

MEASURING THE ORGANIZATIONAL ACHIEVEMENT QUOTIENT:  
CONSTRUCT CREATION, SCALE DEVELOPMENT, AND  
ASSESSMENT OF RELIABILITY AND VALIDITY

by

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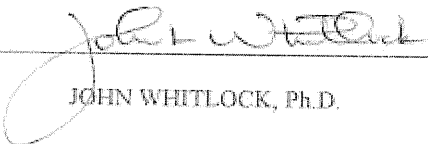
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## Abstract

Behaviors related to achievement have been theoretically linked to both job satisfaction and job performance. This dissertation posits a new construct, Achievement Quotient (AQ), which captures those aspects of individual achievement that are most beneficial to organizations. A survey instrument to quantify AQ was designed and administered to a sample (N=628) of graduate and undergraduate business students. The scale was shown to be reliable ( $\alpha=0.79$ ) and valid. The instrument was vetted by content- and face-validity reviews. A two-factor structure was demonstrated and explicated. Finally, the scale was shown to perform as expected with respect to several external criteria, including gender (no relationship) academic performance (positive relationship), earning power (positive relationship), job satisfaction (positive relationship), and job performance (positive relationship).

## Dedication

This project is dedicated to my family. You are the reason for my efforts in all things. I hope that we will recoup my investment in education together for years to come.

I would also like to dedicate this dissertation to the late Dr. David N. Schramm, my first doctoral advisor. We did not get the chance to reconcile dark matter theory with galactic observations, but I am still studying stars and how they are made—only now the laboratories are organizations, not galaxies. Your advice still guides and inspires my work. Your students continue to remember you.

## Acknowledgements

I would first like to thank my wife for putting up with me throughout this process. Your love and support have helped me keep my head in the game. I would also like to thank my mother for being my first teacher and instilling in me the value of education.

I appreciate the efforts of my dissertation committee. Drs. Butler, Santonastasi, and Whitlock have each provided invaluable suggestions for improving the quality of this project. I am certain that my future projects will continue to benefit from their guidance throughout this study. A special thanks to Dr. Jim Mirabella and Dr. Marc Muchnick for giving selflessly of their time and expertise in evaluating the AQ scale for content validity. Your thorough and thoughtful assessments of the survey instrument resulted in a much improved scale. I will remember your advice throughout my career.

I wish to relay a special thanks to Dr. Gary Sutter of Grantham University for allowing me access to the university's students and generously offering staff assistance in compiling my sample frame. This study could not have succeeded without your support. I cannot fully convey my appreciation to you.

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## CHAPTER 1. INTRODUCTION

### Introduction to the Problem

“Happy workers are productive workers.” This precept has been debated in the research literature for decades. The first mention of a link between employee attitudes and performance dates back to the Hawthorne studies (Roethlisberger & Dickson, 1939). Subsequent research has failed to demonstrate strong evidence for such a relationship (Brayfield & Crockett, 1955; Iaffaldano & Muchinsky, 1985); regardless, the relationship between job satisfaction and job performance has been referred to as the “Holy Grail” of industrial psychologists (Landy, 1989). Why all of this attention to these particular metrics? Perhaps it is because of their great importance in impacting organizational success on the one hand and unnecessary expenses on the other.

“Corporations spend on average 36 percent of their revenue on human capital expenses.” (Lermusiaux, 2004) Annual employee turnover rates have been reported to be as high 30–50% across a number of sectors (Keep Employees, Inc., 2004). Estimates for the cost of losing a single mid-level employee range from \$42,000 to over \$250,000 (Ribelin, 2003; Keep Employees, Inc., 2004), and those figures do not include costs associated with lost productivity—costs which could easily exceed those associated with recruitment, selection, and training by several times (Waters, 2003). A reduction of just five percent in employee turnover has been linked to savings of ten percent in total costs and increases in productivity of up to 65% (Rucci, Kim, & Quinn, 1998).

Absenteeism and employee turnover are two of the more insipid drains on an organization's resources and productivity. Job satisfaction is negatively correlated with both absenteeism (Daniels & Bailey, 1999) and turnover (McCulloch, 2003). Employees with lower job satisfaction are more likely to be absent on any given day or to leave the organization altogether. Organizational commitment is the extent to which an individual desires to remain a part of an organization. In a real sense, organizational commitment is the antithesis of employee turnover. Organizational-Citizenship Behaviors (OCBs, Thorsteinson, 2003) are behaviors that "help the organization but may not be directly or explicitly recognized in the organization's formal reward system." (Feather & Rauter, 2004) Both organizational commitment (Blau, 2003) and organizational-citizenship behaviors (Feather & Rauter, 2004) have been shown to be positively correlated with job satisfaction.

### Background of the Study

Given the importance of performance and employee satisfaction to the success and financial well being of an organization, it is easy to see why interest in linking these two aspects has refused to die down. Does the research literature provide any useful mechanism for relating performance and job satisfaction? In general the answer appears to be "no"; however, job performance and job satisfaction do share a common set of antecedents. According to Frederick Herzberg's (1957) two-factor theory, job satisfaction is positively affected by attributes such as employee empowerment, responsibility, and opportunities to learn, grow, and advance (Reynolds, 2004). Goal theory and expectancy theory stress the importance of goals and incentives in motivating performance. Employees who have goals to pursue are more satisfied

with their jobs and tend to perform better. The common theme in these two areas of research is achievement. From a practitioner's perspective influencing achievement-focus on the individual and organizational levels can reasonably be expected to improve both job satisfaction and job performance.

Organizations have a vested interest in improving performance, at the individual and, ultimately, organizational levels and in maintaining high satisfaction levels among their employees. The reasons for sustaining high performance levels are manifest. The benefits for maintaining satisfaction levels may be less apparent; however, research (Daniels & Bailey, 1999; Vaughn, 2003) has shown that low satisfaction levels can lead to absenteeism, reduced commitment, and turnover. Clearly, each of these situations results in costs that organizations would prefer to avoid.

#### Theoretical Tradition

The creation and analysis of the prototype instrument developed by this research relies upon the quantitative tradition for social and managerial research. The science of measurement dates back thousands of years to the Chinese and Babylonians who recorded detailed astronomical observations. However, the theoretical framework governing measurement in the social sciences was developed primarily over the last century. In 1928 Bogardus published the social distance scale. His work was generalized by Guttman (1948) in creating the concept of a unidimensional scale. Likert (1932) scales introduced five-point responses ranging from *strongly disagree* to *strongly agree*, as opposed to the dichotomous, agree/disagree responses which were

prevalent at the time. The theoretical framework upon which this research is based is discussed in great detail in Chapter 2.

### Research Questions

The primary research question for this study is

Is the prototype instrument capable of providing reliable and valid data on achievement in the workplace?

Secondary research questions include:

Is achievement related to employee satisfaction?

and

Is achievement related to productivity?

### Statement of the Problem/Purpose of the Study

The importance of achievement to both job satisfaction and job & organizational performance prompt the creation of the new construct, Achievement Quotient (AQ). This construct applies to both the individual and organizational levels, albeit with slightly different operationalizations.

At the individual level, a high achievement quotient involves personal responsibility, an internal locus of control, and a demonstrated history of setting and attaining goals. On the opposite end of the spectrum, a low achievement quotient corresponds to a propensity toward blame, an external locus of control, and a belief that rewards are deserved rather than earned, with little if any history of setting one's own goals.



At the organizational level, a high achievement quotient entails setting goals for employees, monitoring progress and issuing feedback, enforcing accountability, and providing rewards and recognition for the accomplishment of objectives. On the other hand, a low achievement quotient is characterized by a lack of goals, no evaluative measures or reporting, no enforcement of accountability, and the capricious distribution of rewards and recognition (if they are given at all).

Practitioners will argue that the benefits of a high AQ for organizations are manifest. Organizations that create goals, communicate them effectively to their employees, develop plans for accomplishing those goals, monitor progress, and adjust accordingly will certainly enjoy more success than those who do not. However, despite the common-sense simplicity that underlies the AQ concept; many organizations do not practice all of these tenets to the extent that they should, nor even to the extent that they might think that they do. According to esteemed management consultant, Peter Drucker, “You cannot manage what you don’t measure.” The purpose of this project is to develop and validate a tool that organizations can use to measure their commitment to measuring, in part—and to achievement, in general.

#### Rationale

Competitive pressures associated with the increasingly more global economy force companies to achieve more effectively and more efficiently. New legislative actions (e.g., the Sarbanes-Oxley Act) have sought to increase the accountability of corporate officers for the actions of their firms. Even not-for-profit organizations are finding themselves in the crosshairs of these trends. According to Robert Shea (2005) of the President’s Management Council, the

FY2006 budget includes “an unprecedented amount of information not only about how well programs have been performing, but also about how we expect them to perform in the future.” And, these expectations are tied directly to funding decisions by the Budget & Performance Integration Initiative of the President’s Management Agenda. As federal programs are held to increased scrutiny and higher standards of accountability, non-profits with federally derived funding will find that they, too, must demonstrate results in order to retain their funding.

These trends mean that it is more important now than ever before for organizations to focus on achievement. A complete Achievement-Quotient Assessment can give executives valuable data about organizational processes related to achievement such as goal setting, communication, and measurement as well as information about the behavioral patterns of employees. The individual and organizational traits associated with AQ are not permanent conditions beyond the control of the individual or organization. At the organizational level, steps can clearly be taken to increase achievement quotient. Psychologists may argue that, for the individual, AQ is a fixed trait, but it is also possible that one can willfully move toward the higher end of the spectrum. Just as one can focus one’s gaze upon any chosen object or one’s attention upon any chosen task, so can an individual or an organization choose the extent to which they focus on achievements. These properties make the AQ construct an excellent candidate indicator for research at the individual and organizational levels. The fact that management has at its disposal the tools necessary to affect the organization’s AQ and to choose, if not influence, the AQ of their employees makes this construct an excellent diagnostic and prescriptive tool.

### Organization of the Remainder of the Study

The purpose of this dissertation is to validate the individual portion of the Achievement Quotient scale. In addition, the reliability of this scale will be established. Reliability is the extent to which repeated measurements yield the same result. Validity is the extent to which the scale measures the desired construct. Thus, reliability reflects the precision of a scale—does the ruler measure miles or millimeters? Similarly, validity reflects the accuracy of a scale—is the meter stick actually a meter in length? In the context of constructs in the social sciences, these concepts can be difficult to pin down. How can one determine whether discrepancies between repeated measurements of job satisfaction, self-efficacy, or intelligence are indicative of shortcomings in the scale or actual changes in the test subject? Whereas a ruler unequivocally measures length and a watch clearly measures the passage of time, how can one prove that an IQ test measures intelligence or that a self-efficacy assessment actually measures that trait? This dissertation will investigate these questions in the context of individual achievement quotient. By collecting reliable and valid data, we may achieve a clearer understanding of the relationship between the key factors, variables, and concepts underlying achievement at the individual and organizational levels, worker satisfaction, and organizational performance.

### Significance of the Study

This study will develop a prototype instrument to quantify achievement attitudes and behaviors. The instrument will be analyzed to assess its reliability and validity. Although this study does not directly further the accumulated body of knowledge pertaining to achievement, the resulting scale will be a valuable diagnostic and prescriptive tool for managers in organizational

settings. In addition, by creating a scale to quantify achievement, this instrument will allow researchers to add to the body of knowledge in organizational behavior. In particular, this study will conduct preliminary analyses of the relationship between achievement and job satisfaction and the relationship between achievement and productivity.

### Assumptions and Limitations

This study is based upon all of the positivistic assumptions, namely, determination, reductionism, and empiricism (e.g., Creswell, 2003). Thus, this research will assume that there exists an objective reality, which researchers can observe. This objective reality manifests causal relationships. Researchers can make claims about these relationships in the form of hypotheses and theories. These claims can be tested via observation and measurement. The objective reality cannot be completely described, thus theories are considered to be models rather than perfectly accurate descriptions. As such, tests of theories and hypotheses either refute the claim or fail to do so; these tests never affirmatively prove the veracity of a theory. Although theories offer utility at a certain level of detail, they might fail at another level of detail; no theory contains all of the complexities of the objective reality.

The limitations of this study all relate to the sample. The population for which the instrument is designed is worker in corporate settings; however, the study sample will not be a random sample from this population. Rather, the study will utilize a purposive sample of graduate and undergraduate business students. Although the respondents are fairly representative of the intended population, the results of this study cannot be generalized. This limitation is

greatly mitigated by the fact that the primary purpose of the study is to ascertain the reliability and validity of the instrument, rather than assessing behaviors or attitudes of the respondents.

## CHAPTER 2. LITERATURE REVIEW

### Measurement

Key to any field of investigation that purports to be a science is the notion of measurement. Indeed the scientific method consists of developing a theory with predictive power, *measuring* observable phenomena, and comparing these measurements to theoretical predictions. Inaccurate and irrelevant theories are burned away in this crucible so that the theories which survive this process are sufficiently robust and veracious to be useful to practitioners as well as scientists.

