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A Comparison of MMPI-2-RF Profiles of Outpatients with Reported Chronic Medical Conditions, Reported Disability, or Psychological Ailments

Natalie Hicks

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by
Natalie Hicks, M.S.

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By

Natalie Hicks, M.S.

_____
Radhika Krishnamurthy, Psy.D., ABAP
Professor, School of Psychology
Doctoral Research Project Chair

_____
Vida L. Tyc, Ph.D.
Professor, School of Psychology
Doctoral Research Project Committee Member

_____
John F. Lavelle, Ph.D.
Associate Professor, School of Arts and Communication
Doctoral Research Project Committee Member

_____
Lisa A. Steelman, Ph.D.
Professor and Dean
College of Psychology and Liberal Arts

Abstract

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Natalie Hicks, M.S.

Major Advisor: Radhika Krishnamurthy, Psy.D., ABAP

Past personality assessment research using MMPI instruments has examined their use in a variety of contexts, including in healthcare settings. The utility of the more recently developed Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF), however, has not been examined in these contexts to the same degree. The present study evaluated differences between MMPI-2-RF scores in a sample of 154 adult outpatient community mental health clients who (a) reported a preexisting physical condition in conjunction with psychological symptoms (n = 66), (b) were either in the process of applying for or were already receiving Social Security disability compensation (n = 30), or (c) reported purely psychological disturbance (n = 58). Multivariate analysis revealed significant differences among the scores on six (12.2%) of the 49 MMPI-2-RF scales of interest in this study (i.e., all scales excluding the two Interest scales). Subsequent univariate and post-hoc analyses demonstrated differences between the Social Security disability compensation group and comorbid complaints group on three (6.1%) of the 49 scales examined, between the Social Security disability compensation group and psychological complaints group on six (12.2%) of these 49 scales, and between the psychological complaints and comorbid complaints on one (2%) scale. Hierarchical linear regression results revealed that the three scales identified as

significantly different between the Social Security disability compensation and comorbid complaints groups accounted for 13% of the variance in score differences between these groups. A second hierarchical linear regression analysis demonstrated the six scales that were significantly different between the Social Security disability compensation and psychological complaints groups collectively accounted for 30% of the variance between these groups. Simple linear regression results indicated the one scale found to be significantly different between the psychological complaints and comorbid complaints groups accounted for 4% of the variance between these groups. Overall, the nature of the differences that emerged between the three groups was such that: (a) the Social Security disability compensation group reported a broad array of symptoms across several domains, including experiences of negative affect, internalization of emotion, somatic concerns, pessimism, and disturbances in interpersonal interactions; (b) the comorbid conditions group reported both somatic and psychological symptoms consistent with the nature of their presenting concerns; and (c) the psychological complaints group primarily reported emotional dysfunction with fewer somatic symptoms than those reported by the other two groups. Contributions, limitations, and future research directions are discussed.

Keywords: MMPI-2-RF, personality assessment, chronic health, disability compensation.

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Introduction

The distinction between mind and body and the connection between them has been a persistent issue addressed throughout the history of psychology. Positions taken on this issue generally fall within two camps: monism or dualism. Monism, or the belief that everything in existence, including human cognitions and behaviors, can be explained in terms of matter, was the reigning opinion until dualism was introduced in philosophical literature in the mid-1600s by René Descartes. Dualism posits that both physical and mental events exist and are governed by different principles. Once the assumption is made that there are both physical and mental events, the question then becomes how the two are connected. While there are several forms of dualism, that which is most related to the current study is interactionism, which claims that the body and mind interact; that is, the mind influences the body and vice versa. This was the position taken by Descartes, as well as the psychoanalysts, including Freud (Hergenhahn & Henley, 2013). The interconnection between psychological and physical functioning has long been recognized in psychology. More recently, the American Psychological Association (APA) reported that as many as 70% of primary care visits are driven by patients' psychological problems, including anxiety, depression, and stress (2014). This briefing also noted that co-occurring mental disorders, such as anxiety and depression, can worsen the courses of several chronic illnesses, including cardiovascular disease, diabetes, asthma, epilepsy, cancer, and obesity. Furthermore, psychological distress has been found to weaken the immune system (APA, 2014).

The understanding that physical and mental health interact and influence each other sparked further research examining various facets of personality on health. This connection also led to the later development of various subfields within psychology and medicine such as health psychology and integrated behavioral healthcare. Psychological assessment findings have shown the effects of various personality traits and psychological symptoms on health, as well as health conditions' effects on psychological factors such as mood. The Minnesota Multiphasic Personality Inventory (MMPI) instruments in particular have been widely used in such contexts, including evaluating the impact of physical conditions on psychological functioning and in disability evaluations. While the use of the MMPI-2 in defining clinical profiles related to specific health conditions and Social Security disability evaluations has been widely documented (e.g., Deardorff, Chino, & Scott, 1993; Livingston, Jennings, Colotla, Reynolds, & Shercliffe, 2006), the use of the MMPI-2-RF for these purposes is not as prevalent in the literature, given that this instrument is the most recent version and its research base is still developing. Specifically, a comparison of MMPI-2-RF profiles of individuals with chronic health conditions and those seeking or receiving Social Security disability compensation has not been made, indicating a need for further investigation. The current study examined similarities and differences in MMPI-2-RF profiles of outpatient psychotherapy clients with reported comorbid physical and mental health-, disability-, or psychological condition.

Review of Literature

Relationship Between Physical and Mental Health

The connection between physical and mental health has been well-documented in the psychological literature and is determined to be quite strong (Ohrnberger, Fichera, & Sutton, 2017). For instance, stress and other psychosocial factors (e.g., chronic anger, depression, optimism, social isolation versus support) have been shown to have psychobiological effects on the development and progression of physical illness and disease, health behavior and prevention, and psychosocial aspects of healthcare. Similarly, physical illnesses and their associated medical/surgical care impact several aspects of the lives of patients and their families, including physical distress, emotional adjustment, social and vocational roles, and disability (Smith, Williams, & Ruiz, 2016). The biopsychosocial model proposed by Engel (1977) addresses these relationships, as it posits that disease and its treatment are best understood in the context of considering not only the individual but also the interpersonal, social, and cultural levels in which the individual operates.

Several mental disorders (e.g., bulimia nervosa, bipolar I disorder, major depressive disorder [MDD], borderline personality disorder) are associated with a greater risk for attempted and completed suicide than that of the general population. Traditionally, there has been an opinion that suicide and unintentional deaths were a major contributor to excess mortality in individuals with mental illness. Specifically, it has been found that the mortality of individuals with severe mental disorders, including schizophrenia and related psychotic disorders, bipolar disorder, and MDD is in excess

compared to that of the general population (Brown, Kim, Mitchell, & Inskip, 2010; Vancampfort et al., 2015). For schizophrenia in particular, it is suggested that excess unnatural deaths are inherent to the disorder, while excess natural deaths are best explained by differences in exposure to environmental risk factors (Kendler, 1986). However, most mental illnesses do not directly lead to death. Data from Lawrence, Hancock, and Kisely (2013) indicate that roughly 80% of excess deaths in those with mental illness are instead due to comorbid physical health conditions. Additionally, Brown et al. (2010) examined the 25-year mortality of individuals with schizophrenia and determined that most deaths over this timespan were from common causes seen in the general population (e.g., circulatory disease, respiratory disease, and cancer). Cardiovascular mortality of schizophrenia in particular was found to have increased over the past 25 years, relative to the general population, and a large portion of the excess mortality of this sample was likely attributable to effects of cigarette smoking (224 members of the $N = 370$ sample were cigarette smokers at the beginning of the study). Individuals diagnosed with mental illnesses have greater risk of preventable chronic physical illnesses, as well as decreased life expectancy of up to 30 years (Brown et al., 2010; Lawrence et al., 2013; Rosenbaum et al., 2015; Vancampfort et al., 2015).

The mortality rate of individuals with mental health conditions is greater than that of the general population, with cardiovascular disease (CVD) being the leading cause of death in those with a mental health condition or conditions; thus, a great deal of research has focused on this particular relationship. Regardless of mortality, even the rates of development and progression of CVD have been found to be higher in individuals with

mental health conditions than in individuals without. Like Brown et al. (2010), Vancampfort et al. (2015) focused on schizophrenia and other psychotic disorders, bipolar disorder, and MDD, and the prevalence of metabolic syndrome (MetS) and its components, which are highly predictive of cardiovascular disease in individuals with these disorders. This meta-analysis indicated that approximately one third, or 32.6% (95% CI = 30.8%-34.4%), of this psychiatric population had MetS, and their relative risk for developing MetS was 1.58 times greater than that of the general population. Prevalence rates for MetS were consistently elevated for each diagnostic subgroup without significant differences across schizophrenia, bipolar disorder, and MDD.

Rosenbaum et al. (2015) also studied the prevalence and risk of MetS and its components but in individuals with posttraumatic stress disorder (PTSD). The results of this meta-analytic study determined that 38.7% (CI = 32.1%-45.6%) of the 9,673 individuals with PTSD had MetS, and their relative risk for developing MetS was approximately twice as great than in age-and gender-matched controls in the general population (RR = 1.82; 95% CI = 1.72-1.92, $p < .0001$). High rates of MetS components, including abdominal obesity (49.3%, 95% CI = 29.7%-69.0%), hypertension (76.9%, 95% CI = 67.9%-84.8%), hypertriglyceridemia (45.9%, 95% CI = 12.2%-81.9%), hyperglycemia (36.1%, 95% CI = 18.8%-55.6%), and low high density-lipoprotein (HDL)- cholesterol levels (46.4%, 95% CI = 26.4%-67.0%) were also found for individuals with PTSD.

Lawrence et al. (2013) conducted a comparable study examining life expectancy for people with psychiatric disorders in Western Australia. This study demonstrated that

the gap in life expectancy for such individuals compared to the general population increased between 1985 and 2005, from 13.5 to 15.9 years for men and from 10.4 to 12.0 years for women. In other words, men with psychiatric disorders have a life expectancy that is roughly 16 years less than men in the general population, while the life expectancy of women with psychiatric disorders is 12 years less than women in the general population. Like Brown et al. (2010), Lawrence et al. (2013) also established that excess mortality was generally attributed to physical health conditions, particularly cardiovascular disease, respiratory disease, and cancer. Exceptionally large increases in life expectancy gaps were found for both men and women with stress or adjustment reactions as well as psychoses other than schizophrenia, while the widest gap in life expectancy (i.e., greater than 20 years) was seen in individuals with primary diagnoses of a substance use disorder. The majority of excess mortality in these cases was attributable to heart disease, cancer, and liver disease, consistent with the fact that misuse of substances is an established risk factor for cardiovascular disease and several forms of cancer. Overall, these findings suggest that the gap in life expectancy between individuals with psychiatric disorders and the general population is higher than those of other disadvantaged groups. For instance, while the life expectancy for lifelong smokers is approximately 10 years less than that of non-lifelong smokers (Doll, Peto, Boreham, & Sutherland, 2004), it is slightly better than the life expectancies of individuals with psychiatric disorders as established by Lawrence et al. (2013).

Rather than investigating the impact of psychiatric illnesses on physical conditions, Von Korff et al. (2005) examined the impact of physical conditions on mental

health in a sample of 5,692 American adults. Their sample included individuals with chronic spinal pain, other chronic pain conditions including arthritis, rheumatism, severe headaches, and migraine, chronic physical conditions such as respiratory conditions (e.g., asthma, tuberculosis), digestive conditions, (e.g., irritable bowel syndrome, ulcer), cardiovascular conditions (e.g., high blood pressure, heart disease, heart attack, stroke), diabetes, cancer, epilepsy, and hearing or vision impairment, and mental disorders based on *DSM-IV* diagnostic criteria including mood disorders (e.g., depression, dysthymia, bipolar disorder I or II), anxiety disorders (e.g., panic disorder, agoraphobia, specific phobia, social anxiety disorder, generalized anxiety disorder, posttraumatic stress disorder), and substance use disorders (e.g., alcohol abuse and dependence, drug abuse and dependence). Results demonstrated that US adults with chronic spinal pain also typically experience comorbid chronic pain conditions, as well as chronic physical illnesses or mental disorders. In fact, 68.6% of all individuals with chronic spinal pain had another chronic pain condition, while 55.3% had at least one comorbid chronic physical disorder, 35.0% had a comorbid mental disorder, and 87.1% had at least one of these three possible comorbid conditions.

Aside from mental illness in and of itself, psychotropic medications often prescribed as part of mental health treatment have been also identified as contributors to various physical illnesses, particularly to cardiometabolic disorders. For instance, it is common that patients receiving treatment with atypical antipsychotics (e.g., clozapine, olanzapine, risperidone) experience weight gain, which can have adverse effects on cardiovascular health. As atypical antipsychotics may have direct effects on glucose

metabolism, these medications have been connected to the development of type II diabetes (Sussman, 2003). Later research conducted by Saddichha, Manjunatha, Ameen, and Akhtar (2008) corroborated these findings with both typical and atypical antipsychotics within 6 weeks of treatment. Saddichha et al.'s (2008) results also imply that patients with schizophrenia, particularly male patients, may be more susceptible to glycemic abnormalities prior to beginning antipsychotic treatment. Male patients gained a mean 8.2 mg/dl and 21.5mg/dl in glucose profiles by type of bloodwork (fasting blood sugar [FBS] and post-prandial blood sugar [PPBS], respectively), while female patients gained a mean 3.2 (FBS) and 11.4 mg/dl (PPBS). This liability for future development of diabetes has been suggested to be caused by dysfunction of the hypothalamic pituitary adrenal (HPA) axis, which then leads to elevated cortisol levels and development of both insulin resistance and diabetes (Ryan & Thakore, 2002).

Physical and mental health may also impact each other via other mediating variables. First, poorer physical or mental health may lead to a decrease in wages and productivity, which in turn limits access to healthier foods and environments. The negative impact on income then has adverse consequences for mental or physical health; for instance, low income, unemployment, and other socioeconomic deprivation, along with risk factors such as alcohol misuse, smoking, high sugar intake, and physical inactivity have been found to occur with comorbid physical and mental illnesses (Scott & Happell, 2011; Wilton, 2004). Negative health outcomes may also be brought about by poor sleep or stress associated with having a preexisting mental or physical health condition (Contoyannis & Rice, 2001; Garcia-Gómez, Van Kippersluis, O'Donnell, &

Van Doorslaer, 2013). Second, poor mental health may impair individuals' decision-making capabilities, thus reducing their ability to obtain information concerning their health, prevention, and quality of healthcare providers, and having unfavorable implications for their physical health (Mani, Mullainathan, Shafir, & Zhao, 2013).

Third, physical and mental health are both linked to lifestyle choices, including physical activity, alcohol and tobacco use, and diet (Ohrnberger, Fichera, & Sutton, 2017). Previous research has demonstrated that physical activity is negatively associated with both anxiety and mood disorders as well as with poor physical health outcomes (De Mello et al., 2013; Durstine, Gordon, Wang, & Luo, 2013; Gerber & Puehse, 2009; Hegberg & Tone, 2015). There is also strong evidence that exercising has positive effects on both mental and physical health outcomes for older adults (Clegg, Barber, Young, Forster, & Iliffe, 2012), including those with dementia (Forbes et al., 2008). Additionally, reverse-causality is likely to occur, as individuals who are of better physical and mental health are also more likely to engage in physical activity (Ohrnberger et al., 2017). Systematic research on smoking cessation and mental health has shown that depression, anxiety, and stress decline after smoking cessation interventions are completed (Taylor et al., 2014). A reverse-causal relationship is also likely, whereby rates of smoking are twice as high among adults with depression or anxiety disorders than among adults without them (Royal College of Physicians, Royal College of Psychiatrists [RCP], 2013, as cited in Ohrnberger et al., 2017). Excessive alcohol use impacts health outcomes negatively and is predicted by poorer physical and mental health (Frisher, Mendonça, & Shelton, 2015; Rehm et al, 2010). Diet also has implications for health and well-being,

with poor diet being associated with greater risk of mortality (Haveman-Nies, De Groot, & Van Staveren, 2003).

Lastly, social interactions have great effects on health. Prior research has determined that social interaction and mental health have a strong positive relationship (Bekele et al., 2015; Dour et al., 2014). Steptoe, Shanker, Demakakos, and Wardle (2012) found that loneliness and social isolation were associated with increased risk of mortality when baseline mental and physical health were controlled across samples. Conversely, systematic research has shown a constant effect of social relationships on decreased risk of mortality. Reverse-causal relationships have also been established, such that physical disability and poorer mental health led to greater isolation (Steptoe et al., 2012). Past mental and physical health also have significant direct and indirect effects on present physical and mental health. Ohrnberger et al. (2017) found that the indirect effects of past mental health on current physical health are from current lifestyle choices and social interactions, while the relationship of past physical health with present mental health is mediated only by past physical activity.

Due to the bidirectional nature of the relationship between physical and mental health, it stands to reason that treating one of these aspects should lead to improvements in the other. Such an effect has been demonstrated by previous research. For example, a study conducted by Lin et al. (2003) examined the effects of improving care for depression on pain and functional outcomes in adults ages 60 years and older with both depression and arthritis. This study indicated that older adults who received specialized treatment for their depression (i.e., antidepressant medication and six to eight sessions of

psychotherapy) not only reported reductions in depressive symptoms at a 12-month follow-up but also less interference in daily activities due to arthritis, less health-related functional impairment, better health status, and higher overall quality of life than older adults who did not receive the specialized depression treatment.

Personality's Effects on Health and Illness

Personality can be defined as "an individual's unique constellation of psychological traits and states" (Cohen & Swerdlick, 1999, p. 381). The notion that personality influences the development and course of physical illness has made several appearances in various forms throughout the history and study of medicine (McMahon, 1976; Smith & Gallo, 2001). In the mid-to-late 20th century, this hypothesis was integral in the emergence and development of such fields as behavioral medicine, health psychology, and psychosomatic medicine; furthermore, it inspired a renewed interest in personality research within the field of psychology (e.g., Contrada, Cather, & O'Leary, 1999; Stone, Cohen, & Adler, 1979; Surwit, Williams, & Shapiro, 1982; Weiss, Herd, & Fox, 1981; Wiebe & Smith, 1997). Select topics in personality and health research, such as Friedman and Rosenman's (1959) account of the Type A personality/behavior pattern, were so widely studied that they became relevant in popular culture. Other areas of focus, for instance, implications of chronic negative affect for the development and progression of disease, were initially met with criticism, but were later backed by more convincing support (Friedman & Booth-Kewley, 1987; Suls & Bunde, 2005). Concepts such as psychological hardiness were quite important in the rise of personality and health research and are still viewed as influential despite declining in eminence as this area of

research became further developed. New topics introduced in personality theory, such as conscientiousness, have also been identified as having potentially important impacts on health (e.g., Friedman et al., 1993).

Several models have described the underlying mechanisms of the relationship between personality and health (e.g., Cohen, 1979; Suls & Sanders, 1989; Wiebe & Smith, 1997). Health behavior models indicate personality may influence daily health-related habits (e.g., smoking, exercise, diet) and other health behaviors (e.g., doctors' visits, medical screening). Many health behaviors are associated with major domains of personality, and these elements may mediate the relationship between personality and subsequent illness. The interactional stress model cites physiological, rather than behavioral, mechanisms that play a role in the association between personality and disease. This model suggests that personality influences appraisals of both potentially stressful life events and coping mechanisms. Appraisal and style of coping influence physiological responses to stress (i.e., neuroendocrine responses, immune functioning and inflammation, cardiovascular responses), which subsequently affect development of disease (Schneiderman, Ironson, & Siegel, 2005).

Like the interactional stress model, the transactional stress model also describes personality's effects on appraisal, coping, and physiological response as a noteworthy mechanism; however, this model lists an additional pathway in the process. In this model, personality is viewed as an influence for exposure to potential stressors and stress-reducing interpersonal resources, such as social support. By deciding to engage in certain situations over others, unintentionally evoking reactions in others and intentionally

affecting social situations, individuals can have impact on their interpersonal experiences (Buss, 1987). Thus, personality can affect the frequency, magnitude, and duration of exposure to daily stress as well as how readily available stress-reducing social resources are to an individual (Smith & MacKenzie, 2006).

Constitutional predisposition models state that personality and health have non-causal associations between them. According to these models, genetic or other constitutional factors are responsible for both physiological vulnerability to disease and the behavioral, cognitive, and emotional phenotypes of personality. In this model, the given personality characteristic and disease are otherwise unrelated co-effects of the underlying cause. Lastly, the illness behavior model describes personality as influencing perception of and attention to typical physiological sensations, labeling of these sensations as symptoms of illness, reporting of these symptoms, and utilization of health care; however, this model does not mention personality influencing actual disease (Williams, 2004).

Despite these models of personality and health, the specific details of the mechanisms or processes by which psychological factors produce physical distress are not clearly defined. For instance, given the same amount of stress on internal organs or damage to tissue, individuals vary in their subjective pain experiences. Some individuals are able to accomplish great physical feats with apparent disregard or lack of notice to any pain they may be experiencing, while others appear to overreact to even minor physical pain. Personality factors are therefore important to consider when assessing individuals' reactions to physical injury or trauma, such as in medical or disability

evaluations (to be later discussed in greater detail). In the case of disability assessment, for example, personality characteristics such as extreme dependency could sway an individual toward seeking compensation following even a very minor physical injury (Butcher & Harlow, 1987). Several specific personality characteristics have been researched in this context, including conscientiousness, neuroticism, hostility, interpersonal sensitivity, optimism, pessimism, and Type A and D personalities.

Conscientiousness.

Conscientiousness refers to the tendency to follow society's behavioral norms, to be task-and goal-oriented, to delay gratification, to develop and follow plans, and to follow rules (John & Srivastava, 1999). With regard to health, conscientiousness has been shown to predict greater health and longevity, as positive health behaviors and social environmental factors tend to follow from being more conscientious (Roberts, Walton, & Bogg, 2005). Conscientiousness has been linked to greater career success and earnings (Judge, Higgins, Thoreson, & Barrick, 1999). Along with social responsibility, conscientiousness has been linked to greater marital stability, which predicts longevity of life (Cramer, 1993; Kelly & Conley, 1987; Tucker, Friedman, Wingard, & Schwartz, 1996; Tucker, Kressin, Spiro, & Ruscio, 1998). Conscientiousness is also positively correlated with involvement in religion, which is associated with lower rates of substance abuse and greater longevity (MacDonald, 2000; Taylor & MacDonald, 1999; McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000; Miller, Davis, & Greenwald, 2000).

