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Attention Deficits in Cognitive Abilities as Measured by the MMPI-2-RF and NAB

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ATTENTION DEFICITS IN COGNITIVE ABILITIES AS MEASURED BY THE MMPI-2-RF AND NAB

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By

Ashley Mullins

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ATTENTION DEFICITS IN COGNITIVE ABILITIES AS MEASURED BY THE MMPI-2-RF AND NAB

Clinical Psychology

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Master of Science

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ABSTRACT

Attentional deficits, the inability to sustain attention and concentration, are a common symptom of many psychological disorders (i.e. AD/HD, Depression, Bipolar Disorder, Schizophrenia, PTSD, GAD, etc.). Previous studies examined the relationship between Minnesota Multiphasic Personality Inventory-2-Restructured Format (MMPI-2-RF) and measures of attention (Conner's CPT, WAIS III) specifically only with patients with AD/HD or traumatic brain injuries. This study set to explore the clinical utility of patterns on the MMPI-2-RF of people with attentional deficits, as measured by the Neuropsychological Assessment Battery (NAB) Attention Module. The final sample consisted of sixty-one adults (37 women, M_{age} = 20.8 years, age range: 18-48 years) from a General Psychology course or a client of the Learning Diagnostic Clinic (LDC). Participants were administered the MMPI-2-RF, the NAB-Attention Module, and a demographic survey. Results indicate a significant negative correlation between some of the MMPI-2-RF scales and the NAB-Attention scales. Significant negative correlations were found between Demoralization (RCd), Cognitive Complaints (COG), Helplessness/Hopelessness (HLP), Inefficacy (NFC), and Disaffiliativeness (DSF) with the NAB Attention Index score (ATT). This suggests that participants experiencing attentional deficits also report insecurity and a sense of worthlessness in their mental abilities, which may alternatively affect their self-worth and sense of belonging with other people.

KEYWORDS: Minnesota Multiphasic Personality Inventory-2-Restructured Format (MMPI-2-RF), Neuropsychological Assessment Battery (NAB), attention deficits, assessments, cognitive ability.

This abstract is approved as to form and content

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Paul Deal, Ph.D.
Chairperson, Advisory Committee
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INTRODUCTION

Attention is an essential cognitive state in which stimuli in the environment is selectively processed. Deficits in attention and the ability to concentrate are part of the symptomology of many psychological disorders such as Attention Deficit/Hyperactivity Disorder (ADHD), depressive disorders, Generalized Anxiety Disorder (GAD), Post-traumatic Stress Disorder (PTSD), Acute Stress Disorder, and neurocognitive disorders (American Psychiatric Association, 2013). There are several standardized tests that include attention as a construct being measured. These include tests of intellectual ability as well as other neuropsychological tests.

Models of Attention

One of the early models of attention was Broadbent's filter model of attention (1958). In this model, sensory information enters into the Sensory Store and then enters the Selective Filter. Humans have a limited capacity for information, therefore they must select relevant information (which is attended to) from irrelevant information (which is filtered out and lost). The information that is selected (attended to) then enters into Working Memory (WM), where the information can be manipulated and then potentially stored into Long-Term Memory (LTM; Van Zomeren & Brouwer, 1994).

Attention is a dynamic cognitive state and cannot be viewed as a single individual trait (Van Zomeren & Brouwer, 1994). There are two key features of attention: selectivity and intensity. Attention tasks will vary in difficulty of the intensity of the mental activity or the selection criterion (Van Zomeren & Brouwer, 1994). The size of the effect on a

person's performance on these tasks aids in determining the limitations of their attentional capacity. Selectivity requirements can be divided into focused attention and divided attention. Focused attention is the ability to focus on one source of information and exclude the rest (Van Zomeren & Brouwer, 1994). Divided attention is the ability to share attention between two or more sources of information (Van Zomeren & Brouwer, 1994). In focused attention tasks, there are extra stimuli (distractors) to be ignored. Alternatively, in divided attention tasks, all information is relevant.

Intensity requirements can also be divided into two categories: alertness and sustained attention. Alertness is the high sensory ability to orient to stimuli in the environment and a readiness to react to it with motor movements (Van Zomeren & Brouwer, 1994). Alertness is a quick and short reaction to a stimulus. Alternatively, sustained attention is the ability to direct attention at one or more sources of information for a long and unbroken period of time (Van Zomeren & Brouwer, 1994).

Depending on a person's attentional capacity, there is a variable amount of information that is selected and then enters into working memory. In working memory, the information is processed and manipulated. People with attention deficits often show difficulty on working memory tasks because they are not able to attend to all of the relevant information, and then manipulate the information. These deficits also manifest in academic and occupational achievements. Adults with attentional deficits have fewer years of education and have failed more courses compared to controls (Cox, 1998). Adults with attentional deficits also have occupational difficulties such as frequent job turnover, higher risk for being fired, and fewer promotions compared to controls (Cox,

1998). These are just a few of the real-life difficulties adults with attentional deficits experience.

MMPI-2-RF Used to Measure Attention

The Minnesota Multiphasic Personality Inventory-2-Restructured Format (MMPI-2-RF) and its earlier version (MMPI-2) have been used in neuropsychological settings and other clinical settings to measure psychopathology. The MMPI-2 has been linked to measures of "attention, retentive memory, and verbal list material" (Gass, 1996). In 1996, Gass examined specific scales (Clinical Scales: Depression [D], Psychasthenia [Pt], Schizophrenia [Sc]; Content Scales: Depression [DEP], Anxiety [ANX], Fears [FRS], Obsessiveness [OBS], and Bizarre Mentation [BIZ]) on the MMPI-2 and their relationship to the Wechsler Memory Scale-Revised (WMS-R). His sample consisted of 80 male psychiatric inpatients and 48 male closed-head injury patients. The psychiatric inpatients were diagnosed with a range of disorders including major depression, PTSD, bipolar disorder, GAD, and many others. The second sample consisted of veterans who were, on average, 2.6 years post-head injury involving a loss of consciousness. Gass found that both of the samples produced scores on the MMPI-2 that were significantly related to Attention Span. In particular the measures of anxiety (ANX), fearfulness (FRS), and confused or unusual thinking (BIZ) were significantly related to measures of attention and visual memory (Gass, 1996).

A similar study was conducted in 2003 by Ross, Putnam, Gass, Bailey, and Adams, in which they replicated the Gass study. Ross et al. included a sample of 381 people (male and female) referred for an evaluation due to a presumed head injury. The

authors found similar results to Gass in that MMPI-2 measures of emotional state and disturbed thinking were related to attentional measures in the sample. Ross et al. also found that the MMPI-2 clinical scales of Hypochondriasis (Hs), Depression (D), Hysteria (Hy), Psychasthenia (Pt), and Schizophrenia (Sc) were elevated for those with attentional deficits related to head-injury. Similar results have been found for elevations of the Depression (D), Psychopathic Deviate (Pd), Psychasthenia (Pt), and Schizophrenia (Sc) in samples of adults diagnosed with ADHD (Coleman et al. 1998; Downey, Stelson, Pomerleau, & Giordani, 1997; Gualtieri, Ondrusek, & Finley, 1985; Vaeth et al., 1989).

A more recent study conducted by Harp, Jasinski, Shandera-Ochsner, Mason, and Berry (2011) examined the use of the MMPI-2-RF in an adult population of individuals diagnosed with ADHD. In the study, Harp and colleagues examined if feigned ADHD could be detected using the MMPI-2-RF. They compared a clinical sample of students diagnosed with ADHD to a non-ADHD sample. They split each group into either an honest or a malingering condition. In the malingering condition, the students were provided with information about ADHD symptoms and asked to feign (non-ADHD) or exaggerate (ADHD) their symptoms. Harp et al. (2011) found that feigners were able to produce similar clinical profiles to those of honest ADHD participants. Both conditions elevated on the scales of somatic complaints (RC1), antisocial behavior (RC4), aberrant experiences (RC8), and hypomanic activation (RC9; Harp et al., 2011). Additionally, they were also able to produce similar measures on neurological complaints (NUC), cognitive complaints (COG), inefficacy (NFC), stress/worry (STW), anger-proneness (ANP), behavior-restricting fears (BRF), juvenile conduct problems (JCP), substance abuse (SUB), activation (ACT), and family problems (FML; Harp et al., 2011).

In related research, the MMPI-2 profiles of adults diagnosed with ADHD have been studied. Cox (1998) examined adults diagnosed with ADHD compared to Depressive disorder and Dysthymic disorder. For the ADHD group, Cox found significant elevations on Scales 7 (Psychasthenia) and 8 (Schizophrenia). For the Depressive disorders group, Cox found significant elevations on scales 2 (Depression), 6 (Paranoia), 7 (Psychasthenia), and 8 (Schizophrenia). Cox found considerable overlap in the cluster analyses, and concluded, based on these data, that ADHD could not be distinguished from Depression with the MMPI-2.

In 2000, Park developed an ADHD scale for the MMPI-2. The scale consisted of 12 items: 6 related to Inattention and 6 related to Hyperactivity. Park standardized and validated the scale, and determined that the ADHD scale has incremental validity in the assessment of adult ADHD symptoms (2000). In 2002, Gordon used Park's ADHD Scale on the MMPI-2, and compared the scores against other disorders: Specific Learning Disorder (SPL), no diagnosis (V-code), Anxiety Disorder, Mood Disorder, and other psychiatric disorders not specified (NOS). Gordon also examined correlations among the ADHD scale scores and the Wechsler Adult Intelligence Scale, Third edition (WAIS-III), Conners' Continuous Performance Test (CPT), and Learning and Study Strategies Inventory (LASSI). Gordon found that adults diagnosed with ADHD scored significantly higher on the ADHD scales than all comparison groups (SPL, V-code, Anxiety, Mood, NOS). Gordon found no significant correlations between the ADHD scale scores and the CPT index scores. Gordon found that the LASSI low scores on the scales of ATT (attitude about academics), ANX (anxiety about academics), and CON (concentration problems) were negatively correlated with high scores on the ADHD Inattention

subscale. Gordon also found no substantial correlation between the ADHD scale and the WAIS subtests of Arithmetic, Digit Span, and Digit Symbol. Gordon determined that it is difficult to develop a scale to examine a specific disorder, such as ADHD, due to considerable symptomatic overlap with other psychiatric disorders.

Due to the overlapping nature of attentional symptoms in many disorders, the present study examines focuses on attentional deficits, rather than specific attentional disorders (i.e. ADHD). The purpose of this study is to determine if the MMPI-2-RF has certain diagnostic features to reveal attentional deficits by determining its pattern of scores and determining its relation to the attention measures- Neuropsychological Assessment Battery (NAB) Attention Module.

NAB

One recently developed neuropsychological test is the Neuropsychological Assessment Battery (NAB) by Stern and White (2003). The NAB measures five domain-specific modules: memory, attention, language, spatial, and executive functioning. The Attention Module includes six subtests: Orientation, Digits forward, Digits backward, Dots, Numbers and letters, and Driving scenes. The Orientation subtest consists of questions to determine if the person can identify their name, time, place, and situation. In the digits forward subtest the person is presented with a number sequence orally and then must repeat back the sequence. This task measures the auditory attention capacity. For the digits backward subtest, the person is presented with a number sequence orally, but then must recite the sequence in backwards order. This subtest measures auditory working memory. In the Dots subtest the person is presented an array of dots for a brief

period of time, followed by a blank sheet, and then presented with a new array of dots with one new dot. The person is to point to the new dot. Visual scanning and visual working memory are assessed with this task. The Numbers and Letters subtest includes four parts (A, B, C, and D) which includes the tasks of letter cancellation, serial addition, letter counting, and letter cancellation plus serial addition. This subtest measures several functions, including concentration, sustained attention, focused or selective attention, divided attention, psychomotor speed, and information processing speed. The final subtest, Driving scenes, has the person presented with a picture of the perspective of behind a steering wheel. The person is then presented with a new picture and asked to point out and say everything that is different, new, or missing from the previous picture. Driving scenes is a Daily Living Task subtest, which is applying the construct being measured in an everyday living activity. The Driving scenes subtest also is designed to measure attention to detail, selective attention, visual scanning, and visual working memory.

The NAB was standardized using 1,448 adults ranging from ages 18 to 97, designed to match the 2001 U.S. Census. Participants in the normative sample were selected from four geographical locations in the United States: Rhode Island, Florida, Indiana, and California (Stern &White, 2003). The NAB Attention Module has the highest reliability coefficient of all the modules (Language Module, Memory Module, Spatial Module, and Executive Functions Module). The Attention Module subtests of Digits Forward was determined to have an Alpha coefficient = .78 and Digits Backward was determined to have an Alpha coefficient = .79 (Stern & White, 2003). The Attention Module was also determined to have a test-retest reliability = .85, the highest of all the

modules (Stern & White, 2003). The validity of the Attention module was determined by examining the intercorrelations and factor analysis. The intercorrelations revealed that the "each Attention Module primary (subtest) scores correlated more strongly with the Attention Module index score than any other module index score" (Stern & White, 2003, p. 142). The Exploratory Factor Analysis (EFA) revealed the subtests of Digits Forward, Digits Backward, Driving Scenes, Dots, and Mazes consistently loaded on Attention Factor. Digits Forward and Digits Backward loaded only on Attention and no other Module. Dots and Driving Scenes tended to load on all of the Modules. Numbers and Letters Efficiency loaded on Psychomotor Speed/Executive Function, and did not load on Attention. Examining the Confirmatory Factor Analysis (CFA), the Attention Module had the factor loadings of Digits Forward, Digits Backward, Numbers and Letters (A-D), Driving Scenes, and Dots. Numbers and Letters (A-D) were also correlated with the Spatial Module and Executive Functioning Module, which is understandable since it measures many functions including psychomotor speed, information processing, and sustained and selective attention. The data provide support for the validity of the NAB Attention Module.

MMPI-2-RF

The MMPI-2-RF is the updated and revised version of the MMPI-2, which was used in past studies. The MMPI-2-RF has test-retest reliabilities of the RC scales of .70 and higher, with the exception of the RC6 (Ideas of Persecution) scale (.62; Tellegen et al., 2003). Internal consistency was not considered in the development of the RC scales, but later studies show higher levels of internal consistency. The RC scale

intercorrelations depend on if they are affect-related (RC 2 and 7) or non-affect-related (RC4, 6, and 8) (Tellegen et al., 2003). Comparing the RC scales and the Clinical scales, the RC scales show improved reliability and significantly lower intercorrelations (Tellegen et al., 2003). The RC scales also show improved discriminant validity and improved levels of convergent validity than the MMPI-2 (Tellegen et al., 2003).

The MMPI-2-RF consists of eight RC scales. The current study focuses specifically on RC scales of RC2, RC7, and RC8. The RC 2 (Low Positive Emotions) scale measures the lack of positive emotional experiences, which is also a distinctive feature of major depression, but is also found in other disorders (Ben-Porath & Tellegen, 2008). The RC 7 (Dysfunctional Negative Emotions) scale measures various negative emotional experiences (i.e. anger, fear, anxiety; Ben-Porath & Tellegen, 2008). The RC 8 (Aberrant Experiences) scale measures unusual thoughts and perceptions that are characteristic of disorganized thinking (Ben-Porath & Tellegen, 2008). Elevated scores on RC 8 may also be related to a low tolerance for frustration. Some of the experiences in RC 8 have been related to certain neurological disorders (e.g. temporal lobe epilepsy; Ben-Porath & Tellegen, 2008).

The MMPI-2-RF consists of three higher-order scales (H-O). The higher-order scales measure clinically important concepts of thought, affect, and action (Ben-Porath & Tellegen, 2008). The current study focuses on the THD scale. The THD (Thought Dysfunction) scale measures a widespread range of difficulties associated with thought dysfunction, such as confusion, maladjusted behavior, disorganized thinking, shyness, avoidant and introverted behavior, bizarre delusions, and/or hallucinations (Ben-Porath & Tellegen, 2008).

The MMPI-2-RF consists of 25 specific problem scales. The specific problem scales were designed to highlight more narrow issues associated with the restructured clinical scales. The specific problem scales are divided into five sections: Somatic/Cognitive, Internalizing, Externalizing, Interpersonal, and Interest Scales. The current study focuses on the specific problem scales of NUC, COG, NFC, and STW. The NUC (Neurological Complaints) scale measures various neurological problems, such as dizziness, weakness, numbness, and involuntary movement (Ben-Porath & Tellegen, 2008). The COG (Cognitive Complaints) scale measures various cognitive difficulties, including difficulties concentrating, intellectual limitations, memory problems, and confusion (Ben-Porath & Tellegen, 2008). The NFC (Inefficacy) scale measures the difficulty in making decisions, both major and minor (Ben-Porath & Tellegen, 2008). The STW (Stress/Worry) scale measures difficulties with time pressure and specific worries about misfortune and finance (Ben-Porath & Tellegen, 2008).