The concept of measurement has been well ingrained in the physical sciences for hundreds of years, perhaps most famously, since the time of Galileo Galilei; however, the Chinese and Babylonians recorded detailed astronomical observations dating back thousands of years. These observations allowed people to predict seasonal changes in climate, ushering in the transition of human society from hunter-gatherer to agrarian-based. The importance of precision in measurement has also been well known for centuries. For example, in 1675, King Charles II of Great Britain established the Royal Observatory to solve the problem of finding longitude at sea. At the time it was well understood that a  $15^\circ$  change in longitude was equivalent to a hour change in celestial time (as indicated by the transition of the sun and other stars across the zenith); however, to make use of this knowledge a ship at sea must know the precise time at a reference longitude. The Royal Observatory in Greenwich was selected to mark the reference longitude (and is still the origin of  $0^\circ$  longitude today), but there was no way for sailors to accurately track Greenwich Mean Time at sea. Most of the clocks at the time were based on

pendulums and did not fare well in the undulating waters of the open sea. Other designs suffered similar problems due to variations in humidity, temperature, and other sundry circumstances inherent to life at sea. In 1714, Parliament offered a prize of £20,000 (roughly \$4.4 million, in today's U.S. dollars) to anyone who could devise a method for predicting longitude which was accurate to within two minutes and "practicable and useful at sea." (The problem was ultimately solved John Harrison in the early 1760s, though not officially recognized and rewarded by Parliament until 1772.)

There are a great number of equally interesting and historically significant anecdotes that underscore the significance of measurement. However, despite all of its rich history, serious measurement has remained solely in the domain of the physical world until very recently. As recently as 1951 Stevens defined measurement as "the assignment of numbers to objects or events according to rules." But what object or event is one considering when one wishes to measure intelligence, job satisfaction, alienation, or a host of other constructs from the social sciences? Blalock (1968) discussed measurement in terms of "bridging the gap between theory and research." In other words, in the context of abstract concepts such as those often considered in the social sciences measurement is an "explicit, organized plan for classifying (and often quantifying) the particular sense data—the indicants—in terms of the general concept in the researcher's mind" (Riley, 1963).

This last definition draws attention to the fact that measurement involves the theoretical and the empirical. The theoretical is the underlying concept, generally unobservable and not directly measurable. The empirical is an observable response, whether it is a behavior, a mark on a survey, or an answer given in an interview. Measurement must focus on the relationship

between the observable response and the theoretical construct. When this relationship is strong, an analysis of the empirical indicators can lend useful information about the concepts of interest. When there is no relationship between indicators and concepts, a measurement cannot be made. If one erroneously assumes a strong relationship between a theoretical construct and observable responses, then one will likely draw incorrect conclusions about the concept being researched. Clearly, from this point of view, the ancillary theory that connects the theory of interest to the available observable is of paramount significance. The strength and veracity of the theory connecting the research concept to the empirical data is the *validity* of the measurement instrument. Validity will be discussed in greater detail below.

This treatment of measurement as not only the scores derived by a metric but also the relationship of the metric to the theoretical construct of interest has been addressed in the larger context of semantics in linguistics. Hayakawa introduced the concept of the ladder of abstraction (e.g., Hayakawa & Hayakawa, 1991). According to this idea, language is capable of describing similar concepts at various levels of abstraction. Higher rungs on the ladder of abstraction are more general, vague, and (often) ambiguous. Researchers designing instruments should seek to construct items which occupy the lowest rungs of the ladder of abstraction (specific examples, personal experience, etc.) in order to mitigate to changes for misinterpretation of the meaning of each item.

### A Brief History of Measurement in the Social Sciences

The use of surveys for collecting information can be traced back at least as far as the time of Moses, according to the Holy Bible, which also includes references to Roman censuses for



taxation purposes (Weisberg, Krosnick, & Bowen, 1996). The late 19<sup>th</sup> century saw the use of social surveys in the United States and England focusing on social conditions, particularly poverty. During the early 20<sup>th</sup> century, practitioners like George Gallup (e.g., 2004) began exploring the predictive power of surveys. Although there were high-profile failures, including missed predictions for the U.S. Presidential elections of 1936 (Gallup got this one right, but few others picked FDR) and 1948 (resulting in the infamous “Dewey Wins” headline), polling gradually gained respect in the areas of politics and market research. Private and university institutes were formed to advance the state of the art for scale development and survey research. Perhaps most notable among these, along with the Gallup Organization, is the Institute for Social Research at the University of Michigan (Blumenthal, Kahn, Andrews, & Head, 1972; Guenzel, Berkman & Cannell, 1983; and Hess, 1985).

Research in the social sciences seeks to delve further than basic opinion polls. Instead, most social-science research endeavors to measure one or more specific traits. In order to assign a numerical value to a trait such as happiness or satisfaction, a scale must be developed. A scale consists of multiple items. A respondent’s answers to the collection of items is combined to create a single measure of the trait under investigation. Scale methodology has matured through the work of a number of researchers.

One of the earliest examples of a scale is the classic Bogardus (1928) social distance scale. This scale consists of seven dichotomous items. In a classic incarnation, respondents were asked whether they would accept a member of a particular race or nationality (a) into their own family by marriage, (b) into their social club, (c) into their community as a neighbor, (d) to work in their company, (e) as a citizen in their country, (f) as a visitor to their country, or (g) exclude

members of the race or nationality from the respondent's country altogether. The construction of this type of scale is meant ensure that an affirmative response to a particular item implies affirmative responses at lower levels and a negative response to a particular item implies negative responses at higher levels.

Guttman (1944) used this general property of the social distance scale to define his concept of a unidimensional scale. Guttman defined a scale as unidimensional if each item could be characterized as more or less indicative of the trait under investigation than each other item. A consequence of this definition is that a respondent's agreement or disagreement with any given item should predict their response to all other items either above or below, as in the social distance scale. Guttman's method for assessing the unidimensionality of a scale is called Guttman's scaleogram technique. The method involves administering the scale to a number of respondents and creating a matrix of items and responses. The matrix features a row for each item, ordered according to the percentage of endorsements received, and columns of respondents, ordered by the number of items with which they expressed agreement. If the scale is perfectly unidimensional, then the matrix should be divisible into two sections using a single stroke (curve or, possibly jagged, line). All item/respondent-pair entries in one region should be affirmative and all entries in the other region should be negative. The measure of unidimensionality provided by Guttman's scaleogram analysis is  $1 - e/T$ , where  $e$  is the number of errors (affirmative entries in the negative region and negative entries in the affirmative region) and  $T$  is the total number of entries (the number of items times the number of respondents). Convention dictates that a scale exhibit a coefficient of at least 0.90 to be considered acceptable.

Likert (1932) scales abandon dichotomous responses in favor of multiple-choice degree of agreement. A typical Likert item would ask respondents to assess their attitude on a five-point scale: *strongly disagree*, *somewhat disagree*, *neither agree or disagree*, *somewhat agree*, *strongly agree*. Although Likert utilized five-point scales, other choices are also possible. Scales with an odd number of choices are called “unforced” due to the inclusion of a neutral choice. Scales with an even number of choices are called “forced” because they require respondents to decide with which end of the spectrum they more closely identify.

Likert’s procedure for creating a scale is to administer a large number of items to a test sample of respondents. Total scores are computed for each respondent by summing responses to all items. Each item score is then correlated (across respondents) to the total score. Items which do not correlate sufficiently with the total score are deemed to not measure the latent variable and are eliminated from the final pool of items. This method of refining an instrument is said to create a subject-centered scale, since the ultimate composition of the scale is determined by the performance of each item when used with actual subjects.

The semantic differential, developed by Osgood, Suci & Tannenbaum (1957), extends the Likert’s methodology by rating each trait on a number of somewhat different scales. For example, a standard Likert item pertaining to censorship would ask respondents to assess their attitude on a five-point scale ranging from *strongly disagree* to *strongly agree*. A semantic differential treatment of the same topic would use multiple seven-point scales with different end-points like *good/bad*, *foolish/wise*, and *harmful/beneficial*. The responses to each of these items are summed to create an aggregate assessment of attitude toward censorship. As long as the items in a semantic differential are unforced (an odd number of choices with an implied neutral

value is available), this treatment is consistent with the classic Likert treatment, although in practice, the semantic differential exhibits greater reliability. As will be seen in the following discussion of reliability, much of the difference can be attributed to the extra items used in the semantic differential approach.

### Reliability

The discussion of measurement above mentioned the need to ensure that an instrument actually measure the concept of interest. However, one must also be concerned with the precision with which a measurement is made. *Reliability* is defined as the extent to an experiment, test, or other measurement instrument yields the same results when repeated. Consider the game of darts as an example. A reliable dart thrower can hit very close to the same spot every time. That spot need not be the bull's-eye, nor even on the dartboard, for that matter. Where the darts are grouped relates to the validity of the thrower; how tightly they are clustered relates to the thrower's reliability. It is important to note that no instrument is perfectly reliable. According to Stanley (1971),

“the discrepancies between two sets of measurements may be expressed in miles and, in other cases, in millionths of a millimeter; but, if the unit of measurement is fine enough in relation to the accuracy of the measurements, discrepancies always will appear.”

Thus, reliability relates the precision of an instrument to the desired precision of the measurement. So a meter stick which yields the same result on repeated trials to within a few millimeters is considered reliable, whereas calipers with the same resolution are not. This is true

of physical quantities, such as length, weight, and time, as well as psycho-social constructs, such as intelligence, confidence, and satisfaction.

If reliability can be described from a conceptual point of view as the precision of an instrument, then from an operational point of view reliability is the amount of random error associated with an instrument. In the social sciences random errors can include ambiguous instructions, coding errors for qualitative data, changes in word emphasis during an interview, and varying interpretations of survey questions by respondents to name but a few (Stanley, 1971).

The view of reliability as random error derives from classical test theory (e.g., Nunnally, 1978) which defines an observed score,  $X$ , as  $X = t + e$ , where  $t$  is the true score and  $e$  is the random error. The true score is a conceptual construct, empirically unobservable. One can think of the true score as the average observed score after infinitely many repeated trials (assuming no change in the true score across the trials). More formally, the following assumptions characterize  $t$  &  $e$ : a) the expected value of  $e$  is 0; b)  $t$  &  $e$  are independent variables so that there is no correlation between  $t$  &  $e$  for a given trial or across trials (e.g.  $\rho(t_1, e_1) = \rho(t_1, e_2) = 0$ ); and, c) there is no correlation between successive values of  $e$  (e.g.  $\rho(e_1, e_2) = 0$ ).

Given these assumptions,

$$\begin{aligned}\text{Var}(X) &= \text{Var}(t+e) = \text{Var}(t) + \text{Var}(e) + 2*\text{CoVar}(t,e) \\ &= \text{Var}(t) + \text{Var}(e),\end{aligned}$$

and the reliability of  $X$  as a measure of  $t$  is defined as

$$\rho_x \equiv \text{Var}(t) / \text{Var}(X).$$

Two measurements,  $X$  &  $X'$ , are parallel if they have a common true score and their random errors have the same variance. That is to say, measures are parallel if they measure the same construct in the same way. In this case the observable correlation between parallel measurements provides an estimate of reliability, since

$$\rho_{XX'} = \sigma_{XX'} / \sigma_X \sigma_{X'} = (\sigma_t^2 + \sigma_{te} + \sigma_{te'} + \sigma_{ee'}) / \sigma_X \sigma_{X'} = \sigma_t^2 / \sigma_X^2 = \rho_X.$$

This simple formulation underlies all of the methods for reliability estimation principally used by researchers including the retest, alternate-forms, split-halves, and internal-consistency methods.

In fact, each of these methods creates a successively more robust estimate of reliability.

The retest method involves administering the same instrument to the sample on two occasions. These two measurements are assumed to be parallel measurements. Thus, the correlation between the two administrations of the instrument is taken to be an estimate of the reliability of the instrument. The retest method is conceptually very appealing; however, in practice, it is fraught with problems. If the interval between administrations of the instrument is too small, the respondents might remember their previous responses, resulting in an inflated estimate of reliability (Nunally, 1978). If the interval is too large, the true score (the actual value being sought) may have changed (e.g., Heise, 1969). Changes in the true score can also result from reactivity, the tendency of people to become more sensitive to issues brought to their attention. In other words, the act of measuring can actually change the property being measured. Finally, the retest method can be cost prohibitive in that all of the resources required to gather data (distribution efforts, cost of material, turn-around time, processing time, etc.) are effectively doubled.

The alternative-form method is similar to the retest method, except that the second administration uses an alternative form of the instrument rather than the same instrument. Thus, the alternative-form method improves on the retest method by mitigating the effect of memory on the retest score (since the respondent will not have seen these items before). However, the alternative-form method still suffers from issues pertaining to stability (changes in true score), including reactivity, and to costs. In fact, the costs associated with the alternative-form method are greater, because, in this case even the design time is doubled (or worse). Researchers must take great care in devising two instruments with no systematic differences which measure the same construct. In practice, this is often accomplished by randomly choosing items from a larger pool to create the two instruments.

The split-halves method overcomes the problems associated with repeated administrations by splitting the instrument in half and correlating the scores on the two halves. If the two halves of the instrument are parallel measures, then this correlation provides a good estimate of the reliability of the two halves, but not the whole instrument. In fact, Spearman (1910) and Brown (1910) independently showed that the reliability of each half systematically underestimates the reliability of the whole. The Spearman-Brown prophecy formula gives the statistical correction for this bias:  $\rho_X = 2\rho_{X/2} / (1 + \rho_{X/2})$ , where  $\rho_X$  is the corrected reliability of the whole instrument and  $\rho_{X/2}$  is the estimate for the reliability for the half instrument. The formula can also be generalized to represent an instrument divide into  $n$  equal parts as follows:

$$\rho_X = n\rho_{X/n} / (1 + (n-1)\rho_{X/n}).$$

Although the split-halves method eliminates the problems associated with repeated administrations in the retest and alternative-form methods, it brings up a new, unsettling issue.

Namely, the estimate of reliability derived from the split-halves method will depend upon how the instrument is partitioned. The correlation between the first and second halves of the instrument may well be different than the correlation between the even and odd items. This property makes the split-halves method a somewhat unreliable method of estimating reliability!