Aside from affecting health via social environmental factors, conscientiousness also affects health and longevity through its relation to health behaviors. Poor health-related behaviors contribute to poor health outcomes, including cardiovascular disease and cancer (McGinnis & Foege, 1993). In the United States, the most prominent behavioral contributors to mortality are tobacco use, unhealthy diet, physical inactivity, excessive use of alcohol, gun violence, risky sexual behavior, risky driving/automobile accidents, and drug use (McGinnis & Foege, 1993). As these behaviors are related to cardiovascular disease, cancer, AIDS, and accidental death, they are quite relevant to health and longevity. Aspects of conscientiousness, particularly impulse control and reliability, are negatively related to drug and alcohol abuse (Walton & Roberts, 2004). Conscientiousness has also been demonstrated to be positively related to preventative and accident control behaviors, including regular doctors' visits and checking smoke alarms around the home, and negatively related to risky behaviors, such as driving without a seatbelt (Chuah, Drasgow, & Roberts, 2006).

A meta-analysis conducted by Roberts, Walton, and Bogg (2005) demonstrated further support for these positions by comparing known relationships between conscientiousness-related traits and nine negative health behaviors among the leading correlates of mortality: alcohol use, disordered eating (including obesity), drug use, physical inactivity, risky sexual behaviors, risky driving behaviors, tobacco use, suicide, and violence (McGinnis & Foege, 1993). Conscientiousness negatively predicted each behavior, with conventionality being the facet of conscientiousness demonstrating the strongest and most consistent relationship with these behaviors. Individuals who

considered themselves to be more conventional in orientation, reflecting inclination toward adherence to society's norms, were much less likely to abuse drugs and alcohol, drive in a risky manner, have an unhealthy diet, or lead an inactive lifestyle. Reliability and impulse control were also consistently correlated with the selected behaviors, while industriousness and orderliness had less consistent and relatively weak correlations with these behaviors. Conscientiousness is a critical factor in predicting health in terms of social environments and health behaviors. The factors implicated in conscientiousness predicting longevity are the lifestyles conscientious individuals lead, as well as the health-related activities and practices in which they participate. Conscientious individuals create life contexts for themselves that enhance health and engage in activities that either do not detract from health or promote it (Roberts et al., 2005).

Emotionality/neuroticism.

Emotionality (also referred to as *neuroticism*, and, more recently, *negative emotionality*) and extraversion/introversion have been hypothesized to differentially predispose individuals to the development of various mental illness symptoms (Eysenck, 1967; Gray, 1982). For instance, emotional introverts may experience symptoms of depression and anxiety, while emotional extraverts may demonstrate hostility and psychoticism (Claridge, 1985). A longitudinal study conducted by Levenson, Aldwin, Bossé, and Spiro (1988) provided support for these positions by demonstrating that emotionality accounted for a majority of the variance in psychological symptoms reported by a subsample of 1,324 men from the Boston Veterans Administration's Normative Aging Study (NAS) across a span of ten years. Individuals higher in

emotionality (as assessed by a short version of the Eysenck Personality Inventory [EPI; Eysenck & Eysenck, 1968]) reported more psychological symptoms on the revised version of the Hopkins Symptom Checklist (SCL-90-R; Derogatis, 1983), including depression, anxiety, paranoid ideation, somatization, hostility, and psychoticism, than individuals lower in emotionality.

Hostility.

Chronic anger and hostility have long been thought to have negative implications for physical health (Siegman, 1994). Specifically, hostility has been found to be an important risk factor for coronary heart disease (CHD), as well as all-cause mortality (Booth-Kewley & Friedman, 1987; Matthews, 1988; Smith, 1992). Hostility may also be related to negative health behaviors associated with poor physical health, such as smoking, excessive alcohol intake, driving while drinking alcohol, greater caffeine consumption, greater fat and caloric intake, lower physical activity, greater body mass, higher blood pressure, sleep problems, and nonadherence to medication or medical regimens (e.g., Almada et al., 1991; Barefoot, Dahlstrom, & Williams, 1983; Houston & Vavak, 1991; Koskenvuo et al., 1988; Lee, Mendes de Leon, & Markides, 1988; Leiker & Hailey, 1988; Lipkus, Barefoot, Williams, & Siegler, 1994; Musante, Treiber, Davis, Strong, & Levy, 1992; Romanov et al., 1994; Scherwitz et al., 1992; Shekelle, Gale, Ostfeld, & Paul, 1983; Siegler, Peterson, Barefoot, & Williams, 1992). Therefore, negative health behaviors may be a link between hostility and subsequent CHD (Leiker & Hailey, 1988; Siegler, 1994). If these risk factors for disease mediate the relationship

between hostility and health, the relationship may weaken if these risk factors were controlled (Miller, Smith, Turner, Guijarro, & Hallet, 1996).

Demographic characteristics such as sex, age, socioeconomic status, and race/ethnicity could also influence the strength of the association between hostility and physical health. For instance, hostility and CHD are both related to sex, age, social status, non-Caucasian ethnicity, marital status, occupation, and income (Barefoot, Beckham, Haney, Siegler, & Lipkus, 1993; Barefoot et al., 1991; Carmelli et al., 1991; Koskenvuo et al., 1988; Romanov et al., 1994; Scherwits, Perkins, Chesney, & Hughes, 1991; Scherwitz et al., 1992; Shekelle et al, 1983; Siegler, Peterson, Barefoot, & Williams, 1992; Smith & Frohm, 1985). Differences in these demographic characteristic among samples may also account for variations in the findings of research on hostility and CHD. For instance, Williams, Nieto, Sanford, Couper, and Tyroler (2002) found high trait anger was associated with increased risk of stroke among participants aged 60 years or younger, even when biomedical, demographic, and behavioral risk factors were controlled for. Furthermore, effects of this study were similar across sex and ethnicity. A study of approximately 13,000 White and Black men and women found that higher scores on the Spielberger et al. (1985) trait anger scale were associated with a 50-75% increased risk of CHD over a four-and-a-half-year follow-up (Williams et al., 2000). This association was found even when behavioral, biomedical, and demographic risk factors were controlled for. Results of similar research, however, have been mixed. For example, self-reported hostility in a sample of over 9,000 initially healthy French and Irish men was not associated with CHD over a span of 5 years (Sykes et al., 2002). Other studies have

indicated that anger and hostility are not associated with morbidity or mortality among CHD patients (Kaufmann et al., 1999; Welin, Lapas, & Wilhelmsen, 2000). However, one study of approximately 800 women with CHD revealed that those in the uppermost quartile of Cook and Medley's (1954) Hostility (Ho) scale scores were twice as likely to experience a recurrent myocardial infarction than women with low Ho scores after controlling for biomedical, behavioral, and demographic variables (Chaput et al., 2002).

Hostility's association with various interpersonal styles is also linked to health. For instance, verbal aggressiveness and outward anger are associated with hostile dominance. These traits might then influence health by "moving against" people. Individuals who demonstrate hostile dominance exhibit an adversarial, controlling style of interacting with others. They are likely to attempt to influence others, which in turn prompts resistance (Smith, Glazer, Ruiz, & Gallo, 2004). These efforts to influence and control others cause increases in blood pressure and heart rate, and this physiological reactivity may contribute to cardiovascular disease (Manuck, Marsland, Kaplan, &Williams; 1995; Smith, Allred, Morrison, & Carlson, 1989; Smith, Ruiz, & Uchino, 2000; Treiber et al., 2003). Alternatively, hostile submissiveness involving hostility and internalized anger suggests a "moving away" interpersonal style in which less confident and assertive people might be vigilant against potential harm. This mistrust may in turn lead to decreased social support (Smith et al., 2004). Both vigilance and low social support have also been associated with increased cardiovascular reactivity (Kamarck, Peterman, & Raynor, 1998; Lepore, 1998; Smith et al., 2000).

Interpersonally sensitivity.

Interpersonal sensitivity (IS) is characterized by ongoing concerns regarding negative social evaluation. Other related constructs, including introversion, sensitivity to rejection, social inhibition, social anxiety, and submissiveness subsume aspects of IS. In regard to health, IS individuals are at an increased risk for development of infectious diseases, such as progression of human immunodeficiency virus (HIV), incidence of pneumonia and bronchitis, and incidence of colds following inoculation with a virus. It is possible these individuals are also at greater risk for developing CVD; however, IS is not implicated in cancer morbidity and mortality. Additionally, while IS temporally precedes the development of disease, potential confounds hinder achieving certainty of conclusion as to whether IS has an effect on mortality and morbidity. The effects of introversion as an aspect of IS are particularly accentuated in relation to health, and may only be evident in contexts which activate concerns of social evaluation (e.g., living with the stigma surrounding HIV) (Marin & Miller, 2013).

Optimism and pessimism.

Optimism, or the tendency to maintain a positive outlook on the future, rather than pessimistic or hopeless beliefs, has been linked with several favorable health outcomes (Smith & MacKenzie, 2006). Three conceptual models of optimism are utilized in personality and health research. The most widely used model is Scheier and Carver's (1985) generalized expectancy model, which defines optimism as the tendency to expect positive future experiences. A short self-report scale, such as the Life Orientation Test, is then used to measure this construct. Seligman and colleagues' explanatory style approach

defines optimism as a tendency to attribute life difficulties to "temporary, specific, and external (as opposed to permanent, pervasive, and internal) causes" (Gillham, Shatte, Reivich, & Seligman, 2001, p. 54). Measures of this construct include self-report scales and expert coding of written or verbal material.

Previous research has found optimism (as assessed by the Life Orientation Test) to be linked with a lower incidence of medical complications following coronary artery bypass surgery and angioplasty, as well as decreased progression of atherosclerosis (Helgeson & Fritz, 1999; Matthews, Raikkonen, Sutton-Tyrrell, & Kuller, 2004; Scheier et al., 1989; 1999). Pessimism has been found to be associated with decreased survival in women with breast cancer; however, optimism was not determined to play a role in survival in this population (Schulz, Bookwala, Knapp, Scheier, & Williamson, 1996). Prospective studies have demonstrated that content ratings of optimistic explanatory style have been linked to better physician-rated health and greater longevity of life (Peterson, Seligman, & Vaillant, 1988; Peterson, Seligman, Yurko, Martin, & Friedman, 1998). Additional optimism measures have been related to longevity, lower incidence of CHD, and increased longevity following stroke (Kubzansky, Sparrow, Vokonas, & Kawachi, 2001; Lewis, Dennis, O'Rourke, & Sharpe, 2001; Maruta, Colligan, Malinchoc, & Offord, 2000). Greater optimism and/or lower pessimism have been linked to better immune functioning and lower ambulatory blood pressure (Raikkonen, Matthews, Flory, Owens, & Gump, 1999; Segerstrom, Taylor, Kemeny, & Fahey, 1998). Optimism is also associated with greater participation in healthcare (Lin & Peterson, 1990; Strack, Carver, & Blaney, 1987). Lastly, meta-analytic research strongly suggests that optimism

significantly predicts physical health and plays a positive role in physical well-being (Rasmussen, Scheier, & Greenhouse, 2009). In contrast, hopelessness has been associated with the development of hypertension, greater incidence of cardiovascular disease- and cancer-related death, incidence of myocardial infarction, further progression of atherosclerosis, and decreased longevity of life (Anda et al., 1993; Everson et al., 1996; Everson, Kaplan, Goldberg, & Salonen, 2000; Everson, Kaplan, Goldberg, Salonen & Salonen 1997; Stern, Dhanda, & Hazuda, 2001).

Associations between optimism and other characteristics, such as coping style, have also been linked to greater physical health. For instance, problem-focused coping, or attempting to deal with sources of stress, is more likely to be utilized in situations for which positive change is possible. Problem-focused coping may also be more likely among individuals who expect positive change to occur. Indeed, optimism has been found to be positively correlated with the use of problem-focused coping, particularly if individuals perceived their stressful situations to be somewhat controllable. Emotion-focused coping, or attempting to reduce or eradicate emotional distress associated with or brought on by stressful situations, however, has demonstrated mixed results in relation to optimism, due to various subclasses of this coping style. Specifically, optimism was found to be positively correlated with utilization of positive reinterpretation, and was negatively correlated with denial/distancing. Among individuals who perceived their situations to be uncontrollable, optimism was also positively associated with accepting the reality of the situation. This tendency in particular likely facilitates adjustment to various life difficulties such as terminal illness or chronic physical impairment (Scheier

& Carver, 1987). For example, Schulz and Decker (1985) determined a patient's ability to accept his or her disability was one of the most important predictors of positive long-term psychological adjustment among a group of patients with spinal cord injuries.

The health habits of optimistic individuals may also be related to their health outcomes. The extent of similarity between stressful situations involving illness or injury and other stressful situations suggests, based on the previously discussed coping styles, that optimistic individuals handle these stressors more adaptively. In the context of illness, this tendency to cope adaptively should translate into engaging in more adaptive health behaviors, such as following a prescribed medicine regimen or making behavior changes to decrease the severity of illness. Similarly, to the extent that positive health habits are viewed as being adaptive, optimists should be likely to believe that they will benefit from them (Scheier & Carver, 1987).

Physiological mechanisms may also be associated with the level of physical well-being attained by optimists. Research conducted by Van Treuren and Hull (1986) suggests that cardiovascular reactivity to stress may underlie better health outcomes often experienced by optimistic individuals. Several significant results emerged from this study, the first of which was a significant interaction between optimism and time of measurement of systolic blood pressure (SBP). Optimistic participants exhibited decreases in SBP over time, while pessimists' SBP increased from pretest to posttest, then decreased from posttest to recovery. A significant interaction for diastolic blood pressure (DBP) was also found, such that DBP tended to decrease over time for optimistic participants who received success feedback on their tasks. Optimistic

participants who did not receive success feedback and all pessimistic participants demonstrated an increase in DBP between pretest and posttest measurement, and a decline in DBP from posttest measurement to recovery. Lastly, pulse rate was found to have a similar significant interaction. Optimistic participants given success feedback showed a general decrease in pulse rate over time, while all other participants demonstrated an initial increase followed by a decrease. This data thus supports the notion that optimists experience lesser cardiovascular response to stress than pessimists do, which may subsequently encourage more positive health outcomes (Scheier & Carver, 1987).

Aside from cardiovascular response, optimism may also be related to immune system functioning, although a direct establishment of this link has not yet been made. Speculation of this relationship, however, relies on two concepts. First, immunological functioning has been found to be associated with depression. Previous research has examined the relationship between DNA repair in lymphocytes and depression among a sample of nonmedicated, nonpsychotic inpatient psychiatric patients. DNA repair in patients who were depressed was inferior to that of patients who were not depressed (Kiecolt-Glaser, Stephens, Lipetz, Speicher, & Glaser, 1985). Secondly, the association between dispositional optimism and the development of depressive symptomatology has also been observed. A study focused on postpartum depression assessed depressive symptoms just prior to the stressful event's (i.e., childbirth) onset, and symptoms were later measured a second time. Optimism was found to have an inverse relationship with

depression, both prior to the stress of childbirth, and across time (Carver & Gaines, 1987).

Type A personality.

Like hostility and chronic anger, the Type A personality or Type A behavior pattern (TABP) has been linked to the development of CHD. The definition of the Type A person/style/behavior pattern varies, ranging from workaholism to aggression to a specific expressive and emotional style (Friedman & Booth-Kewley, 1987). Several behaviors typical of a Type A individual are also demonstrated by so-called "coronary-prone" individuals, including loud, explosive speech, fast talking, and hurrying. Additionally, these behaviors are generally viewed as indicative of underlying unhealthy emotional states. These emotional states typically consist of feelings of tension, competitiveness, and even hostility, which may stem from insufficient coping skills exhibited by Type A individuals. The characteristic Type A behaviors, therefore, represent the individual's desire to assert and maintain control over his or her environment (Glass, 1977; 1981).

Type A personality/behavior appears to negatively impact health only when presented in the typical pattern described above (i.e., "true Type As") (Friedman & Booth-Kewley, 1987, p. 784). For instance, people who display characteristics such as being active, ambitious, and hard-working, or behaviors such as loud, rapid speech, may be classified as Type A because these characteristics and actions are typical of true Type A personality and behavior. In such individuals, however, these qualities and behaviors may be indicative of alertness and vigor rather than true Type A behavior. Furthermore,

many hard-working individuals, while classified as Type A, cope well and have good health. Their personalities may be labeled as "hardy" or "coherent," and they possess such characteristics as internal locus of control and lack of self-alienation, which can have protective effects for health (Antonovsky, 1979; Friedman & Booth-Kewley, 1987; Kobasa, 1979; Kobasa, Maddi, & Kahn, 1982). On the other hand, some individuals labeled Type B (i.e., quiet, inactive, and not emotionally expressive) may be prone to CHD due to a tendency to repress hostility and ambition. Their proneness to CHD may go undetected because they are quiet, slow to speak, and unaggressive on the surface (Friedman, Hall, & Harris, 1985).

Type D personality.

The Type D personality, or "distressed" personality type, refers to individuals who simultaneously exhibit negative affectivity (NA) and social inhibition (SI). It is suggested the Type D individual experiences negative emotions and inhibits his or her expression in social interactions, thereby proposing that NA along with the individual's style of coping with negative emotions (i.e., inhibition of expressing negative emotions in social interactions) can be considered risk factors for poor health (Williams et al., 2008). Specifically, previous research has shown that Type D personality is linked to CVD and CHD, as well as unhealthy behaviors (Williams et al., 2008). Type D personality has been found to be associated with a decreased likelihood of seeking and receiving appropriate medical care (e.g., regular medical check-ups), as well as an unhealthy lifestyle. Type D individuals are more likely to maintain an unhealthy diet and/or smoke, and are less likely to spend time outdoors than non-Type D individuals (Pedersen et al.,

2004; Williams et al., 2008). Individuals with Type D personality within the general population also generally report more somatic complaints and significantly lower health status than their non-Type D counterparts (De Fruyt & Denollet, 2002; Jellesma, 2008). Specifically, De Fruyt and Denollet (2002) found that Type D individuals reported greater somatic distress, anxiety, and depression than non-Type D individuals, and Jellesma (2008) determined the combination of social inhibition and negative affect, which makes up the Type D personality, denotes an elevated risk for self-reported somatic complaints in adolescents.

As Type D personality has been previously found to be associated with various cardiovascular conditions, a great deal of research has focused specifically on the effects of Type D personality on heart patients' health. For patients with heart failure, Type D personality was found to independently predict impaired health status and greater cardiac symptoms (Schiffer, Denollet, Widdershoven, Hendriks, & Smith, 2007; Schiffer, Pedersen, Widdershoven, & Denollet, 2008). These patients were also six times more likely to report impaired health status than a reference group of non-Type D heart failure patients (Pelle, Schiffer, Smith, Widdershoven, & Denollet, 2009). Like Type D individuals in the general population, Type D heart failure patients also demonstrate less likelihood of seeking appropriate medical care, leading to significant declines in health status among these patients (Williams et al., 2008). Type D personality has been confirmed to be independently associated with indicators of cardiovascular reactivity, such as reduced heart rate recovery (von Kanel et al., 2009). This personality style has additionally been associated with increased levels of cortisol, increased oxidative stress,

immune system dysfunction, and decreased counts of bone marrow endothelial pronator cells in cardiac patients (Kupper, Gidron, Winter, & Denollet, 2009; Molloy, Perkins-Porras, Strike, & Steptoe, 2008; Van Craenenbroeck et al., 2009).

The presence of Type D personality also has adverse effects on mental health. Several studies have demonstrated that individuals from the general population with Type D personality experienced greater distress and more symptoms of depression and anxiety than non-Type D individuals (e.g., De Fruyt & Denollet, 2002; Jellesma, 2008; Pedersen, Schiffer, Smith, Widdershoven, & Dennolet, 2009; Polman, Borkoles, & Nicholls, 2009; Van Hiel & De Ciercq, 2009; Williams, O'Carrol, & O'Connor, 2008). Similar results have also been observed in various medical populations. For instance, a study conducted by Schiffer et al. (2005) found that Type D personality chronic heart failure (CHF) patients were more likely to have worse health, more depressive symptoms, and decreased mood status as compared to their non-Type D counterparts. In a separate study of patients with acute coronary syndromes (ACS), Type D personality was found to be a predictor of decreased quality of life at 5-year follow-up (Denollet, Vaes, & Brutsaert, 2000). Type D personality has also been related to difficult medical outcome in ACS patients (e.g., Denollet & Brutsaert, 1998; Denollet et al., 1996; Denollet et al., 2000). Similarly, arrhythmia patients with Type D personality undergoing implantable cardioverter defibrillator (ICD) therapy experienced greater anxiety and symptoms of depression than non-Type D patients receiving the same treatment (Pedersen, van Domburg, Theuns, Jordaens, & Erdman, 2004). Additionally, people with a Type D personality have been found to report mental health disorders and lower levels of social

support more frequently than non-Type D individuals (Oginska-Bulik, 2006; Williams et al., 2008).

Personality Assessment

In the field of clinical psychology, psychological assessment is ranked highly in terms of professional importance (Greenberg, Smith, & Muenzen, 1995; Phelps, Eisman, & Kohout, 1998). Unlike psychotherapy, formal assessment is unique to the practice of psychology relative to services rendered by other health care providers. Psychological assessment serves several purposes, including describing patients' current functioning (e.g., cognitive abilities, severity of disturbance), confirming, refuting, or modifying clinical impressions derived from less structured interactions with patients, and identifying therapeutic needs. Additionally, assessment can highlight issues likely to arise in treatment, recommend mode of intervention, offer insight into probable treatment outcomes, and aid in differential diagnosis of emotional, behavioral, and cognitive disorders. Formal assessment can also assist in monitoring treatment over time to evaluate the efficacy of interventions or to identify new concerns that may need attending to after original presenting complaints are resolved. Finally, psychological assessment assists in managing risk, including minimizing potential legal liabilities and identifying adverse reactions to treatment, and allows for provision of assessment feedback as its own therapeutic intervention (Meyer et al., 2001).

Personality assessment in psychology can be used in the diagnosis of mental illnesses, as a means of predicting future behavior, as a measure of unconscious processes, and as a quantification of interpersonal styles and tendencies (Smith & Archer,

2008). Anastasi (1988) provides a more general and all-encompassing definition of personality assessment as being "an objective and standardized measure of a sample of behavior" (p. 22). A second, broader definition of personality assessment, given by Rorer (1990), is as follows: "the description of people…a person's manner of behaving, his or her moods, and the situations and behaviors he or she chooses as opposed to the ones he or she avoids" (p. 693). Additionally, while personality assessment is utilized in many different settings, there are five primary reasons to conduct such assessment (Meyer et al., 2001). First, personality assessment can aid in describing psychopathology as well as in differential diagnosis. Psychological tests are based on norms, which provide a starting point for interpretation. Standardized test administration processes also assist in generating diagnostic data that is typically more predictive and informative than data gathered in a clinical interview. Second, personality assessment can describe and predict an individual's everyday behavior such as the quality of his or her interactions with others, his or her expectations of relationships, personal strengths and weaknesses, and typical methods of coping with stress. Third, personality assessment can inform psychological treatment such as offering insight into which psychotherapy modality or medication might be most effective for a given individual. Similarly, personality assessment can aid in monitoring treatment. Assessment results may serve as a baseline measure of an individual's functioning with changes reflected in period retesting, as with the Beck Depression Inventory (BDI; Beck & Steer, 1987). Finally, personality assessment itself can be a form of treatment. The Therapeutic Assessment (TA; Finn, 1996) model was designed to increase the efficacy of personality assessment and

feedback as therapeutic activities. The Therapeutic Assessment model's roots are in self and humanistic psychology, as well as the work of Fischer (1994, 2000), and it views assessment as a collaboration in which the client and examiner work together to gain further understanding regarding the client's personality, interpersonal dynamics, and present problems (Smith & Archer, 2008).

