

Running head: PSYCHOLOGY OF THE COCKPIT

**Psychology of the Cockpit: The Pros and Cons of the MMPI in Pre-
Employment Screening**

By Robert Baron, Ph.D

[The Aviation Consulting Group](#)

TABLE OF CONTENTS

	Page
Abstract	3
Introduction	4
History of the MMPI	4
Psychometrics and Administration of the MMPI-2	8
Psychology of the Cockpit	14
Conclusion	18
References	20

Abstract

The MMPI-2 has become one of the most widely used psychological assessments for the pre-employment screening of airline pilots. This paper looks at the development of the original MMPI through the revised version known as the MMPI-2. The test's psychometric properties and administration are discussed with a focus on threats to validity, such as faking, overreporting and underreporting, and defensive responses. Finally, an argument is presented that addresses whether the need for recurring psychological testing of airline pilots should be mandated based on past examples of in-flight pilot suicides. It appears that a one-time pre-employment screening may not be enough to adequately address the various innate, situational, and environmental factors that might cause psychological instability long after MMPI-2 administration.

Psychology of the Cockpit: The Pros and Cons of the MMPI in Pre-Employment Screening

Introduction

Psychological testing of airline pilots has been the center of an ongoing debate for some time now. For the most part, pilots understand that a psychological evaluation is a necessary part of the pre-employment screening process. It is part of a battery of tests to measure not only the psychological makeup of the pilot but also the skills, knowledge, and experience that he or she brings to the table. Additionally, the traveling public feels the need to be assured that the pilot of their aircraft is psychologically sound and is fully able to remain calm and in control during the course of a flight, especially if an abnormal or emergency situation arises. Unfortunately, there are some limitations in the assessment instrument itself, the Minnesota Multiphasic Personality Inventory (MMPI), which is the standard psychological screening tool that most airlines use today. Additionally, not all pilots who "ace" the MMPI have "the right stuff." In fact, many of the problems associated with the MMPI center around the test-taker answering questions in a way that will make them appear as they think they should appear to an employer as opposed to how they really are. All of this will be addressed shortly.

History of the MMPI

In order to fully understand the modern day limitations of the MMPI a journey through its development and subsequent modifications is required. Starke Hathaway and J. C. McKinley, both of the University of Minnesota, developed the MMPI, which was published in 1942. The test is in a questionnaire format and the original contained 566 true/false statements (the MMPI-2 contains 567 statements). Examples of the content items include:

I am happy most of the time.

I enjoy social gatherings just to be with people.

I am certainly lacking in self-confidence.

I believe I am a condemned person.

(Cited in Hunt, 1993, p.320)

The statements are answered as either *true* or *false* (items left blank are construed as *cannot say*). Ten scales are used to measure certain psychological constructs. Hathaway and McKinley used institutionalized patients with mental disorders to construct their statements. Their comparative and so-called "normal" population was referenced to people with no known psychological disorders. The MMPI was made up only of those items which differentiated the two groups (Welsh & Dahlstrom, 1956, as cited in Cohen & Swerdlik, 2005).

The scales are listed below as well as the clinical criterion group from which they were derived:

1. Hypochondriasis (Hs): Patients who showed exaggerated concerns about their physical health.
2. Depression (D): Clinically depressed patients; unhappy and pessimistic about their future.
3. Hysteria (Hy): Patients with conversion reactions.
4. Psychopathic deviate (Pd): Patients who had histories of delinquency and other antisocial behavior.
5. Masculinity-femininity (Mf): Minnesota draftees, airline stewardesses, and male homosexual college students from the University of Minnesota campus community.
6. Paranoia (Pa): Patients who exhibited paranoid symptomatology such as ideas of reference, suspiciousness, delusions of persecution, and delusions of grandeur.
7. Psychasthenia (Pt): Anxious, obsessive-compulsive, guilt-ridden, and self-doubting patients.
8. Schizophrenia (Sc): Patients who were diagnosed as schizophrenic (various subtypes).
9. Hypomania (Ma): Patients, most diagnosed as manic-depressive, who exhibited manic symptomatology such as elevated mood, excessive activity, and easy distractibility.
10. Social introversion (Si): College students who had scored at the extremes on a test of introversion/extraversion.