The scales predicted to be elevated are based on the elevated scores from previous studies (Campbell, 1998; Coleman et al., 1998; Cox, 1998; Downey et al., 1997; Gass, 1996; Gordon, 2002; Gualtieri et al., 1985; Harp et al., 2011; Ross et al., 2003; Vaeth et al., 1989; See appendix A). A comparison of the results of the studies and the elevated scales of the MMPI-2 and the MMPI-2-RF can be found in the Appendix. The purpose of this study is to examine the relationship between selectMMPI-2-RF scales associated with attentional deficits and the NAB Attention Module.

Hypotheses:

1. There will be a negative relationship between the NAB-Attention scores and the MMPI-2-RF higher-order scale THD.
2. There will be a negative relationship between the NAB-Attention scores and the MMPI-2-RF scales RC2, RC7, and RC8.

3. There will be a negative relationship between the NAB-Attention scores and the MMPI-2-RF specific problem scales of NUC, COG, NFC, and STW.

METHODS

Participants

Prior approval for this project was obtained by the Missouri State University Institutional Review Board (November 4, 2014; project # 15-0180). Sixty-six adults (41 women, 25 men, 53 Caucasian, M_{age} = 20.7 years, age range: 18-48 years) participated in the current study. Participants consisted of Missouri State University (MSU) students in PSY 121 (General Psychology) course (N = 62) and Learning Diagnostic Clinic (LDC) clients (N = 4). The general psychology students are required to select and participate in their choice of experiments to receive course credit. Participants also consisted of clients from the Learning Diagnostic Clinic (LDC) who claimed they were experiencing attentional problems and between the ages of 18-97. Clients come to the LDC when they are experiencing problems that are interfering with their academic and interpersonal functioning, to determine the source of their troubles and seek help with them.

Among the participants, 47% reported experiencing difficulties with attention and concentration. Most (36%) reported experiencing problems concentrating less than seven days in one month, 21% reported experiencing problems every day, 15% reported never experiencing problems, and 12% reported experiencing problems 3-4 days a week. Most (32%) reported that their difficulties concentrating last 1-5 minutes, with 23% reported difficulties lasting 10-30 minutes. Eleven participants (17%) reported a psychiatric diagnosis that included ADD, ADHD, Anxiety, Depression, Bipolar, and Schizoaffective disorder.

Instruments

A demographic survey was administered to collect basic information such as gender, age, school year, and questions about attention difficulties. The questions about attentional difficulties included an indication if they were experiencing attention/concentration difficulties, the duration of the problems, and the severity of the attention/concentration difficulties. No other identifying information, including name, address, or M number, was obtained. The demographic survey is included in appendix B.

The Minnesota Multiphasic Personality Inventory-2-Restructed Form (MMPI-2-RF) is a self-report measure to assess personality and psychopathology. The MMPI-2-RF consists of 338 True-False statements administered to adults ages 18-90 years. The MMPI-2-RF was administered in both paper-and-pencil format as well as a computerized version. Results are presented as *T* scores ($M = 50$, $SD = 10$). Higher scaled scores indicate more endorsement of items from a particular scale, indicating the presence of more symptoms and behaviors associated with each scale. See appendix C for the names and abbreviations of the MMPI-2-RF scales.

The Neuropsychological Assessment Battery (NAB) Attention Module is a standardized neuropsychological test designed to measure attention. The NAB Attention Module consists of six subtests: Orientation, Digits forward, Digits backward, Dots, Numbers and letters, and Driving scenes (See appendix D for abbreviations). The NAB-Attention Module was designed to assess adults ages 18 to 97 years and is individually administered in paper-and-pencil form by an administrator. The subtest scores are presented as *T* scores ($M = 50$, $SD = 10$). The composite index score is originally generated as a Standard score ($M = 100$, $SD = 15$), but those were converted to *T* scores

(M = 50, SD = 10) for the study. Higher scaled scores indicate better performance on the subtests, indicating a higher attentional capacity. Lower scaled scores indicate a decline in performance on the subtests, indicating deficits in attentional capacity.

Procedure

Participants were recruited through the online computer system SONA and through the LDC. Participants were asked to complete the demographics survey, MMPI-2-RF, and NAB-Attention Module. The participant was first led to a quiet room with a table and chair. The Informed consent statement of the study was given first, followed by the demographic survey to obtain information about age, gender, school year, and report of any attentional problems they may be experiencing. Participants were then administered one of the two tests. Participants were randomly assigned the tests they would be administered first to counter-balance for any testing effects.

The MMPI-2-RF administration varied depending on if the participant was an LDC client or a PSY 121 student. LDC clients were led into a solitary room with a computer and chair at a computer. The participants were administered the MMPI-2-RF test on the computer and allowed to take as long as needed to complete the test (35-50 minutes). The General Psychology participants were led to a solitary room with a table and a chair and administered a paper-form of the MMPI-2-RF. The participant was allowed to take as long as needed to complete the test (40-50 minutes).

The NAB Attention Module was administered by the primary researcher or assistant according to the test's standardized procedure, with each subtest administered in order, and following the appropriate directions for each subtest. The Orientation subtest

was excluded due to the participants not suffering from a traumatic brain injury and the questions asking some personal information (e.g. address, phone number, etc.). Participants were administered all the remaining subtests: Digits Forward, Digits Backward, Dots, Numbers and Letters (A-D), and Driving Scenes. Administration of the NAB Attention Module lasted 30 minutes. Participants were then debriefed and allowed to leave.

RESULTS

The data set was screened for multicollinearity, linearity, normality, homoscedasticity, and outliers. Five outliers were identified and removed from the final data set. One participant was removed due to a Cannot Say (CNS) score greater than 15 on the MMPI-2-RF, making the protocol invalid. Three other participants were removed from the final data set due to having invalid protocols; two participants for having a Variable Response Inconsistency (VRIN-r) *T* score greater than 80, and one participant due to a True Response Inconsistency (TRIN-r) *T* score greater than 80. One participant was removed due to being an outlier on Mahalnobis distance ($p < .001$). The data set then had a remaining 61 participants (37 women, 24 men, 50 Caucasian, $M_{age} = 20.8$ years, age range: 18-48 years). Four of the participants were LDC clients, and ten participants self-reported having a psychiatric diagnosis. These two groups were combined into a "clinical" sample (N = 13; one LDC client self-reported a current diagnosis), and compared to the general psychology sample (N = 48) who did not self-report any psychiatric diagnoses. See Table 1 for means, standard deviation, and range for the MMPI-2-RF scales, and Table 2 for NAB Attention Module.

Table 1. Means, Standard Deviations, and Range of MMPI-2-RF Scales

MMPI-2-RF Scale	M	SD	Range
EID	52.4	10.8	39-88
THD	52.1	10.0	36-81
BXD	55.9	10.1	37-79
RCd	57.3	9.9	36-81
RC1	50.2	11.2	34-84
RC2	53.3	8.4	34-79
RC3	52.1	10.7	34-82
RC4	55.0	10.2	43-80
RC6	56.2	10.5	38-88
RC7	54.5	11.5	39-93
RC8	54.9	10.4	38-77
RC9	53.6	10.7	38-81
MLS	52.8	11.2	46-88
GIC	52.0	8.8	42-72
HPC	59.4	11.2	41-86
NUC	59.7	12.1	40-91
COG	49.3	10.1	45-79
SUI	51.1	9.7	40-78
HLP	53.1	11.8	42-76
SFD	57.1	10.7	43-90
NFC	57.5	12.6	36-81
STW	55.8	13.0	44-91
AXY	54.7	11.2	39-80
ANP	52.1	11.1	43-86
BRF	48.0	8.1	36-71
MSF	50.3	9.6	40-70
FCP	52.5	11.0	41-85
SUB	52.7	10.8	37-79
AGG	55.9	12.1	33-83
ACT	52.2	11.1	37-84
FML	46.8	10.3	34-81
IPP	51.0	10.3	36-80
SAV	51.0	8.8	37-75
SHY	52.2	13.1	44-98
DSF	53.8	11.2	28-83
AGGR-r	52.7	11.0	38-86
PSYC-r	51.6	9.7	35-85
DISC-r	56.6	10.7	36-88
NEGE-r	48.3	10.8	32-83
INTR-r	52.4	10.8	39-88

Note: $N = 61$

Table 2. Means, Standard Deviations, and Range of NAB Attention Module

NAB Scale	M	SD	Range
Digits Forward (DF)	46.2	9.5	23-69
Digits Backward (DB)	45.9	10.7	20-65
Dots	50.4	9.0	31-66
Numbers & Letters A Efficiency (N&L A-eff)	43.6	9.0	19-61
Numbers & Letters B Efficiency (N&L B-eff)	47.2	10.0	23-74
Numbers & Letters C Efficiency (N&L C-eff)	45.6	8.7	28-68
Numbers & Letters D Efficiency (N&L D-eff)	45.6	8.9	27-63
Driving Scenes (DRV)	43.2	8.6	27-68
Attention Index (ATT)	43.1	8.3	27-67

Note: $N = 61$

Higher Order Scales

A Pearson product-moment correlation was conducted to assess the relationship between the MMPI-2-RF higher-order scales (EID, THD, and BXD) and the Attention Index (ATT; See Table 3). A non-significant negative correlation were found between THD and ATT, ($r = -.03$, $p = .83$). Hypothesis 1 was rejected due to no significant correlations found between THD and any of the NAB-Attention scales.

A multiple linear regression was conducted to test if H-O scales significantly predict ATT scores. The results indicate that the combination of H-O scales can significantly predict ATT scores, $F(3, 57) = 2.80$, $p = .05$, $R^2 = .13$. EID significantly predicted ATT scores, $\beta = -.42$, $t(57) = -2.89$, $p = .006$, $pr^2 = .13$. THD did not significantly predict ATT scores. See Figure 1 for the relationship between THD and ATT. See Table 4 for the Beta values of the predictor variables.

Table 3. Correlations Between MMPI-2-RF H-O Scales and NAB- Attention Module Scales

	EID	THD	BXD
Digits Forward (DF)	-.12	-.01	-.01
Digits Backward (DB)	-.21	-.13	-.10
Dots	-.01	.02	.05
Numbers & Letters A Efficiency (N&L A-eff)	-.26*	.09	.02
Numbers & Letters B Efficiency (N&L B-eff)	-.19	-.03	-.10
Numbers & Letters C Efficiency (N&L C-eff)	-.30*	-.09	-.08
Numbers & Letters D Efficiency (N&L D-eff)	-.28*	-.07	-.03
Driving Scenes (DRV)	-.11	.03	.05
Attention Index (ATT)	-.32*	-.03	-.03

Note. *p < .05, **p< .01., N = 61

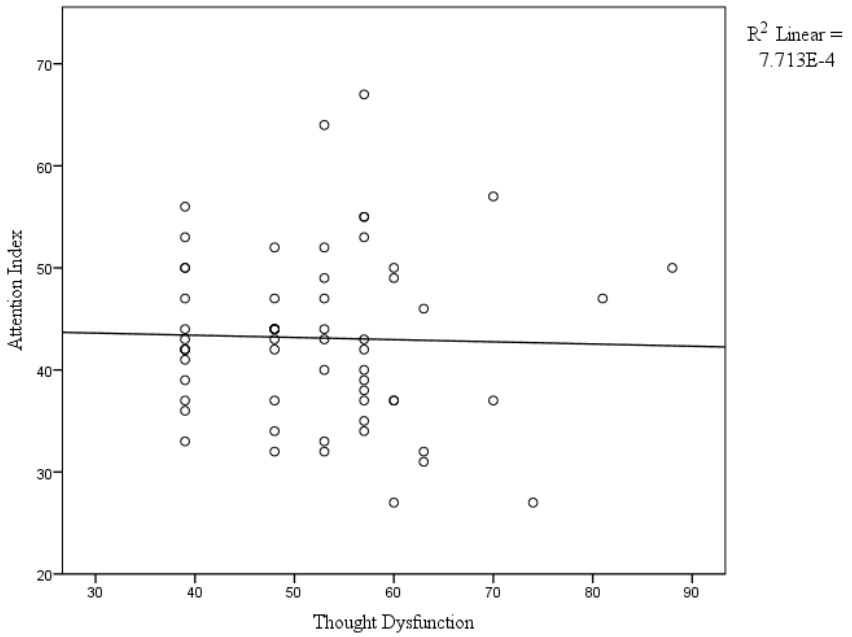

Figure 1. Relationship Between Thought Dysfunction (THD) and Attention Index Scores

Table 4. H-O Scale Predictors of Attention Index (ATT)

Predictor	Beta	*t*	*p*	pr^2
EID	-.42	-2.89	.006	.13
THD	.11	.76	.45	.01
BXD	.11	.71	.48	<.01

Note. df = 57

Restructured Clinical Scales

The Pearson product-moment correlations between the MMPI-2-RF restructured clinical scales (RCd, RC1, RC 2, RC 3, RC 4, RC 6, RC 7, RC 8, RC 9) and NAB-Attention scales (See Table 5) were examined.

RC 2 (Low Positive Emotions) did not have a significant correlation with ATT (r = -.23, p = .07), but did have a significant negative correlation with the subscale N&L C-eff (r = -.29, p = .02). No significant correlations were found with ATT and RC 7 (Dysfunctional Negative Thoughts; r = -.16, p = .21), or RC 8 (Aberrant Experiences; r = -.03, p = .82). Hypothesis 2 was partially supported due to a RC 2 having significant negative correlation with the NAB-Attention subscale of N&L C-eff.

A multiple linear regression was conducted to test if RC scales (RC 2, RC 7, and RC 8) significantly predict ATT scores. The results indicate that the combination of the RC scales did not predict ATT scores, F (3, 57) = 1.53, p = .22, R^2 = .08. None of the RC scales examined significantly predicted ATT scores (See Table 6). See Figures 2, 3, and 4 for the relationship between RC 2, RC 7, and RC 8 with ATT.

Table 5. Correlations Between MMPI-2-RF RC Scales and NAB- Attention Module Scales

	RCd	RC1	RC2	RC3	RC4	RC6	RC7	RC8	RC9
Digits Forward (DF)	-.14	.02	-.14	.03	-.03	.08	>-.01	.05	.08
Digits Backward (DB)	-.20	-.14	-.11	-.05	-.21	-.08	-.07	-.09	-.01
Dots	-.01	.08	-.09	.01	.01	-.06	.04	.04	-.01
Numbers & Letters A Efficiency (N&L A-eff)	-.20	-.02	-.14	.09	-.09	.09	-.10	.05	.17
Numbers & Letters B Efficiency (N&L B-eff)	-.13	-.12	-.11	.09	-16	-.09	-.19	-.05	.01
Numbers & Letters C Efficiency (N&L C-eff)	-.27*	-.09	-.29*	-.07	-.07	.01	-.14	-.17	-.02
Numbers & Letters D Efficiency (N&L D-eff)	-.29*	-.14	-.21	-.06	-.10	.01	-.17	-.11	.01
Driving Scenes (DRV)	-.04	.01	-.03	-.09	-.03	.02	-.13	.09	-.08
Attention Index (ATT)	-.27*	-.08	-.23	.01	-.15	.01	-.16	-.03	.05

Note. *p < .05, **p< .01, N = 61

Table 6. RC Scale Predictors of Attention Index (ATT)

Predictor	Beta	*t*	*p*	pr^2
RC 2	-.22	-1.62	.11	.04
RC 7	-.17	-1.08	.28	.02
RC 8	.12	.78	.44	.01

Note. df = 57

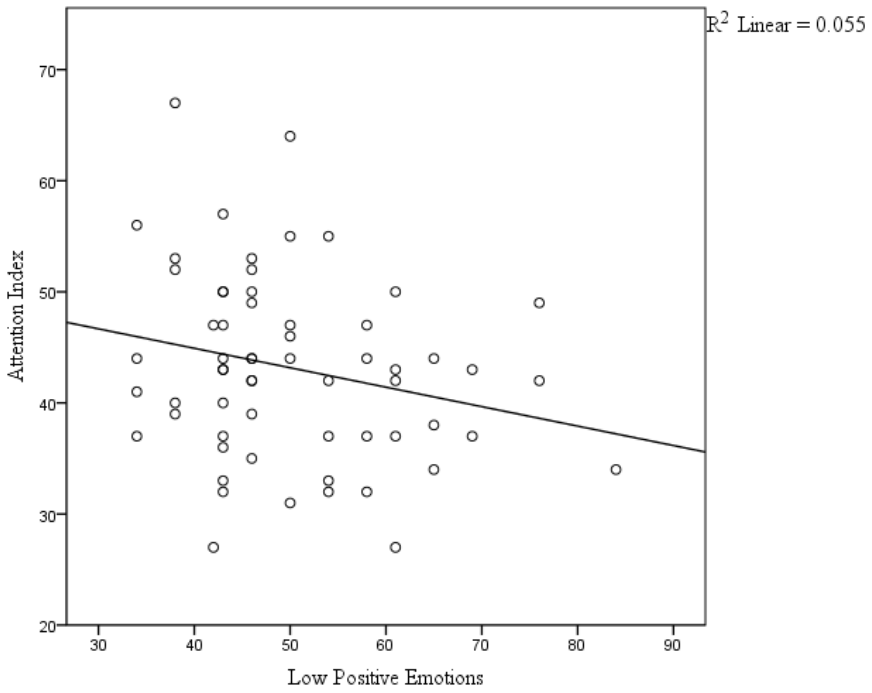

Figure 2. Relationship Between Low Positive Emotions (RC2) and Attention Index Scores