Psychological testing is the most reliable and valid component of the broader *psychological assessment*, which involves compiling data from several sources (e.g., multiple assessment methods, tests, historical and referral information, and behavioral observations) in order to form a cohesive and complete understanding of the individual being evaluated (Handler & Meyer, 1998). Psychological tests are samples of behaviors measured under standardized conditions and then scored and interpreted based on norms (Murphy & Davidshofer, 2005). Personality assessment is the measurement of psychological traits, states, values, interests, attitudes, worldviews, cognitive, emotional, and behavioral styles, personal identity, and related individual characteristics (Cohen & Swerdlik, 1999).

Methods of personality assessment.

As there are nearly limitless reasons a client might undergo personality assessment, there are several forms of tests available for this purpose. Traditionally, personality tests have been placed into one of two categories: *projective* and *objective* tests. However, the field of personality assessment has proposed new, more accurate terminology to replace these labels: *performance-based* and *self-report*, respectively. These two categories alone may not suffice, as testing has become increasingly advanced;

for example, the category of *behavioral assessment* does not fit neatly into either classification.

Traditionally, projective/performance-based tests have typically been unstructured in their response formatting, allowing respondents to respond as much or as little as they choose (within certain guidelines) to the particular test stimulus. The mindset behind performance-based measures is that the lesser amount of structure provided by these measures allows for important individual characteristics to be displayed in such a way that they can be coded and interpreted by clinicians. While performance-based measures share the common feature of being relatively unstructured, they differ in substantive ways (Smith & Archer, 2008). Some measures, such as the Rorschach Inkblot Test (Exner, 2003), have a standardized test administration process, response format, and scoring. Other performance-based measures, like the Thematic Apperception Test (TAT), are not as well-standardized, or have standardized procedures that are not widely accepted and used (e.g., in the case of the TAT, Cramer, 1996; Morgan & Murray, 1935; Murray, 1943; Westen, 1995, Westen, Lohr, Silk, Kerber, & Goodrich, 2002).

In contrast to performance-based measures, self-report measures ask respondents to answer a series of questions about themselves. The response format and question style of the test depends on its purpose and the construct being measured. For instance, self-report measures may be comprised of paper-and-pencil questionnaires or structured interviews conducted by trained clinicians. Self-report measures generally fall into one of two categories: *omnibus* or *narrow-band*. Omnibus measures assess several domains of personality, psychopathology, or functioning. One example of an omnibus, or broad-

band, measure is the Personality Assessment Inventory (PAI; Morey, 1991). The PAI assesses several constructs including depression, anxiety, personality features, interpersonal expectations, and thought disorder, among others. In contrast, the previously mentioned BDI (Beck & Steer, 1987) is a narrow-band measure, as it exclusively assesses depression. Omnibus measures generally allow for broad screening of various characteristics and psychopathology, while narrow-band measures are typically better suited to measure one or a few select characteristics in greater detail (Smith & Archer, 2008).

Popular broad-band personality assessment measures.

Of the omnibus/broad-band personality measures, the most widely used are the Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989; Butcher et al, 2001; to be later discussed in greater detail), the PAI, the Millon Clinical Multiaxial Inventory-IV (MCMI-IV; Millon, Grossman, & Millon, 2015), and the NEO Personality Inventory-3 (NEO-PI-3; McCrae & Costa, 2010).

The PAI assesses the major dimensions of psychopathology found in all clinical disorders and select personality disorders according to the *DSM-IV-TR* (American Psychological Association, 2000). The PAI's 344 items are divided into 22 non-overlapping full scales: four validity scales, eleven clinical scales, five treatment considerations scales, and two interpersonal scales. These items are responded to via a four-alternative scale, with the options of *totally false, slightly true, mainly true,* and *very*

true. Additionally, nine of the eleven clinical scales and one treatment consideration scale have three to four subscales each (Morey, 1991).

Similar to the MMPI instruments, the PAI has a set of validity scales that measure Inconsistency *(ICN;* poor concentration or inattention), Infrequency *(INF*; idiosyncrasy in or random responding), Negative Impression Management (*NIM;* negative response set caused by pessimistic mindset and/or intentional dissimulation), and Positive Impression Management (*PIM;* positive response set due to naïveté or intentional dissimulation). The eleven PAI clinical scales are: Somatic Complaints (*SOM*), Anxiety (*ANX*), Anxiety Related Disorders (*ARD*), Depression (*DEP*), Mania (*MAN*), Paranoia (*PAR*), Schizophrenia (*SCZ*), Borderline Features (*BOR*), Antisocial Features (*ANT*), Alcohol Problems (*ALC*), and Drug Problems (*DRG*). As mentioned previously, the majority of the PAI clinical scales have their own subscales. The *SOM* subscales include Conversion (*SOM-C*), Somatization (*SOM-S*), and Health Concerns (*SOM-H*). *ANX* and *DEP* can be assessed in terms of Cognitive (*ANX-C; DEP-C*), Affective (*ANX-A; DEP-A*), and Physiological (*ANX-P; DEP-P*) symptoms. *ARD*'s subscales are Obsessive-Compulsive (*ARD-O*), Phobias (*ARD-P*), and Traumatic Stress (*ARD-T*). Those for *MAN* are Activity Level (*MAN-A*), Grandiosity (*MAN-G*), and Irritability (*MAN-I*). The *PAR* subscales include Hypervigilance (*PAR-H*), Persecution (*PAR-P*), and Resentment (*PAR-R*), while those for *SCZ* are Psychotic Experiences (*SCZ-P*), Social Detachment (*SCZ-S*), and Thought Disorder (*SCZ-T*). *BOR*'s subscales are Affective Instability (*BOR-A*), Identity Problems (*BOR-I*), Negative Relationships (*BOR-N*), and Self-Harm (*BOR-S*). Lastly, the *ANT* subscales are Antisocial Behaviors (*ANT-B*), Egocentricity (*ANT-E*), and Stimulus

Seeking (*ANT-S*). The five treatment consideration scales are Aggression (*AGG*), Suicidal Ideation (*SUI*), Stress, (*STR*), Nonsupport *(NON*), and Treatment Rejection (*RXR*). Of these five, only *AGG* has subscales, which are as follows: Aggressive Attitude (*AGG-A*), Verbal Aggression (*AGG-V*), and Physical Aggression (*AGG-P*). Lastly, the two interpersonal scales are Dominance (*DOM*) and Warmth (*WRM*) (Morey, 1991).

The MCMI-IV is a 195-item questionnaire that measures major dimensions of psychopathology found in personality disorders (PDs) and more severe psychiatric syndromes (Craig, 2008). The MCMI-IV items are responded to in true/false format, and are divided into 28 scales including four validity (modifier) scales, twelve personality style scales, three severe personality style scales, seven clinical syndrome scales, and three severe clinical syndrome scales (Millon et al., 2015). The validity scales are referred to as "modifying indices" because they modify (i.e., raise or lower) scores on the other scales based on their values' magnitude (Craig, 2008). These scales include the Validity (*V*), Disclosure (*X*), Desirability (*Y*), and Debasement (*Z*) indices. The Personality Styles scales are composed of the Schizoid (*1*), Avoidant (*2A*), Melancholic (*2B*), Dependent (*3*), Histrionic (*4A*), Turbulent (*4B*), Narcissistic (*5*), Antisocial (*6A*), Sadistic (*6B*), Compulsive (*7*), Negativistic (*8A*), and Masochistic (*8B*) scales. Severe Personality Styles scales include Schizotypal (*S*), Borderline (*C*), and Paranoid (*P*). The Clinical Syndromes scales are Generalized Anxiety (*A*), Somatic Symptom (*H*), Bipolar Spectrum (*N*), Persistent Depression (*D*), Alcohol Use (*B*), Drug Use (*T*), and Post-Traumatic Stress (*R*). Lastly, the Severe Clinical Syndromes scales are comprised of

Schizophrenic Spectrum (*SS*), Major Depression (*CC*), and Delusional (*PP*) (Millon et al., 2015).

The addition of the MCMI-IV Grossman Facet scales is intended to clarify further distinctions from the primary personality scales. Each Clinical Personality Pattern scale (scales *1* through *8B*) and Severe Personality Pattern scale (scales *S, C*, and *P*) has three facet scales related to its structural and functional domains. The Facet scales for scale *1* include Interpersonally Unengaged (*1.1*), Meager Content (*1.2*), and Temperamentally Apathetic (*1.3*). Scale *2A*'s Facet scales are Interpersonally Aversive (*2A.1*), Alienated Self-Image (*2A.2*), and Vexatious Content (*2A.3*), while those of scale *2B* are Cognitively Fatalistic (*2B.1*), Worthless Self-Image (*2B.2*), and Temperamentally Woeful (*2B.3*). The Facet scales for scale *3* are Expressively Puerile (*3.1*), Interpersonally Submissive (*3.2*), and Inept Self-Image (*3.3*). The scale *4A* Facet scales are Expressively Dramatic (*4A.1*), Interpersonally Attention-Seeking (*4A.2*), and Temperamentally Fickle (*4A.3*), while the scale *4B* Facet scales include Expressively Impetuous (*4B.1*), Interpersonally High-Spirited (*4B.2*), and Exalted Self-Image (*4B.3*). Scale *5*'s Facet scales are Interpersonally Exploitive (*5.1*), Cognitively Expansive (*5.2*), and Admirable Self-Image (*5.3*). The Facet scales of scale *6A* are Interpersonally Irresponsible *6A.1*), Autonomous Self-Image (*6A.2*), and Acting-Out Dynamics (*6A.3*), while the scale *6B* Facet scales are Expressively Precipitate (*6B.1*), Interpersonally Abrasive (*6B.2*), and Eruptive Architecture (*6B.3*). Scale *7*'s Facet scales include Expressively Disciplined (*7.1*), Cognitively Constricted (*7.2*), and Reliable Self-Image (*7.3*). The Facet scales of scale *8A* are Expressively Embittered (*8A.1*), Discontented Self-Image (*8A.2*), and

Temperamentally Irritable (*8A.3*), and those of scale *8B* are Undeserving Self-Image (*8B.1*), Inverted Architecture (*8B.2*), and Temperamentally Dysphoric (*8B.3*). Lastly, the Facet scales of scales *S*, *C*, and *P* are Cognitively Circumstantial (*S.1*), Estranged Self-Image (*S.2*), and Chaotic Content (*S.3*), Uncertain Self-Image (*C.1*), Split Architecture (*C.2*), and Temperamentally Labile (*C.3*), and Expressively Defensive (*P.1*), Cognitively Mistrustful (*P.2*), and Projection Dynamics (*P.3*), respectively.

The NEO-PI-3 (McCrae & Costa, 2010) is a 240-item measure that assesses five broad personality dimensions. Test takers respond to each item on a five-point scale ranging from *strongly disagree* to *strongly agree.* Three of these domain scales, Neuroticism (*N*), Extraversion (*E*), and Openness to Experience (*O*), have long been researched and serve as the basis for this Inventory's original name, NEO. The NEO PI, NEO PI-R, and NEO PI-3 also measure two additional dimensions, Agreeableness (*A*) and Conscientiousness (*C*). Also included on the NEO PI-3 are six facets on which each of these five domains can be scored. The facets for *N* are Anxiety (*N1*), Angry Hostility (*N2*), Depression (*N3*), Self-Consciousness (*N4*), Impulsiveness (*N*5), and Vulnerability (*N*6). Those for *E* include Warmth (*E1*), Gregariousness (*E2*), Assertiveness (*E3*), Activity (*E*4), Excitement-Seeking (*E5*), and Positive Emotions (*E6*). The *O* facets are Fantasy (*O1*), Aesthetics (*O2*), Feelings (*O3*), Actions (*O4*), Ideas (*O5*), and Values (*O6*). *A*'s facets are Trust (*A1*), Straightforwardness (*A2*), Altruism (*A3*), Compliance (*A4*), Modesty (*A5*), and Tender-Mindedness (*A6*). Lastly, the *C* facets include Competence (*C1*), Order (*C2*), Dutifulness (*C3*), Achievement Striving (*C4*), Self-Discipline (*C5*), and Deliberation (*C6*).

The MMPI instruments, including the MMPI, MMPI-2, MMPI-A, and MMPI-2 Restructured Form (MMPI-2-RF) are the most widely used clinical personality inventories worldwide (Butcher, 2010; Friedman, Lewak, Nichols, & Webb, 2001; Greene, 2011; Lubin, Larsen, & Matarazzo, 1984; Lubin, Larsen, Matarazzo, & Seever, 1985). Since its development and release, the MMPI has been quite popular, and has been consistently ranked as one of the top personality instruments (Butcher, 2010; Freidman, Webb, & Lewak, 1989). The MMPI, MMPI-2, and MMPI-2-RF, designed for assessing adults, are discussed in greater detail below.

MMPI.

The original MMPI (Hathaway & McKinley, 1943) was comprised of 566 numbered statements, which could be answered True or False or, in the form of a card deck, sorted into True, False, or Cannot Say categories (Friedman, Bolinskey, Levak, & Nichols, 2015). Development of the MMPI began in the late 1930s in response to limitations of existing personality tests, particularly a lack of external validity. Hathaway and McKinley initially aspired to create a test that could aid in "diagnosing persons classified as constitutional psychopathic inferiors" (Hathaway, 1939, p. 117) and "assessing the psychological factors associated with physical problems or disease seen in a medical practice" (McKinley & Hathaway, 1943, p. 161). Subsequently, they also hoped their test would "measure the effectiveness of insulin therapy" (Hathaway, 1964, p. 204) in schizophrenia, which was a popular treatment modality in the late 1930s. The test also came to be viewed as an aid in defining levels of psychological impairment and changes in patients' conditions over time, as well as in observing therapeutic effects

(Dahlstrom, Welsh, & Dahlstrom, 1972). The MMPI was first published in 1942; by late April of 1943, the test was generating sufficient revenue that the Psychological Corporation became its licensed distributor. The final form of the MMPI was released in 1951, with the addition of the Social Introversion scale (*Si*), published by Drake in 1946. Further revisions of the MMPI *Manual* were published through 1983 (Friedman et al., 2015).

In creating the MMPI, Hathaway and McKinley were motivated to correct many of the problems hindering the effectiveness of most personality tests at the time. These personality inventories were generally constructed on a rational basis with a focus on content validity, but lacked scales focusing on assessment of test takers' attitudes (e.g., defensiveness, over- or under-reporting of symptoms). Hathaway and McKinley utilized the criterion keying method, an empirical method, in constructing the MMPI. In this method test items were administered to two or more groups of participants: a criterion group chosen for homogeneity in regard to a given diagnosis, selection of features, traits, or other characteristics (e.g., depression), and a comparison group that did not share these features, or shared them only at base-rate levels. Items to which the criterion and comparison groups' responses were statistically different were included in the scale related to the criterion group's characteristics, and items that received similar responses from both groups were excluded. Scoring such scales was done by allotting one point to each item answered in the direction of occurring significantly more frequently in the criterion group. For instance, if a greater proportion of individuals with paranoia than individuals in the control group responded True to an item, a True response to that item

received one point on the Paranoia scale, while a False response did not receive a score. Thus, the higher one's raw score is for any given scale, the more items he or she has responded to in the direction of the criterion group (Friedman et al., 2015).

Using this criterion keying/contrasted group method, Hathaway and McKinley began constructing the MMPI by amassing over 1,000 self-reference statements from various sources, including psychiatric examination forms, psychiatric textbooks, existing attitude and personality scales, clinical reports, and their own clinical experiences. Five hundred four separate statements that could be answered True or False made up the initial item pool; 55 additional items related to masculinity-femininity were later included, nine of which were eventually removed, resulting in the final pool of 550 items (Friedman et al., 2015). These items were placed into 26 content areas, including phobias, religious attitudes, overall health (including medical and neurological symptoms), political and social attitudes, familial, educational, and occupational experiences, and self-presentation, particularly in an overly virtuous manner (Dahlstrom et al., 1972). The items were deemed easily readable, written in the first-person declarative form with simplified writing based on commonly used vocabulary. Using these 550 items, scales were developed by contrasting the responses of the comparison and clinical criterion groups (Friedman et al., 2015).

The comparison group consisted of 724 friends and relatives of patients receiving treatment at the University of Minnesota Hospital outpatient department who agreed to complete the MMPI. This group was entirely Caucasian as few ethnic minority groups resided in Minnesota at the time, belonged to social classes deemed "underprivileged,"

and came from all areas of the state (Dahlstrom et al., 1972; McKinley & Hathaway, 1940). Further control and patient groups were composed of high school graduates attending pre-college conferences at the University of Minnesota (n = 265), medical patients at the University of Minnesota Hospital (n = 254), Work Project Administration (WPA) personnel (n = 265), and inpatients with various diagnoses in the then-called University of Minnesota Hospital Psychopathic Unit (i.e., psychiatric unit) (n = 221). Control participants (other than the medical patients) who were under the care of a physician at the time were excluded from the normative samples; all other participants were included (Friedman et al., 2015). Hathaway and McKinley found their original control sample to be well-matched in age, gender, and marital status to the Minnesota population according to the 1930s census (Dahlstrom et al., 1972). However, it was later determined and now generally accepted that the original MMPI norm group was over-representative of lower educational and occupational groups (Dahlstrom, 1993).

The clinical criterion groups were made up of carefully chosen psychiatric patients representing the following major diagnostic categories: hypochondriasis, depression, conversion hysteria, psychopathy, paranoia, psychasthenia, schizophrenia, and hypomania. Two extra groups were later included to aid in the development of additional MMPI scales. One group was comprised of college women used to develop a *Si* scale, and the other group, used to develop the Masculinity-Femininity (*Mf*) scale consisted of "homosexual invert males" (Drake, 1946; Hathaway, 1980, p. 10).

The MMPI contained 13 standard scales at its core: three validity scales (Lie [*L*], Infrequency [*F*], and Correction [*K*]) and ten standard clinical scales (scale 1

Hypochondriasis [*Hs*], scale 2 Depression [*D*], scale 3 Hysteria [*Hy*], scale 4 Psychopathic Deviate [*Pd*], scale 5 Masculinity-Femininity [*Mf*], scale 6 Paranoia [*Pa*], scale 7 Psychasthenia [*Pt*], scale 8 Schizophrenia [*Sc*], scale 9 Hypomania [*Ma*], and scale 0 Social Introversion [*Si*]). The validity scales were developed in order to aid in recognizing test records produced by uncooperative or deceptive test-taking strategies (e.g., faking good or faking bad) or participants who had difficulty in comprehending or reading the test items (Friedman et al., 2015). The clinical scales were predominantly developed to contribute to identifying the type and severity of psychiatric conditions, with a secondary objective being to provide an objective means of estimating effects of therapy and other changes in patients' conditions over time (Dahlstrom et al., 1972).

The traditional validity scales of the MMPI were Cannot Say (?), *L*, *F*, and *K*. The Cannot Say score is the number of items left unmarked or marked both True and False by the test taker. In either instance, the response is rendered unscorable. The Infrequency scale (*F*) was developed to measure the tendency of the test taker to respond to items in an unusual fashion. Items included in the *F* scale represent a varied array of content that obviously suggest deviant behavior, thus making it relatively easy for test takers to either deny or over-report problems (Friedman et al., 2015). Fortunately, a meta-analytic review conducted by Berry, Baer, and Harris (1991) found that *F* scores (particularly raw-score *F* values) are one of the most powerful measures on the MMPI in detecting faking. The Lie scale (*L*) was designed as a validity indicator to detect intentional under-reporting of problems, or "faking good." All 15 items on the scale are keyed False and were derived rationally from previous research on honesty and conceit by Hartshorne and May (1928).

A high *L* score reflects feelings of virtue and denial of minor character faults. Lastly, the Correction scale (*K*) was originally developed in order to improve the sensitivity of the clinical scales to detect psychopathology by adding a correction or suppression factor to their scaled scores. Without this correction, excessive false negative or low-ranging MMPI scores were found among psychiatric patients who should have demonstrated elevations on certain clinical scales due to their psychopathology. The goals of designing the *K* scale were aimed primarily at reducing these false negatives without significantly affecting the number of accurate test hits (true positives or true negatives). Additionally, correct interpretation of the *K* scale can aid in assessing fake-bad and fake-good test attitudes (Friedman et al., 2015).

Scale 1 (*Hs*) was the first to be included in the MMPI, largely due to the great numbers of patients with this disorder that were available, and because this diagnosis was rather easy to determine (McKinley & Hathaway, 1940). This scale measures bodily complaints or somatic ailments reported by an individual, that is, the degree to which an individual is denying good physical health. Hypochondriasis involves unrealistic interpretation of physical symptoms or sensations as abnormal, which leads the afflicted individual to fear that he or she has a serious disease (American Psychiatric Association, 2013). The MMPI *Hs* criterion group was made up of 50 inpatients with only pure, uncomplicated hypochondriasis. Patients with coexisting disorders, such as psychosis or a physical condition, were excluded from the criterion group (Friedman et al., 2015).

Scale 2 (*D*) was designed to gauge the presence and magnitude of symptoms of depression, a mood state characterized by decreased morale, feelings of hopelessness

and/or worthlessness, slowing of thought and/or action, and possible preoccupations with death and/or suicide (Dahlstrom et al., 1972). *D* is thought of as a mood scale (state vs. trait), and as such, is sensitive to transient and brief emotional states, such as declines in morale and efficiency (Friedman et al., 2015). Thus, *D* is useful in measuring response to treatment, and is even generally more sensitive to genuine health/illness states than scores on scale 1 (Nichols, 2011). Five participant groups were used to construct scale 2, but most of its 60 items were derived by comparing participants without observable depression with a group of 50 patients who had been diagnosed as being in the depressed phase of a manic-depressive psychosis (Hathaway & McKinley, 1942). A group of depressed "normal" individuals was also included in the creation of the scale in order to help establish more intermediate scale values between the comparison and criterion groups (Friedman et al., 2015).