The most robust, and widely used, type of method for estimating reliability is the internal-consistency method. This method does not rely on subdividing the instrument, but instead uses all of the responses to all of the items to compute an estimate of reliability from a single administration of the instrument. The most popular reliability estimate derived from of this method is Cronbach's (1951) alpha, given by  $\alpha = n/(n-1)[1 - (\sum \sigma_{Y_i}^2)/\sigma_X^2]$ , where  $n$  is the number of items in the instrument,  $(\sum \sigma_{Y_i}^2)$  is the sum of the individual items',  $Y_i$ , variances, and  $\sigma_X^2$  is the composite variance. Alternatively, the reliability can be computed using the correlation matrix as  $\alpha = n\bar{\rho}/[1 + \bar{\rho}(n-1)]$ , where  $\bar{\rho}$  is the average inter-item correlation. Alpha can be interpreted as the average value of all possible split-halves estimates (Novick & Lewis, 1967). Thus, although Cronbach's alpha is substantially more difficult and intensive to compute, conceptually it is comparable to the other methods discussed to this point and remedies most of the problems with those estimates, making it the most robust indicator of reliability.

No discussion of reliability would be complete with mentioning the attenuation unreliable instruments cause on correlations. The correlation between any two scales,  $X$  and  $Y$ , is given by

$$\begin{aligned} \rho_{XY} &= \sigma_{XY} / \sigma_X \sigma_Y \\ &= (\sigma_{X(t)Y(t)} + \sigma_{X(t)Y(e)} + \sigma_{X(e)Y(t)} + \sigma_{X(e)Y(e)}) / [(\sigma_{X(t)} / \sqrt{\rho_X})(\sigma_{Y(t)} / \sqrt{\rho_Y})] \\ &= \sqrt{\rho_X \rho_Y} \times \sigma_{X(t)Y(t)} / \sigma_{X(t)} \sigma_{Y(t)} = \\ &= \sqrt{\rho_X \rho_Y} \times \rho_{X(t)Y(t)} \end{aligned}$$



where  $\rho_{X(t)Y(t)}$  is the true correlation between  $X$  and  $Y$ . Since  $\rho_X \leq 1$  &  $\rho_Y \leq 1$ ,  $\rho_X \rho_Y \leq 1$  which implies that  $\sqrt{\rho_X \rho_Y} \leq 1$ . Thus, the true correlation of any two scales is attenuated by the geometric mean of the reliabilities of the scales. Therefore, the observed correlation must be corrected for this bias.

### Validity

Once an instrument has been demonstrated to be reliable, one knows that it measures *something*. The validity of an instrument is the extent to which it measures the construct it is intended to measure. Thus, whereas reliability is concerned with the precision of an instrument, or how well it measures something, validity is concerned with the application of the instrument. And, where reliability is a measure of the random error associated with the use of an instrument, validity is a measure of the non-random error associate with the use of the instrument.

Validity is necessarily more subjective than reliability, because people must agree about certain facets of the underlying concept. Consider the one item instrument, "Define a drinking cup." Does this item, when administered to a sample of English-speaking Americans, accurately determine whether the individual knows what a drinking cup is? The answer to that question, of course depends upon the definition of a drinking cup. What differentiates a drinking cup from a drinking glass from a mug? Is size a factor? For example, is a beer stein a drinking cup? Is a shot glass? Is composition important? Should a cup be ceramic like a coffee cup rather than glass, plastic, or paper? Is shape relevant? Must a cup have a handle? Can/must cups have lids? Is function important? A coffee cup used for the daily consumption of coffee would almost certainly qualify as a drinking cup, but what about the same object used to hold pens and pencils

on an office desk? Clearly, the definition of a drinking cup is more complex than one might think at first. And, a drinking cup is a physical object that one can literally put one's hands on...it is certainly much more difficult when the underlying concept is psycho-social, like conservatism, intelligence, or self-efficacy.

Given the subjective nature of validity, the first "validity filter" against which most instruments are tested is a subjective evaluation by a panel of experts. The purpose of such an evaluation is to determine whether each item in the scale is relevant to the construct, whether the instrument adequately covers all aspects of the underlying construct, and whether the items cover the various facets of the construct with appropriate relative emphasis. Instruments which perform well in such an evaluation are said to have high content validity (Messick, 1993; Nunally & Bernstein, 1994; Haynes et al., 1995).

Closely related to content validity is face validity. Kaplan and Saccuzzo (1997) describe face validity as the "mere appearance that a measure has validity." Other authors (Nevo, 1985; Anastasi & Urbina, 1998) have sought to differentiate face validity from content validity. Whereas content validity is concerned with expert evaluation of the content of the instrument, face validity reflects the usability of the instrument by the intended population. Elements of face validity include the clarity of survey items and instructions, the appropriateness of the level of language utilized by the instrument, and the overall ease of use of the instrument. For example a physical survey instrument with a stamped, self-addressed return envelop has higher face validity than the same instrument that requires respondents to supply and address their own envelop to return the survey. Similarly, a Web-based instrument would have greater face validity in a population of knowledge workers than in a population of blue-collar workers. This particular

distinction will abate as Internet use continues to proliferate, but face validity will always depend upon the target population in a variety of ways.

Criterion-related validity quantifies the extent to which the measure correlates to a specific criterion. The criterion can be another widely accepted measure of the same construct (Haynes et al., 1999) or a different measure of interest (Kaplan & Saccuzzo, 1997). Thus, criterion-related validity most closely matches the heuristic definition of validity mentioned earlier (that the instrument measures the concept it purports to measure). The extent to which an instrument correlates to an external criterion indicates the predictive power of the instrument. When an instrument accurately indicates the value of an external criterion measured after the administration of the instrument, the instrument is said to have high predictive validity. An instrument which accurately identifies the value of an external criterion measured before the application of the instrument has great post-dictive validity. And, an instrument that accurately depicts the value of an external criterion measured at the same time as the instrument is administered exhibits high concurrent validity. For example, a survey administered to prospective employees which successfully indicates their future performance on the job for which they are being considered has great value due to its high predictive validity. A forensic test that consisting narrows the pool of suspect in a criminal investigation while always retaining the actual culprit has high post-dictive validity. Instruments may exhibit more than one type temporally ordered validity, but high predictive validity does not guarantee high post-dictive validity and vice versa.

There are circumstances when particular groups of people are expected to exhibit different levels of the construct of interest. For example, professional basketball players are

expected to be taller than medical doctors. Whereas medical doctors should exhibit roughly the same height, on average, as the general population of adults, professional basketball players should typically possess exceptional height in order to gain admittance to this group. A valid measure of height should find the basketball players' heights surpass those of physicians. This type of measure of validity is called known-group validity (Saxe & Weitz, 1982; Jarvis & Petty, 1996).

### Job Satisfaction

Job satisfaction (Bates, 2003; Berta, 2003; Huling, 2003; Reynolds, 2004) is an employee's contentment with his job. Frederick Herzberg and his colleagues (1957) conducted a meta-analysis of job satisfaction and its antecedents. Conventional wisdom would indicate that several factors should influence an employee's satisfaction. In keeping with Value Theory, an increased presence of these factors should improve job satisfaction, and a decreased presence of these same factors should lead to lowered job satisfaction, eventually resulting in feelings of active dissatisfaction. Interestingly, instead of finding the simple relationship outlined above and espoused by Value Theory, Herzberg *et al* (1957) discovered that separate groups of factors are associated with satisfaction and dissatisfaction.

Employees attribute feelings of satisfaction to factors associated directly with their work. Since these factors motivate higher satisfaction, they are commonly known as "motivator factors." Herzberg dubbed them "intrinsic motivation" factors. Greater levels of satisfaction are associated with increased levels responsibility, self-efficacy, and sense of achievement.

Employees report increased satisfaction when their achievements are recognized by the

organization. Learning opportunities, chances for personal growth, and prospects for career advancement also motivate increased job satisfaction (Ochalia, 2004).

The absence of motivator factors does not cause active dissatisfaction. Rather, employee dissatisfaction is associated with factors which are ancillary to one's actual work. These "extrinsic motivation" factors, or hygiene factors, as they are also known, include relations with one's managers and co-workers, working conditions, security, and pay. According to Herzberg's two-factor theory, an abundance of any of these factors does not lead to an increase in employee satisfaction, but the absence of these factors can lead to employees feeling dissatisfied.

Two-factor theory has become widely accepted (Alavi & Askaripur, 2003; Asad & Khan, 2003; Huang & Vliert, 2003; Liberman, 2004); however, some verification studies (Ewen, 1964) found only marginal support for Herzberg's conclusions. One of the surprising implications of Herzberg's theory is that increased pay is not associated with increased satisfaction. Managers cannot simply buy an employee's satisfaction. Rather, managers must attempt to ensure that their employees are challenged by their work, enjoy some level of responsibility, and have opportunities to learn, grow, and advance (Reynolds, 2004).

### Job Performance

The modern study of performance in organizations dates back over a century. In the 1880s Frederick Winslow Taylor noticed inefficient work practices in effect at the Midvale Steel Company where he worked as foreman (Kanigel, 1997). Renowned management theorist, Peter Drucker (1974) said that Taylor "was the first man who did not take work for granted, but who looked at it and studied it." Taylor wrote extensively on his efforts to remove inefficiencies from

his subordinates' work flows (e.g., Taylor, 1947). Thus, the field of "scientific management" was born. The goal of scientific management in Taylor's eyes is to find the "one best way" (Pugh, 1971; Kanigel, 1997) to perform the tasks required to achieve organizational objectives. Frank & Lillian Gilbreth, a bricklayer/psychologist, husband/wife team, added to the field of scientific management through the use of time-and-motion studies (Hopeman, 1965; George, 1972). The couple sought to increase productivity by carefully studying each motion employees executed during the completion of their tasks. Based upon their research, the Gilbreths created a number of operating principles to govern the efficient completion of physical tasks. The principles included items like, "The two hands should begin and complete their motion at the same time," and, "The two hands should not be idle at the same time except during rest periods." (Hopeman, 1965)

The ideas expressed by Taylor, the Gilbreths, and contemporaries collectively form the Classical School, also known as the Scientific Management School. This school of thought can be characterized by a general distrust of the employee. The classical school believed that there was "one best way" to accomplish the tasks required by organizations and that it was the manager's responsibility to determine that course of action and to direct that laborers to abide by the prescribed method. Scientific Management advocated a division of labor: managers were to think; employees were to do. Employees were thought to be lacking in intrinsic motivation; only financial incentives and the watchful eye (and frequent lash) of management could maintain productivity. In today's parlance, the Classical School can be thought of as micro-management in the extreme.

Douglas McGregor (1972) found this conceptualization to be lacking. In particular, he found this framework to be devoid of trust for employee, a view he did not share. McGregor referred to the collective ideals of the classical school, namely that employees detest work and must be bribed or otherwise cajoled into performing, as Theory X. McGregor posited a new Theory Y. In his view, workers want to succeed for a sense of pride and accomplishment; workers should be allowed to make decisions about their own work; and employees could be trusted if management treated them fairly.

Contemporary literature (Pritchard, Jones, Roth, Stuebing, & Ekberg, 1988; Casison, 2003; Glenn, 2003; Messmer, 2003) overwhelmingly favors the tenets of McGregor's Theory Y, particularly in the cases of knowledge workers and forward-facing employees. This paper will address various aspects of modern thought on performance. In particular, the concepts of goals and incentives will be addressed as they pertain to both individuals and groups. Since today's organizations rely heavily on teams to accomplish organizational objectives several issues that affect the performance of groups will be addressed, including size, cohesiveness, conformity and social loafing. A set of recommendations for practitioners who wish to improve the performance of individuals and groups in their organizations will also be presented.

## CHAPTER 3. METHODOLOGY

### Overview

Research indicates that both job satisfaction and job performance are positively related to employee empowerment, responsibility, goals, incentives, and opportunities to learn, grow, and advance (Herzberg, 1957; Reynolds, 2004). Each of these attributes represents an aspect of an achievement mentality. Since these attributes correlate positively with both job satisfaction and job performance, it is reasonable to investigate achievement as an indicator of satisfaction and performance. A new construct, achievement quotient (AQ), was introduced to serve as an achievement indicator for future studies. This construct assumes that individuals and organizations can be located along a spectrum from extremely focused on achievement to extremely focused on entitlement. This “focus” encompasses both behaviors and attitudes, since both past behaviors and present attitudes are very good indicators of future behavior. The purpose of this study was to develop a comprehensive scale to measure achievement quotient on the individual level. Individual job satisfaction and job performance of the individual was also measured. A set of instruments designed to measure each of these attributes was developed and validated. In addition, an initial defense of the validity and reliability of the instrument set will be made.

The AQ scale was first reviewed for content validity by a panel of five experts. Members of the panel produced several recommendations designed to elicit better response rates and to increase the ease of use of the instrument for respondents.



The AQ scale was then field tested to assess face validity by a panel of eight persons, consistent with the study population. Upon survey completion, each field tester was individually interviewed by the researcher to determine whether individual survey items were interpreted as anticipated. Field testers were also asked discuss the ease of use of the instrument, as well as the extent to which the overall design elicits truthful and thoughtful responses. Minor revisions were made to the instrument based upon feedback obtained from the field testers prior to further reliability and validity testing being conducted.