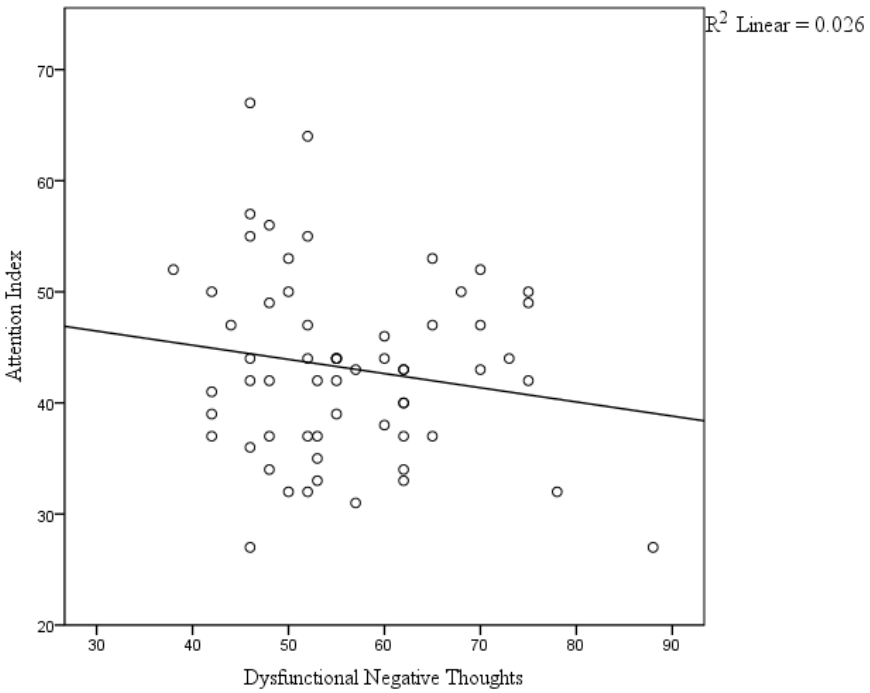

Figure 3. Relationship Between Dysfunctional Negative Thoughts (RC7) and Attention Index Scores

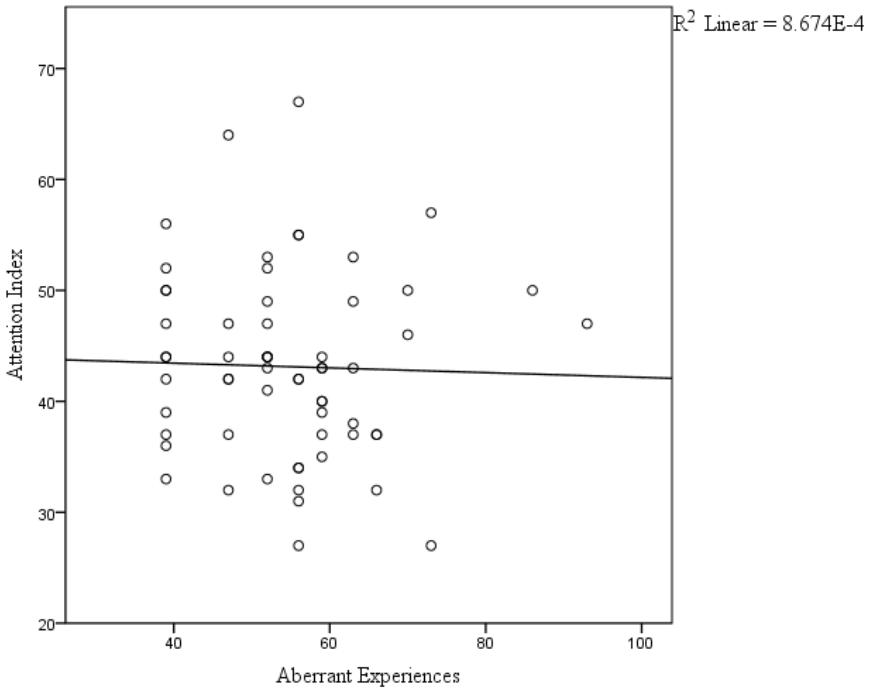

Figure 4. Relationship Between Aberrant Experiences (RC8) and Attention Index Scores

Somatic/ Cognitive Scales

A Pearson product-moment correlation was conducted to assess the relationship between the Somatic/Cognitive Scales (MLS, GIC, HPC, NUC, COG) and the NAB-Attention Scales (See Table 7). COG (Cognitive Complaints) was the only scale to have a significant negative correlation with ATT, r = -.27, p = .04. COG was also found to have a significant negative correlation with the NAB-Attention subscale of N & L D-eff, r = -.30, p = .02. .No significant correlation was found between ATT and NUC (Neurological Complaints), r = -.05, p = .72.

A multiple linear regression was conducted to test if Somatic/Cognitive scales (NUC and COG) significantly predict ATT scores. The results indicate that the combination of the NUC and COG did not predict ATT scores, F (2, 58) = 1.53, p = .08, R^2 = .08. COG did however significantly predict ATT scores on its own, β = -.33 , t (58) = -2.26 , p =.03, pr^2 = .08 (See Table 8). See Figure 5 for the relationship between NUC and ATT, and Figure 6 for COG and ATT.

Table 7. Correlations Between MMPI-2-RF Somatic/Cognitive Scales and NAB-Attention Module Scales

	MLS	GIC	HPC	NUC	COG
Digits Forward (DF)	.07	-.09	<.01	.08	-.21
Digits Backward (DB)	-.05	-.23	<.01	-.11	-.18
Dots	-.01	.18	.05	.08	.05
Numbers & Letters A Efficiency (N&L A-eff)	-.06	-.19	<.01	-.09	-.13
Numbers & Letters B Efficiency (N&L B-eff)	-.18	-.16	-.06	-.09	-.18
Numbers & Letters C Efficiency (N&L C-eff)	-.13	-.17	.01	-.03	-.21
Numbers & Letters D Efficiency (N&L D-eff)	-.20	-.27*	-.13	-.01	-.30*
Driving Scenes (DRV)	-.03	-.07	.06	-.09	-.08
Attention Index (ATT)	-.12	-.22	-.01	-.05	-.27*

Note. *p < .05, **p< .01., N = 61

Table 8. Somatic/Cognitive Scale Predictors of Attention Index (ATT)

Predictor	Beta	*t*	*p*	pr^2
NUC	.12	.82	.42	.01
COG	-.33	-2.26	.03	.08

Note. df = 58

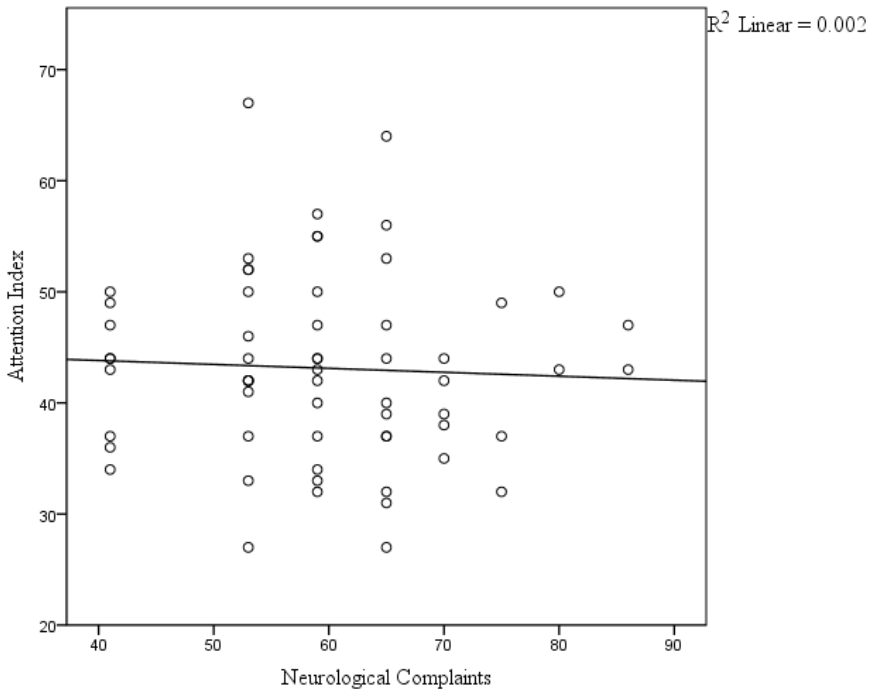

Figure 5. Relationship Between Neurological Complaints (NUC) and Attention Index Scores

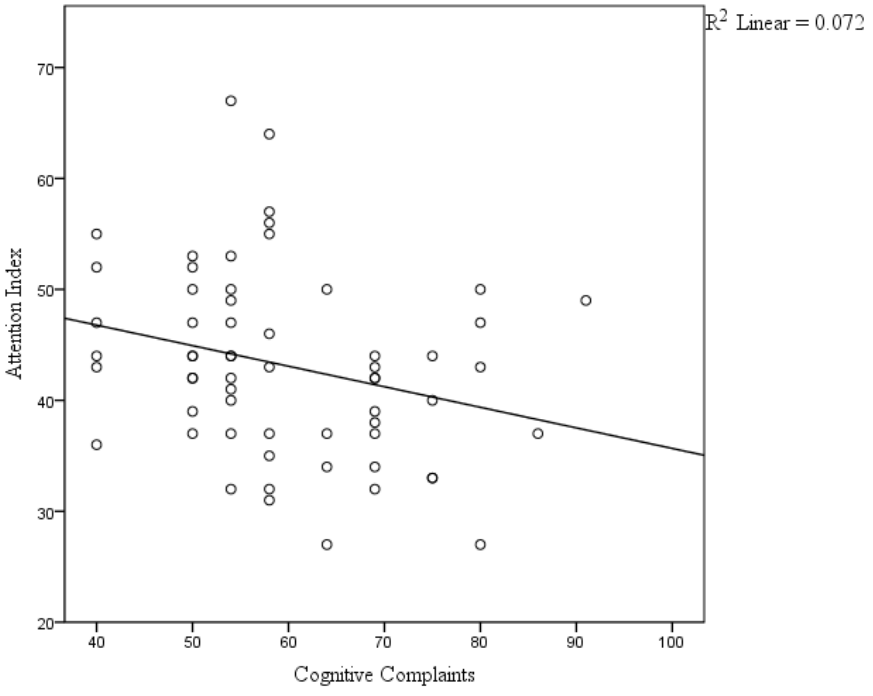

Figure 6. Relationship Between Cognitive Complaints (COG) and Attention Index Scores

Internalizing Scales

A Pearson product-moment correlation was conducted to assess the relationship between the Internalizing Scales (SUI, HLP, SFD, NFC, STW, AXY, ANP, BRF, MSF) and the NAB-Attention Scales (See Table 9) were examined. NFC did not have a significant correlation with ATT (r = -.22, p = .09), but did have a significant negative correlation with the NAB-Attention subscale of N&L D-eff (r = -.34, p = .01). STW did not have a significant correlation with ATT (r = -.21, p = .09), or any of the other NAB-Attention subscales. Hypothesis 3 was partially supported due to a significant negative correlation between ATT and COG, and a significant negative correlation between NFC and N&L D-eff.

A multiple linear regression was conducted to test if Internalizing scales (NFC and STW) significantly predict ATT scores. The results indicate that the combination of the RC scales did not predict ATT scores, F (2, 58) = 1.84, p = .17, R^2 = .06. Neither NFC nor STW significantly predicted ATT scores (See Table 10). See Figure 7 for the relationship between NFC and ATT, and Figure 8 for STW and ATT.

Table 9. Correlations Between MMPI-2-RF Internalizing Scales and NAB- Attention Module Scales

	SUI	HLP	SFD	NFC	STW	AXY	ANP	BRF	MSF
Digits Forward (DF)	-.07	-.25*	-.13	.03	.04	-.02	.01	-.03	.24
Digits Backward (DB)	<.01	-.30*	-.17	.03	-.10	-.15	-.03	-.19	.05
Dots	-.11	.07	<-.01	.01	.07	.07	.08	-.05	.05
Numbers & Letters A Efficiency (N&L A-eff)	-.07	-2.0	-.27*	-.17	-.20	-.18	-.02	.05	.03
Numbers & Letters B Efficiency (N&L B-eff)	-.11	.12	-.15	-.21	-.24	-.18	-.34*	-.16	.09
Numbers & Letters C Efficiency (N&L C-eff)	.04	-.26*	-.12	-.24	-.13	-.06	-.14	-.03	.08
Numbers & Letters D Efficiency (N&L D-eff)	-.17	-.15	-.18	-.34*	-.24	-.12	-.13	-.12	-.03
Driving Scenes (DRV)	.02	-.21	-.09	-.15	-.17	.08	-.04	.04	-.8
Attention Index (ATT)	-.10	-.27*	-.25	-.22	-.21	-.12	-.14	-.09	.11

Note. *p < .05, **p< .01, N = 61

Table 10. Internalizing Scale Predictors of Attention Index (ATT)

Predictor	Beta	*t*	*p*	pr^2
NFC	-.14	-.93	.36	.01
STW	-.13	-.86	.39	.01

Note. df = 58

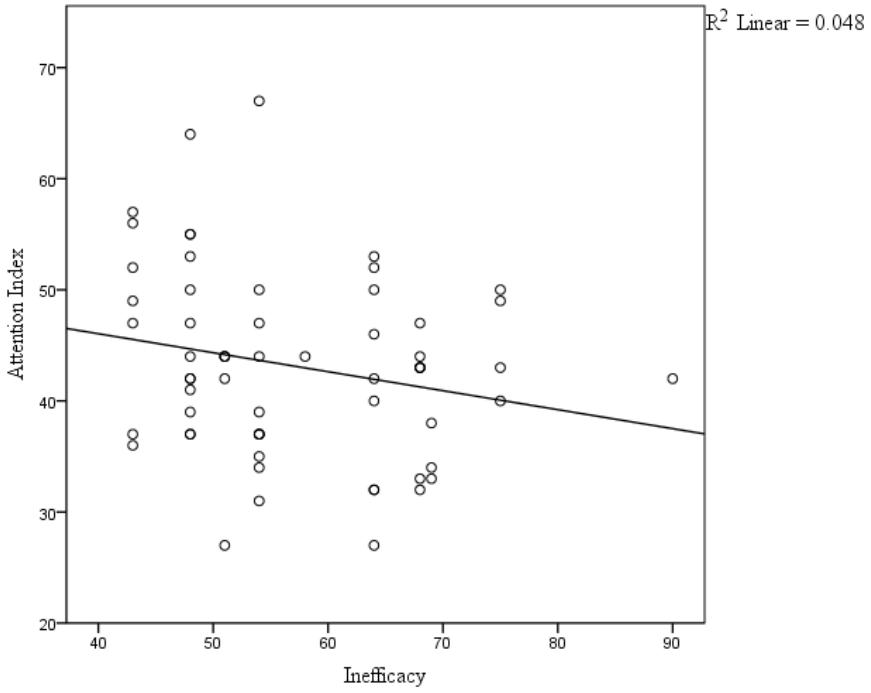

Figure 7. Relationship Between Inefficacy (NFC) and Attention Index Scores

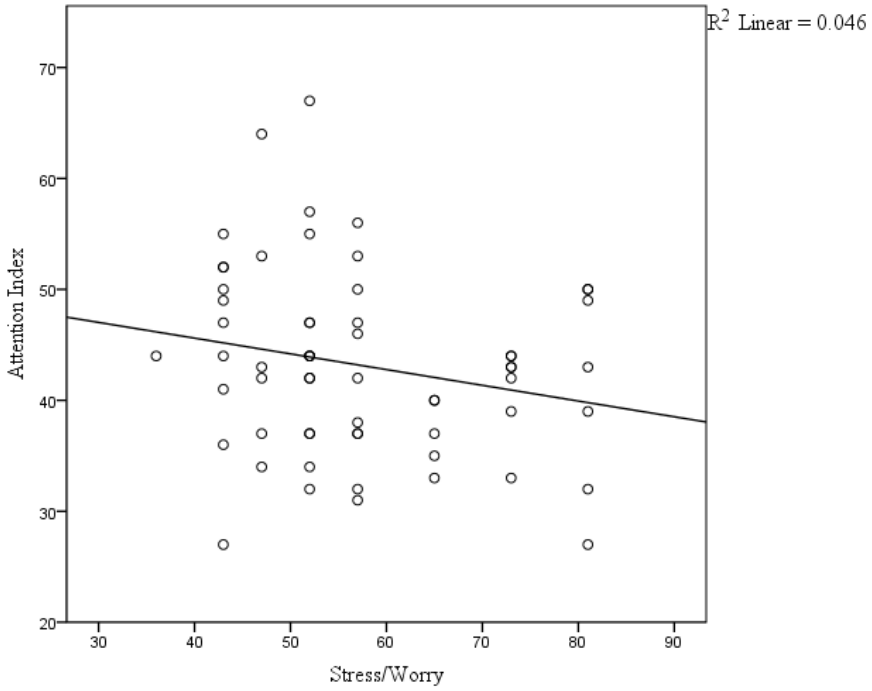

Figure 8. Relationship Between Stress/Worry (STW) and Attention Index Scores

DISCUSSION

The purpose of this study was to assess if specific MMPI-2-RF scales would be related to attentional deficits as assessed by NAB-Attention module scales. Hypothesis 1 stated there would be a negative relationship between THD and the NAB-Attention scores. Hypothesis 1 was rejected due to no significant correlations found between THD and any of the NAB subscales. THD may not have had a significant correlation due to the THD scale measuring disorganized thinking patterns related to psychotic features (i.e. delusions, hallucinations, and unrealistic thinking). One of the H-O scales, EID, did have a significant negative correlation with several of the NAB subscales and the Attention Index (ATT). This was an interesting finding, since difficulties with attention and concentration are a symptom of many disorders, such as depression, schizophrenia, ADD, and ADHD. This finding may have been due to the sample experiencing attention deficits related to emotionality and internalizing symptoms rather than pure attentional deficits. Only four of those with a psychiatric diagnosis had a single diagnosis of ADD/ADHD. The remaining six participants with a previous diagnosis had multiple diagnoses of either ADD with an emotional disorder (Depression, Bipolar, Anxiety).