(Cited in Cohen & Swerdlik, 2005, p.362)

Since the MMPI is a self-reporting instrument there were some validity issues that needed to be addressed. To that end, three validity scales were built into the test. These included the *L* scale (Lie scale), the *F* scale (Frequency scale), and the *K* (correction) scale (Hathaway & McKinley, 1943). These validity scales were used to tease out the test-taker's response patterns (such as lying and careless answering) that could negatively affect the results. This type of validity had more to do with the honesty of the test-taker's answers rather than the validity of the test in the psychometric sense of the word.

It is obvious that the MMPI has a strong affinity for identifying mental illness. Indeed, when the test was originally developed it served that function well. However, the negative aspect of the terminology has caused modern-day problems in terms of creating test anxiety. For example, the label *psychopathic deviate*, a term routinely used many years ago, is not commonly used today. Instead, the scales are referenced by their numbers in an attempt to lessen some of the psychopathic references to the test (Cohen & Swerdlik, 2005). It should also be noted that although the MMPI is a good diagnostic instrument for mental illness, it does also measure normal personality features and that is one of the reasons it has been so enduring and successful over time.

The original MMPI had been used extensively for over 50 years as an efficient and fairly reliable tool in the evaluation of employee candidates. However, the original MMPI was beginning to show signs of aging in certain areas such as behavioral categories and sample population. Subtle but extensive changes were about to take place to bring the MMPI up to current standards. In 1989, James Butcher and his colleagues from the University of Minnesota revised the MMPI and named it, appropriately, the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).

Butcher et al. retained the MMPIs general structure, administration, and scoring. Interpretation remained intact. However, in forming their brainstorming committee, and reviewing many of the critical offerings of the original MMPI (Dahlstrom, 1972; Hathaway,

1972; Meehl, 1972; Loevinger, 1972; Norman, 1972) they found that other areas were in serious need of revision. These revisional changes included the following:

- The traditional clinical scales needed to be nearly identical in terms of item structure and general configuration as the original instrument.
- Although many elements in the test needed to be identical in the revision, some changes to the booklet were necessary: Unused and dated items were deleted, some of the items were rewritten, some objectionable items were dropped, and new content was added in order to measure contemporary clinical problems and make the MMPI a more effective instrument in the future.
- A more relevant, contemporary normative population study needed to be conducted to provide new norms for the traditional validity and clinical scales, even though the items were continuous with the original version.
- The inclusion of new item content to replace out-of-date items would allow for the development of new scales to address contemporary problems.
- The committee agreed that a substantial number of clinical studies needed to be developed in order to provide for well-defined samples to "test out" new scales that were to be developed or to provide a new validation of the traditional scales.

(Cited in Butcher, 2000)

In terms of specificity, the MMPI-2 improvements included; 1) a more representative standardization sample (normal control group) used in renorming the MMPI-2, 2) items were rewritten to correct grammatical errors, and to make the language more contemporary, nonsexist, and readable, 3) items thought to be objectionable to present-day test-takers were eliminated, 4) items such as drug abuse, suicide potential, marital adjustment, attitudes toward work, and Type A behavior patterns were added, and 5) the suggested age range of the test-taker was raised from

14 years old and older for the MMPI to 18 years old and older for the MMPI-2 (Cohen & Swerdlik, 2005).

For the most part the MMPI-2 was widely accepted and administrators immediately began to use the new version upon its release in 1989. Interestingly, a small percentage (less than 5%) continued to use the original version nine years after the MMPI-2 became available (Butcher, 2000). This created many problems because of the overlap in critical assessment situations (such as court cases) where the original norms were being used although they were not aligned with the norms of the new version. Because of this, the test publisher withdrew the original MMPI from service as of September 1, 1999 (Butcher, 2000).