Following the content and face validity reviews, a pilot study was conducted. The Achievement-Quotient utilized to this point consisted of 12 items. However, the initial pilot study showed the scale to be unreliable ( $\alpha=0.54$ ). Based upon this pilot, some scale items which were not identified in earlier validity reviews were changed to ensure that they were more narrowly construed. Furthermore, adding valid items to any scale generally increases the reliability of the scale. With this in mind, the number of items was expanded from 12 to 30. Researchers must always exercise care when increasing the length of a survey instrument. If the instrument is too short, it may be unreliable (“Measure twice, cut once,” as carpenters say); however, if the instrument is too long, it may suffer from respondent fatigue. Since respondents for this study were motivated entirely by an altruistic sense of volunteerism, their self-interest in completing the survey was low. As such, a feeling of monotony can quickly develop when reading, considering, and replying to several similar items, which will tend to compromise the veracity to responses. The researcher feels that the final instrument struck a good balance between these competing pressures.

## The Instrument

### *Theoretical Framework*

The relationship between job satisfaction and job performance has been a matter of spirited debate for many years. Some researchers have suggested that high satisfaction levels lead to improved performance (Shore & Martin, 1989; Keavney & Nelson, 1993, Koys, 2001); others have argued that high performance leads to increased satisfaction (Greene, 1972; Stumpf & Hartman, 1984; Darden, Hampton, & Howell, 1989; Brown, Cron, & Leigh, 1993; MacKenzie, Podsakoff, & Ahearne, 1998; and Vaughn, 2003). Neither position is supported by conclusive evidence (Judge, Thoresen, Bono, & Patton, 2001). In fact, researchers have debated whether any strong relationship between these two constructs exists (Iaffaldano & Muchinsky, 1985).

Theoretical implications and empirical results both point to achievement-oriented factors, such as empowerment, responsibility, goals, feedback, and opportunities to learn, grow, and advance, as being positively related to both job satisfaction and job performance (Herzberg et al, 1957; Reynolds, 2004). Although achievement-oriented cultural aspects tend to be related to both satisfaction and performance, the dominant cultural attributes within the United States of America have become increasingly entitlement-oriented. This paper defines a new construct, achievement quotient (AQ). Table 1 summarizes the traits of the extreme ends of the AQ spectrum at the individual and organizational levels.

Table 1. Principal Characteristics of High and Low Achievement Quotient

	Individual	Organizational
High Achievement Quotient	personal responsibility	setting goals for employees
	internal locus of control	monitoring progress and issuing
	demonstrated history of setting and attaining goals	feedback enforcing accountability
		providing rewards and recognition for the accomplishment of objectives
Low Achievement Quotient	a propensity toward blame	lack of goals
	external locus of control	no evaluative measures or reporting
	a belief that rewards are deserved rather than earned	no enforcement of accountability capricious distribution of rewards and
	little if any history of setting one's own goals	recognition

The AQ construct should provide a useful tool for managers to assess the extent to which their organization is conducive to high levels of satisfaction and performance and the extent to which its employees are compatible with a culture of high performance and satisfaction. A comprehensive study of the correlations of AQ at the individual and organizational levels with individual & aggregated satisfaction and individual & organizational performance could

conclusively establish the value of AQ as a diagnostic and prescriptive tool for management. The present study focuses on the construct at the individual level.

### *Published Instruments*

A number of instruments have been developed to measure job satisfaction. The Job Characteristics Model (JCM) was developed by Hackman & Oldham (1976, 1980). The JCM considers skill variety, task identity, task significance, autonomy, and feedback on job performance. Hackman & Oldham's model and instrument have been utilized in a number of studies pertaining job satisfaction (Fried & Ferris, 1987; Kulik, Oldham, & Hackman, 1987), although not without some criticism (Roberts & Glick, 1981; O'Brien, 1982; Bottger & Chew, 1986). Another popular tool is the Job Descriptive Index (JDI; Smith, Kendall, & Hulin, 1969). This instrument consists of subscales that address work on present job, present pay, opportunities for promotion, supervision, and coworkers. The JDI offers many benefits. It is nationally normed, easy to administer, take, and score, and widely used (DeMeuse, 1985; Zedeck, 1987).

Despite the benefits offered by other instruments, the most thorough survey widely used to measure job satisfaction is the Minnesota Satisfaction Questionnaire (MSQ; Weiss, Dawis, England, & Lofquist, 1967). The MSQ comes in two formats: short form and long form. Both formats of the instrument cover twenty subscales: ability utilization, achievement, activity, advancement, authority, company policies, compensation, co-workers, creativity, independence, moral values, recognition, responsibility, security, social service, social status, supervision–human relations, supervision–technical, variety, and working conditions. The Long-Form MSQ features five items per subscale, whereas the Short-Form MSQ utilizes the twenty items from the

Long-Form MSQ thought to best represent each subscale. In addition, the Long-Form MSQ contains a twenty-item general-satisfaction subscale. Both formats of the MSQ are nationally normed, more comprehensive than other available instruments, and have been widely used in published studies (Warr, Cook, & Wall, 1979; Cook, Hepworth, Wall, & Warr, 1981; Kulik & Oldham, 1988).

Similarly, a variety of instruments have been developed to measure job performance. Unfortunately, there are no clearly leading exemplars in this field of research. Many of the instruments utilized in the research literature are not published. However, items for an in-role job performance scale (Podsakoff & MacKenzie, 1989) and an innovative job performance scale (Kanter, 1988; Scott & Bruce, 1994) have been published. Both of these scales have been analyzed and utilized by other authors, e.g., Organ & Konovsky (1989) and Janssen (2001). By combining the in-role and innovative job performance scales one can obtain a more comprehensive appraisal of an employee's job performance.

Since AQ is a new construct, it must be operationalized. New instruments will be created according to this operationalization, based upon the theoretical framework presented above.

### *Measurement Scales*

In order to assess AQ, job satisfaction, and performance at the individual level, three major scales were utilized. One section focused on job satisfaction, while a second section focused on individual performance. A third section focused on individual AQ, and a fourth section with demographic information was also included.

The primary instrument in this set is intended for employees in any job in any organization. Future researchers may choose to supplement this instrument with industry-specific, organization-specific, and/or job-specific items as warranted. However, the present instrument is intended for a highly generalized population and, therefore, attempts to remain neutral with respect to the details of the respondent's employment situation. This information is collected in the demographic section but ignored throughout the remainder of the instrument.

In order to adequately measure individual performance, a supplemental instrument should be distributed to the respondent's immediate supervisor. The supervisor and employee data are then combined to create an aggregate assessment of individual performance. Although this combined score is expected to be a better metric of individual job performance, the design of this study will not allow the researcher access to supervisor data. Future researchers who intend to utilize this instrument in an organizational setting are advised to use a composite performance metric based on the supervisor's assessment as well as the employee's assessment.

### *Instrument Defense*

As discussed previously, the instrument (see appendix) is composed of four sections: job satisfaction, individual job performance (self-reported), individual AQ, and demographics. Although the reliability and validity of the instrument were measured utilizing a pilot study, each section is defended individually below.

The job satisfaction items are based upon the Minnesota Satisfaction Questionnaire (MSQ) short form (Weiss, Dawis, England, & Lofquist, 1967). Previous factor analyses of these 20 items (Sat01-Sat20 on the Survey Instrument, Appendix D, Section 2) has repeatedly revealed

two factors: Intrinsic and Extrinsic Satisfaction. Scores on these two factors and a General Satisfaction score are commonly used. The items comprising the Intrinsic Satisfaction scale are Sat01, Sat02, Sat03, Sat04, Sat07, Sat08, Sat09, Sat10, Sat11, Sat15, Sat16, and Sat20 from the Survey Instrument. The items comprising the Extrinsic Satisfaction scale are Sat05, Sat06, Sat12, Sat13, Sat14, Sat17, Sat18 and Sat19 from the Survey Instrument. The MSQ short form has been widely used in the research literature (Moorman, 1993; Brown, 1996; Spector, 1997; Hirschfeld, 2000; Sweeney, Hohenshil, & Fortune, 2002; Tang, Furnham, & Davis, 2003). The reliability and validity of this instrument are well established.

The individual job performance items, items Perf01–Perf14 on the Survey Instrument (Appendix D, Section 3), are comprised of two scales. The first five items are consistent with Podsakoff & MacKenzie's (1989) in-role job performance scale. The remaining nine items comprise an innovative job performance scale (similar to Kanter (1988) and Scott & Bruce (1994)). Both types of scales have been tested in subsequent research (Janssen, 2001). The reliability and validity of the original scales have been established. Again, these items should be presented to both the employee and the supervisor because research has indicated that aggregate scale represents a better measure than either of the individual appraisals (Jones & Nisbett, 1971; Organ & Konovsky, 1989; Janssen, 2001). However, the design of this validation study only considers self-reported data.

The individual AQ items are new. These 30 items (items AQ01–AQ30 on the Survey Instrument, Appendix D, Section 4) are designed to measure five attributes: responsibility, goal-setting behavior, locus of control (Rotter, 1971), risk acceptance/aversion, and entitlement attitudes. The items expected to comprise the Responsibility scale are AQ01, AQ07, AQ11,

AQ16, AQ25, and AQ27. The items designed to measure the Goal-Setting Behavior scale are AQ02, AQ06, AQ13, AQ17, AQ21, and AQ23. The items meant to comprise the Locus of Control scale are AQ03, AQ08, AQ14, AQ18, AQ22, and AQ24. The items thought to examine Risk Acceptance/Aversion are AQ04, AQ09, AQ12, AQ28, AQ29, and AQ30. The items comprising the Entitlement-Attitudes scale are AQ05, AQ10, AQ15, AQ19, AQ20, and AQ26. Exploratory Factor Analysis will be employed during pilot study to determine whether the intended factors are expressed in the instrument (Probst, 2003; Scott & Dinham, 2003).

The demographics section is purely informational. It does not seek to measure any latent construct, only to gather information which may prove useful in understanding relationships between the constructs measured by the remaining sections of the instrument.

Although various parts of the instrument have been verified to be valid and reliable, a pilot study was undertaken to determine the validity and reliability of the composite instrument. In addition to the standard reliability tests, an exploratory factor analysis was performed to determine the underlying structure of the new items, and to verify the reported structure of the established items.

#### Description of the Sample

This study utilized a purposive sample comprised of Grantham University business students at the graduate and undergraduate levels. The students were working adults enrolled in regionally accredited online business programs at Grantham University, seeking either a bachelors or masters degree. Permission was obtained from Academic Dean at Grantham University to utilize the university's students for the study.



The study population represents an excellent laboratory in which to test the reliability and validity of the AQ scale because its members share many points in common with the intended population of interest. The goal was to create an instrument to be used in corporate environments. Students in the study population are working adults whose professional lives are spent in organizations just like those for whom this instrument is intended.

The number of respondents (N) was 652, including 24 were not employed at the time they completed the survey. Due to the importance of employment to most of the theoretical constructs being considered, these responses were eliminated from the study. Thus, the final number of valid responses (N) was 628, which was sufficient for the analyses being conducted.

### Measures

The data were analyzed in a process consistent with those established and tested for similar applications (Jones & Nisbett, 1971; Organ & Konovsky, 1989; Janssen, 2001; Dierdorff, 2002). First, simple descriptive statistics (means, standard deviations, and correlation coefficients) were computed for all of the manifest variables. Next, the manifest variables were grouped according to the latent variables which they are assumed to comprise. The data were then subjected to statistical analysis to verify the presumed structure (Probst, 2003; Scott & Dinham, 2003).

Reliability and validity were assessed using three approaches. First, Cronbach's alpha was computed to measure reliability. Cronbach's alpha requires more respondents than items to be effective. Since the AQ scale consisted of thirty items, the study sample size must have substantially exceeded this number to effectively use Cronbach's alpha. Second, concurrent

validity checks were conducted against a number of external criteria, particularly job performance and job satisfaction. These checks involved computing the correlation between AQ and the external criteria. Finally, known-groups tests of validity were conducted. In one test, groups were created based upon reported academic performance. Groups with superior academic performance were expected to also demonstrate higher aggregate achievement quotients. An analysis of variance was utilized to determine whether the groups AQs differ in the anticipated way.

#### Treatment of Data

The survey was distributed electronically via the World-Wide Web. All data were populated directly into a SQL database for reporting and analysis. The database was encrypted and password-protected to ensure the privacy of the respondents' data. Off-site back ups will safeguard the data against catastrophic loss. These back-ups were also encrypted and password-protected.

The principal ethical issue this project faces is that of protecting the privacy of sensitive participant data. Obviously, academic performance is an important issue for students at all levels, and, as such, all data were kept confidential. The researcher maintained sole access to the raw data sets. Any identifying information was removed from the data immediately after collection. Data will remain the property of the researcher; however, detailed data will never be published in such a way as to allow for the identification of individual respondents.

The data were measured at the ordinal and interval levels. Ordinal-level data was treated as interval data for the purposes of the analyses, as is common practice among social-science

researchers. Reliability was assessed by computing Cronbach's alpha (with acceptable reliability indicated by  $\alpha > 0.70$ ). Validity was ascertained via exploratory factor analyses and comparisons theoretically relevant external criteria.

## CHAPTER 4. DATA COLLECTION AND ANALYSIS

### Introduction

This research investigated a new scale for assessing Achievement Quotient (AQ). AQ is itself a new construct that quantifies an individual's ability to achieve. In particular, this metric should provide considerable diagnostic and prescriptive utility in organizational settings. The AQ Scale was embedded in an online questionnaire, along with demographic items and scales to assess job satisfaction and job performance. The composite survey was successfully completed by 628 business students. The study first verified the previously published structures of the job-satisfaction and job-performance scales. Next, the reliability of the perspective AQ subscales was assessed. A Cronbach's alpha of at least 0.70 is generally required for retention of a scale in the social sciences. Finally, AQ scores were compared to a variety of external criterion to assess the validity of the new scale. This chapter explores the results of the study by discussing (a) descriptive statistics pertaining to the sample, (b) analyses of existing scales, (c) analysis of the AQ scale, (d) the research questions, (e) limitation of the analyses, and (f) a summary of the results.