The diagnosis of hysteria was quite common in the 1930s; however, it was difficult to determine as definite diagnostic criteria were lacking, hysterical phenomena commonly co-occurred with other neurotic symptoms in the same individual, and there was diagnostic uncertainty of hysterical reactions in individuals suspected of having organic disease (McKinley & Hathaway, 1944). Thus, Scale 3 (*Hy*) was originally created to assist in the diagnosis of hysteria, as well as to measure the degree to which patients were likely to develop symptoms of conversion. Conversion symptoms included "fits" such as blackouts, fainting, and pseudoseizures, abdominal pain, vomiting, amnesia, paralysis, contractures, tremors, speech irregularities (e.g., mutism, stammer, stutter, lisp, whispering), spasmodic movements, awkward or impaired gait, episodic

weakness and/or fatigue, anesthesia, deafness, blindness, blurred or tunnel vision, and cardiac crises, such as palpitations. The 50 participants in the *Hy* criterion group were primarily inpatients in the University of Minnesota Hospital psychiatric unit. Each had received a diagnosis of psychoneurosis or hysteria, or had been noted as having particularly hysterical components in a personality disturbance (Friedman et al., 2015). The patients of the criterion group manifested "neurotic defense of the conversion form of hysteria" (Dahlstrom et al., 1972, p. 191).

Scale 4 (*Pd*) was designed to measure the "personality characteristics of the amoral and asocial subgroup of persons with psychopathic personality disorders" (Dahlstrom et al., 1972, p. 195). The name of this scale, Psychopathic Deviate, implies "a variation in the direction of psychopathy," in accordance with the American Psychiatric Association's definition of psychopathic personality at the time, which included pathological emotionality and sexuality, along with asocial or amoral attitudes (McKinley & Hathaway, 1944, p. 172). McKinley and Hathaway (1944) found the scale was successful in identifying approximately half of the cases repeatedly classified as clinical psychopathic personalities. The criterion group was comprised of an undisclosed number of men and women ages 17 to 22. Symptomatically, the criterion cases varied greatly, but were characterized by complaints of stealing, lying, truancy, sexual promiscuity, over-indulgence in alcohol, forgery, and like behaviors. A common factor among the criterion group appeared to be low anticipation of their behavior's consequences, as well as an inability to learn to anticipate such consequences and cease engaging in antisocial behavior. The general construct of *Pd* appears to be one of an ingrained and mostly

maladaptive pattern of personality and behavior that generally involves some degree of externalization, such that problems and conflicts are perceived as originating outside of the self, dishonesty, selfishness, disloyalty, and/or malice (Greene, 2011).

Scale 5 (*Mf*) was originally intended to distinguish between homosexual and heterosexual men (Graham, 2011). Three subgroups of homosexual men were used for scale development based on the etiology of their gender preference. The first group consisted of "pseudo-homosexuals" with neurotic features related to inferiority. The second subgroup was a psychopathic type who tended to elevate scale 4, and the third subgroup became the final criterion group. This group was made up of 13 homosexual men screened for psychological abnormalities, such as psychosis, evident neurotic tendencies, and psychopathy. Hence, their homosexuality was not deemed to be caused by or related to any psychological condition. These men were seen as having feminine dispositions evident in their expressive styles, interests, and attitudes (Dahlstrom et al., 1972). Subsequent comparison groups consisted of 67 female airline employees and 54 male soldiers whose scores were compared to ascertain their response frequencies by gender (Hathaway & McKinley, 1943). A second comparison step involved identifying men who scored in the "feminine" direction on an "Invert" scale derived from Terman and Miles (1936). The responses of these men were then compared to those of a group of "normals." Contrary to the scale's original intent, scale 5 does not adequately differentiate homosexual men from their heterosexual counterparts (Wong, 1984). Instead, it came to be used to assess gender-role conformity and gender-related interests (Friedman et al., 2015).

According to Hathaway (1980), scale 6 (*Pa*) was designed to assess paranoid symptoms and features. The paranoid criterion group patients had diagnoses of paranoid state, paranoid condition, or paranoid schizophrenia. These patients displayed several symptoms of paranoia including ideas of reference, feelings of persecution, grandiose self-thoughts, hypersensitivity, rigid thinking, and suspiciousness. Accordingly, the scale measures a range of chronic and acute paranoid ideations and attitudes including delusions of control, persecutory ideation/delusions, hypersensitivity, and denial of cynicism. Externalizing processes including projection, hypervigilance, and scanning for "evidence" of hostile intentions or actions were also assessed (Friedman et al., 2015).

Scale 7 (*Pt*) was developed to measure a neurotic pattern labeled *psychasthenia,* a now obsolete term used to denote neuroses dominated by "doubting, agitation, and anxiety and by obsessional ideas" (Berrios, 1985, p. 174). Psychasthenia involves an inability to disengage in undesired, maladaptive behaviors, which stems from the concept of a "weakened will" according to McKinley and Hathaway (1942, p. 616). Psychasthenic tendencies as defined by the original MMPI included excessive self-doubts and worries that lead to tension, difficulty in making decisions, various fears, obsessive preoccupations, compulsive urges and behaviors, ambiguous anxieties, and feelings of low self-confidence and insecurity. In the past, psychasthenic conditions were often referred to as compulsion neuroses, obsessive-compulsive states, or obsessive-ruminative tension states (McKinley, 1944). Today, the appropriate diagnostic category for psychasthenia would be obsessive-compulsive disorder (*DSM-5;* American Psychiatric Association, 2013). Scale 7 does not contain items reflecting specific phobias or

compulsions. Instead, the underlying personality structure of psychasthenia, rather than specific symptomatology, is presented in the items of Scale 7 (Friedman et al., 2015).

Dementia Praecox was recognized as a syndrome by Kraepelin (1893), and was later renamed *Schizophrenia* by Bleuler in 1911 (e.g., Bleuler, 1950). Schizophrenia is currently recognized as a group of disorders with a biogenetic etiological basis (Eysenck, Wakefield, & Friedman, 1983; Gallagher, Jones, & Baraket, 1987), and its diagnostic criteria, according to *DSM-5*, include impairment of psychological processes involving thinking, perceiving, feelings, speaking, and behaving, with no one symptom considered characteristic of the disorder (American Psychiatric Association, 2013). Deterioration from a prior level of functioning is frequently observed with constant symptoms of the disorder present for at least six months before diagnosis. Symptoms include social withdrawal, inappropriate affect, delusion, odd behavior, hallucinations, and digressive, vague, circumstantial, or disorganized speech. Scale 8 (*Sc*) measures these characteristics of schizophrenia. Individuals in the *Sc* criterion group were diagnosed with various subtypes of schizophrenia that are not recognized in the *DSM-5* (e.g., catatonic, paranoid, simple, and hebephrenic). Thus, the wide range of symptoms that can be present in schizophrenia were represented (Friedman et al., 2015).

Scale 9 (*Ma*) was the last of the basic Clinical scales to be developed and measures aspects of a mildly elevated mood, including flight of ideas, labile affect, and psychomotor excitement (Friedman et al., 2015). *Ma* reflects the personality pattern *hypomania*, an affective disorder involving heightened activity levels along with easy distractibility, insomnia, excessive optimism, grandiosity, suspiciousness, and irascibility

(Dahlstrom et al., 1972). Twenty-four inpatients at the University of Minnesota Hospital were selected as the *Ma* criterion group. Only patients with less than full-blown mania were considered for inclusion, as more severe cases were unable to fully engage in sorting items into the True, False, and Cannot Say categories. Thus, the scale name *Hypomania* denotes measurement of a less than full-blown manic condition. It was important to develop a measure of more moderate or subtle cases of mania in order to identify the condition early on and improve prognosis and treatment options for the test taker (Friedman et al., 2015).

Scale 0 (*Si*) was originally developed to assess an individual's degree of introversion- extraversion (Drake, 1946). *Si* is the only MMPI scale to have a criterion group comprised of a non-psychiatric ("normal") sample. Development of the *Si* scale was inspired by the Minnesota T-S-E (Thinking-Social-Emotional) Inventory, which was then often administered at the University of Wisconsin guidance program. The T-S-E Inventory was developed by Evans and McConnell (1941) and separated the character traits of introversion-extraversion into categories of thinking, social activity, and emotional expression. Drake developed a similar scale measuring social introversion from the MMPI using two female criterion groups: 50 college students who scored at the 65th percentile or higher on the social introversion-extraversion component of the T-S-E Inventory, and 50 college students who scored below the 35th percentile. While the scale was initially scored using only women, it was later validated with men, and male and female groups were combined into one group in order to establish *Si* norms. (Friedman et al., 2015).

The raw scores of each MMPI Validity and Clinical scale are converted into standard *T*-scores by plotting them onto a profile. The pattern of high scores is what is typically interpreted; these scores provide the interpreter the ability to compare the test taker's scores to the test norms. Individual scales were initially interpreted to aid in diagnosis. However, combinations of scales were later determined to be better descriptors of personality characteristics, such that patterns of scale scores rather than single scale elevations became the primary focus of interpretation rather than single scale elevations. "Codetype" or "Code Pattern" became the terms used to describe configural interpretation of the MMPI profile (Friedman et al., 2015).

Additional research-based scales came to be incorporated into the MMPI beyond its original 13 scales. As high scores on certain clinical scales can be better understood by examining components that make up the broader constructs they measure, Harris and Lingoes (1955, 1968) developed a set of rational, content-based subscales (named Harris-Lingoes Subscales) for Clinical scales *2, 3, 4, 6, 8,* and *9*. Wiggins (1966) developed a series of 13 content scales containing items with straightforward descriptions of symptoms and problems. The Content scales were designed to allow patients to express their symptoms and concerns in a more direct manner than on the Clinical scales. Furthermore, hundreds of research-based supplementary scales were developed for the MMPI, some of which came to be included into the standard test profile. These included factor scales Anxiety (*A*) and Repression (*R*) (Welsh, 1956)*;* an Ego Strength scale (*Es*; Barron, 1953); a Low Back Pain scale (*Lb*; Hanvik, 1949); a Caudality scale (*Ca*; Williams, 1952); a Dependency scale (*Dy*; Navran, 1954*);* a Social Responsibility scale

(*Re*; Gough, McClosky, & Meehl, 1952); Prejudice (*Pr*; Gough, 1951) and Social Status (*St*; Gough, 1948a, 1948b) scales; a Control scale (*Cn*; Cuadra, 1956); a Manifest Anxiety scale (*At* or *MAS*; Taylor, 1953); a College Maladjustment scale (*Mt*; Kleinmuntz, 1961); an Alcoholism scale (*Alc* or *MAC*; MacAndrew, 1965); and an Overcontrolled-Hostility scale (*O-H*; Megargee, Cook, & Mendelsohn, 1967) (as cited in Friedman et al., 2015). Thus, the MMPI instrument evolved and became more comprehensive than its original version.

MMPI-2.

The development of the MMPI-2 (Butcher et al., 1989) began in 1982 based on two identified needs. First, the most apparent need was the collection of new norms. The original MMPI normative sample had been collected in the 1930s and was composed almost entirely of Caucasian, working-class, rural-dwelling individuals from Minnesota who had obtained eight years of education, on average. While this sample was appropriate when the MMPI was published, it became inadequate as the MMPI became more widely used in the United States and around the world. Secondly, the revision of the MMPI aimed to update its test items. Items that were not scored on any of the more widely used scales and those deemed offensive on the bases of religious beliefs, sexist wording, or mention of bowel and bladder functioning, were removed from the item pool. Additionally, items containing outdated language or cultural references were revised. The original validity scales were carried over from the MMPI to the MMPI-2. Similarly, the Clinical scales were essentially left unchanged, although some items were revised or eliminated from the scales (Ben-Porath & Tellegen, 2008). The original Wiggins content

scales were replaced with a set of 15 new MMPI-2 Content scales to address areas such as fears, anger, and family problems not assessed by the Clinical scales. These scales include: Anxiety (*ANX*), Fears (*FRS*), Obsessiveness (*OBS*), Depression (*DEP*), Health Concerns (*HEA*), Bizarre Mentation (*BIZ*), Anger (*ANG*), Cynicism (*CYN*), Antisocial Practices (*ASP*), Type A Behavior (*TPA*), Low Self-Esteem (*LSE*), Social Discomfort (*SOD*), Family Problems (*FAM*), Work Interference (*WRK*), and Negative Treatment Indicators (*TRT*) (Friedman et al., 2015). Additionally, a standard set of supplementary scales was selected for the MMPI-2 Supplementary scales profile, which includes the following: *A* and *R* (Welsh, 1956); *Es* (Barron, 1953); Dominance (*Do*; Gough, McClosky, & Meehl, 1951); *Re* (Gough et al., 1952); *Mt* (Kleinmuntz, 1961); Post-Traumatic Stress Disorder scales *PK* (Keane, Malloy, & Fairbank, 1984) and *PS* (Schlenger & Kulka, 1987); the Marital Distress Scale (*MDS*; Hjemboe, Almagor, & Butcher, 1992); Hostility (*Ho*; Cook & Medley, 1954); *O-H (*Megargee et al., 1967)*;* Alcoholism scale- Revised (*MAC-R;* MacAndrew, 1965); Addiction Admission (*AAS*) and Addiction Potential (*APS*) (Hathaway & McKinley, 1989); and Gender Role-Masculine (*GM*) and Gender-Role- Feminine (*GF*) (Hathaway & McKinley, 1989). Ben-Porath and Sherwood (1993) later developed subscales for content scales with heterogeneous content, which they titled *components.* Another important addition consisted of the Personality Psychopathology-Five (*PSY-5*) scales intended to measure major domains of disordered personality (Harkness, McNulty, & Ben-Porath, 1995). These include Aggressiveness (*AGGR*), Psychoticism (*PSYC*), Disconstraint (*DISC*),

Negative Emotionality/Neuroticism (*NEGE*), and Introversion/Low Positive Emotionality (*INTR*).

An experimental form (Form AX) was created in order to test a new group of "normal" participants, as well as to provide a basis for developing the new MMPI-2. Form AX contained all 550 items from the MMPI, as well as 154 new experimental items, for a total of 704 items. Some item order change occurred, although this was likely inconsequential. Eight-two original MMPI items were rewritten for Form AX to improve the clarity or modernity of their language. Ultimately, 14 of these items were eliminated, resulting in 68 original items left in the MMPI-2 (Friedman et al., 2015). Additionally, 47 of the 154 experimental items were also eliminated from the MMPI-2 (Nichols, 1992, as cited in Friedman et al., 2015). The original MMPI-2 was published in 1989; it consists of 567 items and introduced several improvements to the original MMPI, which was discontinued by its publisher in 1999. First, new norms, which were more representative of the United States' population, were provided. Two thousand six hundred adult paid volunteers (1,462 women and 1,138 men, all ages 18 to 85) were selected from California, Minnesota, North Carolina, Ohio, Pennsylvania, Virginia, and Washington to participate as the MMPI-2 normative sample. This new sample was more ethnically diverse than the original sample as it included African-Americans, Hispanics, and Native Americans; however, in comparison with 1990 census data, Asian-Americans and Hispanics were still underrepresented in the MMPI-2 normative sample. Furthermore, young adults in the age range of 18 to 19, as well as older adults ages 70 to 84 were also underrepresented (Friedman et al., 2015).

A new method of deriving MMPI-2 standard scores was introduced, as were several new scales. Two new response inconsistency scales, *VRIN* and *TRIN*, were developed to assist in identifying protocols demonstrating random or biased responding. A new scale, F-back (*Fb*), was designed to identify infrequent responding to items in the second half of the MMPI-2. Further research and development of the MMPI-2 following its initial release resulted in additional MMPI-2 scales. Two Validity scales, Infrequency-Psychopathology (*Fp*; Arbisi & Ben-Porath, 1995a; 1995b) and the Superlative Self-Presentation scale (*S*; Butcher & Han, 1995) were introduced, with *Fp* assessing the likelihood that a high *F* scale reflects exaggeration rather than genuine psychopathology, and *S* detecting an unrealistically virtuous self-presentation. Subsequent developments also introduced non-gendered MMPI-2 norms and the addition of the Symptom Validity Scale (*FBS*) to the Validity scales (Ben-Porath & Tellegen, 2008).

The Variable Response Inconsistency scale (*VRIN*) consists of 67 pairs of items intended to detect inconsistent, contradictory responding (Friedman et al., 2015). Each item pair has similar or opposite meaning (Butcher et al., 2001). Some items are scored as inconsistent if one item receives an opposite response from the other item in the pair, while others are scored as inconsistent if both items are scored alike. Very high *VRIN* scores suggest the test taker may not have responded carefully to the test items, thus causing the profile to be uninterpretable. The True Response Inconsistency scale (*TRIN*) is comprised of 23 item pairs that are opposite in content (Friedman et al., 2015). A high *TRIN* score reflects biased responding in either an acquiescent (True) or nay-saying (False) direction (Butcher et al., 2001, as cited in Friedman et al., 2015). The *Fb* scale

was designed for the MMPI-2 to function similarly to the *F* scale, but for items appearing later in the test. The *F* scale is scored within the first 361 items of the MMPI-2; when the test was re-standardized from the MMPI, the *Fb* scale was developed to pick up where the *F* scale left off. The *Fb* scale begins at Item 281 (Friedman et al., 2015). The *Fp* scale was designed by Arbisi and Ben-Porath (1995a; 1995b) to provide further measurement of self-unfavorable or over-reporting, especially in patient populations in which higher rates of endorsement of psychological disturbance are anticipated. As there are several reasons as to why an elevation on *F* might occur, such as random responding, poor reading comprehension, genuine psychopathology, or attempting to "fake bad," *Fp* was designed to better understand *F* elevations. The *Fp* scale was constructed with items rarely endorsed by two groups of patients with known psychiatric disturbance, and by individuals from the MMPI-2 re-standardization sample. Therefore, an elevation on *Fp* indicates the test taker endorsed items rarely endorsed by psychiatric patients and individuals from the general population, and suggests the score was the result of a "faking bad" response style (Friedman et al., 2015). The final Validity scale addition to the first publication of the MMPI-2 was the *S* scale. This scale was developed by Butcher and Han (1995) by comparing item responses of 274 male airline pilot applicants with the 1,138 men from the MMPI-2 re-standardization sample. The scale contains fifty items that differed significantly in endorsement frequency between the two groups and added to its internal consistency based on item and content analyses. *S* is similar to *K* in that both scales may be considered measures of defensiveness. Unlike *K,* however, *S* extends throughout the MMPI-2 until Item 560, while *K* items are found prior to Item 366

(Friedman et al., 2015). Additionally, the content of *S* is less subtle than that of *K* and is more socially desirable, accentuating characteristics such as denial of cynicism, mistrust, irritability, anxiety, and internal conflict, and assertion of benevolent views toward others, contentment with one's life, an even temper, and conventionality (Nichols, 2011). The newest among the MMPI-2 Validity scales is the Symptom Validity Scale (*FBS,* formerly Fake Bad Scale). The *FBS* was developed by Lees-Haley, English, and Glenn in 1991, but it was not added to the official MMPI-2 scoring program until January, 2007. This scale is a supplemental measure of validity intended to detect malingering in plaintiffs involved in personal injury litigation (Friedman et al., 2015).

The aspect of the MMPI-2 which most directly relates to the later development of the MMPI-2-RF is the introduction of the Restructured Clinical (RC) scales to the MMPI-2. While the MMPI-2 Clinical scales have been recognized as demonstrating strength due to containing items that reflect clinically significant dimensions, one downfall is that these scales are not psychometrically optimal. For instance, the MMPI-2 Clinical scales each contain heterogeneous item content, item overlap across them, and consequent high inter-correlations across Clinical scale scores. The RC scales were designed to address these problems. Each RC scale measures a homogenous dimension identified as a major component of one or more Clinical scale(s), and are as follows: Somatic Complaints (*RC1*), Low Positive Emotions (*RC2*), Cynicism (*RC3*), Antisocial Behavior (*RC4*), Ideas of Persecution (*RC6*), Dysfunctional Negative Emotions (*RC7*), Aberrant Experiences (*RC8*), and Hypomanic Activation (*RC9*). The shared variance across Clinical scales related to distress was placed into a single Demoralization (*RCd*)

scale. The RC scales offer considerable value as measures of several distinct core components of the Clinical scales, but were not considered sufficient for a comprehensive MMPI-2 based assessment of clinically relevant features. Scales measuring aspects of the original Clinical scales (e.g., shyness, anxiety, aggression, substance abuse) and other facets not assessed, or not directly assessed, by the RC scales (e.g., interests, suicidal ideation, fears) were also needed. Furthermore, the RC scales did not include measures of the core components of Clinical scales 5 and 0. While these scales are not measures of psychopathology, both assess attributes relevant to comprehensive psychological assessment. Lastly, a set of higher-order dimensions remained unidentified by the RC scales (Ben-Porath & Tellegen, 2008).

MMPI-2-RF.

The MMPI-2-RF (Ben-Porath & Tellegen, 2008) is a 338-item restructured version of the 567-item MMPI-2 that includes the previously discussed MMPI-2 RC scales along with newly developed scales. The MMPI-2-RF was designed to provide comprehensive and efficient assessment of clinically relevant variables measurable by its item pool, and is intended for use in a variety of settings. Each item included in the MMPI-2-RF comes from the MMPI-2. Additionally, the MMPI-2-RF shares the same normative sample as the MMPI-2. New norms were deemed unnecessary based on the test developers' examination of data from recent cohorts whose mean scores were found to be similar to those of the MMPI-2 normative sample. One major distinction between the norms of these two instruments is that the norms for the MMPI-2 are provided

separately for each gender, while the MMPI-2-RF uses non-gendered norms (Ben-Porath & Tellegen, 2008).

One goal of developing the MMPI-2-RF was to assess the entire pool of MMPI-2 items and select potential areas for further scale construction (Ben-Porath & Tellegen, 2008). The MMPI-2-RF was intended to be a useful alternative to, rather than replacement for, the MMPI-2 (Graham, 2011). This restructured version now contains 51 scales with several of the MMPI-2-RF scales being constructed using like procedures or containing many of the same items as those on the MMPI-2. The nine RC scales of the MMPI-2 make up the core of the MMPI-2-RF and are joined by seven revised Validity scales (*VRIN-r, TRIN-r, F-r, Fp-r, FBS-r, L-r,* and *K-r*) and one new Validity scale (Infrequent Somatic Responses [*Fs*]). Each of the seven revised MMPI-2-RF Validity scales are quite similar to their MMPI-2 counterparts and are used to assess deviant response patterns in the same way as their antecedent versions (Tellegen & Ben-Porath, 2008). The new *Fs* scale was created by Wygant, Ben-Porath, and Arbisi (2004) to highlight overreporting of uncommon somatic symptoms.