Psychometrics and Administration of the MMPI-2

The modern day MMPI-2 has cleaned up many of the content and validity issues of its predecessor, but, like many other psychological tests, it is by no means perfect. In fact, some of the same limitations and deficiencies that were apparent in the MMPI are still clearly capable of confounding the validity of results in the MMPI-2, although to a lesser extent. These limitations include a lengthy test with a resulting long period of time required for completion, a feeling that the test-taker is answering revealing and often embarrassing questions, and the obvious psychopathic tone of the test, which makes people feel the items are either funny or insulting (Hunt, 1993).

Further expansion of validity issues include; 1) fakability in answering the questions (Viswesvaran & Ones, 1999) (the use of validity scales reduces the possibility of dishonest answers and if a trend of dishonesty is found, the test-taker might be required to re-test after further instructions from the administrator), 2) susceptibility of overreporting and underreporting (Sellbom, Ben-Porath, Graham, Arbisi, & Bagby, 2005) and, 3) defensive response sets as an attempt to conceal psychological disturbances (Butcher, 1994; Butcher, Morfitt, Rouse & Holden, 1997; Ganellen, 1994).

Although the three items listed above are related in nature, a further elucidation of each is appropriate to fully understand some of the limitations of the test from not only the test-taker's perspective but from the administrator's as well.

It should come as no surprise that when a pilot sits down to take the MMPI-2 he or she would like to show him or herself in the best possible light. To that end, some faking may occur in an attempt to lessen the chances of being truly (or perhaps falsely) assigned to a psychological category that could have a negative impact on the job interview. Research has been conducted to look at the effects of faking on the MMPI-2 in a simulated testing environment. Viswesvaran and Ones (1997) examined whether individuals can fake their responses to a personality inventory if instructed to do so. Between-subjects and within-subjects were meta-analyzed separately. Across 51 studies, it was found that fakability did not vary by personality dimension; all the Big Five factors were equally fakable (the Big Five factors of personality are; Agreeableness, Conscientiousness, Emotional Stability, Extraversion, and Openness to Experience). Faking produced the largest distortions in social desirability scales. Instructions to fake good produced lower effect sizes compared with instructions to fake bad.

Although it is possible for an individual to fake on the MMPI-2, it does not necessarily imply that they do in real-world applications (Hough & Schneider, 1996; Schwab, 1974). More importantly, even if they do fake in real-world applications, it is uncertain that such faking will destroy predicative validity (Barrick & Mount, 1991; Christiansen, Goffin, Johnston, & Rothstein, 1994; Hough et al., 1990; Ones, Viswesvaran, & Reiss, 1996; Ones et al., 1993).

Another example of a threat to validity is the potential for overreporting and underreporting. Similar to fakability, the reporter might want to show him or herself as being psychopathic (typically not airline pilot candidates but people who feign psychopathology to receive financial compensation or avoid criminal prosecution) or others who attempt to cover up psychological difficulties in pre-employment screening or child custody evaluations (Sellbom et al., 2005). Sellbom and colleagues conducted a study that examined the susceptibility of three MMPI-2 scale sets (Clinical, Restructured Clinical [RC], and Content) to overreporting and

underreporting using five analog samples. Two samples of 85 and 191 undergraduate students, respectively, took the MMPI-2 under *underreporting* versus standard instructions. Three samples consisting of 42 undergraduates, 73 psychiatric inpatients, and 84 medical patients took the MMPI-2 under *overreporting* versus standard instructions. A comparison of the effect sizes across the three sets of scales indicated that Clinical Scale scores are not less susceptible to distortion than the Content or RC Scales.

The validity scales built in to the MMPI-2 detect this overreporting and underreporting. In fact, there has been a good amount of research conducted to examine these scales' utility and it appears that the MMPI-2 validity scales are effective at detecting response distortion (Butcher et al., 2001).

Defensiveness is the last in this trio of MMPI-2 validity issues. Test results might become distorted as a result of a defensive response set. This defensiveness may be caused by normal test anxiety or perhaps, to a certain extent, the psychotic theme of the overall test questions. In turn, this may cause a distortion of the results to a point where test validity is compromised. In fact, if excess defensiveness is detected the test-taker might be required to take the test again.

In a study of MMPI-2 response characteristics for a large group of airline pilot applicants compared with those of a normative sample of men, Butcher (1994) found, among other things, that airline pilots, as other job applicants, present in a defensive manner on personality tests, with high elevations on *L* and *K* being quite common.