Hypothesis 2 stated there would be a negative relationship between the MMPI-2-RF scales of RC 2, RC 7, and RC 8 and the NAB-Attention module scales. None of these scales had a significant correlation with the Attention Index (ATT). However, RC 2 was significantly correlated to N&L C-eff. Hypothesis 2 was only partially supported as there was not a significant correlation between the RC 7 and RC 8 scales and the NAB-Attention scales. The scales of RC 7 may not have had a significant correlation with the

attention scores due to RC7 scale items consisting of emotional statements (e.g. "I have been afraid of things or people that I knew could not hurt me" Ben-Porath & Tellegen, 2008), rather than relation to attention. People who are at risk for anxiety-related psychopathology have been found to have high endorsement on RC 7 scale items (Ben-Porath & Tellegen, 2008). Even though difficulty with concentration and attention is a symptom of anxiety-related psychopathology, the RC7 scale does not measure these attentional symptoms.

The RC 8 scale measures unusual perceptual experiences and disorganized thinking, which are symptoms of psychotic-related psychopathology. The RC 8 scale has very few items that may relate to attentional capacity (e.g. "I have had blank spells in which my activities were interrupted and I did not know what was going on around me" Ben-Porath & Tellegen, 2008) and mainly consists of items about peculiar experiences or delusional thinking. Perhaps the previous studies found elevations on the RC7 and RC 8 due to comorbidity of AD/HD with anxiety and mood disorders, which increases in adulthood (Mash & Barkley, 2014).

The RCd scale was found to be moderately correlated with the NAB Attention Index. Demoralization (RCd) is a broad measure of dissatisfaction with life and overall unhappiness (Ben-Porath & Tellegen, 2008). High RCd scores are an indication of being overwhelmed in life and a sense of helplessness and ineffectiveness. High RCd scores are also associated with difficulty in concentration, which could be the result of life-stress and affective influences, rather than pure inattention (Ben-Porath & Tellegen, 2008).

Hypothesis 3 stated that the specific problem scales of NUC, COG, NFC and STW would have a negative relationship with NAB- Attention Scales. Cognitive

Complaints (COG) was found to significantly predict Attention Index (ATT) scores and some of the NAB-Attention subscales scores. That is as COG scores increase on the MMPI-2-RF, NAB Attention scores decrease. The COG scale contains the most items that measure different cognitive difficulties, which include a low tolerance for frustration and difficulties concentrating (Ben-Porath & Tellegen, 2008). As this scale contains the most items about attentional difficulties, it would be understandable that it has a moderate relationship with Attention index scores. NUC was not found to have any relationship with the NAB-Attention scales. The NUC scale measures more of the somatic symptoms that are associated with inattention, such as migraines and dizziness, which in turn may be related to medical conditions. This scale would most likely be elevated for those who have attentional difficulties due to a neurological disorder (i.e. traumatic brain injury).

The NFC scale did not have a significant relationship with the Attention Index, but did have a significant moderate relationship with the subscale of N&L D-eff. The NFC scale measures indecisiveness and inability to effectively handle certain life difficulties. The N&L D-eff scale was one of the harder tasks on the NAB Attention module, due to a heavy mental load while under a time limit. People may feel ineffective in dealing with more difficult mental tasks. The STW scale did not have a significant relationship with the NAB-Attention module. The STW scale measures the level of life stresses (e.g. finances, disappointments, time pressures; Ben-Porath & Tellegen, 2008). The STW scale is comprised of nine statements about worry and/or stressors in a person's life (e.g. "It makes me nervous to have to wait" Ben-Porath & Tellegen, 2008). Although inattention is a symptom of anxiety-related psychopathology, the scale does not endorse explicit attentional symptoms that may be related to worry or stress.

Interestingly, there were significant negative correlations with other specific problem scales. Helplessness/Hopelessness (HLP) was moderately correlated with the NAB Attention Index and several of the subscales. The HLP scale measures a person's feeling of inability to overcome their life-problems and achieve their life-goals (Ben-Porath & Tellegen, 2008). People high on this scale may feel like they are overwhelmed and lack motivation to change (Ben-Porath & Tellegen, 2008). The relationship between feelings of helplessness/hopelessness may be related to feeling unable to achieve life goals due to attentional deficits. Cox (1998) discussed that people with attention deficits had more difficulty with college courses (less years of education and more failed courses) and more occupational difficulties (high turnover, risk of being fired, fewer promotions). Perhaps people with attention deficits, which are a symptom of many disorders, realize they are having more difficulties than others and feel they are not able to achieve similar life goals as compared to those who do not have difficulties with attention. If this is the case, it may also explain the moderate relationship between Self-Doubt (SFD) and the subscale of N&L C-eff. Self-doubt (SFD) measures the lack of confidence and feelings of inferiority and insecurity (Ben-Porath & Tellegen, 2008). People with attentional deficits may feel insecure about their deficits, which in turn may have more of an impact on their performance.

Coincidently, there was also a moderate relationship between disaffiliativeness (DSF) and the Attention Index and subscales. DSF scale measures a person's social distance. High DSF scores indicate that the responder dislikes being around people and prefers to be alone (Ben-Porath & Tellegen, 2008). As people perform worse on attentional tasks, they may prefer to distance themselves from others to not feel insecure

about their deficits. If this is the cause, it may also explain the moderate relationship between SHY and the NAB subscales. People may feel shy because of their deficits and may prefer not to be around others to avoid feelings of insecurity and worthlessness. Another possibility is that high DSF and SHY scores may also be related to a specific disorder, which itself is the main cause of the attentional difficulties.

Perhaps that the MMPI-2-RF scale elevations and correlates (HLP, SFD, NFC, DSF, SHY, RCd) with NAB-Attention scales could be explained by the sample in the study. The study was performed on a college campus, with majority of the sample consisting of college freshmen/sophomores. The college campus population could have feelings of incapability due to their surroundings, in which their performance is constantly being compared to similar people in their classes. Additionally, the results differ from the results of previous studies due to differences in the populations being examined (Cox, 1998; Gass, 1996; Harp et al., 2011, Ross et al., 2003).

Our study used more of a general population to compare to a clinical sample that varied in diagnoses of inattention. Most of the previous studies examined specifically one disorder (ADD/ADHD) or those of more serious psychological impairment (psychiatric inpatients and traumatic brain injury survivors). The results of finding COG as significantly related to attentional measures are consistent with the findings of Harp et al., 2011, although Harp et al. also found other scale elevations that the present study did not. Perhaps the both studies had this elevation due to similarities between the measured population and using the MMPI-2-RF. Harp et al. was one of the few studies to use the Restructured Format of the MMPI-2 in their study, while the other studies use the MMPI-2. Harp et. al. had also used a general population sample to compare to those of ADHD in

detecting if the general sample could feign symptoms to produce similar patterns on the MMPI-2-RF.

Due to the mixed findings, additional analyses were conducted to test if there were differences between the General Psych sample and the clinical sample. The general psychology sample ($M = 44.7$, $SD = 7.94$) had significantly higher NAB Attention Index (ATT) scores than the clinical sample, $M = 34.3$, $SD = 7.34$, $t\ (59) = 3.02$, $p = .004$. Means and Standard Deviations for the two groups are shown in Tables 11-14.

Table 11. Means, Standard Deviations, and Range of NAB Attention Module for General Psych Sample

NAB Scale	M	SD	Range
Digits Forward (DF)	47.6	8.3	29-69
Digits Backward (DB)	46.3	11.1	20-65
Dots	50.4	8.9	31-66
Numbers & Letters A Efficiency (N&L A-eff)	45.6	7.9	28-61
Numbers & Letters B Efficiency (N&L B-eff)	47.6	9.5	29-73
Numbers & Letters C Efficiency (N&L C-eff)	46.7	8.9	28-68
Numbers & Letters D Efficiency (N&L D-eff)	47.5	8.3	29-63
Driving Scenes (DRV)	43.7	8.6	28-68
Attention Index (ATT)	44.7	7.9	31-67

Note: $N = 48$

Table 12. Means, Standard Deviations, and Range of NAB Attention Module for Clinical Sample

NAB Scale	M	SD	Range
Digits Forward (DF)	41.1	11.8	23-60
Digits Backward (DB)	44.4	9.2	33-60
Dots	50.5	9.9	34-63
Numbers & Letters A Efficiency (N&L A-eff)	36.2	9.3	19-46
Numbers & Letters B Efficiency (N&L B-eff)	45.8	11.8	23-74
Numbers & Letters C Efficiency (N&L C-eff)	41.3	6.6	31-51
Numbers & Letters D Efficiency (N&L D-eff)	38.9	7.9	27-52
Driving Scenes (DRV)	41.0	8.8	27-52
Attention Index (ATT)	37.3	7.3	27-50

Note: $N = 13$

Table 13. Means, Standard Deviations, and Range of MMPI-2-RF Scales for General Psych Sample

MMPI-2-RF Scale	M	SD	Range
EID	50.5	9.0	33-71
THD	51.5	9.7	39-81
BXD	50.8	9.1	36-73
RCd	53.4	8.7	37-73
RC1	55.7	9.2	36-81
RC2	47.8	8.9	34-69
RC3	53.9	8.3	38-79
RC4	50.6	9.4	34-73
RC6	54.4	9.7	43-75
RC7	55.4	9.5	38-78
RC8	53.9	11.1	39-93
RC9	55.1	9.5	40-74
MLS	51.7	9.4	38-81
GIC	52.0	11.3	46-88
HPC	50.7	8.0	42-72
NUC	57.9	11.4	41-86
COG	56.5	10.5	40-86
SUI	48.0	9.1	45-79
HLP	49.4	9.3	40-78
SFD	50.6	10.9	42-76
NFC	55.7	10.3	43-90
STW	55.0	11.2	36-81
AXY	53.9	11.9	44-91
ANP	54.7	11.2	39-80
BRF	51.8	10.8	43-79
MSF	48.4	8.1	36-71
FCP	49.0	8.9	40-70
SUB	51.8	11.4	41-85
AGG	51.9	10.8	37-79
ACT	55.8	10.8	39-83
FML	51.8	11.5	37-84
IPP	45.8	8.9	34-68
SAV	49.5	10.4	36-80
SHY	50.1	8.4	37-66
DSF	49.9	10.8	44-78
AGGR-r	54.7	10.8	37-83
PSYC-r	52.1	10.3	38-79
DISC-r	50.6	9.6	35-85
NEGE-r	55.4	10.2	36-80
INTR-r	46.2	9.9	32-70

Note: $N = 48$

Table 14. Means, Standard Deviations, and Range of MMPI-2-RF Scales for Clinical Sample

MMPI-2-RF Scale	M	SD	Range
EID	61.5	10.9	43-80
THD	55.7	13.9	39-88
BXD	56.9	12.1	40-81
RCd	65.1	10.0	46-79
RC1	63.2	10.2	51-81
RC2	58.9	14.4	38-84
RC3	51.0	8.8	34-70
RC4	57.8	13.4	34-82
RC6	57.2	11.9	43-80
RC7	58.9	13.8	42-88
RC8	56.9	13.1	39-86
RC9	54.2	13.7	38-77
MLS	60.9	12.3	38-81
GIC	55.5	11.1	46-72
HPC	57.1	9.9	42-72
NUC	64.8	9.2	53-80
COG	71.5	10.3	50-91
SUI	54.1	12.4	45-79
HLP	57.5	8.6	40-69
SFD	62.1	10.7	42-76
NFC	62.2	10.9	48-75
STW	66.5	13.7	43-81
AXY	62.9	14.8	44-91
ANP	54.5	11.6	39-80
BRF	53.5	12.6	43-86
MSF	46.3	8.1	36-65
FCP	54.7	11.2	40-70
SUB	55.2	8.9	41-69
AGG	55.9	10.9	45-79
ACT	56.2	16.4	33-83
FML	53.7	9.6	37-74
IPP	50.5	14.2	39-81
SAV	56.3	8.3	47-70
SHY	54.4	9.6	44-75
DSF	60.6	17.3	44-98
AGGR-r	50.3	12.4	28-69
PSYC-r	64.9	13.8	38-86
DISC-r	55.5	9.3	41-69
NEGE-r	61.1	11.6	49-88
INTR-r	56.0	10.9	42-83

Note: $N = 13$

Higher Order Scales

General Psych. A Pearson product-moment correlation was generated to assess the relationship between the MMPI-2-RF higher-order scales (EID, THD, and BXD) and the Attention Index (ATT) in the General Psych Sample (See Table 15). EID was the only scale found to have significant negative correlations with the NAB-Attention scales, r = -.34, p = .02. Non-significant correlations were found between THD and ATT, (r = -.02, p = .92), and BXD and ATT (r = -.05, p = .72).

A multiple linear regression was conducted for the General Psych sample to test if H-O scales significantly predicted ATT scores. The results indicate that the combinations of H-O scales to predict ATT scores was not significant, F (3, 44) = 2.37, p = .08, R^2 = .14. EID was the only H-O scale that significantly predicted ATT scores, β = -.37, t (44) = -2.63, p =.01, pr^2 = .14. See Table 16 for the Beta values of the predictor variables. See appendix E for all of the scatterplots between the MMPI-2-RF scales and the NAB Attention Index Score for the General Psych sample.

Table 15. Correlations Between MMPI-2-RF H-O Scales and NAB- Attention Module Scales for General Psych Sample

	EID	THD	BXD
Digits Forward (DF)	-.10	-.03	-.04
Digits Backward (DB)	-.36*	-.24	-.23
Dots	.08	.09	-.02
Numbers & Letters A Efficiency (N&L A-eff)	-.20	.13	.02
Numbers & Letters B Efficiency (N&L B-eff)	-.29*	-.02	.01
Numbers & Letters C Efficiency (N&L C-eff)	-.34*	-.14	-.09
Numbers & Letters D Efficiency (N&L D-eff)	-.19	.02	-.04
Driving Scenes (DRV)	-.09	.08	.11
Attention Index (ATT)	-.34*	-.02	-.05

Note. *p < .05, **p< .01., N = 48

Table 16. H-O Scale Predictors of Attention Index (ATT) for General Psych Sample

Predictor	Beta	*t*	*p*	pr^2
EID	-.37	-2.63	.01	.14
THD	.15	.99	.33	<.01
BXD	<.01	.01	.99	<.01

Note. df = 48

Clinical Sample. A Pearson product-moment correlation was conducted to assess the relationship between the MMPI-2-RF higher-order scales (EID, THD, and BXD) and the Attention Index (ATT) in the Clinical Sample (See Table 17). Non-significant but positive correlations were found between EID and ATT ($r = .30$, $p = .31$), THD and ATT, ($r = .19$, $p = .55$), and BXD and ATT ($r = .45$, $p = .13$).