Three new Higher-Order (H-O) scales (Internalizing Dysfunction [*EID*], Thought Dysfunction [*THD*], and Behavioral/Externalizing Dysfunction [*BXD*]) are introduced in this test version. Tellegen and Ben-Porath (2008) devised the Higher-Order scales to identify the major dimensions of the MMPI-2-RF scales and provide an organized structure for interpretation of the substantive scales. Three consistent factors, *EID, THD*, and *BXD*, were the result of factor analyses of the RC scales in three clinical samples. Other scales were then developed to measure these dimensions by correlating the three

factor scores with the 567-item MMPI-2- item pool. The majority of the *EID* scale items come from the *RCd, RC2*, and *RC7* scales; most of the *THD* scale items come from scales *RC6* and *RC8*; and most of the scale items for the *BXD* scale come from the *RC4* and *RC9* scales. Therefore, the Higher-Order scales represent the core constructs of three frequently occurring MMPI-2 code types (27/72, 68/86, and 49/94, respectively) (Graham, 2011).

As the RC scales do not assess every important clinical construct included in the MMPI-2 item pool, Ben-Porath and Tellegen (2008) designed 23 Specific Problems scales for the MMPI-2-RF. These scales were developed to measure distinctive Clinical scale components not assessed by the RC scales, facets of the RC scales that warranted separate assessment, and clinically significant attributes not represented by the RC scales. The SP scales are divided into four groups based on content which are: Somatic scales, Internalizing scales, Externalizing scales, and Interpersonal scales. The Somatic scales cluster contains Malaise (*MLS*), Gastrointestinal Complaints (*GIC*), Head Pain Complaints (*HPC*), Neurological Complaints (*NUC*), and Cognitive Complaints (*COG*). The scales of the Internalizing scales group are Suicidal/Death Ideation (*SUI*), Helplessness/Hopelessness (*HLP*), Self-Doubt (*SFD*), Inefficacy (*NFC*), Stress/Worry (*STW*), Anxiety (*AXY*), Anger Proneness (*ANP*), Behavior-Restricting Fears (*BRF*), and Multiple Specific Fears (*MSF*). The Externalizing scales consist of Juvenile Conduct Problems (*JCP*), Substance Abuse (*SUB*), Aggression (*AGG*), Activation (*ACT*), and the Interpersonal scales contain Family Problems (*FML*), Interpersonal Passivity (*IPP*), Social Avoidance (*SAV*), Shyness (*SHY*), and Disaffiliativeness (*DSF*) (Graham, 2011).

The MMPI-2-RF also presents two new Interest Scales (Aesthetic-Literary Interests [*AES*] and Mechanical-Physical Interests [*MEC*]). These Interest scales were created based on factor analyses of MMPI-2 Masculinity-Femininity scale items, from which two independent dimensions were identified. The first scale, *AES,* consists of seven items related to interest in writing, music, and theater, while the second scale, *MEC*, contains nine items having to do with interest in fixing or building things, outdoor activities, and sports. Lastly, the MMPI-2-RF also contains revised versions of the MMPI-2 PSY-5 scales (*AGGR-r, PSYC-r, DISC-r, NEGE-r,* and *INTR-r*) (Graham, 2011). These scales conceptually link the MMPI instruments with contemporary models of personality and psychopathology (Graham, 2011). Table 1 presents the MMPI-2-RF scales and their measured characteristics.

Table 1
MMPI-2-RF scales and measured characteristics

Scale Name	Characteristic
Validity Scales	
Cannot Say (?)	Unanswered items
Variable Response Inconsistency (*VRIN-r*)	Random response pattern
True Response Inconsistency (*TRIN-r*)	Inconsistent response pattern related to acquiescent or nay-saying response bias
Infrequent Responses (*F-r*)	Responses suggesting high disturbance that is rare in the general population
Infrequent Psychopathology Responses (*Fp-r*)	Responses suggesting high disturbance that is rare in psychiatric populations

(table continues)

Table 1 (cont.)
MMPI-2-RF scales and measured characteristics

Scale Name	Characteristic
Infrequent Somatic Responses (*Fs*)	Somatic symptoms infrequently endorsed in medical patient populations
Symptom Validity (*FBS-r*)	Somatic and cognitive complaints associated with over-reporting of symptoms
Uncommon Virtues (*L-r*)	Unrealistic moral attributes, values, or actions
Adjustment Validity (*K-r*)	Avowals of good psychological adjustment; associated with defensiveness (indicated by under-reported maladjustment) at high levels
Higher-Order (H-O) Scales	
Emotional/Internalizing Dysfunction (*EID*)	Disturbance in mood and affect
Thought Dysfunction (*THD*)	Disturbance associated with disordered thinking
Behavioral/Externalizing Dysfunction (*BXD*)	Disturbance associated with under-controlled behavior
Restructured Clinical (RC) Scales	
Demoralization (*RCd*)	General unhappiness and dissatisfaction
Somatic Complaints (*RC1*)	Varied physical health complaints
Low Positive Emotions (*RC2*)	Deficiency of positive emotionality
Cynicism (*RC3*)	Non-self-referential beliefs expressing mistrust and generally low opinions of others
Antisocial Behavior (*RC4*)	Rule-breaking and irresponsible behavior

(table continues)

Table 1 (cont.)
MMPI-2-RF scales and measured characteristics

Scale Name	Characteristic
Ideas of Persecution (*RC6*)	Self-referential beliefs that others are threatening
Dysfunctional Negative Emotions (*RC7*)	Maladaptive anxiety, anger, frustration
Aberrant Experiences (*RC8*)	Unusual perceptions or cognitions
Hypomanic Activation (*RC9*)	Over-activation, aggression, impulsivity, and grandiosity
Specific Problems (SP) Scales	
Somatic/Cognitive Scales	
Malaise (*MLS*)	General sense of physical debilitation, poor health
Gastrointestinal Complaints (*GIC*)	Nausea, recurring upset stomach, and poor appetite
Head Pain Complaints (*HPC*)	Head and neck pain
Neurological Complaints (*NUC*)	Dizziness, weakness, paralysis, loss of balance, etc.
Cognitive Complaints (*COG*)	Difficulties with memory, concentration
Suicidal/Death Ideation (*SUI*)	Direct reports of suicidal ideation and recent suicide attempts
Helplessness/Hopelessness (*HLP*)	Belief that goals cannot be reached or problems solved
Self-Doubt (*SFD*)	Lack of confidence, feelings of inferiority

(table continues)

Table 1 (cont.)
MMPI-2-RF scales and measured characteristics

Scale Name	Characteristic
Inefficiency (*INF*)	Belief that one is indecisive and ineffectual
Stress/Worry (*STW*)	Preoccupation with disappointments, difficulty managing under pressure
Anxiety (*ANX*)	Pervasive anxiety, fears, frequent nightmares
Anger Proneness (*ANP*)	Becoming easily angered, impatient
Behavior-Restricting Fears (*BRF*)	Fears that significantly inhibit daily functioning
Multiple Specific Fears (*MSF*)	Fears of blood, water, thunderstorms, etc.
<u>Externalizing Scales</u>	
Juvenile Conduct Problems (*JCP*)	Problematic behaviors at home and school
Substance Abuse (*SUB*)	Current and past misuse of alcohol and/or drugs
Aggression (*AGG*)	Physically aggressive, violent behavior
Activation (*ACT*)	Heightened excitement and energy levels
<u>Interpersonal Scales</u>	
Family Problems (*FML*)	Conflict within familial relationships
Interpersonal Passivity (*IPP*)	Submissiveness, lack of assertion
Shyness (*SHY*)	Bashful, prone to feel awkward and anxious around others

(table continues)

Table 1 (cont.)
MMPI-2-RF scales and measured characteristics

Scale Name	Characteristic
Disaffiliativeness (*DSF*)	Disliking people and interacting with them
Interest Scales	
Aesthetic-Literary Interests (*AES*)	Literature, music, the theater
Mechanical-Physical Interests (*MEC*)	Fixing and building things, the outdoors, sports
Personality-Psychopathology Five (PSY-5) Scales	
Aggressiveness-Revised (*AGGR-r*)	Instrumental, goal-targeted aggression
Psychoticism-Revised (*PSYC-r*)	Disconnection from reality
Disconstraint- Revised (*DISC-r*)	Under-controlled behavior
Negative Emotionality/Neuroticism-Revised (*NEGE-r*)	Anxiety, insecurity, worry, fear
Introversion/Low Positive Emotionality-Revised (*INTR-r*)	Social disengagement, lack of pleasure

Note. Adapted from Ben-Porath and Tellegen, 2008

MMPI, MMPI-2, and MMPI-2-RF Assessment in Health-Related Contexts

Health psychology assessment has been defined as "assessment of the interactions of the patient, the disease, and the person's environment, leading to the formulations of a diagnostic or treatment strategy based on an understanding of the biopsychosocial interaction" (Rozensky, Pereira, & Whitehead, 2016, p. 219). The use of assessment measures in health psychology settings typically serves to provide valid formulation by integrating components of the biopsychosocial model to assist in integrated treatment

planning (Rozensky et al., 2016). Additionally, health psychology assessment often answers questions and, by extension, solves problems related to patient care for other healthcare professionals (Belar & Deardorff, 1995). Such issues likely to be encountered in multidisciplinary healthcare settings include psychological presentations and complications of organic disease, psychological reactions to organic disease, somatic effects of psychological distress, and somatic presentations of psychiatric disorder (Lipowski, 1967).

Health psychology assessment involves evaluation of patients presenting with a wide range of physical illnesses and psychological disorders. With regards to physical disease alone, psychological assessment has been utilized in patient conceptualization and treatment planning for metabolic and endocrine disorders, nervous system diseases, circulatory and respiratory system diseases, diseases of the digestive system and skin, and many others (Boll, Johnson, Perry, & Rozensky, 2002). Common presenting problems frequently encountered by psychologists in healthcare settings are management of cancer, pain, obesity, and need for bariatric surgery (Rozensky, Pereira, & Whitehead, 2016).

Substantial research has been conducted with regards to the MMPI instruments and physical health conditions in particular (e.g., Mayerink, Reitan, & Selz, 1988; Strassberg, Reimherr, Ward, Russell, & Cole, 1981; Slesinger, Archer, & Duane, 2002), as the MMPI measures have long been used in medical settings. Indeed, the original MMPI was developed for use in medical settings to aid in differentiating patients with genuine medical complaints from patients whose problems had underlying psychological symptoms, and was intended for assessment of both psychiatric and general medical

patients (Arbisi & Seime, 2006; McKinley & Hathaway, 1943). Research concerning the MMPI in health-related contexts has focused on the previously mentioned most common presenting problems seen by psychologists in healthcare settings, particularly chronic pain. Chronic pain has been a serious health and economic concern in the United States for several decades. During the time of the MMPI's use, the National Institutes of Health (1979) estimated that 15 million Americans suffered from low back pain, and the annual medical care cost for these individuals was $5 billion. Brena, Chapman, and Decker (1981) estimated these costs to be higher: For one million pain-disabled patients per year, the cost to society was $20 billion per year. These differences in cost between medical care for chronic pain patients and costs for society are partly due to the risk for psychological dysfunction and losses of social, vocational, and financial support frequently associated with the chronic pain condition. Psychological factors may also exacerbate the pain experience, may affect response to medical and/or surgical intervention, and, in some cases, may be the primary factor responsible for the pain (Prokop, 1988).

Some research has suggested that pain of longer duration has been associated with more frequent high scores on MMPI profiles (e.g., Cox, Chapman, & Black, 1978; McGill, Lawlis, Selby, Mooney, & McCoy, 1983), while other studies have not demonstrated such a relationship (e.g., Armentrout, Moore, Parker, Hewett & Feltz, 1982; McCreary, 1985). However, it is generally agreed upon that pain of greater intensity is related to more high scores on MMPI profiles. A study conducted by Strassberg, Reimherr, Ward, Russell, and Cole (1981) illustrates these relationships. This

study also demonstrated the ability of the MMPI to predict long-term (e.g., approximately 4 years) outcomes of psychiatric and anesthesiologic treatment for chronic pain. Regardless of whether chronic pain patients received psychiatric or anesthesiologic treatment, better medical (i.e., number of doctors consulted, hospitalizations, and surgeries since treatment) and subjective (i.e., current level of pain, current pain in comparison with pretreatment level of pain, helpfulness of treatment, maximum relief, length of effectiveness of treatment, and overall success of treatment) outcomes were associated with less defensiveness (i.e., lower scores on *K* scale) and fewer psychological undertones in pain complaints (i.e., lower scores on *Hy* and *Hs* scales) on the MMPI.

Mayerink, Reitan, and Selz's 1988 study investigated MMPI profiles of multiple sclerosis (MS) patients ($n = 83$) in comparison to a control group selected from the MMPI normative group ($n = 83$, with the same male-to-female ratio as the MS patient group). MS patients endorsed previously selected "symptom items" on scales 1, 2, 3, 7, and 8 at a much higher rate than they did non-symptom items; furthermore, the patients endorsed symptom items at a much higher rate than did the control group.

The focus of the MMPI's utility in healthcare settings has shifted in recent years. Since its inception in 1982, the MMPI-2 has remained one of the most widely used psychological assessment instruments in medical settings, with its most common uses in these venues being screening for psychopathology, substance abuse problems, psychological effects of physical conditions, responses to medical treatment, and the prediction of future symptomatology (Graham, 2011; Marek & Ben-Porath, 2017). Published in 2008, the MMPI-2-RF has also proven to be a useful aid in health

psychology assessment. Its scale scores have demonstrated reliability and validity in a variety of medical contexts, including pre-surgical assessment and monitoring of chronic pain and epilepsy (Marek & Ben-Porath, 2017). Additionally, the MMPI-2-RF improves on psychometric limitations of the MMPI-2, such as item overlap between MMPI-2 Clinical scales, which have been eliminated between the Restructured Clinical scales. However, item overlap has not been entirely eliminated from other MMPI-2-RF scales.

The MMPI instruments may also be used in disability assessment. Social Security and private disability insurance assessments differ from both personal injury disability assessment and workers' compensation disability assessment. Under Social Security and private disability insurance, a separate assessment for the cause or circumstances that led to the disability is not made; only a genuine disabling condition must be determined. Personal injury litigation, however, requires a separate assessment to determine whether the disability was the fault, whether intentionally or not, of the party being sued. Workers' compensation falls in the middle of this continuum as fault does not need to be demonstrated, but it must be proven that the injury or disability arose due to and in the course of employment (Lencsis, 1998).

Pollack and Grainey (1984) conducted a study examining group differences in MMPI scores between state disability insurance applicants, applicants for private workers' compensation, and adoption applicants serving as a control group. Significant differences were found between the three groups, with the adoption group exhibiting the "best" MMPI scores (i.e., *T*- scores of approximately 50); however, this group also demonstrated the highest *K* scores, indicating attempts to present with low psychological

disturbance. The private disability applicants scored significantly higher than the adoption group but lower than the state disability applicants. Overall, this group showed elevations on scales 1 and 3 with a lower score on scale 2, suggestive of a somatically focused "conversion V" profile (to be further discussed). The state disability applicants had very high scores across several MMPI scales with mean scores on scales 1, 2, 3, 4, 6, 7, 8, and 9 ranging from 60.08 to 91.00. This group's high *F* scale score in particular (*M* = 80.00 for men, *M* = 77.38 for women) are suggestive of malingering or severe emotional turmoil. None of these applicants were applying for disability on the basis of emotional problems; however, emotional problems could still account for these elevations. Additionally, a need for income from state disability may have provided the applicants with motivation to appear worse than they truly were. These findings imply that the three groups examined differ in terms of motivation. With respect to the two disability applicant groups in particular, it could be expected that on the basis of these MMPI scores, the private disability applicants would be more likely to be placed in employment than the state disability applicants (i.e., the state disability applicants would be more likely to receive monetary compensation on the basis of their injuries).

Traditionally, workers' compensation required evidence of physical injury sustained in the workplace. Over time, however, mental conditions became more widely recognized and deemed acceptable for receiving workers' compensation, although they were required to have a physical connection (Drukteinis, 2013). Two types of claims can be made within these parameters: physical trauma leading to a mental disorder (i.e., physical-mental claim) or mental trauma leading to a physical disorder (i.e., mental-

physical claim). In physical-mental claims, a clear precipitating physical injury has subsequent psychological effects. In mental-physical claims, emotional or stressful circumstances led to psychological ailments that include objectively assessed physical concerns. Such emotional or stressful events must have been clearly initially identified as a discrete event or "nervous shock" (Larson & Larson, 2005, as cited in Drukteinis, 2013).

A third, more controversial, category of claims may also be made. Mental-mental claims are those in which a mental trauma leads to psychological disorder without any physical components (Tucker, 2010). These claims are particularly difficult to evaluate, as verifying personal injury primarily attributed to intangible effects that produce psychological distress can be problematic. Accidental injury language, on the surface, is more easily applied to physical, rather than mental or stress, events (Drukteinis, 2013). Furthermore, as work stress is fairly commonplace today, even when mental-mental claims are allowed, statutory language is often put in place that requires more than what is considered the typical amount of stress experienced by all employees in order to support the claim. Stress experiences and stress claims are also fairly subjective; thus, the causal connections of the precipitating event(s) and consequences are more likely to be challenged than those of claims involving a physical component (Lawrence, 1983, as cited as Drukteinis, 2013). While mental conditions were essentially excluded from workers' compensation initially, as mental disorders and their psychological and physiological bases have become better understood, there has been an increase in workers' compensation claims made on these grounds (McDonald & Kulick, 2001, as

cited in Drukteinis, 2013). Such mental disorders may occur independent of any physical condition, but they are often comorbid with and complicate physical conditions, as discussed previously.

Psychological evaluation on the basis of disability claims, whether the disability be physical, mental, or dual in nature, can be valuable in examining personality factors contributing to an individual's symptoms or evaluating an individual's response to an acquired physical disability. However, there are limitations in utilizing psychological assessment measures such as the MMPI instruments in disability evaluations. It is impossible, for instance, to determine, on the basis of a psychological assessment, whether a disability claimant's injuries are organically derived, or if they stem from personality factors. Furthermore, the nature of an individual's personality and its influence on current functioning cannot be established unless personality assessment was conducted prior to the current disability. In short, there is no foolproof means to detect prior personality or functioning with only present psychological assessment (Butcher & Harlow, 1987).

Research with Chronic Health Conditions. Pain patients frequently exhibit a so-called "conversion V" (or simply "conversion") profile on the MMPI-2 consisting of clinically significant high scores (i.e., $T \geq 65$) on scales 1 and 3 and a slightly lower score on scale 2. This profile, also referred to as the "psychosomatic profile," reflects somatic concerns as well as disturbances in mood. While this profile is recognized as a likely accurate report of genuine physical symptoms (Kvåle, Ellertsen, & Skouen, 2001; Lamping, 1985), it also reflects defensiveness characteristic of a somaticizing patient

who denies awareness of internal psychological conflict and expresses the conflict via somatic symptoms and concerns (Ellertsen, Vaeroy, Endersen, & Førre, 1991).

Further investigation into MMPI-2 profiles of a chronic pain sample by Slesinger, Archer, and Duane (2002) demonstrated that chronic pain patients' code types were comparable to the conversion V profile. The most frequent two-point code types for the chronic pain patients were 1-3/3-1, 2-3/3-2, and 1-2/2-1, respectively. In terms of cluster types, the neurotic triad profile (i.e., clinically significant high scores on scales 1, 2, and 3, in no particular order) and conversion profile were most frequently observed for chronic pain patients. Longitudinal studies have shown that high scores on MMPI-2 scale 3 are associated with poor outcomes in chronic low back pain treatment, specifically. Vendrig (1999) found endorsement of a particular subset of scale 3 items involving reports of lassitude and malaise (*Hy3*) was related to failure to return to work after completing a chronic pain program in the Netherlands. Additionally, high scores on scale 3 predicted continued disability and failure to return to work one year after initial treatment in a sample of individuals treated for acute low back injury (within six weeks of the injury). The high scale 3 scores were thought to indicate the injured patients' development of passive acceptance of disability, and it was concluded that psychosocial variables associated with high scale 3 scores significantly contributed to the development of disability resulting from low back injury (Gatchel, Polatin, & Kinney, 1995).

The MMPI-2 *PK* scale has also been found to be significantly elevated by chronic pain patients who were victims of motor vehicle accidents (MVA; Duckworth & Iezzi, 2005). Such high scores suggest chronic pain patients who were involved in MVA report

greater physical injury and impairment, greater psychological distress, and greater use of maladaptive coping strategies for pain.

Factor analyses of MMPI-2 profiles of chronic pain patients have yielded several factors specific to this population. Results from a factor analytic study conducted by Deardorff, Chino, and Scott (1993) demonstrated that four factors emerged for a broad sample of chronic pain patients ($N = 114$; chronic low back, head/neck, shoulder/arm, leg/knee, foot, or multiple site pain), which were labelled as follows: Psychological Dysfunction (Factor 1), Interpersonal Isolation (Factor 2), Psychomotor Retardation (Factor 3), and Physical Dysfunction (Factor 4). Factor 1 was found to reflect psychological distress potentially related to chronic pain as indicated by various problematic experiences including overall psychological distress (scale *F*), tension, anxiety, and conflict (scales 7 and 4), feelings of alienation and mistrust (scales 8 and 6), and several features of depression (*D4, D5, D1*, and scale 2). Factor 2 was determined to represent interpersonal isolation as demonstrated by limited personal resources to manage stress (negative loading on defensiveness, scale *K*), pessimism and criticalness (negative loading on Need for Affection [*Hy2*]), social anxiety (negative loading on Denial of Social Anxiety [*Hy1*]), and positive loading on social introversion (scale 0). Factor 3 reflected psychomotor retardation categorized by low energy (negative loading on scale 9), psychomotor retardation (*D2*), and inhibited aggression (*Hy5*). Lastly, Factor 4 represented physical dysfunction, including concern regarding physical functioning (scale 1) and reporting of somatic complaints and physical malfunction (*Hy4*, scale 3, *D3*, and *Hy3*).

Vendrig, de Mey, Derksen, and van Akkerveeken (1998) conducted a factor analytic study inspired by the earlier work of Deardorff et al. (1993) on the MMPI-2 profiles of 248 chronic back pain patients. This study resulted in four similar factors, renamed Psychological Disturbances (Factor 1), Extraversion-Introversion (Factor 2), Passivity (Factor 3), and Somatic Complaints (Factor 4). Scales relevant to Factor 1 were scale 4, scale 6, *D5*, scale 8, scale 7, *D4*, and *D1*. The upper end of Factor 1 reflected psychological distress including features of depression, feelings of hostility and/or being mistreated, and internal turmoil, while the lower end indicated the absence of such distress. Factor 2 scales were *K, Hy2, Hy1*, and scale 0. The upper end of Factor 2 indicated extraversion, persistence, denial of problems or difficulties, avoidance of confrontation, and need for affirmation and reassurance. The middle range was indicative of a healthy balance between positive self-evaluation and self-critique, and the lower end reflected social isolation, introversion, and an overly critical view of oneself and others. Factor 3's scales were *D2* and scale 9; the upper range of this factor suggested low activity levels and a lack of energy, while the lower range was associated with self-assurance, an active and/or outgoing lifestyle, and a sense of involvement. Finally, the scales of Factor 4 were scale 1, *Hy4, D3,* and *Hy3*. The upper range of Factor 4 suggested the expression of distress via mainly somatic symptoms or complaints, and/or experiencing distress regarding physical functioning. The lower range of this factor reflected the absence of such complaints.