In another study the impact of revised instructions on profile validity for a group of job applicants who initially produced invalid profiles was conducted (Butcher et al., 1997). Participants were 271 male applicants for airline pilot positions. Of these, 72 produced invalid defensive MMPI-2 profiles during pre-employment screening. The MMPI-2 was readministered to these applicants with instructions informing them of validity scales and instructing them to respond in a more open, honest manner. Comparisons were made between valid and invalid profiles for initial administrations and between valid and invalid profiles at readministration. Some clinical scales were more elevated for valid, nondefensive profiles. Most content scales

showed more elevation for valid profiles, and 12% of the applicants who were retested produced significant elevations ($T \geq 65$) on the content scales. Profiles were similar to those produced by employed pilots of a previous study.

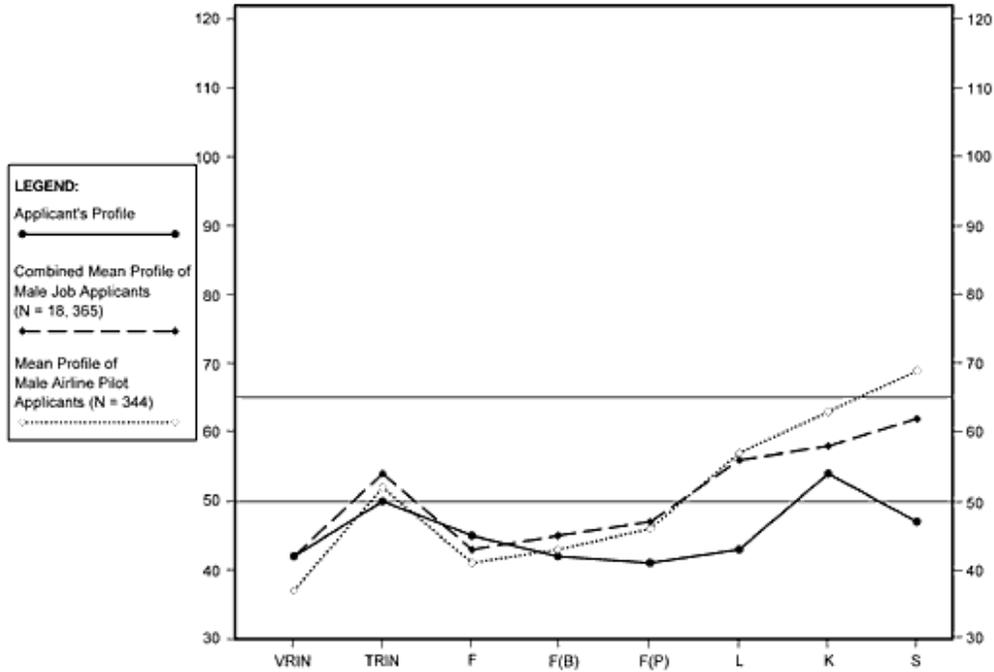
In summary, faking, overreporting and underreporting, and defensive response identification have been addressed well in the MMPI-2. This further adds to the predictive validity of the test and shows why the MMPI-2 has become one of the most popular pre-employment psychological assessments for safety sensitive and high-risk occupations such as that of a commercial airline pilot.

From an administrative perspective, the typical completion time for the 567 true/false item MMPI-2 is 60-90 minutes. The test can be taken in pencil and paper, audiocassette, or computer format. Pencil and paper format is typical in airline testing. Upon completion, applicants' raw scores are converted into T scores, which are then used for scale comparisons. Some extracted samples of a completed MMPI-2 for airline pilots are presented on the following pages:

MMPI-2™
ID 2551

Airline Pilots Adjustment Rating Report
Page 2

MMPI-2 VALIDITY PATTERN



General Applicant								
Sample Mean Score:	42	54	43	45	47	56	58	62
Airline Pilot								
Sample Mean Score:	37	52	41	43	46	57	63	69
Applicant's Raw Score:	3	9	3	0	0	2	17	22
Applicant's T Score:	42	50	45	42	41	43	54	47
Non-Gendered T Score:	42	50	46	42	42	43	54	46
Response %:	100	100	100	100	100	100	100	100

Cannot Say (Raw):	0			
Percent True:	44			
Percent False:	56			
		Raw Score	T Score	Resp. %
	S1-Beliefs in Human Goodness	3	39	100
	S2-Serenity	7	53	100
	S3-Contentment with Life	4	50	100
	S4-Patience/Denial of Irritability	6	58	100
	S5-Denial of Moral Flaws	2	43	100

Used with permission by James N. Butcher, March 2005.