A multiple linear regression was conducted to test if H-O scales significantly predict ATT scores. The results indicate that the combination of H-O scales can significantly predict ATT scores, $F\ (3, 9) = 0.81$, $p = .52$, $R^2 = .21$. None of the Higher Order scales significantly predicted ATT scores individually, $p > .05$. See Table 18 for the Beta values of the predictor variables. See appendix F for all of the scatterplots between the MMPI-2-RF scales and the NAB Attention Index Score for the Clinical sample.

Table 17. Correlations Between MMPI-2-RF H-O Scales and NAB- Attention Module Scales for Clinical Sample

	EID	THD	BXD
Digits Forward (DF)	.25	.19	.30
Digits Backward (DB)	.46	.27	.41
Dots	-.26	-.14	.23
Numbers & Letters A Efficiency (N&L A-eff)	.20	.29	.45
Numbers & Letters B Efficiency (N&L B-eff)	.11	-.01	-.31
Numbers & Letters C Efficiency (N&L C-eff)	.28	.26	.25
Numbers & Letters D Efficiency (N&L D-eff)	.09	-.09	.46
Driving Scenes (DRV)	.05	-.01	.04
Attention Index (ATT)	.30	.19	.45

Note. *p < .05, **p< .01., N = 13

Table 18. H-O Scale Predictors of Attention Index (ATT) for the Clinical Sample

Predictor	Beta	*t*	*p*	pr^2
EID	.11	.31	.76	.01
THD	.04	.13	.90	<.01
BXD	.39	1.15	.28	.13

Note. df = 9

Restructured Clinical Scales

General Psych. The Pearson product-moment correlations between the MMPI-2-RF restructured clinical scales (RCd, RC1, RC 2, RC 3, RC 4, RC 6, RC 7, RC 8, RC 9) and NAB-Attention scales (See Table 19) were examined for the General Psych Sample. The General Psych sample did not have any significant correlations between the RC scales and the Attention Index (ATT), $p > .05$. RCd (Demoralization) had significant negative correlations with the NAB-Attention subscales of DB (r = -.36, p = .01) and N&L C-eff (r = -.30, p = .04). RC 1 (Somatic Complaints) had a significant negative correlation with DB (r = -.29, p = .05). RC 2 (Low Positive Emotions) was negatively correlated with NAB-Attention subscales of N&L B-eff (r = -.33, p = .02) and N&L C-eff (r = -.46, p = .001). RC 4 (Antisocial Behavior) was a significant negative correlation with DB, (r = -.40, p = .004).

A multiple linear regression was conducted to test if RC scales (RC 2, RC 7, and RC 8) significantly predict ATT scores. The results indicate that the combination of the

RC scales did not predict ATT scores, F (3, 44) = 2.12, p = .11, R^2 = .13. None of the RC scales examined significantly predicted ATT scores (See Table 20).

Table 19. Correlations Between MMPI-2-RF RC Scales and NAB- Attention Module Scales for General Psych Sample

	RCd	RC1	RC2	RC3	RC4	RC6	RC7	RC8	RC9
Digits Forward (DF)	-.15	-.10	-.11	-.01	-.08	.08	-.02	.03	.10
Digits Backward (DB)	-.36*	-.29*	-.21	-.06	-.40**	-.20	-.20	-.19	-.04
Dots	.03	.07	.02	.03	-.04	-.07	.14	.09	-.08
Numbers & Letters A Efficiency (N&L A-eff)	-.10	.11	.03	-.01	-.11	.03	-.23	.01	.06
Numbers & Letters B Efficiency (N&L B-eff)	-.21	-.19	-.33*	.08	-.13	-.03	-.23	-.06	.12
Numbers & Letters C Efficiency (N&L C-eff)	.30*	-.16	-.46**	-.12	-.05	-.06	-.20	-.27	-.08
Numbers & Letters D Efficiency (N&L D-eff)	-.18	-.16	-.15	-.25	-.11	.09	-.20	-.10	-.10
Driving Scenes (DRV)	.02	-.01	.01	-.04	<.01	.01	-.11	.09	-.09
Attention Index (ATT)	-.28	-.16	-.28	-.07	-.21	-.02	-.23	-.08	<-.01

Note. *p < .05, **p< .01, N = 48

Table 20. RC Scale Predictors of Attention Index (ATT) for General Psych Sample

Predictor	Beta	*t*	*p*	pr^2
RC 2	-.27	-1.87	.07	.07
RC 7	-.25	-1.52	.14	.05
RC 8	.12	.68	.50	.01

Note. df = 44

Clinical Sample. The Pearson product-moment correlations between the MMPI-2-RF restructured clinical scales (RCd, RC1, RC 2, RC 3, RC 4, RC 6, RC 7, RC 8, RC 9) and NAB-Attention scales (See Table 21) were examined for the Clinical Sample. RC 1 had a significant positive correlation with ATT (r = .82, p = .001). RC 1 also had significant positive correlations with the subscales of DB (r = .59, p = .03) and N&L C-eff (r = .75, p = .003). No significant correlations were found with ATT and RC 2 (r = .37, p = .21), RC 7 (Dysfunctional Negative Thoughts; r = .19, p = .53), or RC 8 (Aberrant Experiences; r = .33, p = .28).

A multiple linear regression was conducted to test if RC scales (RC 2, RC 7, and RC 8) significantly predict ATT scores. The results indicate that the combination of the RC scales did not predict ATT scores, F (3,9) = .86, p = ..50, R^2 = .22. None of the RC scales examined significantly predicted ATT scores (See Table 22).

Table 21. Correlations Between MMPI-2-RF RC Scales and NAB- Attention Module Scales for Clinical Sample

	RCd	RC1	RC2	RC3	RC4	RC6	RC7	RC8	RC9
Digits Forward (DF)	.34	.64*	.12	<-.01	.32	.21	.15	.22	.04
Digits Backward (DB)	.51	.59*	.26	-.09	.48	.40	.41	.33	.08
Dots	-.13	.12	-.38	-.03	.13	-.03	-.20	-.13	.17
Numbers & Letters A Efficiency (N&L A-eff)	.32	.21	.09	.19	.34	.48	.38	.38	.45
Numbers & Letters B Efficiency (N&L B-eff)	.18	.15	.37	.10	-.17	-.20	-.07	<.01	-.23
Numbers & Letters C Efficiency (N&L C-eff)	.37	.75**	.55	-.07	.19	.43	.19	.37	.11
Numbers & Letters D Efficiency (N&L D-eff)	.07	.49	.16	.35	.37	-.02	.07	.01	.24
Driving Scenes (DRV)	.08	.25	.30	-.38	.03	.12	-.10	.14	-.06
Attention Index (ATT)	.46	.82**	.37	.01	.43	.32	.19	.33	.18

Note. *p < .05, **p< .01, N =13

Table 22. RC Scale Predictors of Attention Index (ATT) for Clinical Sample

Predictor	Beta	*t*	*p*	pr^2
RC 2	.37	1.15	.28	.13
RC 7	-.23	-.54	.61	.03
RC 8	.39	.98	.36	.10

Note. df = 9

Somatic/ Cognitive Scales

General Psych. A Pearson product-moment correlation was conducted to assess the relationship between the Somatic/Cognitive Scales (MLS, GIC, HPC, NUC, COG) and the NAB-Attention Scales in the General Psych sample (See Table 23). GIC (Gastrointestinal Complaints) was the only scale to have a significant negative correlation with ATT, $r = -.29$, $p = .04$. GIC was also found to have a significant negative correlation with the NAB-Attention subscales of N & L B-eff ($r = -.29$, $p = .05$) and N & L D-eff ($r = -.35$, $p = .02$). MLS (Malaise) was also found to have significant negative correlation with the subscale N&L B-eff, $r = -.30$, $p = .04$.

A multiple linear regression was conducted to test if Somatic/Cognitive scales (NUC and COG) significantly predict ATT scores. The results indicate that the combination of the NUC and COG did not predict ATT scores, $F(2, 45) = 1.04$, $p = .36$, $R^2 = .04$. Neither NUC or COG significantly predict ATT scores on their own (See Table 24).

Table 23. Correlations Between MMPI-2-RF Somatic/Cognitive Scales and NAB-Attention Module Scales of the General Psych Sample

	MLS	GIC	HPC	NUC	COG
Digits Forward (DF)	.04	-.15	-.01	-.02	-.17
Digits Backward (DB)	-.19	-.26	-.07	-.22	-.28
Dots	-.01	.15	.07	.06	.08
Numbers & Letters A Efficiency (N&L A-eff)	.09	-.22	.17	<-.01	-.02
Numbers & Letters B Efficiency (N&L B-eff)	-.30*	-.29*	-.01	-.13	-.23
Numbers & Letters C Efficiency (N&L C-eff)	-.22	-.20	-.01	-.03	-.16
Numbers & Letters D Efficiency (N&L D-eff)	-.08	-.35*	-.20	.03	-.22
Attention Index (ATT)	-.19	-.29*	.01	-.08	-.21

Note. *p < .05, **p< .01., N = 48

Table 24. Somatic/Cognitive Scale Predictors of Attention Index (ATT) of the General Psych Sample

Predictor	Beta	*t*	*p*	pr^2
NUC	.02	.12	.91	<.01
COG	-.22	-1.33	.19	.04

Note. df = 45

Clinical Sample. A Pearson product-moment correlation was conducted to assess the relationship between the Somatic/Cognitive Scales (MLS, GIC, HPC, NUC, COG) and the NAB-Attention Scales in the Clinical sample (See Table 25). NUC (Neurological Complaints) had a significant positive correlation with ATT, $r = .74$, $p = .004$. NUC also have significant positive correlations with the subscales DF ($r = .77$, $p = .002$) and DB ($r = .66$, $p = .02$). COG (Cognitive Complaints) was also found to have a significant positive correlation with the NAB-Attention subscale of N&L A-eff, $r = .57$, $p = .04$. MLS (Malaise) also had a significant positive correlation with ATT, $r = .64$, $p = .02$. MLS also had a significant positive correlations with the subscales of DB ($r = .59$, $p = .03$) and N&L C-eff ($r = .64$, $p = .02$). HPC (Head Pain Complaints) also had significant positive correlations with the subscales N&L C-eff ($r = .57$, $p = .04$) and N&L D-eff ($r = .61$, $p = .03$).

A multiple linear regression was conducted to test if Somatic/Cognitive scales (NUC and COG) significantly predict ATT scores. The results indicate that the combination of the NUC and COG significantly predicted ATT scores, $F(2, 10) = 6.10$, $p = .02$, $R^2 = .55$. NUC was a significant predictor of ATT scores on its own, $\beta = .71$ $t(10) = 3.04$, $p = .03$, $pr^2 = .48$ (See Table 26).

Table 25. Correlations Between MMPI-2-RF Somatic/Cognitive Scales and NAB-Attention Module Scales of the Clinical Sample

	MLS	GIC	HPC	NUC	COG
Digits Forward (DF)	.52	.22	.33	.78**	.19
Digits Backward (DB)	.59*	-.03	.38	.66*	.35
Dots	-.02	.27	<-.01	.17	-.04
Numbers & Letters A Efficiency (N&L A-eff)	.17	.10	.14	.11	.57*
Numbers & Letters B Efficiency (N&L B-eff)	.16	.28	-.13	.12	.06
Numbers & Letters C Efficiency (N&L C-eff)	.64*	.18	.57*	.53	.28
Numbers & Letters D Efficiency (N&L D-eff)	-.05	.20	.61*	.44	.32
Driving Scenes (DRV)	.41	-.20	.02	.03	-.25
Attention Index (ATT)	.64*	.28	.45	.74**	.37

Note. *p < .05, **p< .01., N = 13

Table 26. Somatic/Cognitive Scale Predictors of Attention Index (ATT) of the Clinical Sample

Predictor	Beta	*t*	*p*	pr^2
NUC	.71	3.04	.01	.48
COG	.07	.29	.78	.01

Note. df = 10

Internalizing Scales

General Psych. The Pearson product-moment correlations between the Internalizing Scales (SUI, HLP, SFD, NFS, STW, AXY, ANP, BRF, MSF) and the NAB-Attention Scales (See Table 27) were examined for the General psych sample. None of the internalizing scales had a significant correlation with ATT, $p > .05$. HLP had a significant negative correlations with the NAB-Attention subscale of DB ($r = -.34$, $p = .02$). AXY (Anxiety) had a significant negative correlation with DB ($r = -.31$, $p = .03$. NFC did not have a significant correlation with ATT ($r = -.22$, $p = .09$), but did have a significant negative correlation with the NAB-Attention subscale of N&L B-eff ($r = -.33$, $p = .02$), and N&L D-eff ($r = -.38$, $p = .01$). STW did not have a significant correlation with ATT ($r = -.24$, $p = .09$), or any of the other NAB-Attention subscales.

A multiple linear regression was conducted to test if Internalizing scales (NFC and STW) significantly predict ATT scores. The results indicate that the combination of the RC scales did not predict ATT scores, $F(2, 45) = 1.94$, $p = .16$, $R^2 = .08$. Neither NFC nor STW significantly predicted ATT scores (See Table 28).

Table 27. Correlations Between MMPI-2-RF Internalizing Scales and NAB- Attention Module Scales for General Psych Sample

	SUI	HLP	SFD	NFC	STW	AXY	ANP	BRF	MSF
Digits Forward (DF)	-.08	-.17	-.06	.08	.02	-.07	.02	.07	.16
Digits Backward (DB)	-.07	-.34*	-.25	-.03	-.25	-.31*	-.04	-.25	-.02
Dots	-.04	.21	.08	.08	-.04	.04	.14	.07	.09
Numbers & Letters A Efficiency (N&L A-eff)	<.01	-.09	-.20	-.25	-.16	-.21	-.10	.03	-.08
Numbers & Letters B Efficiency (N&L B-eff)	-.15	.11	-.21	-.33*	-.17	-.17	-.39**	-.22	.05
Numbers & Letters C Efficiency (N&L C-eff)	.01	-.23	-.05	-.28	-.07	-.04	-.17	-.03	-.06
Numbers & Letters D Efficiency (N&L D-eff)	-.21	-.07	.04	-.38**	-.25	-.05	-.19	-.15	-.13
Driving Scenes (DRV)	.04	-.13	-.06	-.08	-.14	.17	.06	.06	-.10
Attention Index (ATT)	-.12	-.16	-.15	-.25	-.24	-.15	-.16	-.08	-.02

Note. *p < .05, **p< .01, N = 48

Table 28. Internalizing Scale Predictors of Attention Index (ATT) of the General Psych Sample

Predictor	Beta	*t*	*p*	pr^2
NFC	-.17	-1.01	.32	.02
STW	-.15	-.87	.39	.02

Note. df =45

Clinical Sample. The Pearson product-moment correlations between the Internalizing Scales (SUI, HLP, SFD, NFS, STW, AXY, ANP, BRF, MSF) and the NAB-Attention Scales (See Table 29) were examined for the Clinical sample. None of the internalizing scales had a significant correlation with ATT, $p > .05$.STW (Stress/Worry) had a significant positive correlation with DB, $r = .56$, $p = .05$. MSF had a significant positive correlation with N&L C-eff, $r = .66$, $p = .01$.

A multiple linear regression was conducted to test if Internalizing scales (NFC and STW) significantly predict ATT scores. The results indicate that the combination of the RC scales did not predict ATT scores, $F(2, 10) = 1.33$, $p = .31$, $R^2 = .21$. Neither NFC nor STW significantly predicted ATT scores (See Table 30).

Table 29. Correlations Between MMPI-2-RF Internalizing Scales and NAB- Attention Module Scales for the Clinical Sample

	SUI	HLP	SFD	NFC	STW	AXY	ANP	BRF	MSF
Digits Forward (DF)	.17	-.19	.12	.19	.49	.38	-.02	-.21	.40
Digits Backward (DB)	.35	-.09	.31	.38	.56*	.55	.01	.04	.35
Dots	-.28	-.49	-.38	-.21	.37	.16	-.10	-.44	-.05
Numbers & Letters A Efficiency (N&L A-eff)	.15	.01	.14	.47	.24	.32	.21	.24	.19
Numbers & Letters B Efficiency (N&L B-eff)	.04	.31	.11	.20	-.35	-.16	-.20	<-.01	.21
Numbers & Letters C Efficiency (N&L C-eff)	.52	.07	.12	.26	.11	.26	-.03	.09	.66*
Numbers & Letters D Efficiency (N&L D-eff)	.29	.22	-.33	.17	.41	.15	.03	.07	.13
Driving Scenes (DRV)	.11	-.35	.02	-.25	-.11	-.03	-.41	.03	-.07
Attention Index (ATT)	.30	-.16	.04	.31	.44	.42	-.17	-.08	.45

Note. *p < .05, **p< .01, N = 13

Table 30. Internalizing Scale Predictors of Attention Index (ATT) of the Clinical Sample

Predictor	Beta	*t*	*p*	pr^2
NFC	.14	.43	.68	.02
STW	.38	1.21	.26	.13

Note. df = 10

Discussion on Differential Group Findings

The correlations for the separate groups revealed that the significant EID correlations from the total sample were found in general psychology sample. These findings suggest that the general psychology sample endorsed more emotional/internalizing items than did the clinical sample. The General Psychology sample had more significant negative correlations with the NAB Attention modules than the clinical sample.

