it is important to also rule out panic disorder as part of the diagnostic process. Panic disorder many occur in social situations but it is generally a fear of having a panic attack rather than a fear of how others will view them. You may wish to rule out panic disorder using a specific measure for panic disorder.

Strength of Correlation	Item	Correlation
Item with highest correlation	Do you experience a rush of fear, anxiety or impending doom when others are watching you?	.793
Item with lowest correlation	When you are speaking, do you often feel others are judging or evaluating you?	.655

Group 8 – Attention Deficit Hyperactivity Disorder (ADHD)

The Attention Deficit Hyperactivity Disorder Scale includes two aspects of the disorder:

1. Inattention and 2. Impulsivity/Hyperactivity. This scale samples both Inattentive and Hyperactive/Impulsive patterns, with an emphasis on inattention due to its higher frequency (Williams et al., 2009) and in the authors' experiences is often underdiagnosed. The items in the scales were selected to include those with the highest correlations with their respective subscales. The correlations of the hyperactive/impulsive items with total scale score are slightly lower than the inattentive items. The largest percentage of persons with ADHD will show the combined pattern with characteristics of the inattentive and hyperactive/impulsive patterns. Milstein et al. (1997) found that 56% had combined type, 37% had only inattentive and 2% had only hyperactive/impulsive symptoms while Williams et al. (2009) found 62% had combined, 31% inattentive and 7% only hyperactive/impulsive type. Still some individuals will show purely, or primarily, inattentive symptoms and a smaller number will show purely or primarily hyperactive/impulsive patterns.

Factor	Items
Inattention	87, 88, 89, 90, 91, 92, 93, 94
Impulsive/Hyperactivity	95, 96, 97, 98

ADHD frequently occurs with other disorders (Post & Anderson, 2007). Young adults have been found (Murphy et al, 2002) to have Depression and Substance Abuse Disorders and those with combined type have a higher incidence of Oppositional Defiant Disorder and greater tendencies toward Antisocial Personality Disorder. Children with ADHD frequently have a comorbidity of Oppositional Defiant Disorder (Post & Anderson, 2007) and adults may show a range of personality disorders, especially Antisocial Personality Disorder (see Appendix F for scale). ADHD is a very common part of Autistic Disorder (Avni et al., 2019). (See Appendix F for an Autistic

scale.) Inability to attend and restlessness at times are better accounted for by GAD or other anxiety disorders and the scores on the GAD scale should be examined. Inability to concentrate may be a part of a Depressive Disorder where they may appear to show an inattentive or combined pattern of ADHD. Individuals with Bipolar Disorder typically show periods of high activity and impulsivity during episodes of mania (McIntyre et al., 2010). Clinicians using the CASE-MH should also examine the Bipolar Disorder scale as these ADHD symptoms may be occurring in individuals when experiencing manic episodes. McGough et al. (2005) reported that studies found a higher incidence of Bipolar, Substance Abuse Disorders, Oppositional Defiant Disorder, OCD, and PTSD in individuals with ADHD. They also found a higher incidence in individuals with hyperactive/impulsive type.

Our research showed that different patterns of ADHD are related to different comorbid disorders (Anderson et al., 2016). Inattentive ADHD is common with Unipolar Depression and Anxiety Disorders. Hyperactive/impulsive pattern is related to Bipolar-with Anxiety Disorders and PTSD.

Strength of Correlation	Item	Correlation
Item with highest correlation	I have difficulty organizing thoughts before beginning a task.	.797
Item with lowest correlation	I am unable to tolerate delays.	.560

In the next chapter, Clinical Applications, will further discuss some of this information in clinical applications along with charts, and further applications of results. It includes further case interpretation.

Statistical Methods Used:

Investigations of dimensionality (i.e., components of the scale) were conducted on each scale to determine if there was one prominent factor underlying the scale. The scale structural examinations were based on data from 610 individuals in the community sample. The reason for an examination of dimensionality was to determine if scales were relatively unitary in the underlying latent trait to justify the use of 1-PL IRT. Following the recommendation of the University of Illinois IRT Modeling Lab (Stark et al., 2001), a Principle Axis Factoring was used to determine if one latent trait was underlying each scale. The reason for using a Principle Axis Factoring is that it only accounts for common variance within a scale. Utilizing this approach, each scale only had one factor with an eigenvalue over one.

Additionally, Principle Components Analyses were conducted to examine both common and unique variance. This method was utilized to examine potential structures using confirmatory factor analyses. Maximum Likelihood Analyses were also used to identify an additional possible scale structure for the scales to test for the best structure using confirmatory factor analysis. On a couple of scales, heuristic models were also tested. Confirmatory factor analyses were conducted to determine the best fitting scale structure utilizing RMSA and other measures. In the very few cases where an item is omitted, the item did not load sufficiently into any factor. The best scale structure is discussed in this chapter.