CONTENT THEMES

MMPI-2 content themes may serve as a source of hypotheses for further investigation. These content themes summarize similar item responses that appear with greater frequency with this applicant than with most people.

He may feel alienated.

He may have trouble controlling his temper.

He may have antisocial attitudes and behavior.

He may have engaged in behavior that runs counter to societal norms.

He may have some unconventional beliefs or attitudes that affect the way he gets along with supervisors.

He may have irresponsible attitudes.

He may sometimes disregard rules when it suits him.

He may have problems with authority and may at times break rules.

He may tend to question supervisory decisions.

He may show some disregard for the feelings of others.

He has a cynical attitude toward life that reflects a tendency to be caustic in relationships with others.

Used with permission by James N. Butcher, March 2005.

Psychology of the Cockpit

The remainder of this paper will concentrate specifically on the MMPI-2 and its application in pre-employment screening for airline pilots. When an airline requires a pilot candidate to go through the pre-employment battery of tests they are analyzing a number of dimensions on the psychological continuum of the prospective flight crewmember. Depending on whom you speak to, the psychological portion of the pilot testing process can be viewed as a waste of time (i.e., airline pilot unions) or as a valuable tool in diagnosing which pilots have the "right stuff" (i.e., prospective employers). A few caveats should also be mentioned at this point; 1) the MMPI-2 is a diagnostic tool and even though some scores may be indicative of potential problems, further evaluation is normally conducted to address those areas in more detail, and 2) it should be kept in mind that the MMPI-2 is only one in a series of tests used to achieve a complete picture of the pilot's total psychological makeup and skill level.

There tends to be a stereotypical image of pilots in terms of being the coolest and most level headed professionals, responsible for hundreds of lives every day. And for the most part that is true. In fact, the Federal Aviation Administration (FAA) would not have initially granted or could revoke at any time a pilot's medical certificate if any of the following mental disorders were or are apparent, as may be the case (this list pertains to a First Class medical certificate and has been somewhat condensed for space purposes):

1. A personality disorder that is severe enough to have repeatedly manifested itself by overt acts.
2. A psychosis (The individual has manifested delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition; or the individual may reasonably be expected to manifest delusions, hallucinations, grossly bizarre or disorganized behavior, or other commonly accepted symptoms of this condition.
3. A bipolar disorder.

4. Substance dependence, except where there is established clinical evidence, satisfactory to the Federal Air Surgeon, of recovery, including sustained total abstinence from the substance(s) for not less than the preceding 2 years. "Substance" includes: Alcohol; other sedatives and hypnotics; anxiolytics; opioids; central nervous system stimulants such as cocaine, amphetamines, and similarly acting sympathomimetics; hallucinogens; phencyclidine or similarly acting arylcyclohexylamines; cannabis; inhalants; and other psychoactive drugs and chemicals.
5. No substance abuse within the preceding 2 years.
6. No other personality disorder, neurosis, or other mental condition that the Federal Air Surgeon, based on the case history and appropriate, qualified medical judgment relating to the condition involved, finds—

Makes the person unable to safely perform the duties or exercise the privileges of the airman certificate applied for or held; or may reasonably be expected, for the maximum duration of the airman medical certificate applied for or held, to make the person unable to perform those duties or exercise those privileges.