Interestingly, the clinical sample had positive correlations between the MMPI-2-RF scales and the NAB-Attentions scales. This means that items endorsed on the MMPI-2-RF were associated with higher NAB-Attention scores. One possible reason for this finding is that clinical sample was treated and no longer symptomatic, and therefore was no longer experiencing symptoms of inattention. The General Psych sample, who did not have diagnoses, may have attentional symptoms that were untreated. Given that the clinical sample was self-reporting their diagnoses, it is difficult to determine if they are still accurately experiencing intentional symptoms. Questions still remain as to who assigned the diagnosis (i.e. general medical practitioner or psychologist) and any if they were accurately reporting any current medications.

Another possible reason for this finding is that people are not able to accurately self-appraise their attentional capacities. In a closer examination of the demographic data, it was found that people's self-appraisal of attentional difficulty did not correlate with their Attention index scores, $\rho = -.21$, $p = .12$. People may inaccurately think they have/do not have attentional difficulties when they do/do not. Some people may think they have difficulty sustaining attention, when their inability may come from other factors (e.g. lack of motivation). Others may not think or admit that they may have attentional deficits, when in actuality they do (e.g. denial).

Limitations and Future Directions

There were certain constraints with this study's sample which could be addressed in future studies. The current sample consisted of university students, with the majority being freshmen (N = 38) and Caucasian (N= 50). The sample also had a minority of those actually diagnosed with psychiatric disorders (N = 10), although slightly less than half (44%) of the study's sample endorsed difficulties with concentration and attention. A larger clinical sample equal to the general population (undiagnosed) sample could provide a more accurate representation on the MMPI-2-RF that in turn might predict attentional deficits on the NAB-Attention module.

Future research could examine a more diverse and representative sample (ethnicity and age), and include different settings. Future research could be conducted assessing the setting and the performance of those with attentional deficits (e.g. work place, university, clinics). Research on this topic could help understand the role of an evaluative environment, in which the person's performance is compared to those in their

environment. Research in these settings for people with attentional deficits may provide a better understanding of the findings of demoralization, inefficacy, helplessness, and self-doubt.

Future research could also be conducted on the disorders which have attentional and concentration difficulties as a symptom and the differences between these groups on MMPI-2-RF and Attention Assessments. Different patterns may be found by comparing a large sample consisting of all of the psychiatric diagnoses (AD/HD, Neurocognitive disorders, Depressive disorders, Bipolar, Schizoaffective, Anxiety disorders, and PTSD). The different disorders may provide overlapping patterns that could be used to find consistent reporting on these attentional symptoms. Lastly, future research could also be conducted on the self-appraisals of attention deficits in adults compared to performance on standardized measures of attention. More research would indicate if people are accurately able to appraise their symptoms of inattention compare to objective performance measures.

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Appendix A. Comparison of Elevated Score Patterns of Attentional Deficits on MMPI-2 and MMPI-2-RF

		Gualtieri et al. (1985)	Vaeth et al. (1989)	Gass (1996)	Downey et al. (1997)	Campbell (1998)	Coleman et al. (1998)	Cox (1998)	Gordon (2002)	Ross et al. (2003)	Harp et al. (2011)
	Measured:	ADD	ADD	Attention	ADHD	ADHD	ADD	ADHD	ADHD	Attention	ADHD
MMPI-2 Clinical Scales:	**MMPI-2-RF Clinical Scales:**										
(1) Hypochondriasis (Hs)	Somatic Complaints (RC1)									Hs	RC1
(2) Depression (D)	Low Positive Emotions (RC2)		D	D	D		D	RC2	RC2	D	
(3) Hysteria (Hy)	Cynicism (RC3)			Hy						Hy	
(4) Psychopathic Deviant (Pd)	Antisocial Behavior (RC4)		Pd		Pd						RC4
(6) Paranoia (Pa)	Ideas of Persecution (RC6)		Pa								
(7) Psychasthenia (Pt)	Dysfunctional Negative Thoughts (RC7)	Pt	Pt	Pt	Pt	RC7	Pt	RC7	RC7	Pt	
(8) Schizophrenia (Sc)	Aberrant Experiences (RC8)	Sc	Sc	Sc	Sc	RC8	Sc	RC8	RC8	Sc	RC8
(9) Hypomania (Ma)	Hypomanic Activation (RC9)	Ma	Ma						RC9		RC9
(0) Social Introversion (Si)		Si	Si								

Appendix B. Demographic Survey

1. Birth date:_____ Age: _____

2. Sex: _____

3. Ethnicity:

_____White/Caucasian
_____Hispanic or Latino
_____Black or African American
_____Native American or American Indian
_____Asian/Pacific Islander
_____Other: _____

4. Current Level in School: (Circle One)

Freshman (13^{th}) Sophomore (14^{th}) Junior (15^{th}) Senior (16^{th})

5. Have you been experiencing any problems within the past 6 months with Sustained Attention and Concentration? (Circle One)

Yes No

6. How often do you say you experience problems concentrating? (Circle One)

Never	$\leq$ 7 days in 1 month	7-14 days in 1 month	1-2 days a week	3-4 days a week	5-6 days a week	Every day (7 days a week)

7. If/When you experience problems sustaining attention/concentrating, how long does it seem to last? (Circle One)

$\leq$ 1 min.	1-5 min.	10-30 min.	30 min.	1 hour	2-3 hours	4-5 hours	6 hours or longer

8. Are there certain circumstances that may seem to be related to these problems? (e.g. Tiredness, Noises in environment, Lack of motivation) Please explain:

9. Do you have any current psychiatric diagnoses:

Yes No

If yes, please explain:

Appendix C. MMPI-2-RF Scale Names and Abbreviations

Validity Scales:

CNS - Cannot Say
VRIN-r -Variable Response Inconsistency
TRIN-r -True Response Inconsistency
F-r - Infrequent Responses
Fp-r - Infrequent Psychopathology Responses
Fs - Infrequent Somatic Responses
FBS-r - Symptom Validity
RBS - Response Bias
L-r - Uncommon Virtues
K-r - Adjustment Validity

Higher-Order (H-O) Scales:

EID - Emotional / Internalizing Dysfunction
THD - Thought Dysfunction
BXD - Behavioral / Externalizing Dysfunction

Restructured Clinical (RC) Scales:

RCd -Demoralization
RC1 -Somatic Complaints
RC2 - Low Positive Emotions
RC3- Cynicism
RC4- Antisocial Behavior
RC6- Ideas of Persecution
RC7- Dysfunctional Negative Emotions
RC8- Aberrant Experiences
RC9-Hypomanic Activation

Somatic / Cognitive Scales:

MLS - Malaise
GIC - Gastro-Intestinal Complaints
HPC -Head Pain Complaints
NUC -Neurological Complaints
COG -Cognitive Complaints

Internalizing Scales:

SUI - Suicidal/Death Ideation
HLP - Helplessness/Hopelessness
SFD - Self-Doubt
NFC -Inefficacy
STW -Stress / Worry
AXY - Anxiety
ANP -Anger Proneness

BRF - Behavior-Restricting Fears
MSF -Multiple Specific Fears

Externalizing Scales:
JCP - Juvenile Conduct Problems
SUB -Substance Abuse
AGG -Aggression
ACT - Activation

Interpersonal Scales:
FML - Family Problems
IPP - Interpersonal Passivity
SAV - Social Avoidance
SHY - Shyness
DSF - Disaffiliativeness

Interest Scales:
AES - Aesthetic-Literary Interests
MEC - Mechanical-Physical Interests

PSY-5 (Personality Psychopathology Five) Scales, Revised:
AGGR-r - Aggressiveness-Revised
PSYC-r - Psychoticism-Revised
DISC-r - Disconstraint-Revised
NEGE-r -Negative Emotionality / Neuroticism - Revised
INTR-r - Introversion / Low Positive Emotionality-Revised

Appendix D. NAB Attention Module Scale Names and Abbreviations

Orientation (ORN)

Digits Forward (DF)

Digits Backward (DB)

Dots (DOT)

Numbers & Letters A Efficiency (N&L A-eff)

Numbers & Letters B Efficiency (N&L B-eff)

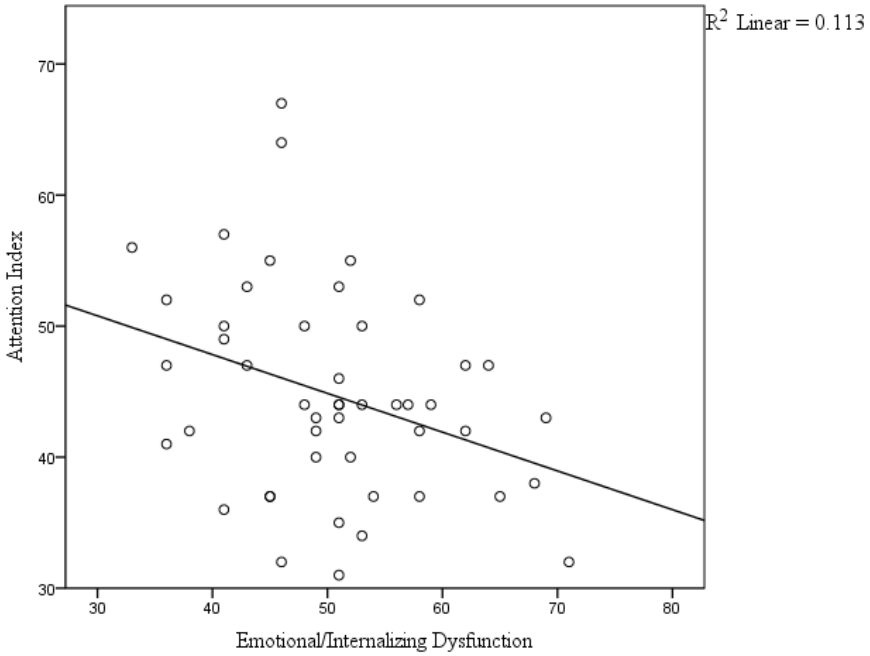
Numbers & Letters C Efficiency (N&L C-eff)

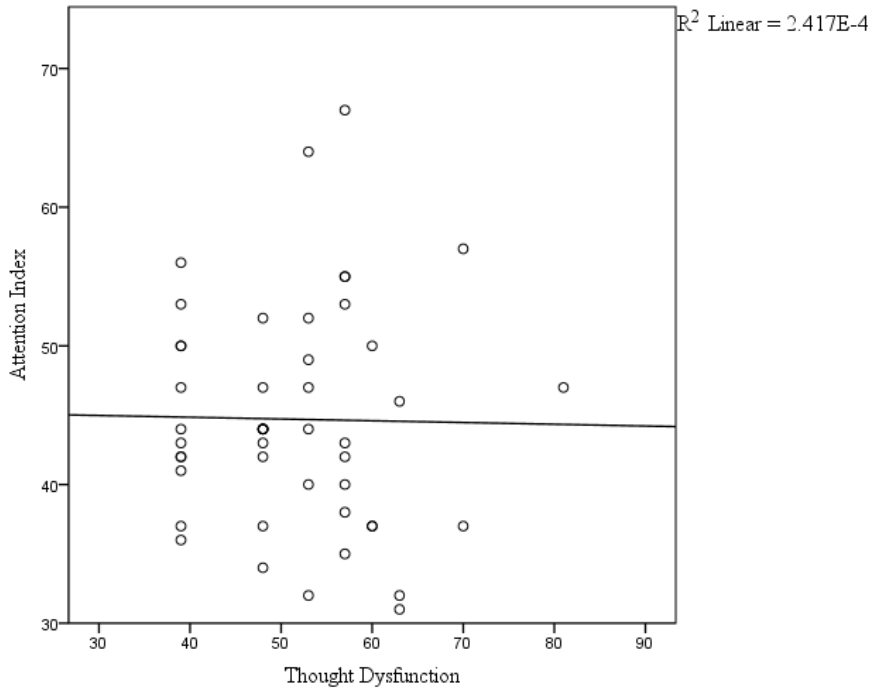
Numbers & Letters D Efficiency (N&L D-eff)

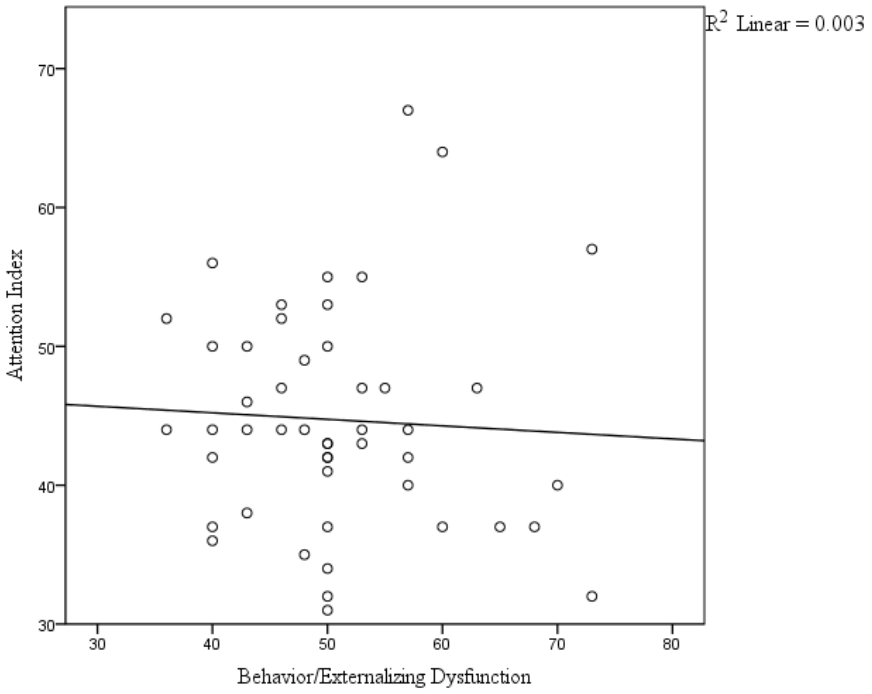
Driving Scenes (DRV)

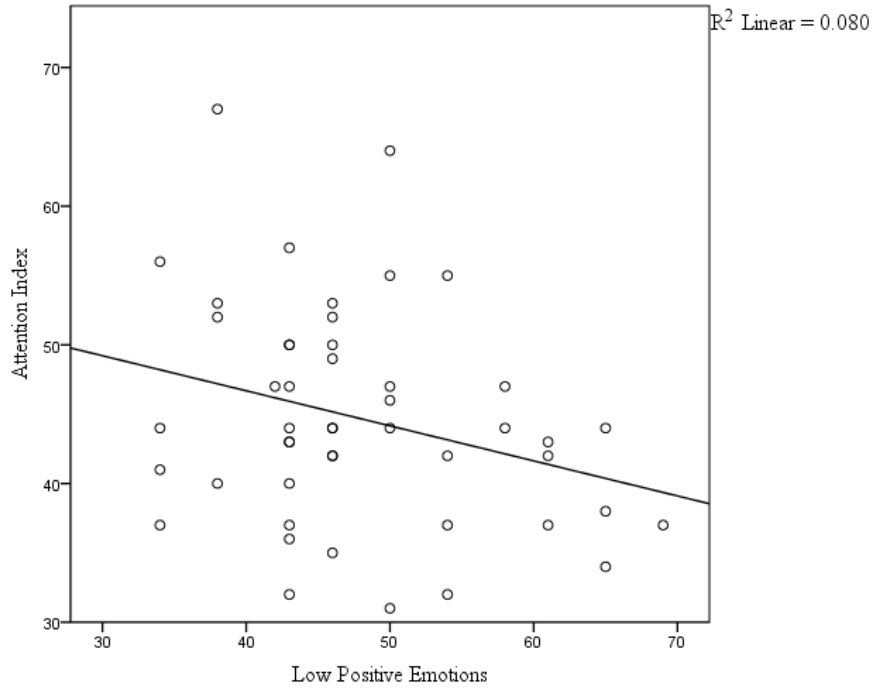
Attention Index (ATT)