### Description of the Sample

This study utilized a purposive sample comprised of 3,044 undergraduate and graduate business students at Grantham University. The students were working adults enrolled in regionally accredited online business programs at Grantham University, seeking either

associates, bachelors, or masters degree. Permission was obtained from Academic Dean at Grantham University to utilize the university's students for the study.

The number of respondents was 652, although 24 respondents were not employed. Due to the importance of employment to most of the theoretical constructs being considered, these responses were eliminated from the study. Thus, the final number of valid responses was 628, which was sufficient for the analyses being conducted. Of the remaining respondents, the vast majority (98%) considered themselves to be employed full time and two percent reported that they were employed part time.

Table 2. Respondent Genders

Gender	Frequency	Percent	Cumulative Percent
Male	452	71.97	71.97
Female	176	28.03	100.00

N=628

The respondent population (m=452, f=176) was roughly 72% male and 28% female (see Table 2). Although this discrepancy is somewhat surprising, a random sample from the sample frame confirmed this ratio. The data made available to the researcher by the university included name, internal student identification number, and e-mail address but not gender. Although many of the students' first names were not indicative of gender due either to their multicultural origins or dual use as masculine and feminine names, a sample of 100 names was found to consist of 62

masculine names, 28 feminine names, and 10 ambiguous names. Ignoring the ambiguous names the resulting ratio was 69% male and 31% female.

The average age of the respondents was approximately 35, which is practicably indistinguishable from the median age (see Table 3). Half of the respondents were under age 35, with a trivial number below 21. No respondents reported ages in excess of 60.

Table 3. Respondent Ages

Age	Frequency	Percent	Cumulative Percent
Under 21	2	0.32	0.32
21 - 25	76	12.10	12.42
26 - 30	114	18.15	30.57
31 - 35	121	19.27	49.84
36 - 40	151	24.04	73.89
41 - 45	112	17.83	91.72
46 - 50	37	5.89	97.61
51 - 55	9	1.43	99.04
56 - 60	6	0.96	100.00
61 - 65	0	0.00	100.00
Over 65	0	0.00	100.00

Mean=35.24, Median=38

N=628

The vast majority of the respondents were undergraduates (542, 86%, see Table 4). All undergraduates at Grantham University are required to complete associates programs prior to admittance into a bachelors program. As such, over two thirds of the respondents would be considered upper-level undergraduates, and roughly one half of the remaining respondents were in the MBA program. Respondents were asked to assess the degree progress in terms of the percentage of degree requirements they had completed. Not surprisingly, the results were essentially uniformly distributed with mild bumps at the beginning and middle (see Table 5).

Table 4. Degrees Pursued by Respondents

Degree being Pursued	Frequency	Percent	Cumulative Percent
Associates	90	14.33	14.33
Bachelors	452	71.97	86.31
Masters	86	13.69	100.00

N=628

The principal reason for collecting the degree progress data was to ensure that eager new or disgruntled old students were not self selecting for participation, since students at either terminus of their studies are less likely to be representative of the sample population. The flat nature of the degree-completion frequency distribution abates any concerns about this possible bias.

Table 5. Degree Progress of Respondents

Percent of Degree Completed	Frequency	Percent	Cumulative Percent
0% (just started)	47	7.48	7.48
0-19%	109	17.36	24.84
20-39%	107	17.04	41.88
40-59%	143	22.77	64.65
60-79%	126	20.06	84.71
80-99%	81	12.90	97.61
100% (graduating this term)	15	2.39	100.00

Mean=54.77, Median=59.50

N=628

A variety of metrics for assessing academic performance were considered, but, ultimately, the old standby of grade-point average proved to be most useful (see Table 6). The distribution of GPAs was strongly skewed toward the high end. More than half of all respondents reported GPAs in excess of 3.50, and less than one in seven reported GPAs less than 3.00. Grade inflation has become an issue at many universities over the past several years; however, despite the unrealistic compression of GPAs across the student body, valid discrimination of academic performance is still possible.



Table 6. Respondent GPAs

GPA	Frequency	Percent	Cumulative Percent
Less than 2.00	6	0.96	0.96
2.00–2.24	7	1.11	2.07
2.25–2.49	2	0.32	2.39
2.50–2.74	22	3.50	5.89
2.75–2.99	45	7.17	13.06
3.00–3.24	107	17.04	30.10
3.25–3.49	88	14.01	44.11
3.50–3.74	125	19.90	64.01
3.75–3.99	151	24.04	88.06
4.00	75	11.94	100.00

Mean=3.48, Median=3.62

N=628

### Analysis of Existing Scales

Previous factor analyses of the job-satisfaction items (Sat01-Sat20 on the Survey Instrument, Appendix D, Section 2) has repeatedly revealed two factors: Intrinsic and Extrinsic Satisfaction. Scores on these two factors and a General Satisfaction score are commonly used. The items comprising the Intrinsic Satisfaction scale are Sat01, Sat02, Sat03, Sat04, Sat07, Sat08, Sat09, Sat10, Sat11, Sat15, Sat16, and Sat20 from the Survey Instrument. The items comprising the Extrinsic Satisfaction scale are Sat05, Sat06, Sat12, Sat13, Sat14, Sat17, Sat18

and Sat19 from the Survey Instrument. The reliability and validity of this type of instrument are well established.

The reliability of the job-satisfaction scale as measured by the respondents of this study was quite high— $\alpha=0.93$ , well in excess of 0.70, the de facto floor for reliability in the social sciences. In addition, a factor analysis was conducted using principal axis factoring. Table 7 provides the factor loadings for each item in the job-satisfaction scale. (Values less than 0.35 were suppressed to make the table easier to read.) The factor analysis reveals the same structure as previous researchers have identified.

Factor 1 is consistent with the Intrinsic Satisfaction scale, and Factor 2 is equivalent to the Extrinsic Satisfaction scale. Both scales were found to demonstrate high reliability independently— $\alpha=0.91$  for the intrinsic-satisfaction scale and  $\alpha=0.86$  for the extrinsic-satisfaction scale. These analyses confirmed the findings of previous researchers and further confirm the reliability and validity of this job-satisfaction scale.

Table 7. Factor Loadings of Items in Job-Satisfaction Scale

	Factor			Factor	
	1	2		1	2
SAT01	0.58		SAT11	0.73	
SAT02	0.54		SAT12		0.62
SAT03	0.61		SAT13		0.38
SAT04	0.73		SAT14	0.41	0.42
SAT05		0.76	SAT15	0.53	0.57
SAT06		0.77	SAT16	0.56	0.53
SAT07	0.36	0.43	SAT17		0.62
SAT08	0.53		SAT18		0.51
SAT09	0.72		SAT19		0.62
SAT10	0.52		SAT20	0.63	0.41

(Loadings less than 0.35 are omitted to make the table easier to read.)

The individual job performance items, items Perf01–Perf14 on the Survey Instrument (Appendix D, Section 3), are comprised of two scales. The first five items comprise an in-role job-performance scale while remaining nine items comprise an innovative job-performance scale. The reliability and validity of these scales have been established by previous research.

This study also assessed the reliability of the job-performance scale to be quite high— $\alpha=0.92$ . Furthermore, a principal axis factoring analysis of the job-performance items confirmed the factor structure found by previous researchers (see Table 8).

Table 8. Factor Loadings of Items in Job-Performance Scale

	Factor			Factor	
	1	2		1	2
PERF01		0.81	PERF08	0.67	
PERF02		0.84	PERF09	0.84	
PERF03		0.69	PERF10	0.62	
PERF04		0.86	PERF11	0.85	
PERF05		0.84	PERF12	0.87	
PERF06	0.76		PERF13	0.86	
PERF07	0.76		PERF14	0.82	

(Loadings less than 0.35 are omitted to make the table easier to read.)

Factor 1 corresponds to the innovative job-performance scale, and Factor 2 is consistent with the in-role job-performance scale. Both scales were found to demonstrate high reliability independently— $\alpha=0.94$  for the innovative job-performance scale and  $\alpha=0.91$  for the in-role job-performance scale. These analyses confirmed the findings of previous research and further attest to the reliability and validity of this job-performance scale.

This study has confirmed the reliability and validity of these previously published scales for assessing job satisfaction and job performance. These metrics will be utilized later in this study to establish the validity of the newly developed achievement-quotient scale.

## Analysis of Achievement-Quotient Scale

*Analysis of Subscales*

The individual Achievement-Quotient scale is new. The internal consistency of the scale was found to be sufficiently high ( $\alpha=0.79$ ) for all items to be retained. The 30 items were created to measure various aspects of achievement attitudes and behaviors, specifically: responsibility, goal-setting behavior, locus of control, risk acceptance/aversion, and entitlement attitudes (see Table 9–Table 13). As such, the internal consistencies of each of the subscales must also be assessed.

Table 9. Responsibility AQ Subscale

Responsibility ( $\alpha=0.66$ )	AQ01	I learn from my mistakes.
	AQ07	I correct the situation when I make a mistake.
	AQ11	I admit when I am wrong.
	AQ16	I like having control over my work.
	AQ25*	The first step in solving a problem is to assign blame.
	AQ27	Personal responsibility is important to me.

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

Each subscale's reliability was independently assessed by computing Cronbach's  $\alpha$ . The results were less than reassuring. Generally, researchers want each subscale which comprises a

composite scale to be a reliable measure of that factor. In this case, all of the computed reliability measures fell short of the  $\alpha=0.70$  floor commonly used to qualify scales as reliable in the social sciences.

Table 10. Goal-Setting Behavior AQ Subscale

Goal-Setting Behavior ( $\alpha=0.64$ )	AQ02	Clear goals help me to focus
	AQ06	Assessing progress is a key to success
	AQ13	I set goals for myself.
	AQ17	I have accomplished difficult goals.
	AQ21	I can develop a plan to achieve a given objective.
	AQ23*	Measuring is less important than doing.

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

If these subscales function as independent factors within the composite AQ scale, then their unacceptable reliabilities greatly compromise the validity of the new scale. If, however, these subscales do not represent distinct aspects of achievement, but rather only probe superficially different facets of a single construct, the low reliabilities of the groups of questions is of little concern. In fact, the well known concept of regression to the mean clearly illustrates that multiple similar measurements of the same construct will yield a more reliable measure than

would a few measurements. With this in mind, we turn now to the factor analysis of the new scale.

Table 11. Locus of Control AQ Subscale

Locus of Control ( $\alpha=0.45$ )	AQ03	Persistence and hard work lead to success.
	AQ08*	My life seems like a series of random events.
	AQ14*	Other people control my life.
	AQ18	I earn the respect and honors I receive.
	AQ22*	The success I have is largely a matter of chance.
	AQ24	People must be the master of their own fate.

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

### *Factor Analysis*

Data from the 30-item Achievement-Quotient scale was analyzed using principal axis factoring with SPSS 11.0.0 to extract the underlying factors. Although principal components analysis is often used for this purpose (and is, not coincidentally, the default option in SPSS), principal axis factoring is preferred because it only utilizes the variance items share with other items. Principal component analysis, on the other hand, attempts to force the factor structure to explain spurious variance among the items—an objective somewhat antithetical to the goal of elucidating commonalities among the items (Gorsuch, 1990).

Table 12. Risk Acceptance / Aversion AQ Subscale

Risk Acceptance / Aversion ( $\alpha=0.43$ )	AQ04	Some risk is necessary for success.
	AQ09*	I tend to play it safe.
	AQ12*	I seek approval before take action.
	AQ28	"Only those who dare to fail greatly can ever achieve greatly." –Robert F. Kennedy
	AQ29	"Make no small plans for they have no power to stir the soul." –Niccolo Machiavelli
	AQ30	"Two roads diverged in a wood, and I ... I took the one less traveled by, and that has made all the difference." –Robert Frost

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

A variety of techniques exist for determining the number of factors to extract. Perhaps the most popular method is the Kaiser-Gutman procedure, which retains all factors with eigenvalues greater than one (Loehlin, 1998). However, this procedure is overly conservative, in that it retains any factor that explains observed variances even marginally better than the individual items themselves. Since the items are designed to be parallel (or, at least strongly correlated), one should expect spurious covariance which does not necessarily indicate a factor structure. In order



for the factor structure to be truly useful, one must demand more from individual factors to merit retention.

Table 13. Entitlement Attitudes AQ Subscale

Entitlement Attitudes ( $\alpha=0.53$ )	AQ05	People earn what they get.
	AQ10*	I only work hard enough not to get fired.
	AQ15*	I deserve better than I get.
	AQ19*	I should not be subjected to performance appraisals.
	AQ20*	Job security should be an employee's right.
	AQ26*	People are entitled to be promoted based on time with their company.

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

A more discriminating approach involves examining the Scree plot to find the “elbow” at which the plot flattens out and to retain all factors above this point. A Scree plot (e.g., Figure 1) is a graph to eigenvalues versus factor number, with factors numbered in order of decreasing eigenvalues. This plot illustrates the relative importance of the eigenvalues, allowing the researcher to eliminate all factors which do not make a significant contribution to explaining the observed variance among the data.