Research on use of the MMPI-2-RF among patients with physical health complaints or documented medical conditions is slowly developing. Tarescavage,

Scheman, and Ben-Porath (2015) reported on descriptive statistics, reliability information, and concurrent validity correlations, which may be used to assess and inform use of the MMPI-2-RF specifically with chronic low back pain patients. Descriptive findings indicated generally similar scores across gender; however, men scored higher than women on the *BXD, RC4, JCP, SUB, MEC, AGGR-r,* and *DISC-r* scales, whereas women scored higher on the *Fs, FBS-r, GIC, MSF*, and *AES* scales. The results found for men are not unexpected, as men typically score higher on externalizing scales than do women, even in the normative sample (Tellegen & Ben-Porath, 2008). Differences in scores on the Interest scales (i.e., *MEC* and *AES*) are also not unusual, as these scales are comprised of items from MMPI-2 Clinical scale 5, Masculinity-Femininity (Ben-Porath, 2012). Women's higher scores on Symptom Validity (*FBS-r*) and Multiple Specific Fears (*MSF*) remained consistent with normative sample findings, as well as previous research with other medical populations. For instance, an earlier study conducted by Tarescavage, Wygant, Boutacoff, and Ben-Porath (2013) indicated that female bariatric surgery candidates obtained higher scores on *FBS-r*, *HPC*, and *AES,* while their male counterparts scored higher on *BXD, MEC*, and *DISC-r*, and both genders demonstrated elevations on *MLS*, reflecting a broad sense of poor health. Tarescavage et al.'s (2015) finding that women scored higher on Infrequent Somatic Complaints (*Fs*) and *GIC*, however, is less typical for medical samples; this phenomenon is more commonly found in settings with higher rates of psychopathology (e.g., outpatient community mental health clinics). Thus, it is fair to say that this sample of chronic low

back pain patients overall presented with substantial emotional and somatic complaints on the MMPI-2-RF, consistent with previous research (e.g., Von Korff et al., 2005).

Tarescavage, Scheman, and Ben-Porath (2015) found the MMPI-2-RF Emotional Dysfunction scales demonstrated several convergent associations with the Pain Disability Index (PDI; Tait, Chibnall, & Krause, 1990) and the Depression, Anxiety, Stress scales (DASS; Lovibond & Lovibond, 1996). Findings from the PDI are consistent with the biopsychosocial model of pain, which states that pain experiences are modulated by emotions. The Emotional Dysfunction scales most strongly correlated with the DASS Depression, Stress, and Anxiety scales; however, *RCd* was most strongly associated with DASS Depression, not DASS Stress, as might be expected. Instead, the DASS Stress scale was associated with *RC7* and *NEGE-r* in this sample. Scales from the Somatic/Cognitive domain demonstrated convergent associations with self-reported and observed pain, hours resting per day, pain disability, and medication use, but were overall uncorrelated with observed physical ability. Thus, self-reported pain complaints and actual physical functioning may not converge because, as suggested by the biopsychosocial model, pain complaints are influenced by various emotional and cognitive factors (Gatchel, 2004; Gatchel, Peng, Peters, Fuchs, & Turk, 2007). Generally speaking, this research indicates that the MMPI-2-RF scale scores are associated with numerous constructs relevant in the assessment of chronic back pain patients, though further research is needed.

Research with Disability Compensation Claims. The majority of previous research regarding the MMPI-2 and disability has primarily focused on the efficacy of

various Validity scales (i.e., *F-K* [Gough's Dissimulation Index; Gough, 1950], *Ds2* [Gough's Dissimulation scale; Gough, 1954], *FBS*, and *Ob* [Sum of Obvious Items Index]), the over-reporting validity scales (specifically, F scales *F*, *Fb*, and *Fp*), and the Response Bias Scale (*RBS*) in detecting malingering or feigned symptomatology. For instance, Chmielewski, Zhu, Burchett, Bury, and Bagby (2017) found the *F, Fb,* and *Fp* scale scores of disability claimants suspected of malingering (N = 54) were significantly higher than those of non-malingering disability claimants (N = 688). Similarly, Arbisi, Ben-Porath, and McNulty (2006) determined the over-reporting scales accurately detect feigned or exaggerated PTSD symptoms within the context of veterans' compensation and pension (C&P) evaluations. Bury and Bagby (2002) utilized a similar method in which the *F* scales, along with *F-K, Ds2, FBS*, and *Ob*, were used to classify malingering of coached and uncoached PTSD symptoms in a sample of workplace accident victims (N = 61). Of all validity scales included, the *F* scales consistently yielded the highest classification rates for symptom malingering. In both studies, *Fp* in particular was found to consistently classify overreporting of symptoms (Arbisi, Ben-Porath, & McNulty, 2006; Bury & Bagby, 2002).

The *RBS* has been demonstrated to add to the standard MMPI-2 validity scales in predicting symptom validity test (SVT) failure (i.e., scoring above the cutoff score on the World Memory Test [WMT], Green, 2003; the Test of Memory Malingering [TOMM], Tombaugh, 1996; or both) in a sample of personal injury disability claimants. Higher *RBS* scores were associated with discriminating between passing or failing SVT (Wygant et al., 2010). Prior research has also investigated MMPI-2 code types related to disability.

The results of Livingston, Jennings, Colotla, Reynolds, and Shercliffe's (2006) study investigating MMPI-2 code type congruence of injured workers demonstrated two- and three-point code types very similar to the conversion V profile typical of individuals with chronic pain (1-2 and 1-2-3, respectively).

Like prior research conducted on the use of the MMPI-2 in the context of disability compensation, research on the MMPI-2-RF used for the same purpose has focused primarily on the efficacy of the Validity scales in correctly determining malingering. For instance, Chmielewski et al. (2017) found the MMPI-2-RF over-reporting Validity scales accounted for 35% of the variance in dimensionally assessed suspected malingering in a sample of disability claimants (N = 742). Among these scales, the *F-r* scale demonstrated the greatest predictive power for suspected malingering, along with *Fs*. These scales also demonstrated acceptable-to-excellent classification accuracy in predicting suspected malingering and demonstrated large effect sizes in differentiating between suspected malingering and non-malingering groups. Similarly, Bianchini et al. (2017) found highly significant group differences between malingering and non-malingering pain patients on each MMPI-2-RF Validity scale studied (i.e., *F-r, Fb-r, Fs, FBS-r*, and *RBS*), as well as on two Clinical scales (*RCd* and *RC1*). Specifically, the highest scores on all scales were observed for the group classified as *Definite malingered pain-related disability (MPRD)*.

Aguerrevere et al. (2018) conducted like research with a sample of financially incentivized chronic pain patients (N = 348) and found two distinct clusters within this sample. The first cluster (Cluster 1) demonstrated valid reporting on the MMPI-2-RF,

with less than 5% of its members exhibiting invalid profiles. The second cluster (Cluster 2) was characterized by mean elevations on all selected overreporting MMPI-2-RF Validity scales, except *Fp-r*. Furthermore, MMPI-2-RF profiles were deemed to be likely invalid due to malingering; almost all members demonstrated elevations ($T \geq 80$) on the Validity scales *F-r, RBS*, and *FBS-r*, with approximately 50% of participants presenting invalid profiles ($T \geq 120$) due to highly improbable infrequent responses (*F-r*) and negative response bias (*RBS*). Cluster 1 chronic pain patients also reported significant elevations on RC scales *RC1* and *RC2*, while Cluster 2 demonstrated elevations on all the RC scales except for *RC3, RC4,* and *RC9.* These elevations were associated with elevations on the Validity scales, which clearly suggests that the RC scale elevations are very likely due to symptom exaggeration. This overemphasis on symptoms is directly captured by each MMPI-2-RF Validity scale meant to detect overreporting. To further support this statement, description of the Cluster 2 participants specified that approximately three quarters (71%) of the group were classified as suspected malingerers according to Bianchini, Greve, and Glynn's (2005) MPRD criteria. Thus, most Cluster 2 participants were likely presenting invalid MMPI-2-RF profiles due to deliberate efforts to misrepresent accurate symptomatology in the hopes of possible monetary compensation.

Tarescavage, Wygant, Gervais, and Ben-Porath (2013) studied the associations between the five MMPI-2-RF overreporting Validity scales and measures of both effort (as assessed by neurocognitive measures, such as the Forced Choice Recognition component of the California Verbal Learning Test-II [CVLT-II; Delis, Kramer, Kaplan,

& Ober, 2000]) and cognitive SVTs in a sample of non-head injury disability claimants (*N* = 863). The MMPI-2-RF overreporting Validity scales were also examined in comparison with the Slick, Sherman, and Iverson (1999) criteria for malingered neurocognitive dysfunction (MND). The *F-r* and *RBS* scales demonstrated significantly stronger associations with SVT scores than did the remaining MMPI-2-RF overreporting Validity scales. The MMPI-2-RF Validity scales also did well in differentiating between MND participant groups. In particular, *RBS* exhibited the largest effect size in differentiating between the *Incentive Only* and *Probable/Definite* MND groups. *RBS* also displayed the best sensitivity for detecting MND at cutoffs with a false positive rate of 10%.

When patients present evidence of MND, they respond to self-report measures in such a way that reflects the experience of great emotional distress and interpersonal avoidance along with various somatic symptoms and cognitive complaints. Furthermore, as patients display probable or definite evidence of MND, they may endorse MMPI-2-RF items that suggest thought dysfunction. Tarescavage et al. (2013) found that patients with *Probable/Definite* MND (i.e., those who had an external incentive, such as involvement in a personal injury or disability claim, and exhibited below chance performance on at least one cognitive SVT) generally scored higher on the *RC2* and *RCd* scales than patients whose MND was *Suspect* or *Probable* (i.e., those who had an external incentive and scored below cutoff, but not below chance on one cognitive SVT, and those who had an external incentive and scored below cutoff, but not below chance on at least two cognitive SVTs or performed below cutoff on one cognitive SVT and below cutoff on an

embedded indicator of effort [e.g., Reliable Digit Span], respectfully) or who were purely externally incentivized (i.e., *Incentive Only*). Earlier research (e.g., Gervais, Wygant, Sellbom, & Ben-Porath, 2011; Thomas & Youngjohn, 2009) has examined similar effects in disability claimants who failed at least one cognitive SVT and a sample of traumatic brain injury (TBI) litigants, respectfully. Gervais et al. (2011) found that disability claimants with SVT failure had high scores on scales *RC1, RCd*, and *RC2*, and averaged near clinical elevation on scale *RC6*. Thomas and Youngjohn (2009) obtained similar results in a sample of TBI litigants (N = 83), with those who demonstrated poor effort on cognitive SVTs also having elevated scores on *RC1* and *RC2*, accompanied by near clinical elevations on *RC8* and *RCd*.

Previous MMPI-2-RF and disability compensation research has also focused specifically on the accuracy of the *RBS* in detecting malingering. Wygant et al. (2010) examined the ability of the *RBS* to predict SVT failure in a sample of personal injury and disability claimants (N = 127) and obtained comparable results to the initial *RBS* validation sample studied by Gervais, Ben-Porath, Wygant, and Green (2007), wherein the *RBS* outperformed the *F* scales and *FBS* in classifying SVT performance. Wygant et al. (2010) found that the *RBS* added to the standard MMPI-2 and MMPI-2-RF Validity scales in predicting SVT failure in that sample of personal injury and disability claimants. Their research also supports the notion that symptom exaggeration in the context of disability is more likely to take the form of overreported physical, rather than psychological, symptoms, consistent with individuals presenting themselves as being injured.

Rationale and Hypotheses

The examination of psychological factors involved in or co-occurring with physical conditions is often useful. Chronic health conditions, both physical and mental, have more recently become a major concern; patients in mental healthcare settings have increasingly presented with chronic physical conditions and patients in primary care settings often report or have underlying emotional and/or behavioral concerns. Approximately 30% of Americans have a diagnosable psychiatric disorder at any given point in time, and roughly 50% will experience a diagnosable disorder at some point in their lives (Kessler et al., 2005a; Kessler et al., 2005b). The United States population was 313.9 million in 2016; therefore, it can be said that hundreds of millions of Americans have been, are, or will be affected by mental illness (Robinson & Reiter, 2016). Similarly, the number of individuals receiving disability compensation has increased substantially from 6,673,362 in 2000 to 10,162,488 in 2018 (Social Security Administration, 2018). Thus, these two areas deserve particular focus.

Personality assessment has aided in identifying important aspects of personality that contribute to and result from health conditions. This area of study was enhanced by the development of the MMPI as a great deal of research on the original MMPI involved various medical patient samples. Substantial research has been conducted with the MMPI-2 in these regards, largely relating to chronic pain. However, it has not focused on a broader scope of medical conditions such as hepatitis, Lyme disease, cancer, and fibromyalgia, and these conditions' impacts on psychological functioning. These and other physical health conditions can have an adverse impact on emotional and behavioral

functioning. The existing MMPI literature has focused largely on within-group differences to identify distinct personality patterns of subgroups with various medical conditions. When between-group comparisons have occurred, for example, between malingering and nonmalingering disability claimants, they have focused on the use of Validity scales to identify malingering (e.g., Chmielewski et al., 2017). In general, less attention has been given to between-group differences in MMPI-based research of health related conditions. Moreover, no study to date has specifically compared MMPI instrument profiles of individuals with comorbid physical and mental health complaints, those seeking or receiving Social Security disability compensation, and those presenting with purely psychological difficulties. While some overlaps of personality patterns may be expected between individuals with comorbid chronic health conditions and those involved in disability or personal injury litigation, particularly in terms of somatic indices, important differences may need to be identified. Therefore, these were a central focus of the current study.

While a fair amount of MMPI-2 research in medical and healthcare settings has been undertaken, this area of research is in its infancy for the MMPI-2-RF, given that it is the most recent of this family of instruments. Furthermore, as the MMPI-2-RF is a substantially different restructured test, there is relatively limited generalizability from the older forms of the instrument and a new research literature with this measure is needed. Specifically, because the MMPI-2-RF is a 21st century addition to the family of MMPI instruments at a time when healthcare is a considerable national interest, this

particular area of research is likely to be valuable. The current study thus contributes to this developing literature.

The current study examined differences in the MMPI-2-RF profiles of outpatients receiving services at a community mental health clinic on the bases of (a) reported comorbid physical and psychological conditions, (b) reported receiving or seeking of Social Security disability compensation, and (c) purely psychological complaints. Based on prior research findings with the MMPI and MMPI-2, persons with comorbid physical and psychological conditions were expected to demonstrate a mixed profile punctuated with somatic complaints but also evidence various psychological components. Those seeking disability compensation were expected to demonstrate similar but more pronounced high-score profiles in terms of physiological and psychological concerns. Individuals with purely psychological complaints may also display somatic expressions (e.g., related to somaticizing psychological symptoms), but other areas of psychological difficulty were likely to be prominent. Thus, some similarities were expected across the three groups in somatic, emotional, and behavioral expressions. However, the central goal of this study was to examine specific areas of difference. Because this topic has not been previously researched, this objective was undertaken in an exploratory manner.

Method

Participants

The initial sample pool for this study consisted of 377 adult clients who had received services from a university-affiliated community mental health clinic in the Southeastern United States. This sample was reduced to 154 participants on the bases of (a) invalid MMPI-2-RF profiles, (b) age, and (c) reduction of the psychological complaints group to equate its size with those of the other groups of this study. Inclusion criteria based on patients' MMPI-2-RF profiles consisted of the following: Item omissions < 15, *VRIN-r* and *TRIN-r T*- scores < 80, *L-r* scale *T*- score < 80, *K-r* scale *T*-score < 70, *F-r T*-scores < 120, and *Fp-r, Fs,* and *FBS-r T*- scores < 100. Application of these criteria ensures the test profiles are not invalidated by insufficient responding, inconsistent and/or biased responding, excessively favorable self-presentation, excessive defensiveness, or unrealistically high over-reporting of symptoms (Ben-Porath & Tellegen, 2008). Use of the MMPI-2-RF score criteria resulted in the exclusion of 39 participants.

The final sample (N = 154) was divided into three groups based on whether they had comorbid physical and psychological complaints (n = 66), were receiving or seeking Social Security disability compensation (n = 30), or sought services for purely psychological ailments (n = 58). The groups were defined in the following manner: (a) Participants in the comorbid complaints group must have reported a chronic medical condition (e.g., diabetes, cancer, multiple sclerosis) at the time of intake, in addition to seeking treatment for psychological concerns, (b) those in the Social Security disability compensation group must have reported either receiving or being in the process of

applying for Social Security disability compensation on the basis of a psychological and/or medical condition at the time of intake, and (c) participants in the psychological complaints group must have presented only with ailments related to or symptoms of psychological disorder. Table 2 presents the psychological diagnoses of all three groups.

(continues)

Table 2

Psychological diagnoses of the total sample (N = 154) by group

Diagnostic Category	Comorbid Complaints (*n* = 66)		Social Security Disability Compensation (*n* = 30)		Psychological Complaints (*n* = 58)	
	Frequency	%	Frequency	%	Frequency	%
Co-occurring Substance-Related and Psychological Disorders	14	21.2	3	10.0	22	37.9
Depression/Mood Disorder	13	19.7	7	23.3	11	19.0
Anxiety or Related Disorder	7	10.6	0	0	1	1.7
Substance-Related Disorder	3	4.5	0	0	4	6.9
Trauma/Stress-Related Disorder	8	12.1	0	0	4	6.9
Personality Disorder	1	1.5	1	3.3	0	0
Schizophrenia/Psychosis	1	1.5	2	6.7	0	0
Developmental Disorder	1	1.5	3	10.0	0	0
Two or More Psychological Disorders	12	18.2	10	33.3	16	27.6
Other (e.g., Pain Disorder)	6	9.1	2	6.7	0	0
Diagnostic Information Not Available	0	0	2	6.7	0	0

Within the comorbid complaints group (n = 66), 44 participants (66.7%) were women and 22 (33.3%) were men. Ages of the individuals in this sample ranged from 18 years to 82 years with a mean age of 44.50 (SD = 15.55). In terms of ethnic distribution, 89.4% of the comorbid complaints sample identified as White/Caucasian, 4.5% as Black/African-American, 3.0% as Hispanic, and 3.0% as Bi-or Multiracial/Other.

The individuals in the comorbid conditions group presented with a wide range of both medical and psychiatric diagnoses. Table 3 presents data on the reported medical diagnoses of this group.

Table 3
Medical diagnoses reported by the comorbid complaints group (n = 66)

Diagnostic Category	Frequency	%
Chronic Pain/Pain-Related (e.g., Fibromyalgia)	16	24.2
Chronic Infection (e.g., Hepatitis C)	4	6.1
Diabetes/Endocrine Disorder	2	3.0
Asthma/Chronic Obstructive Pulmonary Disease (COPD)	3	4.5
Gastrointestinal Disorder (e.g., Irritable Bowel Syndrome [IBS])	3	4.5
Cancer	3	4.5
Thyroid/Hormonal Disorder (e.g., Hashimoto's Disease)	3	4.5
Movement Disorder (e.g., Cerebral Palsy)	1	1.5
Multiple Diagnoses	23	34.8
Other (e.g., Sleep Apnea)	8	12.1

Within the Social Security disability compensation group (n = 30), 15 participants were men (50.0%) and 15 were women (50.0%). Ages of this group ranged from 18 years to 63 years with a mean age of 40.43 (SD = 14.01). With respect to race/ethnicity, 80.0%

of the Social Security disability compensation group identified as White/Caucasian, 10.0% as Black/African-American, 3.3% as Hispanic, and 3.3% as Bi- or Multiracial/Other. Race/ethnicity was not identified for one (3.3%) participant in the Social Security disability compensation group. Table 4 presents the medical diagnoses of this group and Table 5 displays data on the justification provided by participants in this group for seeking or receiving Social Security disability compensation.

Table 4
Medical diagnoses reported by the Social Security disability compensation group (n = 30)

Diagnostic Category	Frequency	%
Chronic Pain/Pain-Related (e.g., Fibromyalgia)	5	16.7
Chronic Infection	1	3.3
Neurological Disorder (e.g., Epilepsy)	2	6.7
Multiple Diagnoses	8	26.7
No Diagnosis	11	36.7
Diagnostic Information Not Available	3	10.0

Table 5
Reason for seeking or receiving Social Security disability compensation as reported by the group (n = 30)

Reason for Seeking/Receiving Social Security Disability Compensation	Frequency	%
Physical	7	23.3
Psychological	13	43.3
Physical and Psychological	2	6.7
Unclear/Not Specified	8	26.7

Lastly, within the purely psychological complaints group (n = 58), 31 participants were men (53.4%) and 27 were women (46.6%). Ages of this group ranged from 18 years

to 64 years with a mean age of 35.97 (*SD* = 12.66). In terms of race/ethnicity, 87.9% of the psychological complaints group identified as White/Caucasian, 6.9% as Hispanic, 1.7% as Asian, and 3.4% as Bi-or Multiracial/Other.

Measures

The central measure of this study was the MMPI-2-RF. Forty-nine of the 51 scales, excluding the Interest scales (which were deemed not relevant to this study), were examined. The MMPI-2-RF Technical Manual (Tellegen & Ben-Porath, 2008) details support of the MMPI-2-RF's psychometric accuracy. The MMPI-2-RF's psychometric properties were assessed using existing MMPI-2 datasets, and its Technical Manual provides reliability coefficients and Standard Error of Measurement (SEM) values for the Validity and Substantive scales for the normative sample, an outpatient community mental health sample, a psychiatric inpatient sample from a general community hospital, and male Veteran Administration's hospital inpatients (Tellegen & Ben-Porath, 2008).

The Technical Manual provides test-retest reliability values for the normative sample and the clinical samples. The Validity scales test-retest reliability coefficients and SEMs ranged from .40/8 for *TRIN-r* to .84/4 for *K-r. TRIN-r* and *VRIN-r* have higher SEMs and lower test-retest reliability values, which Tellegen and Ben-Porath (2008) posit is due to these scales' natures, as they assess response style. The H-O and RC scales each demonstrated strong test-retest reliability and SEMs, with H-O coefficients and SEMs ranging from .71/5 for *THD* and .91/3 for *BXD* and RC coefficients and SEMs ranging from .64/6 for *RC6* and .89/3 for *RC4.* The Specific Problems scales demonstrated adequate reliability with coefficients ranging from .54 for *NUC* to .92 for

MEC. The Somatic/Cognitive scales in particular demonstrated lower reliability coefficients than the other categories of the Specific Problems scales. The SEMs for this grouping of scales were also adequate, ranging from 7 for *NUC* to 3 for *MEC.* Finally, the *PSY-5* scales demonstrated strong test-retest reliability with coefficients and SEMs ranging from .76/5 for *PSYC-r* and .93/3 for *DISC-r*. Overall, these internal consistency values demonstrate support for the stability of MMPI-2-RF scores (Tellegen & Ben-Porath, 2008).