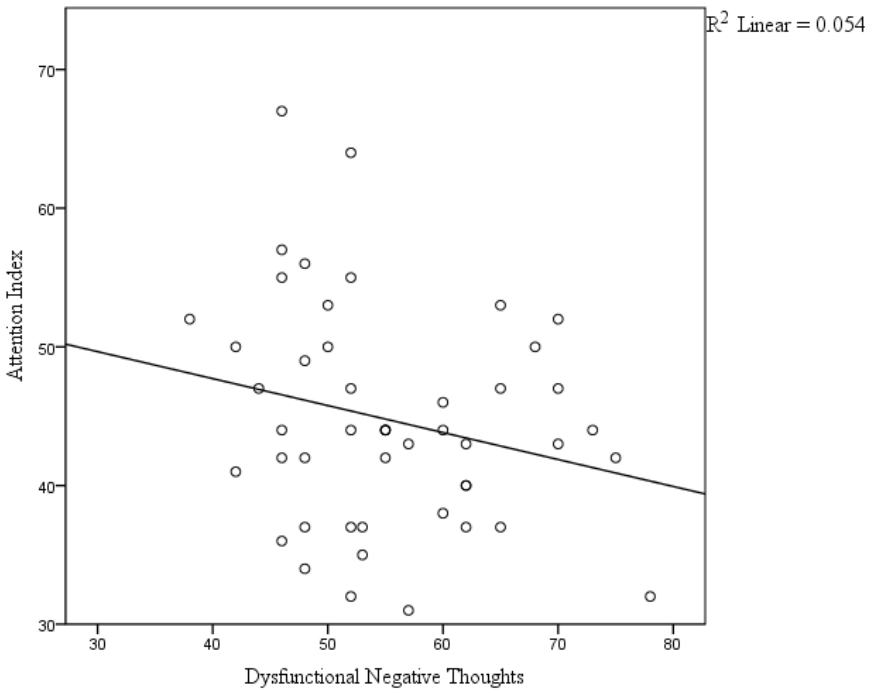
Appendix E. Scatterplots of MMPI-2-RF Scales and ATT for General Psych Sample

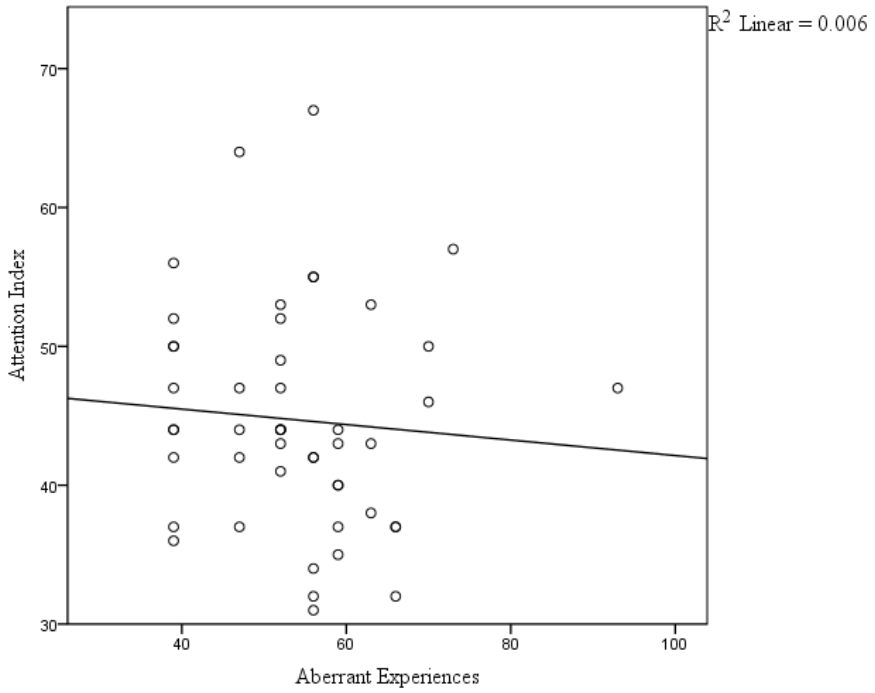


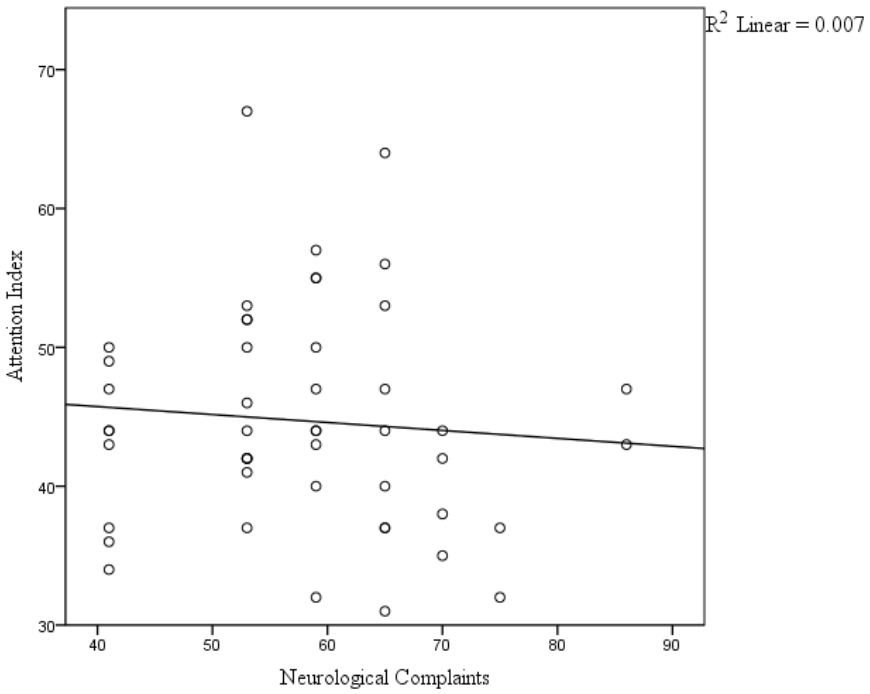


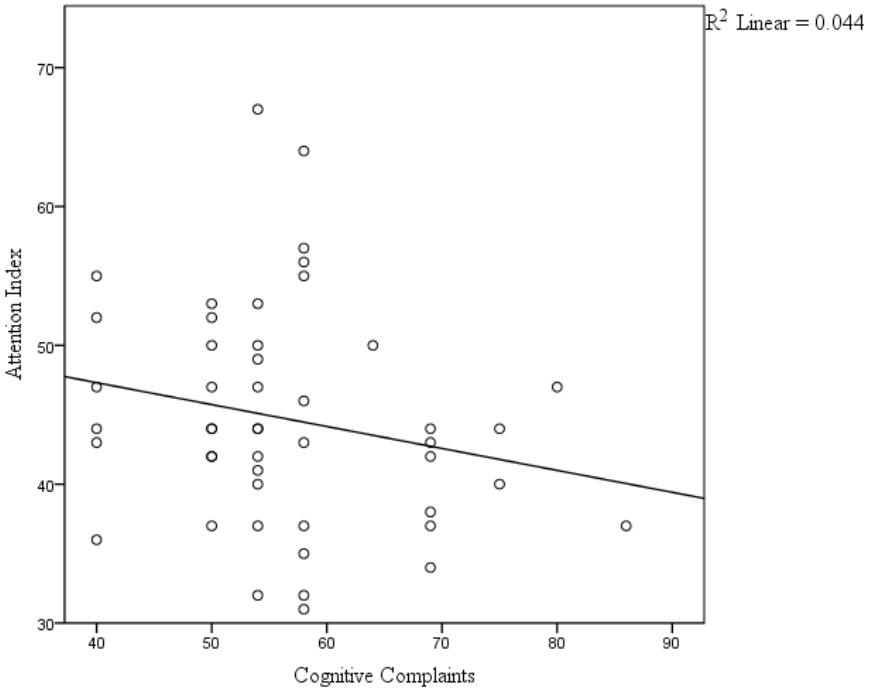

R2 Linear = 0.003
Attention Index
Behavior/Externalizing Dysfunction
70
60
50
40
30
30
40
50
60
70
80

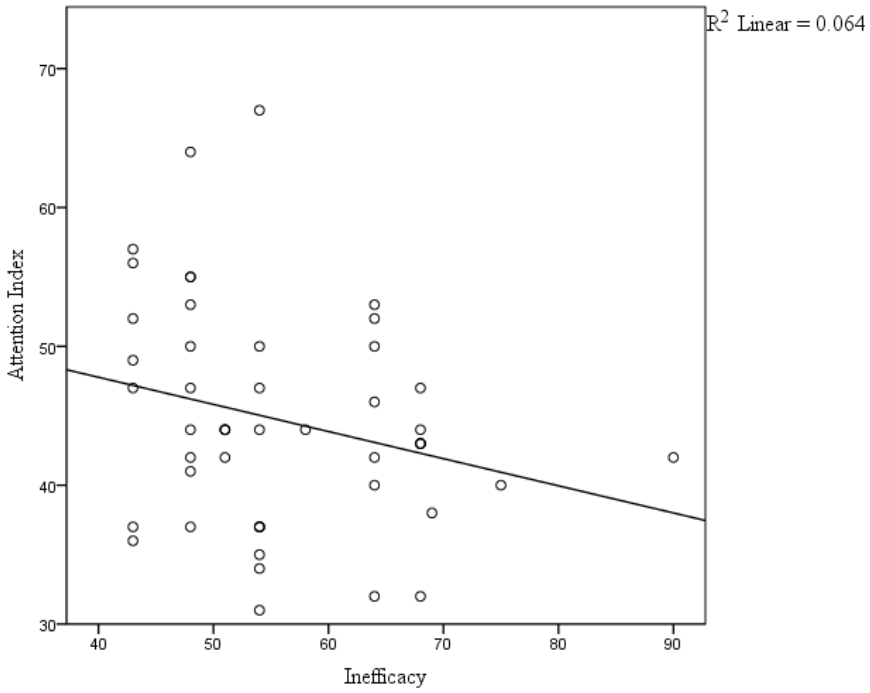

R2 Linear = 0.080
Attention Index
Low Positive Emotions
70
60
50
40
30
30
40
50
60
70

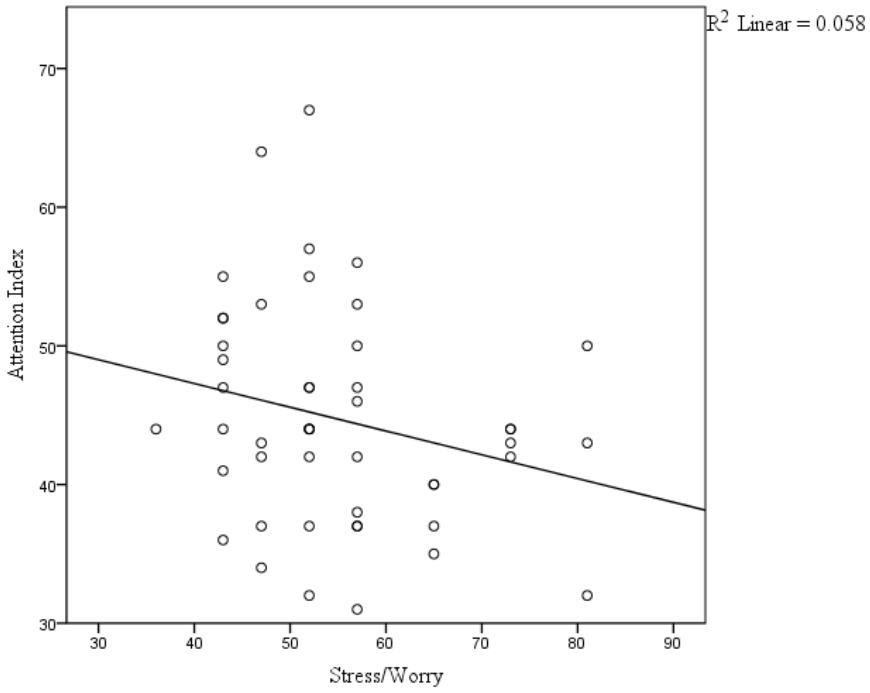

R2 Linear = 0.054
Attention Index
70
60
50
40
30
30
40
50
60
70
80
Dysfunctional Negative Thoughts


R2 Linear = 0.006
Attention Index
70
60
50
40
30
40
60
80
100
Aberrant Experiences

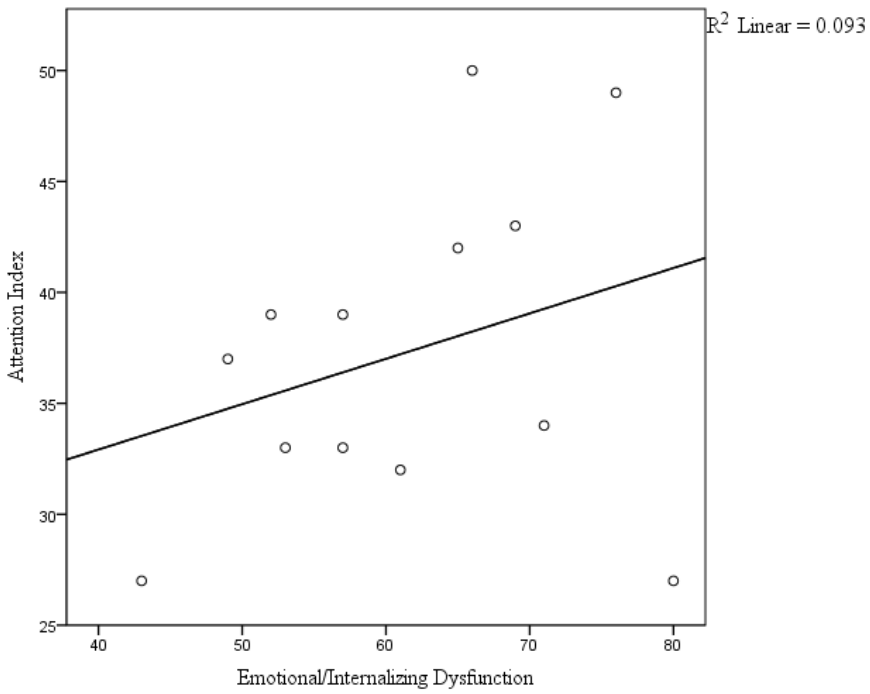

R² Linear = 0.007
Attention Index
70
60
50
40
30
40
50
60
70
80
90
Neurological Complaints

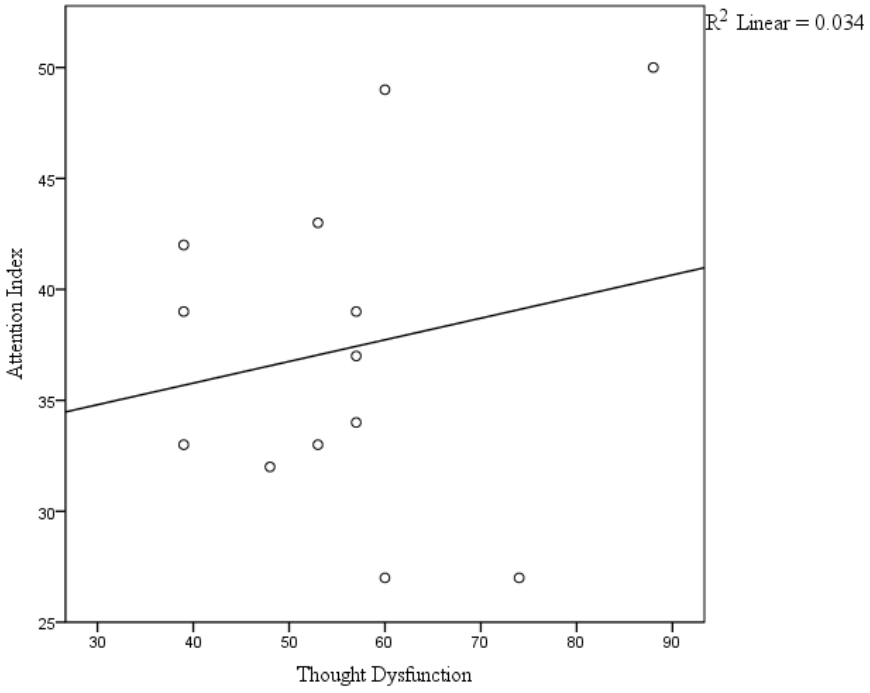

R² Linear = 0.044
Attention Index
70
60
50
40
30
40
50
60
70
80
90
Cognitive Complaints