(FAA, CFR-Title 14, Part 67)

If these mental disorders are not apparent and the pilot has been successfully flying for 20 or 30 years, it can be assumed that he or she does have the "right stuff." Unfortunately, pilots are not always truthful when it comes to reporting these problems to the AME (Aviation Medical Examiner) for their medical certificates in the first place, and will certainly resist admitting to mental problems in the future (a First Class medical must be renewed every six months). This resistance is understandable as the disclosure of a severe mental disorder can result in the immediate revocation of his or her medical certificate and an ensuing loss of income. Additionally, Co-workers may not be the best source of information about a pilot's abnormal behavior, as the common "code of honor" is upheld in this tightly knit group of professionals. So, do some pilots slip through the hoops? That question will be addressed shortly.

It should be understood that not all mental disorders are medically disqualifying for a pilot. Some of the more "benign" problems can be treated and the pilot can continue to function normally. The most common and treatable psychological problems presenting in aircrew are addictive behavior (e.g., alcohol abuse), anxiety, marital conflict, somatization, depression, and phobic reactions (Bor, Field, & Scragg, 2002). Anxiety disorders presenting as a fear of flying have also been seen by AMEs but are generally attributable to personal stress or after a flying accident or incident (Bor & Van Gerwen, 2003, as cited in Bor, Field, & Scragg, 2002). Misconduct and anti-social behavior accounts for approximately 10% of psychological problems among pilots (Picano & Edwards, 1996, as cited in Bor, Fields, & Scragg, 2002).

But what would happen if one of these pilots with a more serious disorder happened to "slip through the hoops" in either the initial medical certification or on a recurrent checkup? Take for instance the following airline crashes due to a suspected psychological malady:

- The National Transportation Safety Board (NTSB) concluded that suicide might have been the cause of Air Egypt flight 990 off New York in 1999.
- Pilot sabotage was suspected in the Silk Air 737 crash in December 1997 where the aircraft plummeted into a river into Indonesia, killing all 104 passengers and crew. Investigators believe that the pilot deliberately flew the plane into the ground. The former military pilot in command had a history of gambling and financial problems and had taken out a life insurance policy the day before the flight.
- The cause of the crash of a Royal Air Maroc commuter plane in 1994, which killed 54 people, was deemed a case of pilot suicide.
- In 1982, a Japan Airlines pilot was institutionalized after trying to crash the DC-8 that he was flying into Tokyo's Haneda Airport, killing 24 passengers in the process.
- In 1998, an Air Botswana pilot informed air traffic control of his intention to fly his empty plane first into the president's residence. When deterred, he chose instead to crash it into the remainder of the airline's fleet at the airport at Gaborone. The pilot, believed to

have been grounded after an AIDS diagnosis, died in the crash. Miraculously, no one on the ground was injured.

(Bor, Field, & Scragg, 2002)

One might think that there is little credibility to the above examples because they all involved foreign pilots. However, it should also be kept in mind that stress, financial problems, addictions, and so forth are not indigenous to a certain population, and pilots in the United States are susceptible to very much the same environmental stressors as their foreign counterparts.

Because of these concerns of transient emotional instability and the case examples enumerated above, there is a growing amount of evidence suggesting that psychological testing of pilots should be a continuous rather than a one-time process. Understanding that personality traits and states are two separate entities must be considered. Traits are *stable* aspects of personality that influence behavior in a *wide range* of settings (Carver & Scheier, 1992). States, on the other hand, are hard to predict, highly dynamic, and more influenced by situationism or the environment (Barker, 1978; Moos & Insel, 1974). A pre-employment MMPI-2 may adequately measure traits but does not necessarily indicate how a pilot will react in specific situations. Situational behavior contributed to the "suicide pilot" crashes cited above. These same pilots may have tested well on a pre-employment assessment yet somewhere down the line something broke. An ongoing evaluation may have prevented these occurrences. Butcher (2002) suggests that while a one-time appraisal at an early career stage is important, it is insufficient for assuring a lifetime of emotional stability. Butcher also points out that people change over time—often for the worse, and this can be impacted by genetic vulnerability, life changes, and cruel environmental twists (p.169).