As the outpatient community mental health reference sample (410 men, 610 women) best matches the sample of this study, the internal consistency values for that group are reported here. The internal consistency values for the Validity scales ranged from .24 for *VRIN-r* (women) to .85 for *F-r* (both men and women). The internal consistency values of the H-O and RC scales ranged from .77 for *RC4* (women) to .96 for *EID* (men). Internal consistency values for the Somatic/Cognitive and Internalizing scales ranged from .48 for *BRF* (men) to .83 for *COG* (women). The Externalizing, Interpersonal, and Interest scales' internal consistency values ranged from .55 for *MEC* (women) to .85 for *SAV* (women). Lastly, the internal consistency values of the *PSY-5* scales range from .70 for *DISC-r* (women) to .85 for *INTR-r* (men). Overall, these values indicate the MMPI-2-RF demonstrates adequate internal consistency reliability (Tellegen & Ben-Porath, 2008).

External validity data for the MMPI-2-RF has been collected from a variety of settings in which this instrument is likely to be used, demonstrating the convergent and discriminant validity of the test's scores. These data provide support for the construct

validity of the substantive scales. According to Tellegen and Ben-Porath (2008), the empirical correlates described in the Technical Manual also provide the basis for meaningful interpretation of the MMPI-2-RF. These external correlates, along with the additional psychometric findings detailed in the Technical Manual, provide support for the ability of the MMPI-2-RF to demonstrate the appropriate level of validity with respect to assessing responses and characteristics of personality and psychological dysfunction (Tellegen & Ben-Porath, 2008).

Procedure

The study began upon approval from the Florida Institute of Technology Institutional Review Board (IRB), the clinic from which data was collected, and the Doctoral Research Project committee. Participants' demographic information (i.e., age, race/ethnicity, and gender) and MMPI-2 scores was extracted from the clinic's electronic client records, spanning approximately five years (i.e., 2014-2019). Because the participants had been tested with the MMPI-2, their MMPI-2 item responses were used to derive MMPI-2-RF scores with the use of computerized scoring software. This approach is supported by research that has demonstrated MMPI-2-RF scores derived from the MMPI-2 are comparable to scores obtained from the MMPI-2-RF alone (Van der Heijden, Egger, & Derksen, 2010). All data was input into an SPSS database. Client identities were protected in that personally identifying information was not included in the research database. Instead, participants were assigned ID numbers in place of names.

As mentioned previously, the sample of this study initially consisted of 377 participants. After the initial participant groups were formed, their MMPI-2 profiles were

rescored as MMPI-2-RF profiles via the use of computer software or hand-scoring templates. Following this procedure, the validity of all MMPI-2-RF profiles was assessed in accordance with the inclusion criteria. Seven of the 73 initial comorbid complaints group profiles were removed, one due to a *TRIN-r T*-score of 80, one due to a *L-r T*-score > 80, two due to *F-r T*-scores of 120, two due to *Fs T*-scores > 100, and one due to an *FBS-r T*-score > 100, which resulted in a final comorbid complaints group of $n = 66$. Twenty out of the 51 initial Social Security disability compensation profiles were excluded, one due to a *VRIN-r T*-score > 80, one due to a *L-r T*-score > 80 and *Fp-r* T-score of 120, two due to *Fp-r T*-scores > 100, one due to an *FBS-r T*-score > 100, two due to an *Fs T*-score > 100, one due to *Fs* and *FBS-r T*-scores > 100, and 12 due to *F-r T*-scores of 120. An additional case was removed from this group on the basis of age: one participant was 17 years old, and thus did not meet the inclusion criteria of being an adult client. The final Social Security disability compensation group was formed at $n = 30$. Lastly, 12 of the 253 initial psychological complaints profiles were removed, one due to a *VRIN-r T*-score > 80, two due to *TRIN-r T*-scores ≥ 80, one due to a *TRIN-r T*-score ≥ 80 and an *L-r T*-score > 80, two due to *L-r T*-scores > 80 alone, one due to a *L-r T*-score > 80 and a *K-r T*-score > 70, two due to *Fs T*-scores > 100, two due to *Fp-r T*-scores >100, and one due to a *F-r T*-score of 120. At this stage, the psychological complaints group was $n = 241$.

Following the removal of all invalid profiles, focused reduction of the psychological complaints group using age (specifically, ages 18, 21, and 23 years) was undertaken in order to establish a sample size and age composition more comparable to

the larger of the other two participant groups, which was the comorbid complaints subsample. The ages 18, 21, and 23 were selected because they occurred in the highest frequency in the psychological complaints group. The original counts of participants of these ages in this subsample were as follows: age 18 n = 13, age 21 n = 13, and age 23 n = 12. A total of 30 profiles, ten from each age, were removed. A random number generator was used to select each profile to be removed; every second profile was removed until 10 profiles from each age were removed, resulting in three remaining 18-year olds, three 21-year-olds, and two 23-year-olds. After this procedure, the psychological complaints group was comprised of 211 individuals overall. A second focused reduction involved removing all cases (n = 40) for which diagnostic information was not available, leaving 171 participants in the psychological complaints group. Lastly, a random number generator was again utilized to further reduce this subsample, such that every fifth profile was removed until the final psychological complaints group was n = 58.

Data Analyses

Preliminary analyses consisted of use of descriptive statistics (e.g., means, standard deviations, percentage data) to describe the demographic characteristics of each of the three subsamples used in the study. Central analyses consisted of a multivariate analysis of variance (MANOVA) comparing MMPI-2-RF scale scores across each of the three groups, followed by univariate analyses of variance (ANOVA) to examine specific areas of significant difference. The Bonferroni post hoc test was used for identification of specific scales whose scores differed significantly between groups. After scales

contributing to significant differences between groups were identified, hierarchical and simple linear regression analyses were used to determine which of these scales were most predictive of between-group variance.

Results

Initial analyses consisted of computing the means and standard deviations for scaled scores for the MMPI-2-RF for each of the three participant groups. Table 5 displays these scores.

(continues)

Table 6
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

MMPI-2-RF Scale	Comorbid Complaints (*n* = 66)		Social Security Disability Compensation (*n* = 30)		Psychological Complaints (*n* = 58)	
	M	SD	M	SD	M	SD
Validity Scales						
Cannot Say (?)	0.41	1.64	0.27	1.11	0.07	0.26
Variable Response Inconsistency (*VRIN-r*)	54.23	9.74	51.90	9.02	51.09	9.56
True Response Inconsistency (*TRIN-r*)	57.30	7.19	58.33	7.03	55.33	5.66
Infrequent Responses (*F-r*)	**71.79**	19.15	**79.40**	19.39	**70.24**	19.04
Infrequent Psychopathology Responses (*Fp-r*)	58.17	12.80	**62.93**	15.11	59.69	16.70
Infrequent Somatic Responses (*Fs*)	**62.42**	16.13	**70.07**	17.30	**63.57**	15.54
Symptom Validity (*FBS-r*)	**68.45**	15.19	**70.67**	13.66	**64.95**	14.45
Uncommon Virtues (*L-r*)	51.36	10.17	56.47	8.70	50.93	9.20
Adjustment Validity (*K-r*)	44.26	8.96	40.63	10.30	43.02	9.93

(table continues)

Table 6 (cont.)
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

MMPI-2-RF Scale	Comorbid Complaints (*n = 66*)		Social Security Disability Compensation (*n = 30*)		Psychological Complaints (*n = 58*)	
	M	SD	M	SD	M	SD
Higher-Order (H-O) Scales						
Emotional/Internalizing Dysfunction (*EID*)	**65.58**	12.79	**70.10**	12.98	**65.81**	13.64
Thought Dysfunction (*THD*)	54.89	12.17	55.27	11.14	52.09	10.57
Behavioral/Externalizing Dysfunction (*BXD*)	52.48	11.96	53.43	11.76	55.95	11.06
Restructured Clinical (RC) Scales						
Demoralization (*RCd*)	**65.79**	12.47	**70.10**	10.29	**67.79**	12.38
Somatic Complaints (*RC1*)	**65.36**	14.01	**69.37**	13.80	**60.88**	13.76
Low Positive Emotionality (*RC2*)	**64.83**	15.86	**74.87**	14.04	**63.29**	15.47
Cynicism (*RC3*)	51.56	9.86	56.13	11.58	53.90	10.94
Antisocial Behaviors (*RC4*)	58.18	11.14	57.30	11.15	**60.50**	10.90
Ideas of Persecution (*RC6*)	58.55	12.88	58.07	11.66	57.50	13.04

(table continues)

Table 6 (cont.)
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

MMPI-2-RF Scale	Comorbid Complaints (*n = 66*)		Social Security Disability Compensation (*n = 30*)		Psychological Complaints (*n = 58*)	
	M	SD	M	SD	M	SD
Dysfunctional Negative Emotions (*RC7*)	59.97	11.95	59.23	12.33	57.95	13.17
Aberrant Experiences (*RC8*)	56.45	11.80	57.50	12.78	53.29	10.88
Hypomanic Activation (*RC9*)	46.56	8.90	48.23	10.94	50.07	10.22
Specific Problem Scales						
Somatic/Cognitive Scales						
Malaise (*MLS*)	**66.67**	13.22	**75.27**	12.51	**65.90**	12.76
Gastrointestinal Complaints (*GIC*)	**63.21**	17.19	**66.60**	15.89	**63.62**	16.73
Head Pain Complaints (*HPC*)	**61.71**	13.80	**63.97**	12.99	58.40	13.16
Neurological Complaints (*NUC*)	**62.64**	14.45	**68.93**	14.05	58.21	12.63
Cognitive Complaints (*COG*)	**65.39**	15.10	**70.97**	14.82	**63.71**	13.31

(table continues)

Table 6 (cont.)
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

MMPI-2-RF Scale	Comorbid Complaints (n = 66)		Social Security Disability Compensation (n = 30)		Psychological Complaints (n = 58)	
	M	SD	M	SD	M	SD
Internalizing Scales						
Suicidal/Death Ideation (*SUI*)	56.06	14.58	52.70	14.16	55.26	15.54
Helplessness/Hopelessness (*HLP*)	57.41	15.43	**63.87**	17.29	58.91	15.39
Self-Doubt (*SFD*)	**62.88**	13.00	**65.10**	10.41	**64.14**	13.28
Inefficacy (*NFC*)	**60.85**	12.75	**60.47**	11.88	**60.67**	12.20
Stress/Worry (*STW*)	**60.92**	12.17	59.13	11.75	58.24	10.84
Anxiety (*AXY*)	**67.83**	15.16	**63.30**	15.31	**62.05**	15.41
Anger Proneness (*ANP*)	54.35	11.48	57.97	14.69	56.52	13.44
Behavior-Restricting Fears (*BRF*)	56.47	12.92	56.20	11.03	52.16	10.44
Multiple Specific Fears (*MSF*)	49.83	7.69	49.53	10.12	46.81	9.16

(table continues)

Table 6 (cont.)
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

MMPI-2-RF Scale	Comorbid Complaints (*n* = 66)		Social Security Disability Compensation (*n* = 30)		Psychological Complaints (*n* = 58)	
	M	SD	M	SD	M	SD
Externalizing Scales						
Juvenile Conduct Problems (*JCP*)	55.79	13.46	56.73	13.58	54.31	12.37
Substance Abuse (*SUB*)	54.97	13.37	52.20	10.02	**60.76**	14.29
Aggression (*AGG*)	50.89	9.19	52.80	10.96	53.38	12.53
Activation (*ACT*)	47.26	9.52	49.03	11.76	48.97	10.29
Interpersonal Scales						
Family Problems (*FML*)	57.20	12.25	56.93	11.97	57.62	11.65
Interpersonal Passivity (*IPP*)	52.82	13.10	51.93	9.48	49.74	7.64
Social Avoidance (*SAV*)	**60.09**	13.99	59.50	13.33	56.93	14.04
Shyness (*SHY*)	54.88	12.64	52.93	9.85	52.33	11.21
Disaffiliativeness (*DSF*)	56.73	14.50	**60.67**	15.92	56.52	15.54

(table continues)

Table 6 (cont.)
MMPI-2-RF T-score means and standard deviations for the total sample (N = 154) by group

	Comorbid Complaints (*n* = 66)		Social Security Disability Compensation (*n* = 30)		Psychological Complaints (*n* = 58)	
	M	SD	M	SD	M	SD
Interest Scales*						
Aesthetic-Literary Interests (*AES*)	47.08	10.10	40.03	7.63	47.97	10.95
Mechanical-Physical Interests (*MEC*)	48.05	9.19	49.13	10.82	48.74	9.37
Personality Psychopathology Five (PSY-5) Scales						
Aggressiveness-Revised (*AGG-r*)	47.59	11.24	47.70	9.52	49.28	9.48
Psychoticism-Revised (*PSYC-r*)	54.77	12.90	56.50	10.55	51.91	10.88
Disconstraint-Revised (*DISC-r*)	51.50	11.95	52.17	10.54	55.24	10.42
Negative Emotionality-Revised (*NEGE-r*)	**60.79**	11.98	**61.60**	14.10	59.57	12.30
Introversion/Low Positive Emotionality-Revised (*INTR-r*)	**62.55**	14.73	**67.53**	15.55	**60.35**	14.60

Note. Mean scores in boldface represent 1 SD above the normative mean of 50 or higher (≥60). *Interest scale scores were not used in this study's analysis.

The comorbid complaints group had mean *T*-scores ≥ 60 (i.e., high scores) for 19 (39%) of the 49 MMPI-2-RF scales included in the analysis. Specifically, all of the Specific Problems Somatic/Cognitive scales and Somatic Complaints (*RC1*) had high scores. Among those scales measuring aspects of emotionality, Emotional/Internalizing Dysfunction (*EID*), Demoralization (*RCd*), Low Positive Emotionality (*RC2*), Self-Doubt (*SFD*), Inefficacy (*NFC*), Anxiety (*AXY*), Negative Emotionality-Revised (*NEGE-r*), and Introversion/Low Positive Emotionality-Revised (*INTR-r*) were each at a *T*-score of 60 or greater. In addition, the comorbid complaints subsample demonstrated high mean scores on Social Avoidance (*SAV*) and Stress/Worry (*STW*). Among the Validity scales, this group's scores on Infrequent Responses (*F-r*), Infrequent Somatic Responses (*Fs*), and Symptom Validity (*FBS-r*) were at $T \geq 60$.

The mean *T*-scores of the Social Security disability compensation group were ≥ 60 for 20 (41%) of the 49 scales. A pattern of high scores similar to that of the comorbid complaints group emerged for Emotional/Internalizing Dysfunction (*EID*), and select RC scales, Somatic/Cognitive scales, Internalizing scales, and PSY-5 scales. In addition, this group demonstrated high scores on Helplessness/Hopelessness (*HLP*) and Disaffiliativeness (*DSF*). The Social Security disability compensation group displayed the same Validity scales high scores as the comorbid complaints group with the addition of a high score on Infrequent Psychopathology Responses (*Fp-r*) as well.

The psychological complaints group had mean *T*-scores ≥ 60 for 16 (33%) of the 49 scales in a pattern similar to those of the other two groups; for instance, this group's mean high scores on the H-O, RC, and Internalizing scales approximated those of the

comorbid complaints and Social Security disability compensation groups. This group demonstrated fewer mean high scores on the Somatic/Cognitive scales than the other two groups (specifically, mean *T*-scores were ≥ 60 on Malaise [*MLS*], Gastrointestinal Complaints [*GIC*], and Cognitive Complaints [*COG*]) and no elevations on any of the Interpersonal scales. However, this group was the only group to demonstrate mean high scores on Antisocial Behaviors (*RC4*) and one Externalizing scale, Substance Abuse (*SUB*). The high Validity scale scores of the psychological complaints group were the same as those of the comorbid complaints group (i.e., Infrequent Responses [*F-r*], Infrequent Somatic Responses [*Fs*], and Symptom Validity [*FBS-r*]).

Several trends emerged for all three groups' MMPI-2-RF scale scores. First, scores on several scales related to internalization of emotions and negative emotionality (i.e., *EID, RCd, RC2, SFD, NFC, AXY,* and *INTR-r*) were at $T \geq 60$ for all three groups. Each group also exhibited high scores on some scales assessing somatic and cognitive symptoms (i.e., *RC1, MLS, GIC,* and *COG*) and some Validity scales (i.e., *F-r, Fs,* and *FBS-r*). This resulted in a total of 14 scales on which each group demonstrated scores at $T \geq 60$.

In terms of distinct trends of each group, the Social Security disability compensation group alone had high mean *T*-scores on *Fp-r*, *HLP* and *DSF*. Only the comorbid complaints group produced a mean *T*-score ≥ 60 on *STW* and *SAV* and the psychological complaints group alone produced high mean *T*-scores on *RC4* and *SUB*. As an additional step, the overall mean score for the 14 scales on which all three groups demonstrated high scores was computed separately for each group. The overall mean

high score of the Social Security disability compensation group was 69.56, that of the comorbid complaints group was 65.26, and that of the psychological complaints group was 64.07. Thus, the mean score was higher by approximately one-half standard deviation for the Social Security disability compensation group than for the other two groups, and was roughly two standard deviations higher than the normative mean for the MMPI-2-RF.

The central analyses of this study consisted of assessing significant differences in MMPI-2-RF scale scores across the three groups. A MANOVA was conducted for this purpose. It should be noted that a significant Box's *M* test ($p = .001$) indicated covariance matrices of MMPI-2-RF scale scores across groups were not homogeneous (i.e., the observed covariance of MMPI-2-RF scale scores was not equal across the three participant groups). However, the MANOVA is robust to violations of the assumption of homogeneity of covariance matrices. Moreover, the assumption of sphericity was met, that is, Bartlett's test of sphericity was significant ($p < .01$), which indicated the study group variances can be assumed to be equal. These findings supported analysis of the MANOVA results. The MANOVA result was significant, Wilks' $\lambda = .32$, $p < .01$, partial $\eta^2 = .44$. Subsequent univariate ANOVA results were examined to determine significant differences in MMPI-2-RF scale scores across the three groups; these results are presented in Table 7.

Table 7
Significantly different MMPI-2-RF scale scores across the comorbid complaints, Social Security disability, and psychological complaints groups (N = 154)

Scale	*df*	*F*	*p*	partial η^2
L-r	2	3.77	.025	.048
RC1	2	3.95	.021	.050
RC2	2	6.06	.003	.074
MLS	2	5.87	.004	.072
NUC	2	6.11	.003	.075
SUB	2	5.08	.007	.063

Note. These results refer to significant differences between any pair of groups among the three study groups, and are not necessarily representative of every combination of pairs.

Two patterns can be discerned when observing the significant differences in scale scores across the three participant groups. First, three of these six scales were also among those on which each group demonstrated high scores of $T \geq 60$ (i.e., *RC1, RC2,* and *MLS*). However, three additional scales whose scores were not necessarily in the $T \geq 60$ range for each group also emerged as being significantly different across groups (i.e., *L-r, NUC,* and *SUB*).

Following the ANOVA, subsequent Bonferroni post-hoc analyses were conducted to determine significant differences in MMPI-2-RF scale scores between specific pairs of this study's participant groups; that is, between the comorbid complaints and Social Security disability compensation groups, between the comorbid complaints and psychological complaints groups, and between the Social Security disability compensation and psychological complaints groups. Significant differences were found between the comorbid complaints and Social Security disability compensation groups, between the Social Security disability compensation and psychological complaints

groups, and between the comorbid and psychological complaints groups. Table 8 presents significant differences on MMPI-2-RF scores between the Social Security disability compensation and comorbid complaints groups, while Table 9 displays significant score differences between the Social Security disability compensation and psychological complaints groups.

Table 8

Significantly different MMPI-2-RF scale scores of the Social Security disability compensation (n = 30) and comorbid complaints (n = 66) groups

Scale	Social Security Disability Compensation		Comorbid Complaints		Mean Difference	*p*
	M	SD	M	SD		
RC2	74.87	14.04	64.83	15.86	**10.03**	.011
MLS	75.27	12.51	66.67	13.22	8.60	.009
L-r	56.47	8.70	51.36	10.17	5.10	.049

Note. Mean difference in boldface indicates mean difference ≥ 1 SD from the normative mean.

As seen in Table 8, significant differences in MMPI-2-RF scale scores between the Social Security disability compensation and comorbid complaints groups were observed for only three of the 49 scales of interest. Mean scores for these three scales were consistently higher for the Social Security disability compensation group than for the comorbid complaints group. As indicated above, *RC2* produced the largest difference between the Social Security disability compensation and comorbid complaints groups.

Table 9
Significantly different MMPI-2-RF scale scores of the Social Security disability compensation (n = 30) and psychological complaints (n = 58) groups

Scale	Social Security Disability Compensation		Psychological Complaints		Mean Difference	*p*
	M	SD	M	SD		
RC2	74.87	14.04	63.29	15.47	**11.57**	.003
NUC	68.93	14.05	58.21	12.63	**10.73**	.002
MLS	75.27	12.51	65.90	12.76	9.37	.005
SUB	52.20	10.02	60.76	14.29	8.56*	.013
RC1	69.37	13.80	60.88	13.76	8.49	.022
L-r	56.47	8.70	50.93	9.20	5.54	.033

Note. Mean differences in boldface indicate mean differences ≥ 1 SD from the normative mean. * denotes the mean high score of the psychological complaints group was greater than that of the Social Security disability compensation group.

Among the six scales that had significantly different scores between the groups shown in Table 9, mean scores were generally higher for the Social Security disability compensation group than the psychological complaints group; however, the psychological complaints group scored higher than the Social Security disability compensation group on *SUB. RC2* and *NUC* were found to have the greatest difference between the Social Security Disability compensation and psychological complaints groups.

SUB was the only scale that significantly differed between the psychological complaints and comorbid complaints group, with the psychological complaints group demonstrating a higher score (M = 60.76, SD = 14.29) than the comorbid complaints group (M = 54.97, SD = 13.37). The mean difference of these scores was 5.79, p = .047

Hierarchical linear regression analyses were conducted to determine which of the above-noted scales had the greatest explanatory power in distinguishing between the Social Security disability compensation group and the comorbid complaints group and between the Social Security disability group and the psychological complaints group. The three MMPI-2-RF scales identified as differing significantly between the Social Security disability compensation group and the comorbid complaints group were entered into the first regression analysis based on the size of their mean differences in descending order as follows: *RC2, MLS,* and *L-r.* Results of this analysis indicated that collectively, these three scales collectively accounted for 13% of the variance in score differences between the Social Security disability compensation and comorbid complaints groups. Table 10 depicts the steps of this equation.