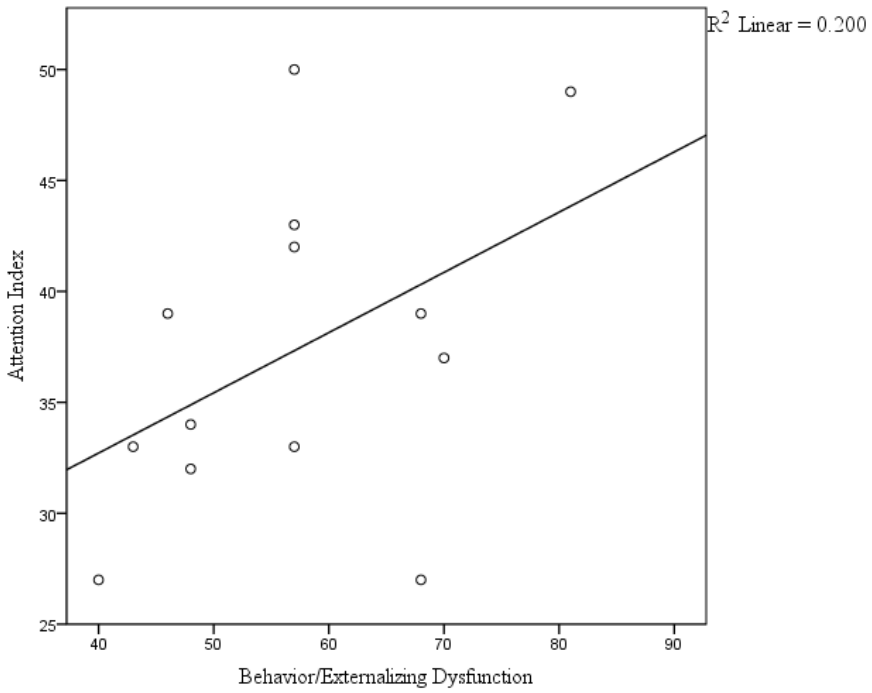

R2 Linear = 0.064
Attention Index
Inefficacy
70
60
50
40
30
40
50
60
70
80
90

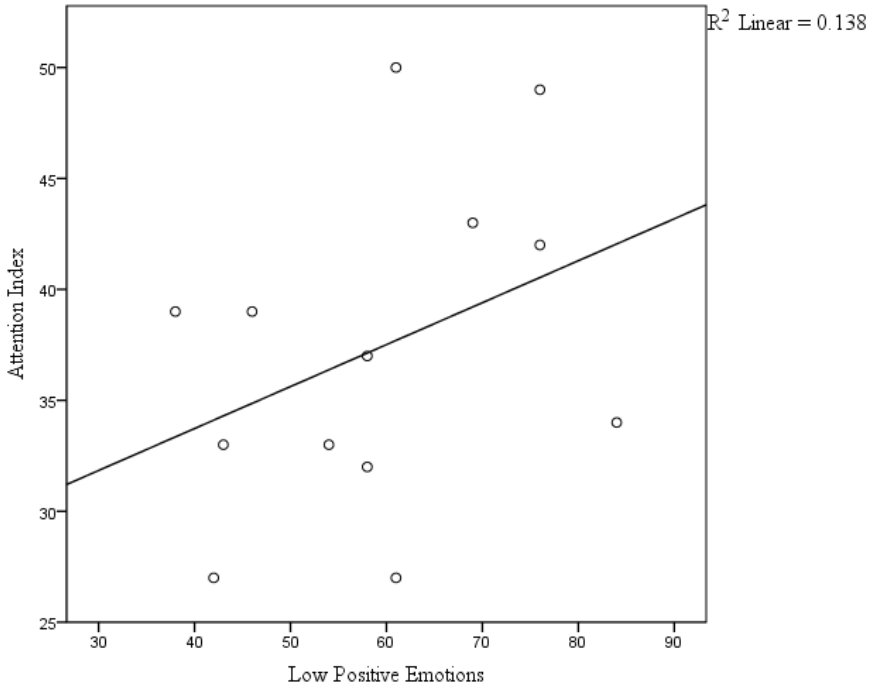

R2 Linear = 0.058
Attention Index
Stress/Worry
70
60
50
40
30
30
40
50
60
70
80
90

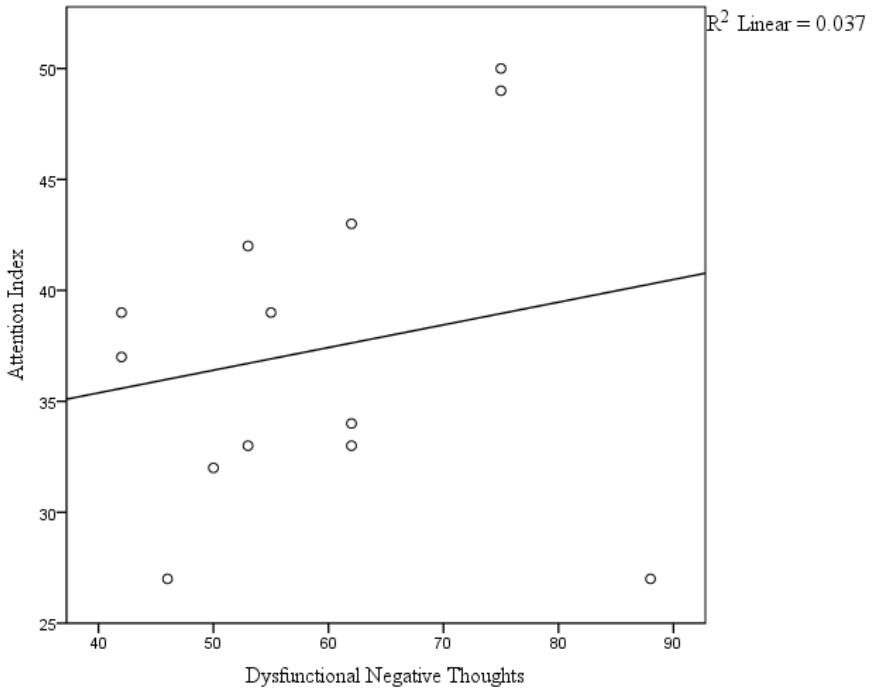
Appendix F. Scatterplots of MMPI-2-RF Scales and ATT for Clinical Sample

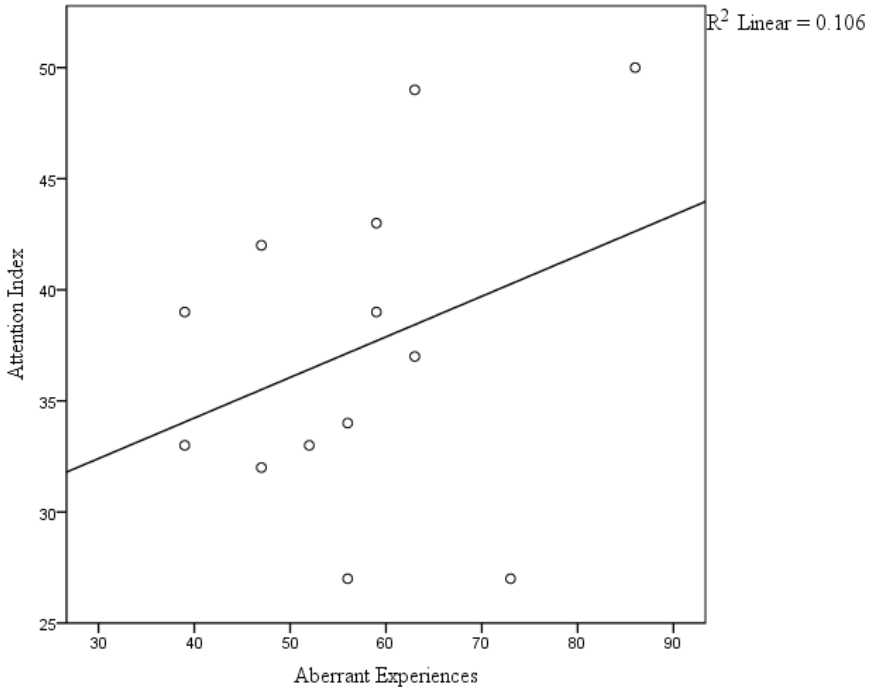


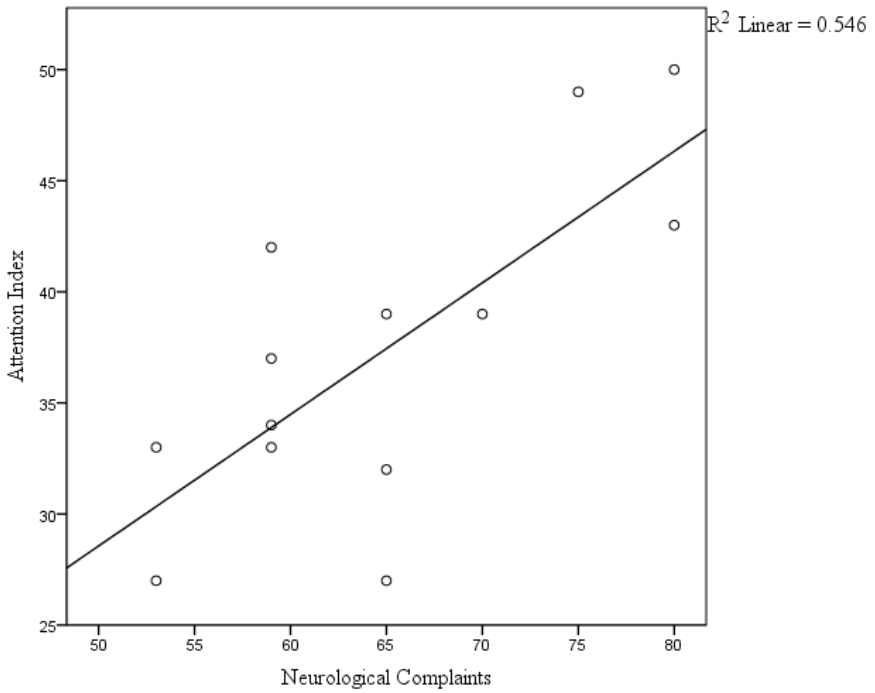


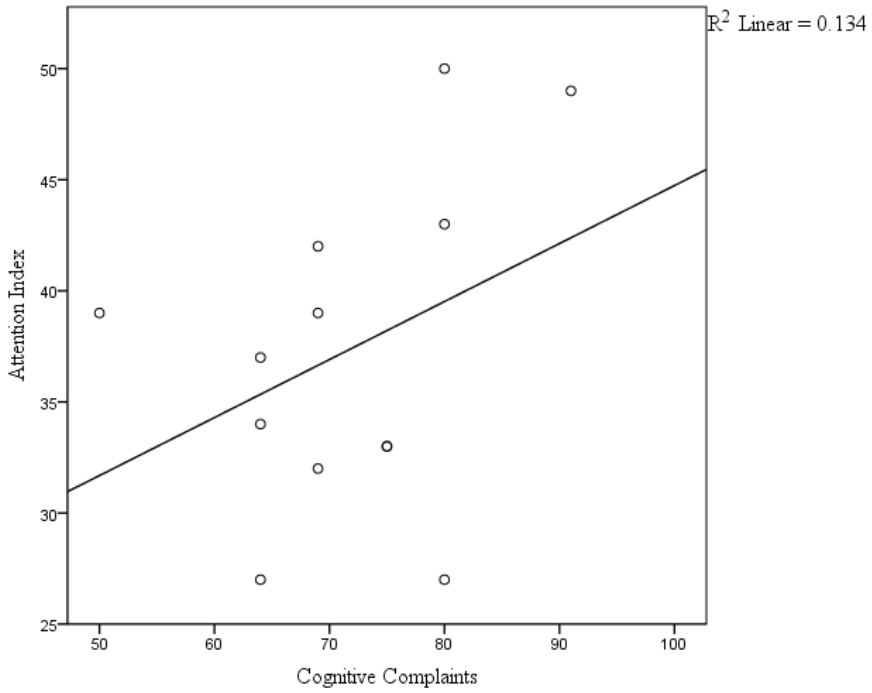

R² Linear = 0.200
Attention Index
Behavior/Externalizing Dysfunction
50
45
40
35
30
25
40
50
60
70
80
90

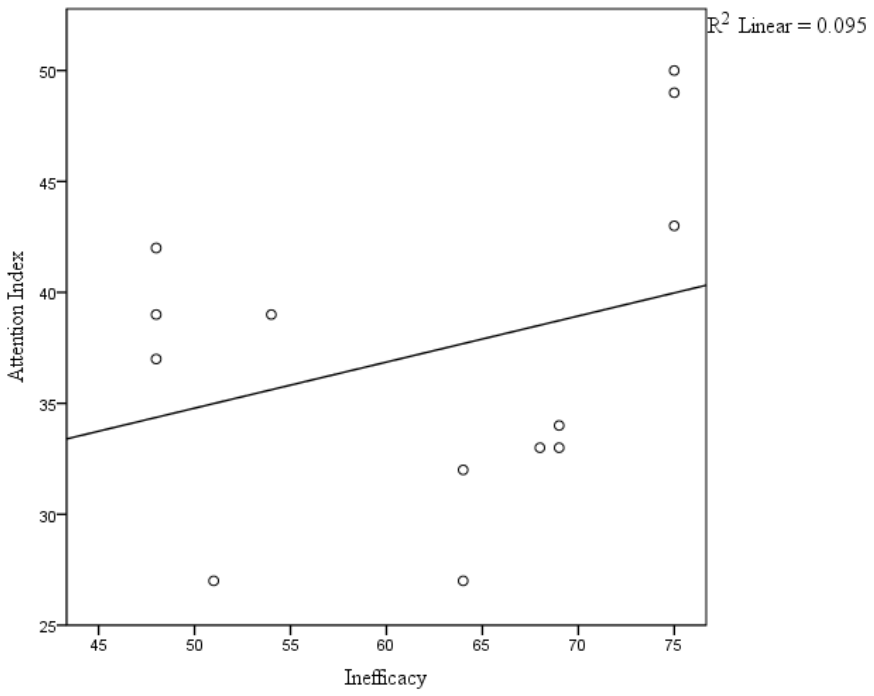

R² Linear = 0.138
Attention Index
Low Positive Emotions
50
45
40
35
30
25
30
40
50
60
70
80
90

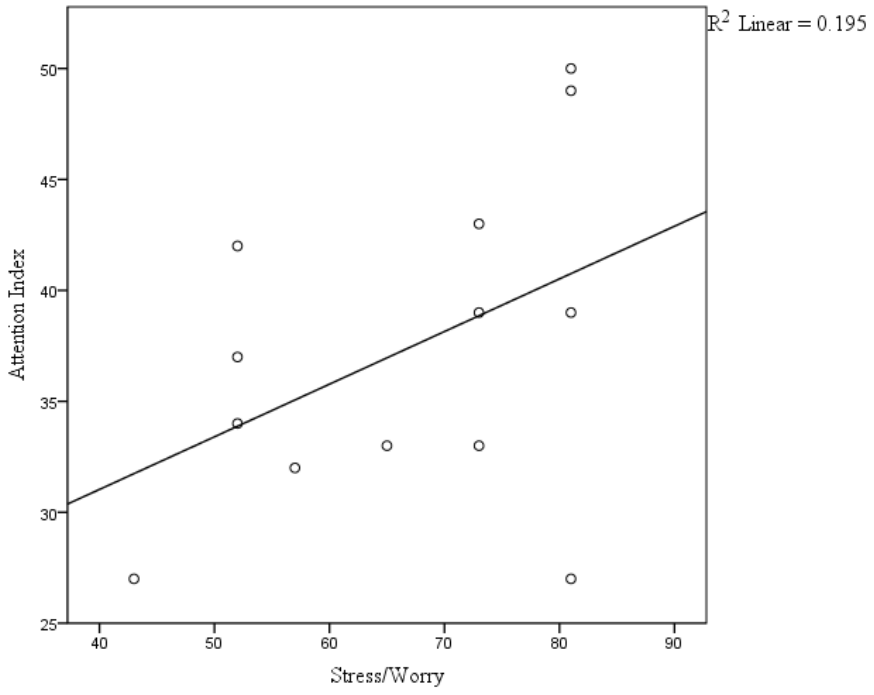

R2 Linear = 0.037
Attention Index
Dysfunctional Negative Thoughts
50
45
40
35
30
25
40
50
60
70
80
90


R2 Linear = 0.106
Attention Index
Aberrant Experiences
50
45
40
35
30
25
30
40
50
60
70
80
90


R² Linear = 0.546
Attention Index
Neurological Complaints
50
45
40
35
30
25
50
55
60
65
70
75
80


R² Linear = 0.134
Attention Index
Cognitive Complaints
50
45
40
35
30
25
50
60
70
80
90
100


R² Linear = 0.095
Attention Index
Inefficacy
50
45
40
35
30
25
45
50
55
60
65
70
75


R² Linear = 0.195
Attention Index
Stress/Worry
50
45
40
35
30
25
40
50
60
70
80
90