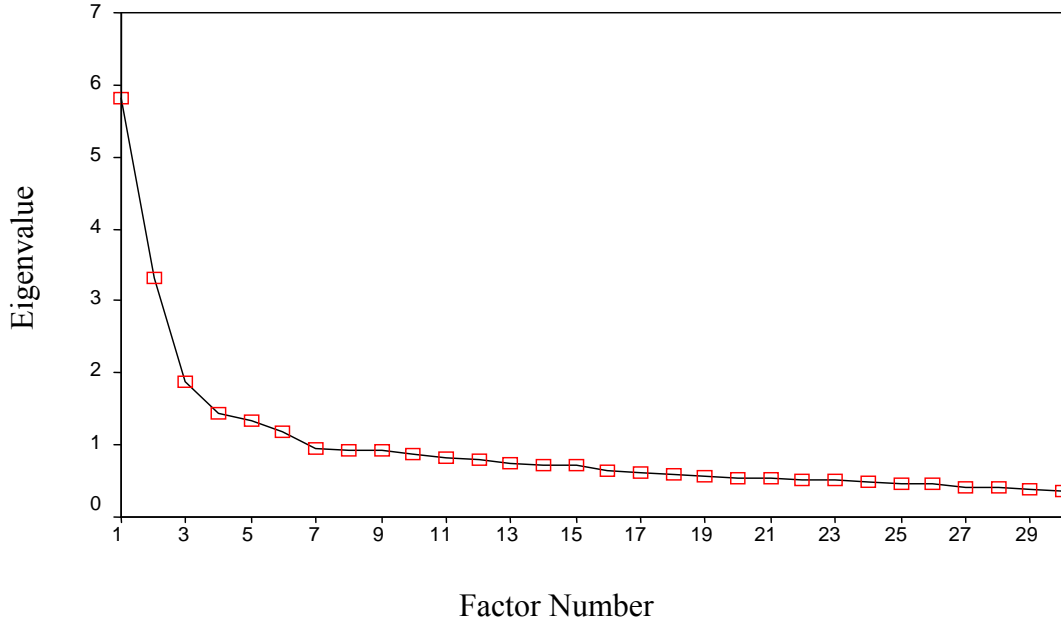


Figure 1. Scree plot for AQ factors

Hammond (2000) endorsed the use of a more subjective approach. Using the so-called interpretability approach, “the researcher identifies the minimum and maximum number of factors and carries out an analysis for each potential solution.” Researchers have recommended various criteria for considering a factor loading to be significant. Cliff & Hamburger (1968) advise against using loading less than roughly 0.30. Hair, Anderson, Tatham, and Black (1998) considered the significance of a 0.30 loading to be minimal, 0.40 to be important, and 0.50 to be practically significant.

Table 14. Factor Loadings of Items in the Achievement-Quotient Scale

	Factor			Factor	
	1	2		1	2
AQ01	0.62		AQ16	0.55	
AQ02	0.66		AQ17	0.64	
AQ03	0.59		AQ18	0.58	
AQ04	0.47		AQ19*		0.52
AQ05	0.32		AQ20*		0.45
AQ06	0.56		AQ21	0.61	
AQ07	0.63		AQ22*	0.31	0.54
AQ08*		0.44	AQ23*		0.44
AQ09*		0.35	AQ24	0.31	
AQ10*	0.34	0.41	AQ25*	0.33	0.53
AQ11	0.41		AQ26*		0.52
AQ12*		0.33	AQ27	0.56	
AQ13	0.55		AQ28	0.31	
AQ14*			AQ29		
AQ15*		0.34	AQ30	0.33	

\*Item is reverse coded. Respondent answers were inverted prior to analysis.

(Loadings less than 0.30 are omitted to make the table easier to read.)

In assessing the factor structure of the AQ scale, the researcher first reviewed the Scree plot and determined that the most likely number of factors was one to six, inclusive. Each of these possible models was investigated to see which led to the most readily interpretable structure. Recall that the instrument design consisted of five presumed factors. However, the five-factor solution did not produce the anticipated structure. In fact, most of the variables loaded significantly onto the first factor. This was construed as very good news indeed, since it excuses the low reliability of the presumed subscales. These items are not actually subscales, but rather collections of items that coarsely measure the latent construct. This matter is easily resolved by pooling the items and testing their composite reliability, which was high ( $\alpha=0.79$ ).

After examining the structure of the all of the models (up to six factors) resulting from principal axis factoring, the model which was most readily interpretable featured only two factors. The solution was rotated using the varimax rotation method, which produces orthogonal (uncorrelated) factors. Although a number of possible rotation methods are available, using an orthogonal approach allows the solution to be interpreted much more readily than approaches which result in correlated factors. The two-factor structure explained 30.4% of the total variance. A surprising feature of the two-factor solution was that the items split according to whether they were reverse coded. There were no other significant commonalities among items that loaded heavily onto a given factor.

Reverse-coded items are items the researcher feels are contrary to the construct under investigation. For example, AQ10 reads, "My life seems like a series of random events." A person who demonstrates strong attitudes and behaviors consistent with achieving would tend to disagree with this statement, believing, instead, that he can make sense of his life and control the

events he experiences through analysis, planning, and action. Responses to the reverse-coded items were transformed prior to analysis. Specifically, all 5s were replaced by 1s, all 4s were replaced by 2s, all 2s were replaced by 4s, all 1s were replaced by 5s, and all 3s were left unchanged. Reverse-coded items are used by some researchers to increase the reliability of their instruments, although there is debate as up the utility of reverse-coding for this purpose. Reverse-coding is also used as an internal consistency check. One expects respondents who tend to answer reverse-coded items the opposite of the way they answer regular items. So, if a particular respondent answer 4 or 5 on all items, whether they are reverse-coded or straight-coded items, chances are that that particular respondent was not careful in reading the items and providing truthful responses. Other times it is difficult to express an item in a way that is consistent with latent construct; it is simply easier to create a reverse-coded item than it is to convolute the question to reverse its meaning.

In this study, reverse-coding was used to monitor internal consistency of individual respondents and for simplicity. The factor solution demonstrated that the regular and reverse-coded items were uncorrelated, which verifies the internal consistency of respondents. In fact most respondents measured high in achievement on both the regular and reverse-coded items. Potential problem respondents would have scored high on one type of item and low on the other. That the factor analysis was able to discriminate between regular and reverse coded-items is some cause for concern and may warrant further investigation by future researchers.

*Known-Groups Validity Assessment*

In addition to a scale exhibiting high reliability and an identifiable factor structure, a valid instrument must also produce expected results. To this end the data were examined for known-groups validity. Five criteria were investigated: gender, GPA, annual income, job satisfaction, and job performance. For each of the known-groups analyses AQSCORE was used as the metric for Achievement Quotient. AQSCORE was computed by averaging all items from the AQ scale for a given respondent and then normalizing the maximum score to 100. Table 15 summarizes the results of the known-groups analyses.

A priori there is no reason to expect that AQ should be gender biased. An ANOVA bears this expectation out. Males and females did not distinguish themselves from one another on the AQ scale. The ANOVA resulted in  $F = 0.620$ ,  $p = 0.431$ . Figure 2 features a boxplot of AQ vs. Gender. (Note that females are coded as 0 and males are coded as 1.)

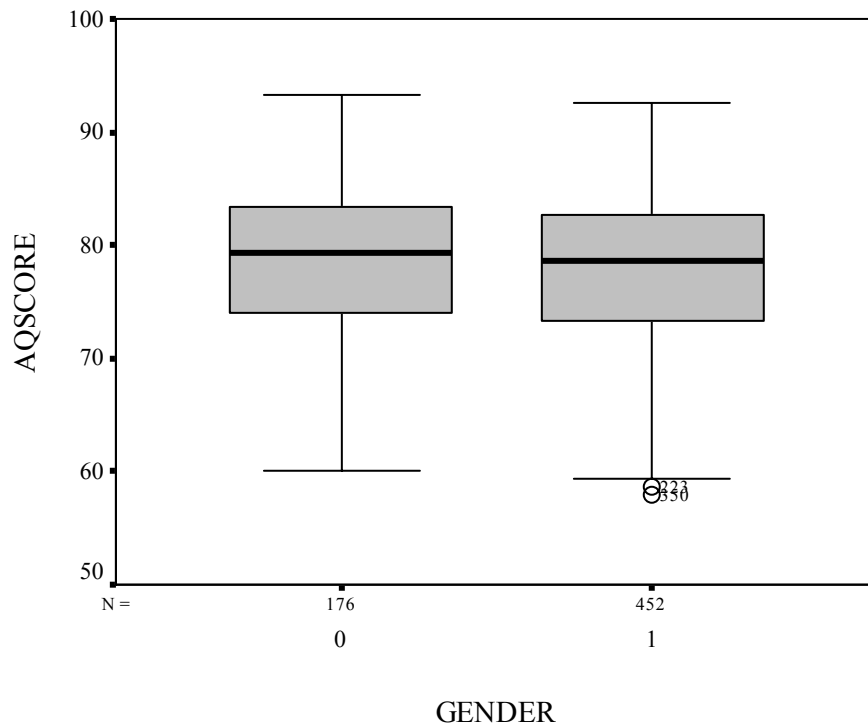


Figure 2. Boxplot of AQ vs. gender (Females coded as 0; males coded as 1.)

One would expect AQ to vary with GPA. The drive to achieve that is responsible for a student performing well academically should also manifest in that individual's AQ. Again, an analysis of variance confirms this assumption. The ANOVA resulted in  $F = 13.536, p < 0.001$ . Figure 3 features a boxplot of AQ vs. GPA. (Note that due to the compression of GPAs mentioned earlier, the GPAs were partitioned into just two groups in order to create a significant separation in GPAs between groups.)



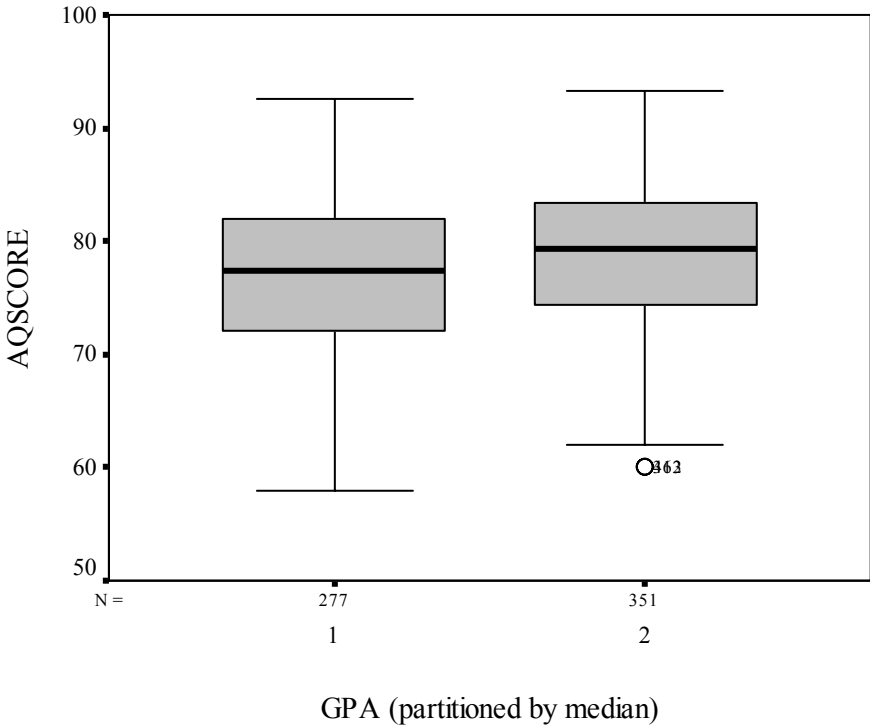


Figure 3. Boxplot of AQ vs. GPA

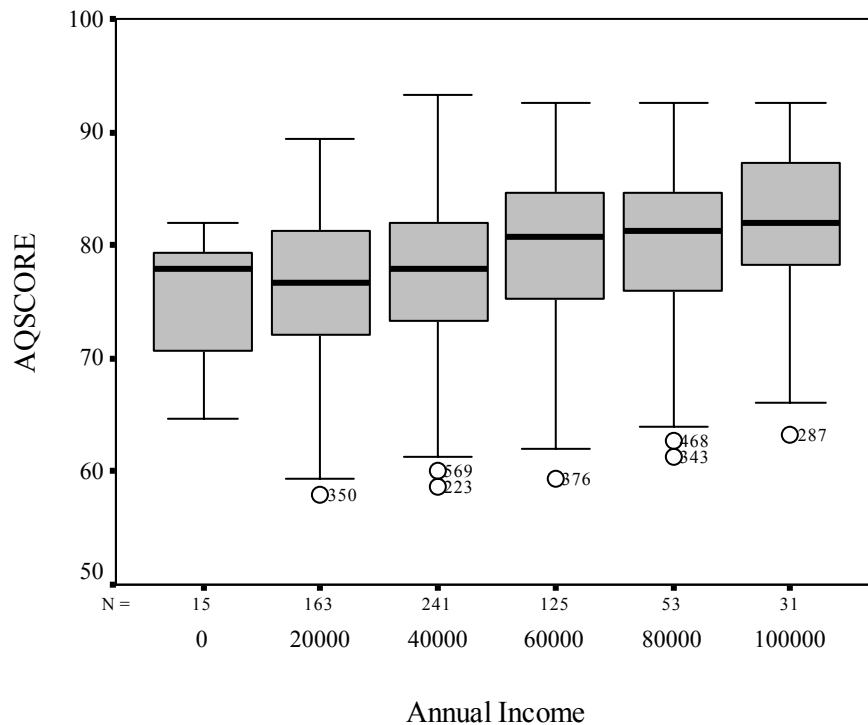


Figure 4. Boxplot of AQ vs. annual income

One might also expect AQ to vary with annual income. Clearly, there are a variety of confounding factors that may moderate any relationship between AQ and annual income. Nevertheless, individuals who are motivated to achieve should expect to see some impact on the bottom line. Yet again, an analysis of variance exposes the expected relationship. The ANOVA resulted in  $F = 7.396$ ,  $p < 0.001$ . Figure 4 features a boxplot of AQ vs. Annual Income. Note that the high and low income bins do not strictly follow the predicted relationship, but these two bins together represent less respondents than the next least populated single bin. Given the small occupancy in the high- and low-income bins, the small deviations of these means from their predicted levels do not compromise the results from this known-groups analysis.