In deep contrast with Butcher's views, the Air Line Pilots Association (ALPA) opposes any long-term monitoring of pilots' mental health. ALPA, which is chartered by the AFL-CIO, is the major pilot labor union that represents over 64,000 pilots, who fly for over 43 U.S. and Canadian airlines, and has been in existence since 1931 (ALPA, 2005). Although ALPA

advocates flight safety and as one of its major goals, there tends to be a dichotomous relationship between mental health testing and the protection and advancement of its members. In fact, ALPA has been adamantly opposed to the use of psychological tests for the assessment of pilots at pre-employment (Butcher, 2002, p.177) as well as on a continual or recurring basis (Woerth, 2000) for as long as the organization has been in existence. The following extracted testimony from Captain Duane Woerth, ALPA president, encapsulates ALPA's overall view on the subject:

Routine psychological testing of airline pilots is unnecessary. There are already ample means during daily operations and recurrent training and evaluations to identify improper pilot behavior. Overlying this entire support network is FAA oversight provided by the FAA's Aeromedical Certification Division in Oklahoma City, and the FAA Office of Aviation Medicine in Washington, DC. (Woerth, 2000).

It is pretty clear that the requirement for psychological testing for airlines pilots will continue to be a controversial subject. For now, however, airlines will continue to use pre-employment psychological tests (such as the MMPI-2) for screening purposes, unobstructed by ALPA policy, as the airlines' probationary period of six months allows the pilot to be released for poor performance without the airline pilots' union becoming involved (Butcher, 2002, p.177).

Conclusion

This paper endeavored to trace the history of the MMPI from its roots to its modern-day version, the MMPI-2. James Butcher and his colleagues spent a great amount of time updating and revising the MMPI to its modern day standards. Like many psychological tests, there are still some inherent limitations and flaws, but for the most part, valid predictive behavior can be accurately assessed.

The controversial issue of whether pilots should be psychologically assessed on a continuous rather than a one-time pre-employment basis was critically analyzed. It is clear that

the largest union representing airline pilots is opposed to psychological testing while evidence suggests that the mental well-being of pilots is insufficiently addressed and problems may manifest unabated with potentially tragic results.

The author would like to thank Dr. James Butcher for his valuable time, insights, and contributions that have been incorporated into this paper.

References

- Air Line Pilots Association. (2005). A voice for the pilot. Retrieved March 7, 2005, from <http://www.alpa.org/?tabid=139>
- Barker, R. G. (1978). *Habits, environments, and human behavior*. San Francisco: Jossey-Bass.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.
- Bor, R., Field, G., & Scragg, P. (2002). The mental health of pilots: An overview. *Counseling Psychology Quarterly, 15*(3), 239-256.
- Butcher, J. N. (1994). Psychological assessment of airline pilot applicants with the MMPI-2. *Journal of Personality Assessment, 62*(1), 31-44.
- Butcher, J. N. (2000). Revising psychological tests: Lessons learned from the revision of the MMPI. *Psychological Assessment, 12*(3), 263-271.
- Butcher, J. N. (2002). Assessing pilots with the wrong stuff: A call for research on emotional health factors in commercial aviators. *International Journal of Selection and Assessment, 10*(1/2), 168-184. March/June, 2002.
- Butcher, J. N., Dahlstrom, W. G., Graham, J. R., Tellegen, A. & Kaemmer, B. (1989). *Minnesota Multiphasic Personality Inventory-2 (MMPI-2): Manual for administration and scoring*. (Minneapolis, MN: University of Minnesota Press).
- Butcher, J. N., Graham, J. R., Ben-Porath, Y. S., Tellegen, A., Dahlstrom, W. G., & Kaemmer, B. (2001). *Minnesota Multiphasic Personality Inventory-2: Manual for administration and scoring* (2nd ed.). Minneapolis: University of Minnesota Press.
- Butcher, J. N., Morfitt, R. C., Rouse, S. V., & Holden, R. R. (1997). Reducing MMPI-2 defensiveness: The effect of specialized instructions on retest validity in a job applicant sample. *Journal of Personality Assessment, 68*(2), 385-401.