Table 10
Hierarchical linear regression analysis describing score differences between the Social Security disability (n = 30) and comorbid complaints (n = 66) groups

Model	Adj. R^2	ΔR^2	β
Step 1			
RC2	.076	.086	.293
Step 2			
RC2			.167
MLS	.082	.015	.177
Step 3			
RC2			.128
MLS			.218
L-r	.133	.059	.245

The six MMPI-2-RF scales whose scores differed significantly between the Social Security disability group and the psychological complaints group were entered into the

second regression analysis in the following order: *RC2, NUC, MLS, SUB, RC1,* and *L-r.* Results of this second analysis demonstrated that the six aforementioned scales collectively accounted for 30% of the variance in score differences between the Social Security disability compensation and psychological complaints groups. Table 11 demonstrates the steps of this equation. Notably, the first four steps accounted for approximately 24% of the variance between these two groups.

(continues)

Table 11

Hierarchical linear regression analysis describing score differences between the Social Security disability (n = 30) and psychological complaints (n = 58) groups

Model	Adj. R^2	ΔR^2	β
Step 1			
RC2	.110	.120	-.347
Step 2			
RC2			-.248
NUC	.168	.066	-.276
Step 3			
RC2			-.289
NUC			-.313
MLS	.160	.002	.078
Step 4			
RC2			-.225
NUC			-.320
MLS			.032
SUB	.237	.083	.293
Step 5			
RC2			-.212
NUC			-.359
MLS			-.021
SUB			.291
RC1	.230	.002	.090
Step 6			
RC2			-.174
NUC			-.400
MLS			-.147
SUB			.179
RC1			.162
L-r	.304	.078	-.313

A simple linear regression was conducted to determine the explanatory power *SUB* had in distinguishing between the psychological complaints group and the comorbid complaints group. Results of this analysis indicated *SUB* accounted for approximately 4% of the variance between these groups. Table 12 displays these results.

Table 12
Simple linear regression analysis describing score difference between the psychological complaints (n = 58) and comorbid complaints (n = 66) groups

Model	Adj. R^2	ΔR^2	β
Step 1			
SUB	.035	.043	.206

Discussion

In the past two decades, vast increases in the number of patients presenting with comorbid physical and mental health concerns in various healthcare settings have been noted. Similarly, the number of Social Security disability compensation cases has increased from approximately 6,000,000 cases in 2000 to approximately 10,000,000 cases in 2018 (Social Security Administration, 2018), which represents a 66% increase over a comparable timespan. For these reasons, greater research focusing on these populations is warranted. Numerous studies have been conducted on comorbid physical and mental health conditions and, to a lesser degree, on Social Security disability compensation seekers in the realms of medical and psychological research. The MMPI instruments in particular have an extensive history of use for research purposes with health-related populations, including applicants for Social Security or Veterans benefits. However, room for further study remains; for instance, the MMPI-2-RF's research base is still developing, as it is the newest addition to the MMPI family. The MMPI-2-RF, relative to its predecessor the MMPI-2, contains a greater number of scales related to somatic and physiological disturbances and lends itself well to use with health-related populations, as was demonstrated in the current study.

The primary goal of this study was to examine differences in MMPI-2-RF scale scores between outpatient therapy clients presenting with comorbid physical and mental health concerns, those seeking or receiving Social Security disability compensation, and those presenting only with psychological concerns. Individuals with comorbid physical and mental health diagnoses and those seeking or receiving Social Security disability

compensation were of central interest in this study; the psychological complaints group was included to provide a point of comparison to the other two groups. It was anticipated that individuals in the comorbid conditions group would demonstrate pronounced somatic complaints due to the nature of their presenting problems and/or preexisting medical/health conditions. Somatic complaints were also expected to be exhibited by those in the Social Security disability compensation group, but with higher scores throughout the entire MMPI-2-RF profile (i.e., on validity scales and psychological complaints scales as well as somatic complaints scales).

The rationale for these projected directions was based on possibilities suggested by prior research: (a) Individuals applying for or receiving disability benefits may be of the opinion that reporting impaired physical functioning is more believable (and therefore more likely to lead to receiving or maintaining disability-related benefits) than reporting diminished psychological functioning (e.g., Pollack & Grainey, 1984); (b) such individuals may be motivated by secondary gain (e.g., financial compensation, attention and nurturance from others) and may engage in exaggeration or malingering of symptoms as a means to achieve these gains (e.g., Aguerrevere et al., 2018; Chmielewski et al., 2017) and; (c) furthermore, it is possible that disability-seeking and –receiving individuals at least partly define their identities in terms of their functional impairments. The psychological complaints group was expected to display high scores on several scales related to psychological symptoms, and it was anticipated that some somatic symptoms may also be present to a lesser extent (e.g., as in the case of physical expression of psychological symptoms).

Preliminary results of this study revealed several MMPI-2-RF scale scores were high (i.e., $T \geq 60$) for all three groups, indicating that the MMPI-2-RF captures disturbances in functioning regardless of whether a person is presenting with comorbid complaints, purely psychological complaints, or is applying for or receiving disability compensation. Overall, 11 scales assessing internalization of emotions, negative emotionality, and somatic/cognitive symptoms (i.e., *EID, RCd, RC2, AXY, SFD, NFC, INTR-r, RC1, MLS, GIC,* and *COG*), as well as three of the eight validity scales (i.e., *F-r, Fs*, and *FBS-r*), emerged as being clinically relevant (i.e., $T \geq 60$) across the three groups. Collectively, these 11 scales assessing symptomology measure disturbances in mood and affect, including negative affect, anxiety, and poor self-esteem, along with assorted physical health complaints. These similarities in MMPI-2-RF score patterns across groups are not surprising and were, in fact, anticipated, given that symptoms of physical and mental conditions often overlap.

The observed overlap in this study demonstrates that distinguishing between disorders can be difficult, as would likely be attested to by mental health and medical providers. A mix of psychological and somatic features can potentially be present in any number of conditions or individuals. Furthermore, it should be noted that although individuals with comorbid physical and mental health, Social Security disability, and psychological concerns may endorse some similar symptoms on a test such as the MMPI-2-RF, the underlying *causes* or *reasons* for their choice of symptom endorsement are not necessarily the same. For instance, an individual diagnosed with depression and IBS may demonstrate high scores on *RCd, RC1, RC2, GIC,* and *NEGE-r*, as these scales reflect

symptoms and experiences consistent with these diagnoses. An applicant or recipient of disability benefits may obtain high scores on these same scales without necessarily experiencing either of these conditions in an effort to obtain monetary compensation or other forms of secondary gain, although such an individual may also be affected by genuine physical and/or psychological ailments. The important point is that personality test results are primarily descriptive and examiner skill is essential for determining the underlying intentions and motivations of test respondents, and it is possible to observe differentiating features in MMPI-2-RF profile patterns.

The central analyses indicated that mean scores for some scales - approximately 12%, or six out of the 49 scales assessed - were significantly different across the three groups. Specifically, five scales related to emotionality, somatic and cognitive symptoms, and externalizing behaviors (i.e., *RC1, RC2, MLS, NUC,* and *SUB*) and one Validity scale (i.e., *L-r*) emerged as being notably different among the three subsamples. The group of five scales that differed in scores across the three groups broadly represented somatic, emotional, and substance use disturbances. Between-groups analyses determined statistically significant differences in MMPI-2-RF scale scores between the Social Security disability compensation and comorbid complaints groups, between the Social Security disability compensation and psychological complaints groups, and between the psychological complaints and comorbid complaints groups. Three of the 49 scales assessed, or approximately 6% of the scales (i.e., *RC2, MLS,* and *L-r*), had significantly different scores between the Social Security disability compensation and comorbid complaints groups. In terms of their measured characteristics, these scales reflect

negative emotionality and physical concerns. Six out of 49 scales, or roughly 12% of the scales assessed (i.e., *L-r, RC1, RC2, MLS, NUC,* and *SUB*), were significantly different between the Social Security disability compensation group and the psychological complaints group. These scales broadly reflect negative affect and specific physical concerns. *SUB* was the only scale out of the 49 assessed (i.e., 2%) that was significantly different between the psychological complaints and comorbid complaints groups. While these percentages do not represent the majority of the scales assessed, they signify differences between the three groups. Specifically, the Social Security disability compensation group consistently scored higher than the comorbid complaints group on all three scales mentioned previously. However, collectively these scales accounted for only a small percentage (i.e., 13%) of the variance between these two groups. The Social Security disability compensation group also scored higher on five of the six aforementioned scales than the psychological complaints group, which accounted for a robust 30% of the variance between these groups. It should be noted, however, that a large portion of the variance between these groups (i.e., roughly 24%) was accounted for by four scales, *RC2*, *NUC, MLS,* and *SUB,* broadly reflecting physical and emotional concerns or discomfort and problematic substance use. While these latter results offer parsimony and may suffice in demonstrating the variance between the Social Security disability and psychological complaints groups, greater confidence in the differentiation between these two groups can be had when considering the effects of all six scales together. The psychological complaints group also scored higher than the comorbid

complaints group on *SUB,* which accounted for a small (i.e., 4%) percentage of the variance between these groups.

In broad terms, these findings demonstrate the general utility of the MMPI-2-RF in identifying differences between various groups. For instance, the differences between the Social Security disability compensation and comorbid complaints groups were primarily in terms of reporting low positive emotionality and a general sense of poor health, such that the Social Security disability compensation group reported greater disturbance in these domains. The nature of the differences between the Social Security disability compensation and psychological complaints groups entailed a stronger sense of disturbances in mood and somatic symptoms in the former group. It should be noted, however, that the Social Security disability compensation group did not report any substance use-related problems, while the psychological complaints group did. This particular result may be indicative of the Social Security disability compensation group's desire to be perceived as being inflicted with disabling difficulties that were not of their choosing, rather than engaging in behaviors that could be construed as volitional. The comorbid complaints and psychological complaints groups also differed in terms of reported intensity and breadth of somatic symptoms and substance use-related problems. It is probable these findings relate to the nature of the comorbid complaints group's presenting concerns and the higher frequency of co-occurring substance-related and psychological disorder and purely substance-related disorder diagnoses among the psychological complaints participants than among the comorbid complaints participants.

One might expect the comorbid complaints group to have reported the greatest disturbance (i.e., higher MMPI-2-RF scale scores) due to the complex nature of their conditions, but in fact, the Social Security disability compensation group generally obtained higher scores than the other two groups. This finding was not hypothesized, but is indicative of the intensity of the latter group's reported disturbance. As proposed earlier, the difficulties reported by the Social Security disability compensation group may have been amplified by a malingering component, the desire for secondary gain, and/or formation of a disability-related identity. While the comorbid complaints group appeared to report specific symptoms and experiences related to their conditions, the Social Security disability compensation group appeared to demonstrate high scores reflective of a general, broad-ranging disturbance. Previous research has not directly compared an MMPI instrument's scale scores between patients with comorbid conditions and applicants or recipients of disability compensation as was done in this study; however, similarity in terms of reported symptoms (e.g., symptoms of depression along with somatic complaints) can be observed when comparing results of studies that used the MMPI-2 or MMPI-2-RF with each population separately (e.g., Livingston et al., 2006; Slesinger et al., 2002).

Each of the three groups in the current study demonstrated a pattern of high scale scores in accordance with expectations. For instance, it was hypothesized that individuals with comorbid physical and mental health conditions would report experiencing symptoms of each ailment. Indeed, the comorbid complaints group in the current study obtained high scores on scales assessing physical symptoms as well as negative

emotionality, anxiety, and worry, which could be attributed to either the comorbidity with mental health condition itself or distress or concern regarding a physical health condition. This finding is similar to results from previous research on the use of the MMPI with multiple sclerosis (MS) patients (Mayerink et al., 1988) in which the patients endorsed "symptom items" from scales 1, 2, 3, 7, and 8 at a high rate (Mayerink et al., 1988). As seen in the current study, the comorbid complaints sample of this study obtained high scores on all somatic symptom-related scales. These MMPI-2-RF scales do not have direct MMPI counterparts; however, several MMPI scales such as Clinical scales 1 and 3 contain somatic symptom items. The current results therefore demonstrate continuity with earlier findings based on the MMPI. As also noted in previous research on the relationship between physical and mental health, the two often contribute to and compound one's overall sense of disturbance. It is likely that this phenomenon underlies the high score pattern observed in the comorbid complaints group's MMPI-2-RF profiles.

Disability claimants may present with psychological or physical complaints or some combination of the two in outpatient mental health settings. To illustrate this point, the Social Security disability compensation group in the current study was primarily seeking or receiving compensation on the basis of psychological disability; however, some individuals reported physical disability or both physical and psychological disability at time of intake. This was reflected in this group's endorsement of both somatic and cognitive symptoms on the MMPI-2-RF. Overall, the results for the Social Security disability compensation group can be described as somewhat broader and more intense than those of the other two groups. Similar findings have also been observed with

use of the MMPI in the context of disability applications, such that state disability applicants were found to demonstrate high scores on eight of the 10 Clinical scales (Pollack & Grainey, 1984). In the current study, the Social Security disability compensation group demonstrated the most high scores overall (i.e., *T*-scores ≥ 60 on 20 of the 49 scales of interest).

The severity of the current Social Security disability compensation group's reported disturbance is made particularly evident by their high (i.e., $T \geq 60$) mean *F-r* score, which was roughly 1 SD higher than those of the comorbid and psychological complaints groups. Comparable results have been demonstrated in previous research using the MMPI-2 and MMPI-2-RF validity scales in the context of disability compensation (e.g., Bianchini et al., 2017; Chmielewski et al., 2017). The high *F-r* scores seen in the current study as well as in prior research may be indicative of disability-seeking or –receiving individuals attempting to demonstrate their need for such compensation through heightened reporting of dysfunction. However, it cannot be assumed from the current results that they are necessarily more impaired in their functioning than individuals in the comorbid or psychological complaints groups, as an index of level of impairment was not included in this study.

It may be expected that those experiencing psychological difficulties will primarily have high scores on scales assessing these concerns; however, it would not necessarily be surprising if such individuals were to also report physical symptoms (e.g., somatic expressions of stress or anxiety). This phenomenon has been observed in previous research, for instance, in findings indicating that stress and depression can affect

the development and progression of physical symptoms and conditions (APA, 2014). Indeed, the psychological complaints group in the current study did report some somatic symptoms, but they displayed fewer high scores on scales measuring these concerns than the comorbid complaints and Social Security disability compensation groups. Additionally, the psychological complaints group demonstrated a pattern of high scores on scales assessing emotional dysfunction and negative emotionality, consistent with their presenting concerns.

The exploratory stance of this study brought to light specific points of distinction for each of the three groups individually. As briefly mentioned previously, the comorbid complaints group was the only group to demonstrate high scores on *STW* and *SAV*. This degree of difficulty in managing under pressure and avoidance of social activity may speak to the severity of their physical symptoms/conditions, psychological symptoms/conditions, or both, as in the compounding effect mentioned previously. The Social Security disability group alone demonstrated *T*-scores ≥ 60 on *Fp-r, HLP,* and *DSF.* These findings speak to the high level of psychological disturbance, negative emotionality, pessimism, and disturbances in interpersonal behaviors reported by this group. Finally, the psychological complaints group was the only group to not obtain high scores on *HPC* and *NUC*. These results were not necessarily unexpected, as each of these two scales assess specific somatic/cognitive complaints. It was more surprising, however, that the psychological complaints group did not demonstrate a score in the clinical range on *NEGE-r.* This scale specifically assesses anxiety, insecurity, worry, and fear, which are prominent features in numerous psychiatric conditions. Thus, this result introduces an

unusual finding, given this group's presenting problems. Additionally, the psychological complaints group was the only group to demonstrate clinically relevant scores on *RC4* and *SUB* (and, in fact, on any Externalizing scale). These findings are likely related to the higher rates of diagnosed substance-related disorders in this group as compared to the other two groups, as rule-/law-breaking and irresponsibility commonly occur in conjunction with alcohol and drug use or misuse.

The current study offers several contributions to the field of personality assessment. First, this study raises awareness to patterns examiners of disability cases can attend to in testing scenarios involving the MMPI-2-RF. Assessment in these contexts poses many challenges for the examiner; it can be difficult to know how much of what is being reported by the examinee is genuine and how much may be propelled by motivation for secondary gain, monetary or otherwise. Ultimately, individual differences must be considered, and it is left to the examiner's knowledge and expertise to make a judgment on whether or not a disability claimant truly meets criteria for disability. The results from this study do not resolve this challenge, but it is hoped they shed light on this particular task.

This study demonstrates continuity with previous research on the use of the MMPI-2 and MMPI-2-RF with similar populations, but also delves into newer territory, as there is no current published study on profile differences between Social Security disability-seeking or-receiving individuals and those with comorbid physical and mental health conditions with either instrument. This study revealed symptom presentation on MMPI-2-RF profiles can appear very similar among various health-related populations,

which was particularly true when comparing the comorbid complaints and Social Security disability compensation groups. Nonetheless, the MMPI-2-RF can be used to identify differences among these individuals, as was also demonstrated by this study's findings. Ultimately, based on the results of this study, one could expect:

(a) Persons with comorbid physical and psychological conditions to report a number of specific symptoms related to each set of ailments;

(b) Those seeking or receiving disability benefits to report a broad range of dysfunction encompassing psychological and somatic concerns, as well as high levels of disturbance;

(c) Those experiencing purely psychological ailments to primarily report psychological disturbance, with any expressed somatic concerns reported likely being a secondary component related to the psychological disturbance.

Although this study offers new findings and provides an extension of the existing research base on use of the MMPI-2-RF with health-related populations, it had some limitations. Specifically, it was limited by the inability to assess for impairment of psychological functioning and malingering in the Social Security disability compensation group. Assessment of these factors is particularly relevant to individuals seeking or receiving disability compensation due to the complexity of their underlying reasons for selecting their responses (e.g., actual concerns or symptoms versus overstatements of the same). As malingering and impairments in psychological functioning could not be assessed in the current sample due to the archival nature of the dataset, it is difficult to ascertain whether this group's overall higher MMPI-2-RF scale scores relative to those of

the other two groups were due to genuine distress and difficulty, or if these scores were instead related to exaggeration of symptoms.

It should be noted that the mean age of the overall sample was approximately 40 years old, an age that falls within middle adulthood. This average age is likely due, in part, to the removal of 30 participants aged 18, 21, and 23 from the psychological complaints group, as previously discussed. As such, the results of this study may be more generalizable to middle-aged and older adults rather than young adults. The results of this study may also be limited in their generalizability to the broader populations represented by each of the participant groups due to the size of each group. This is particularly true for the Social Security disability complaints group, as it consisted of the fewest participants (i.e., $n = 30$).

The current study provides a helpful starting point for future research. Future research might consider incorporating a measure to assess functional impairment secondary to psychological disturbance, particularly for individuals seeking or receiving disability compensation or benefits. In fact, this would be an important step in clinical evaluations that are directed toward affirming or disaffirming the presence of psychological disability in disability compensation-seeking individuals. Future research may also be directed to identifying optimal cut-off scores on MMPI-2-RF scales for Social Security disability-seeking persons to further aid in establishing a more accurate differentiation between disability and malingering. Another fruitful direction for future research could involve establishing the predictive value of MMPI-2-RF scale scores in determining compliance with medical regimens and predicting recovery from medical

illness. Such research and clinical application directions speak to the potentially expanding utilization, role, and relevance of the MMPI-2-RF in a variety of healthcare contexts.

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Appendix: Participant Informed Consent Form

Informed Consent
Client Records Confidential Statement

[Clinic] is an outpatient psychology clinic composed of faculty and graduate students of [university]'s School of Psychology Clinical Psychology program. Your clinician is completing the requirements for his/her doctoral degree in clinical psychology under the direct supervision of a licensed psychologist. [Clinic] has a dual mission to provide comprehensive services to our clients as well as training for our graduate students. Please feel free to ask any questions or voice concerns so that our professional relationship will be open and satisfying for all.

Confidentiality:
We abide by the laws and certifying board regulations concerning confidentiality. Therefore, you may be asked at times to sign a release that would allow us to give (or receive) information to (or from) a physician, school, or other source. That release may also be canceled by you at any time and no further communication would be allowed. Also, you may refuse to give us permission to disclose information.

Special laws that allow for the release of confidential or privileged information have been enacted in an effort to provide protection for the client and the public in unusual circumstances. Personal information about the client may be released without consent to the appropriate parties involved.

Those exceptions to privacy, privileged communication, and confidentiality include:

a. *If there exists a danger of harm to the client or someone else;*
b. *If the client needs to be involuntarily hospitalized due to the debilitating effects of mental illness or alcoholism;*
c. *If the client is required to undergo a court ordered examination;*
d. *If the client discloses information about the abuse or neglect of a child;*
e. *If the client discloses information about the abuse, neglect, or exploitation of an aged or disabled adult;*
f. *If the client's mental or emotional condition is presented as a legal defense;*
g. *If a civil, criminal, or disciplinary action arises from a complaint filed in behalf of the client against a mental health professional in which case the disclosure and release of information shall be limited to that action;*
h. *If it is disclosed that the client tests HIV positive (if he/she tests positive for having been exposed to the AIDS virus), it may then be considered necessary to notify the client's significant other(s) of the positive test results and facts about transmission.*

Emergency: In case of a non-medical emergency, call the [clinic] at [phone number]. If for any reason contact is not made, we encourage you to call 911 or [emergency number at psychiatric hospital], or go to the Emergency Room of the nearest hospital where you will receive attention.

Informed Consent for Treatment:
By my signature below, I signify that:

1) I understand that the records of my evaluation and treatment are private and confidential.
2) I understand that my medical records may be shared with other health care providers at [clinic] as well as graduate students in [university]'s Clinical Psychology program for the purposes of diagnosis, education, research, and supervision.
3) I understand that if my information is selected for use in any psychology-related research projects, the information would be presented anonymously, and my name and personally identifying information would not be used.
4) I have been given the opportunity to discuss these concepts and conditions and to ask for clarification.
5) I understand that I will be informed of the goals, expectations, procedures, benefits, and possible risks involved with counseling or evaluation process.
6) I have the right to refuse or withdraw from any counseling, psychotherapy, or evaluation procedure or intervention unless otherwise specified by law.
7) I should question any procedure, intervention, rationale, or discussion that is unclear or that I do not understand.
8) I understand that all communication will be private, legally privileged, and confidential unless otherwise specified by the special laws presented above or unless I provide my written consent to a specific release of information. I understand that if my clinician is a student, then my treatment will be discussed with a supervising psychologist and a supervision treatment team.
9) I understand that this consent may be withdrawn by me at any time without prejudice.

I hereby give my consent for service to be provided under the conditions above. I have been given a copy of the Notice Of Privacy Practices to inform me about my rights and policies of use and disclosures of Protected Health Information.

Client's Name	SS#	Date of Birth

Client's Signature	Date

Witness	Date