According to two-factor theory, job satisfaction is positively affected by attributes associated with achievement. To create groups for the known-groups analysis respondents were partitioned into job-satisfaction quartiles. The boxplot of AQ vs. Job Satisfaction is given in Figure 5. The ANOVA demonstrated a positive relation between AQ and job satisfaction ( $F = 42.237$  and  $p < 0.001$ ).

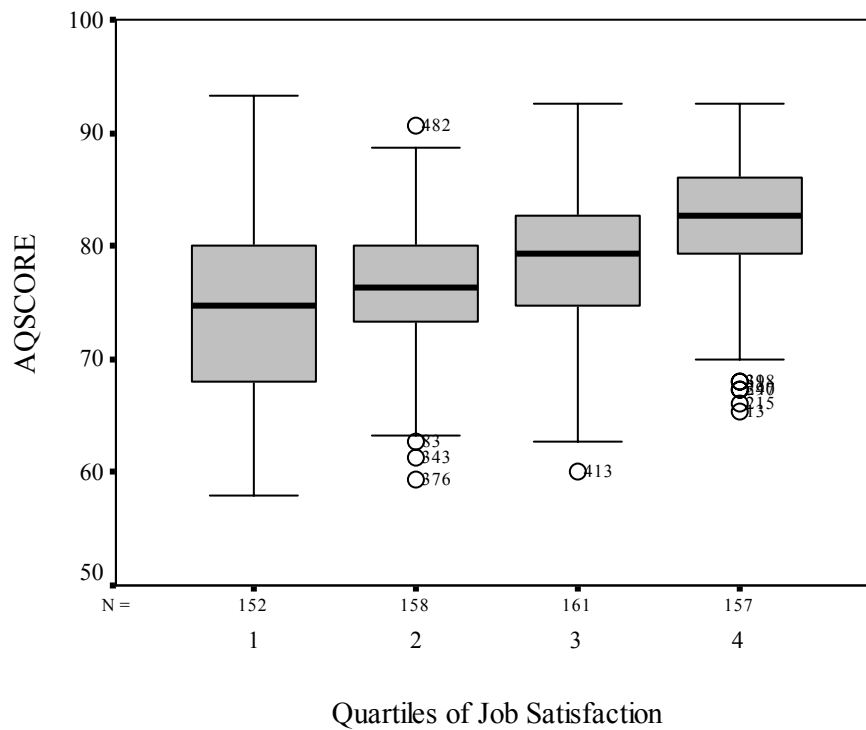


Figure 5. Boxplot of AQ vs. job satisfaction

Goal theory and expectancy theory stress the importance of goals and incentives in motivating performance. Employees who have goals to pursue are more satisfied with their jobs and tend to perform better. Theoretically, then, one expects individuals who excel in

performance on the job to rate high on the AQ scale. Groups for the known-groups analysis respondents were created by adopting the job-performance quartiles. See Figure 6 for a boxplot of AQ vs. Job Performance. The ANOVA identified a positive relation between AQ and job performance ( $F = 33.907$  and  $p < 0.001$ ).

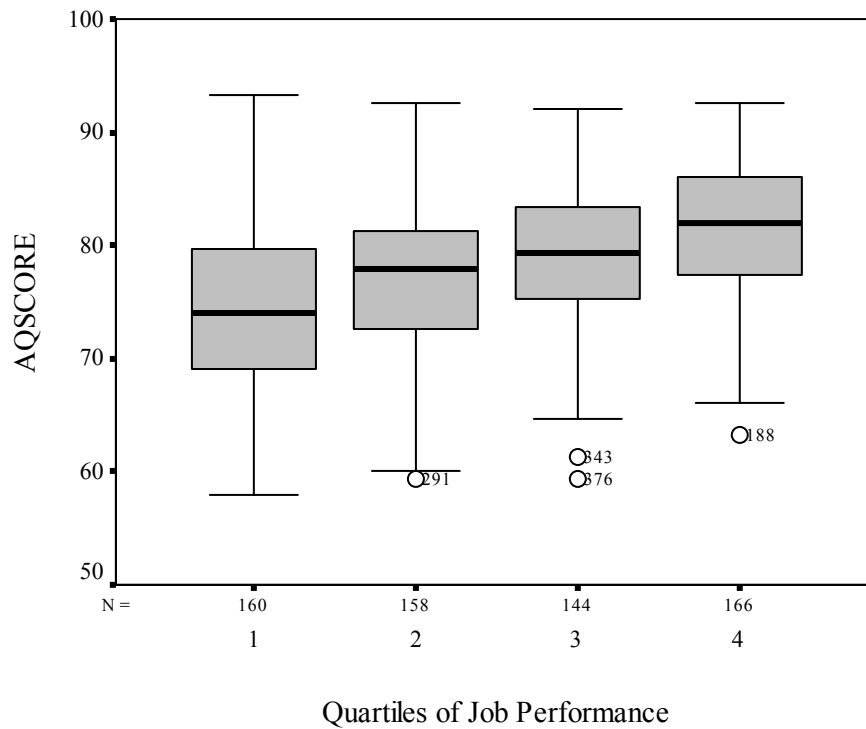


Figure 6. Boxplot of AQ vs. job performance

*Summary of AQ-scale Analyses*

In summary, the AQ scale features two factors, with most items loading on a single factor. The factor structure is readily identifiable and interpretable. The scale is highly reliable ( $\alpha=0.79$ ). In addition, the AQ metric behaves as expected with respect to gender, academic performance, earning power, job satisfaction, and job performance (see Table 15). Taken together, these analyses provide tremendous evidence to support the validity of the new AQ scale.

Table 15. ANOVA Results for Known-Groups Validation Analyses

Criterion	Expected	ANOVA		Observed
	Relationship	F	<i>p</i>	Relationship
Gender	none	0.620	0.431	none
GPA	positive	13.536	< 0.001	positive
Annual Income	positive	7.396	< 0.001	positive
Job Satisfaction	positive	42.237	< 0.001	positive
Job Performance	positive	33.907	< 0.001	positive

### Research Questions

This study asked three major research questions:

1. Is the prototype instrument capable of providing reliable and valid data on achievement in the workplace?
2. Is achievement related to employee satisfaction?
3. Is achievement related to productivity?

Each of these questions has been addressed earlier in this chapter. To recap: Question 1 asks if the AQ scale developed in the course of this study is a reliable and valid measure of achievement. This scale was found to demonstrate high reliability ( $\alpha=0.79$ ). The scale passed a content-validity assessment by a panel of experts and a face-validity evaluation by a group consistent with the sample population. The factor structure of the scale was explicated, and the scale performed as expected with respect to each of several external criteria. In short, the scale has been demonstrated to be a reliable and valid measure of achievement attitudes and behaviors.

Question 2 asks whether AQ is related to employee satisfaction. Figure 5 illustrates a clear relationship between AQ and job satisfaction. In addition, a linear regression analysis rejects ( $F = 98.231, p < 0.001$ ) the null hypothesis that the two variables are not correlated. The analysis yielded a slope of  $\beta = 0.368$  (for standardized AQ and job-satisfaction variables).

Question 3 asks whether AQ is related to job performance. Again, this question was addressed during the known-groups validity analyses. Figure 6 illustrates a clear relationship between AQ and job performance. Furthermore, a linear regression analysis rejects ( $F = 109.195, p < 0.001$ ) the null hypothesis that the two variables are not correlated. The regression analysis yielded a slope of  $\beta = 0.385$  (for standardized AQ and job-performance variables).

### Limitations of Data Analyses

With any statistical analysis the possibility of Type I or Type II errors is manifest. Hypothesis testing is not an absolute. Rather hypothesis testing assesses probabilities and allows researchers to make decisions based upon these probabilities. Although the possibility of statistical errors is certainly a limitation of this study, the consistency of the results across several hypothesis tests strongly refutes the likelihood of such errors.

The remaining limitations of this study relate to the sample. The population for which the instrument is designed is worker in corporate settings; however, the study sample was not a random sample from this population. Instead, the study utilized a purposive sample of graduate and undergraduate business students. Although the respondents were fairly representative of the intended population, the results of this study cannot be generalized. Fortunately, this limitation is greatly mitigated by the fact that the purpose of the study is to ascertain the reliability and validity of the instrument, rather than assessing behaviors or attitudes of the respondents.

### Summary of Results

This study investigated a new scale for assessing Achievement Quotient (AQ), which is itself a new construct that quantifies an individual's ability to achieve. The AQ Scale was distributed to a population of undergraduate and graduate business students via a Web-based questionnaire, along with demographic items and scales to assess job satisfaction and job performance,. The survey resulted in 628 valid responses.

The previously published structures of the job-satisfaction and job-performance scales were verified. The AQ scale was shown to be reliable ( $\alpha=0.79$ ). The reliability of the perspective AQ subscales was found to be insufficient for inclusion in the AQ scale; however, subsequent factor analysis revealed that the subscales were not, in fact, independent factors. Rather, all of the subscale items loaded into two overall achievement factors.

The two factors were determined to be artifacts of the instrument rather than latent variables pertaining to the respondents. Fifteen of the thirty items loaded significantly into one factor; eleven of the remaining fifteen items loaded significantly into a second factor. The difference between Factor 1 and Factor 2 was the structure of the questions. All of the items that loaded into the second factor were reverse-coded.

Finally, AQ scores were compared to a variety of external criterion to assess the validity of the new scale. The scale demonstrated the expected behavior with respect to gender, academic performance, earning power, job satisfaction, and job performance.



## CHAPTER 5. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

### Introduction

Researchers have sought to discern a link between employee attitudes and performance since the publication of the Hawthorne studies; however strong evidence for such a relationship has not been found. In even so, the relationship between job satisfaction and job performance has been referred to as the “Holy Grail” of industrial psychologists. These particular metrics demand such attention from researchers because of their great importance in impacting organizational success on the one hand and unnecessary expenses on the other.

The relevance of job satisfaction to organizational well being can be clearly demonstrated with a series of statistics. According to Lermusiaux (2004), human capital expenses account for an average of 36 percent of corporate revenue. Organizations across a variety of industries have reported annualized employee turnover rates have been reported to be as high 30–50% (and there is strong reason to believe that organizations with the highest turnover underreport their figures). Furthermore, estimates for the cost of losing a single mid-level employee range from \$42,000 to over \$250,000. In addition, costs associated with lost productivity can easily exceed those associated with recruitment, selection, and training by several times (Waters, 2003). Finally, Rucci, Kirn, & Quinn (1998) demonstrated that a reduction of just five percent in employee turnover has been linked to savings of 10% in total costs and increases in productivity of up to 65%.

Along with absenteeism, employee turnover is one of the more insipid drains on an organization’s resources and productivity. Job satisfaction is negatively correlated with both

absenteeism (Daniels & Bailey, 1999) and turnover (McCulloch, 2003). Dissatisfied employees are more likely to be absent on any given day or to leave the organization altogether. In addition, organizational commitment (Blau, 2003) and organizational-citizenship behaviors (Feather & Rauter, 2004), two traits that are beneficial to organizations, are positively correlated with job satisfaction.

Given the importance of performance and employee satisfaction to the success and financial well being of an organization, it is inevitable that researcher interest in linking these two aspects will surface, regardless as to how often it lulls. Although the research literature does not provide a general mechanism for relating performance and job satisfaction, job performance and job satisfaction do share a common set of antecedents. According two-factor theory, job satisfaction is directly related to attributes such as employee empowerment, responsibility, and opportunities to learn, grow, and advance. Goal theory and expectancy theory also emphasize the importance of goals and incentives in the context of motivating performance. Employees who have goals to pursue tend to be satisfied with their jobs and to perform better. The common theme in these two areas of research is achievement. From a practitioner's perspective influencing achievement-quotient on the individual and organizational levels can reasonably be expected to improve both job satisfaction and job performance. Clearly, organizations have a vested interest in improving performance, at the individual and, ultimately, organizational levels and in maintaining high satisfaction levels among their employees. Achievement-quotient assessments and the prescriptive actions they suggest are a pragmatic means for organizations of pursuing these goals.

## Results

This study proposed and operationalized a new construct called Achievement Quotient (AQ) for quantifying those aspects of achievement which should prove useful to organizations. The study then investigated a new scale for assessing AQ. The AQ Scale was administered to a population of undergraduate and graduate business students via a Web-based questionnaire, along with demographic items and scales to assess job satisfaction and job performance,. Six hundred twenty-eight valid responses were ultimately collected.

The job-satisfaction and job-performance scales were analyzed, and previously published structures for these scales were verified. The overall AQ scale was shown to be reliable ( $\alpha=0.79$ ). Further inspection of the constituent subscales determined that their reliability was insufficient for inclusion in the AQ scale. Although this finding would typically be a death knell to the entire scale, subsequent factor analysis revealed that the subscales were not, in fact, independent factors. Instead of these items probing a number of theoretical constructs which were presumed to be independent, all of the subscale items loaded into two overall achievement factors.