- Carver, C. S., & Scheier, M. F. (1992). *Perspectives on personality*. (2nd ed.). Needham Heights: MA: Allyn and Bacon.
- Christiansen, N. D., Goffin, R. D., Johnston, N. G., & Rothstein, M. G. (1994). Correcting the 16PF for faking: Effects on criterion-related validity and individual hiring decisions. *Personnel Psychology, 47*, 847-860.
- Cohen, R. J., & Swerdlik, M. E. (2005). *Psychological testing and assessment: An introduction to tests and measurement*. (6th ed.). New York: McGraw-Hill.
- Dahlstrom, W. G. (1972). Whither the MMPI? (In J. N. Butcher (Ed.), *Objective personality assessment: Changing perspectives* (pp. 85—115). New York: Academic Press).
- Federal Aviation Administration. (2005). Code of federal regulations. Title 14: Part 67-Medical Standards and Certification [Electronic version]. Retrieved March 4, 2005, from <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=88e82e9f4dc4fbf6e9a428d7546ab14f&rgn=div8&view=text&node=14:2.0.1.1.5.2.1.4&idno=14>
- Ganellen, R. J. (1994). Attempting to conceal psychological disturbance: MMPI defensive response sets and the Rorschach. *Journal of Personality Assessment, 63*(3), 423-437.
- Hathaway, S. R. (1972). Where have we gone wrong? The mystery of missing progress. (In J. N. Butcher (Ed.), *Objective personality assessment: Changing perspectives* (pp. 24—44). New York: Academic Press).
- Hathaway, S. R., & McKinley, J. C. (1943). *The Minnesota Multiphasic Personality Inventory* (rev. ed.). Minneapolis: University of Minnesota.
- Hough, L. M., Eaton, N. K., Dunnette, M. D., Kamp, J. D., & McCloy, R. A. (1990). Criterion-related validity of personality constructs and the effect of response distortion on those validities. *Journal of Applied Psychology, 75*, 581-595.
- Hough, L. M., & Schneider, R. J. (1996). The frontiers of I/O personality research. In K. R. Murphy (Ed.), *Individual differences and behavior in organizations* (pp. 31-88). San Francisco: Jossey-Bass.

- Hunt, M. (1993). *The story of psychology*. New York: Anchor Books.
- Loevinger, J. (1972). Some limitations of objective personality tests. (In J. N. Butcher (Ed.), *Objective personality assessment: Changing perspectives* (pp. 45—58). New York: Academic Press).
- Meehl, P. E. (1972). Reactions, reflections, projections. (In J. N. Butcher (Ed.), *Objective personality assessment: Changing perspectives* (pp. 131—183). New York: Academic Press).
- Moos, R. H., & Insel, P. M. (1974). *Issues in social ecology*. Palo Alto, CA: National Press Books.
- Norman, W. (1972). Psychometric considerations for a revision of the MMPI. (In J. N. Butcher (Ed.), *Objective personality assessment: Changing perspectives* (pp. 59—84). New York: Academic Press).
- Ones, D. S., Viswesvaran, C., & Reiss, A. D. (1996). Role of social desirability in personality testing for personnel selection. The red herring. *Journal of Applied Psychology, 81*, 660-679.
- Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance [Monograph]. *Journal of Applied Psychology, 78*, 679-703.
- Schwab, D. P. (1974). Comments of "Re-examination of the fakability of the Gordon Personal Inventory and Profile: A reply to Schwab." *Psychological Reports, 34*, 316-318.
- Sellbom, M., Ben-Porath, Y. S., Graham, J. R., Arbisi, P. A., & Bagby, R. M. (2005). Susceptibility of the MMPI-2 clinical, restructured clinical (RC), and content scales to overreporting and underreporting. *Assessment, 12*(1), 79-85. March 2005.
- Viswesvaran, C., & Ones, D.S. (1999). Meta-analyses of fakability estimates: Implications for personality measurement. *Educational and Psychological Measurement, 59*(2), 197-210. April 1999.

Woerth, D. (2000). Statement of Captain Duane Woerth, President, Air Line Pilots Association, International. Before the subcommittee on aviation. Committee on transportation and infrastructure, U.S. House of Representatives, on issues arising out of the crash of Egypt Air 990, April 11, 2000 [Electronic version]. Retrieved March 7, 2005, from <http://cf.alpa.org/internet/tm/tm041100.htm>