The two factors were determined to be artifacts of the instrument rather than latent variables pertaining to the respondents. Fifteen of the thirty items loaded significantly into one factor; eleven of the remaining fifteen items loaded significantly into a second factor. The difference between Factor 1 and Factor 2 was the structure of the questions. All of the items that loaded into the second factor were reverse-coded. AQ scores computed based upon only the reverse-coded items were not correlated with AQ scores based strictly on the straight-coded items (as the factor analysis indicated). However, a visual inspection of these data revealed no

obviously anomalous scores which would call into question the veracity of the reverse-coded items.

Finally, the overall AQ scores (based upon all items) were compared to a variety of external criterion to assess the validity of the new scale. The AQ scale demonstrated the expected behavior with respect to all of the external criteria (gender, academic performance, earning power, job satisfaction, and job performance).

### Discussion

The results of this study were generally encouraging with respect to the utility of the prototype AQ scale. Although many mature instruments exhibit reliabilities in excess of 90%, the computed reliability of this scale ( $\alpha=0.79$ ) easily exceeded to de facto standard of 70% for acceptability within the social sciences.

One of the interesting findings of this study was that virtually all respondents scored above neutral on the AQ scale. That is to say that each response was assigned a value from one to five, and that the vast majority of respondents' average response (across all items for a specific respondent) was greater than three (the neutral value). In fact, the average response for the sample was 3.90. The lowest AQ in this format was 2.90, and only four respondents (out of 628) posted below a 3.00 average. On the upper end, the highest AQ was 4.67, and fully 277 respondents (out of 628, or 44%) posted an average of at least 4.00.

This finding has two viable interpretations which are not mutually exclusive. The first alternative is that the scale items are constructed in such a way as to elicit largely positive responses. The AQ scale is technically an ordinal instrument, although the researcher has taken

the liberty of conducting parametric analyses that assume the data are at least interval measures, as is accepted practice throughout the social sciences. However, regardless as to whether one considers the AQ scale to be ordinal or interval level of measure, it is not ratio. In particular, there is no meaningful zero point. Even though a neutral response option was explicitly provided for every single item, neutral has no meaning for the composite scale. What does a neutral AQ mean? There is no precise interpretation for this value. Although one knows exactly what one means by no money, zero inches, and no time, the concept of a neutral AQ is nebulous and imprecise at best. As such, the only truly meaningful comparisons for an AQ are with other AQs, not with specific values.

The second alternative is that one at least intuitively understands that people who average greater than 3.00 on the AQ items consider themselves to be at least somewhat committed to the idea of achievement and that people whose AQ average is less than 3.00 are somewhat adverse to the concept of achievement, in practice and/or principle. Given that one can make at least gross interpretations about individual composite averages on this scale, one must conclude that the sample population consists primarily of achievement-oriented people.

Both interpretations carry a certain amount of credence in for this study; however, the researcher believes that the ostensibly high AQ scores are primarily a product of the sample population. All respondents are working adults and business students. Students, in general, might be thought of as more achievement-oriented than the average adult, but this characterization applies even more so to working-adult students. These people typically did not pursue higher education straight out of high school—a pursuit often undertaken somewhat by default by most average-or-better high school graduates. Rather, they entered the work force, experienced the

consequences of their educational status, and made conscious choices to change their circumstances. Therefore, all members strongly demonstrated characteristics associated with high AQ in order to be included in the sample population. In particular, most of these students would naturally identify with concepts of personal responsibility, setting goals, learning from their mistakes, and taking control of their lives.

Although this bias identified in the sample population does not affect the veracity of the results of the study, it does point to the need to assess the validity of the AQ scale against a more diverse population.

#### Limitations

The limitations for this study were two-fold. The first category of limitations stems from the statistical nature of the research design. Statistical analyses and hypothesis tests are necessarily limited by the possibility of Type I or Type II errors. It is always possible that a statistical test will yield the “wrong” answer due to an aberrant number of population outliers among the respondents. The self-selection of respondents inherent to survey research further exacerbates this problem due to the necessary introduction of a bias which cannot be empirically classified. The response rate of 20.63% was large enough that the researcher strongly expects that the sample is representative of the sample population. However, the response rate is not large as to remove all doubt that a self-selection related bias could have impacted the results of the study. Although the possibility of statistical errors is certainly a limitation of this study, the consistency of the results across several hypothesis tests strongly refutes the likelihood of such errors.

The second category of limitations relate to the sample utilized by the study. The population for which the AQ scale was designed is employees in corporate settings; however, the study sample was not a random sample drawn from this population. Rather, the study sample was a purposive sample of graduate and undergraduate business students. The respondents were thought to fairly represent the intended population; however, the results of this study cannot be generalized. In particular, all of the results of this study may eventually be found to not apply to the actual population of interest. Fortunately, the limitation regarding the sample is greatly mitigated by the fact that the purpose of the study is to ascertain the reliability and validity of the instrument, rather than assessing behaviors or attitudes of the respondents. Internal consistency of an instrument is a fairly robust measure across a variety of populations. However, the validity of a scale should be ascertained for each population a researcher wishes to assess.

#### Recommendations for Further Research

The results of this study suggest the need for further research in a variety of areas. First, as was mentioned earlier, the sample for the present study is not representative. Respondents comprised a purposive sample of business students rather than a random sample of corporate employees. In addition, the response rate (20.63%) was not large enough to conclusively rule out a self-selection bias among the respondents. Finally, as was discussed earlier, a bias toward higher AQs was identified among the sample population. For these reasons, replication studies should be conducted utilizing random samples drawn from one or more corporate organizations. In addition, the following research is also indicated:

There is a need for a predictive-validity study to assess the value of the AQ scale for candidate screening. Researchers should administer the AQ scale to prospective employees but not share this information with the prospective employers. Researchers should then contact the employers to obtain their assessments of employees, at which point comparisons can be made between employers' assessments and the AQ assessment. If the AQ scale demonstrates high predictive validity, then organizations may be advised consider AQ assessments as part their candidate-screening process.

There is a need for a concurrent-validity study to assess the subjective value of the AQ assessment for employers. Similar to the predictive-validity study mentioned above, the concurrent-validity study would focus on existing employees and their employers' current assessments of their value to the organization. If the AQ scale is found to have high concurrent validity, then organizations may be advised to add AQ assessments to their performance-appraisal and continual-improvement processes.

There is a need for a comprehensive study or series of studies to assess a very large sample of corporate employees with the goal computing national norms for the AQ scale. When national norms are available for this metric, organizations will be able to benchmark their employees much more effectively. National norms will add value to the predictive-validity and concurrent-validity studies mentioned previously.

There is a need for a further scale development to increase reliability to 90%. Although  $\alpha=0.70$  is the de facto minimum for acceptable scales in the social sciences, scales cannot be highly predictive if they are not highly reliable. In order for the AQ scale to be truly useful to organizations, items should be added, modified, and deleted to raise its reliability coefficient



from its current value of 79% to at least 90%. Care should also be taken to address the straight-coded/reverse-coded structure observed in the present study.

### Conclusions

In summary, this study defined a new construct to assess achievement attitudes and behaviors. The Achievement-Quotient construct was modeled with a new scale. The reliability and validity of the AQ scale were assessed using standard techniques based upon data collected from 628 graduate and undergraduate business students. The overall AQ scale was demonstrated to be reliable ( $\alpha=0.79$ ), and exploratory factor analysis showed a two-factor structure with reverse-coded items separating themselves from straight-coding items. The scale behaved as expected with respect to all of the external criteria. No correlation with gender was noted. Respondents who reported better academic performance also tended have higher AQs. Those with greater earning power demonstrated higher AQs. In addition higher AQs were associated with both increased job satisfaction and better reported job performance.

In all, the scale was found to be a reliable and valid measure of the underlying construct. The researcher expects that this scale will prove useful to organizations on a variety of fronts. As a screening tool, an applicant's AQ may help indicate the likelihood that the prospective employee will exhibit high performance and be satisfied with the position. As a diagnostic tool, employees' AQs may help the organization identify those specific employees who may require more managerial attention and those who will tend to excel with less direction. As a prescriptive tool, a detailed analysis of an employee's responses to each of the AQ items will guide managers as to the specific areas on which they need to work with their employees. Indeed, aggregate

results over a number of employees for a given manager may even reveal strengths and weaknesses in the leadership for that department. In all, the AQ scale is an exciting new tool for organizational researchers and practitioners alike. At a minimum, one-time or occasional measurements of AQ in an organizational setting will get employees to think about their achievement-oriented attitudes and behaviors. However, a more strategic application of AQ assessments could act as the keystone of the change process which bridges the gap from an organization's current culture of entitlement, chaos, or apathy to the desired culture of order, drive, and achievement.

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## APPENDIXES

### APPENDIX A

#### INFORMED CONSENT & INVITATION LETTER

**To: <FIRST\_NAME>, Business Student, Grantham University**

**From: Russell W. Strickland, Adjunct Faculty, The Mark Skousen School of Business,  
Grantham University**

**Addendum: Endorsement letter from our new Provost, Dr. Gary Sutter available at (Link removed.)**

Dear <FIRST\_NAME>,

**My name is Russell W. Strickland. I am an adjunct faculty member at Grantham and a Ph.D. candidate in Organization & Management at Capella University. I would like to ask a quick favor of you. Could you please take five-ten minutes to help me complete my Ph.D. by responding to a survey online? If so, please scroll to the bottom of this message for the link to the survey and thanks! The remainder of this message is what's called an informed consent disclosure. Feel free to read everything or just jump to the survey. I really appreciate your help!**

As a business student at Grantham University, your opinions and attitudes are highly

representative of employees in corporate environments. In conjunction with my dissertation research at Capella University, I have created an instrument to assess important aspects of achievement which may be valued in an organizational setting. The intent is to produce an instrument that can be utilized by complex organizations to identify specific areas of strength and weakness pertaining to organizational performance with a focus on remediation and improvement.

Before a new instrument can be employed it must be validated to ensure that it accurately measures the concept of interest. This is why I have contacted you today. Please click on the link provided below to complete the brief survey. Participants should expect to spend five to ten minutes completing the survey. All responses will be kept strictly confidential. I will be the only person who has any access to the raw data. In particular, Grantham University will not receive any information pertaining to your participation, nor will published results be connected to individual participants in any way. You may choose not to participate for any reason without any penalty or stipulations.

I do hope that you will choose to complete the survey, as your attitudes and opinions will help to add to the body of knowledge in organizational behavior. Furthermore, the results of this research will be made available to participants upon request. I hope that these results will be pertinent to the performance of a variety of types of organizations. As such, obtaining the results of this project may be a great benefit to participants for use in their own professional environments.

Please feel free to contact me with any questions or to request project results. I can be reached at (e-mail, phone, and postal contact information removed).

Thank you very much for your time. Your insights are very much appreciated.

Russell W. Strickland

Adjunct Faculty, The Mark Skousen School of Business, Grantham University

Ph.D. Candidate, Organization & Management, Capella University

**Please click on the link below to take the survey:**

(Link removed.)

APPENDIX B  
SURVEY INSTRUMENT

The survey instrument was deployed on the World-Wide Web in four major sections: employment information, the job satisfaction scale, the job-performance scale, the achievement-quotient scale, and demographics. Each section is detailed below.

*Section 1: Employment Information*

- EI01: Please categorize your employment status (Full-time, Part-time, Not currently employed— Respondents who indicated that they were not employed were seamlessly branched to the AQ scale, skipping the job categorization, the job satisfaction job scale, and the job performance scale.).
- EI02: Number of years in current position (Less than 1, 1, 2, ..., 29, 30, More than 30).
- EI03: Number of years in current organization (Less than 1, 1, 2, ..., 29, 30, More than 30).
- EI04: Number of years in current field (Less than 1, 1, 2, ..., 29, 30, More than 30).
- EI05: Choose the description which best characterizes your job (Assistant/Secretary, Factory/Assembly, Management (Line), Management (Middle), Management (Executive), Office, Sales, Service (Customer), Service (Professional), Service (Repair), Technical, Other (Please specify)).

*Section 2: Job-Satisfaction Scale*

All items in the job-satisfaction scale were evaluated against a five-point Likert scale with the following anchor points: Very Dissatisfied, Somewhat Dissatisfied/Dissatisfied, Neither Satisfied or Dissatisfied, Somewhat Satisfied/Satisfied, Very Satisfied.

On my present job this is how I feel about:

Sat01: Being able to keep busy all the time.

Sat02: The chance to work alone on the job.

Sat03: The chance to do different things from time to time.

Sat04: The chance to be "somebody" in the community.

Sat05: The way my boss handles his/her workers.

Sat06: The competence of my supervisor in making decisions.

Sat07: Being able to do things that don't go against my conscience.

Sat08: The way my job provides for steady employment.

Sat09: The chance to do things for other people.

Sat10: The chance to tell people what to do.

Sat11: The chance to do something that makes use of my abilities.

Sat12: The way company policies are put into practice.

Sat13: My pay in relation to the amount of work I do.

Sat14: The chances for advancement on this job.

Sat15: The freedom to use my own judgment.

Sat16: The chance to try my own methods of doing the job.

Sat17: The working conditions.

Sat18: The way my coworkers get along with each other.

Sat19: The praise I get for doing a good job.

Sat20: The feeling of accomplishment I get from my job.

### *Section 3: Job-Performance Scale*

The job-performance scale features two subsections. Items from the first subsection were evaluated against a five-point Likert scale with the following anchor points: Strongly Disagree, Somewhat Disagree / Disagree, Neither Agree or Disagree, Somewhat Agree/Agree, Strongly Agree. Items from the second subsection were evaluated against a five-point Likert scale with the following anchor points: Rarely / Never, Occasionally, Sometimes, Frequently, Almost Always.

Sub-Section 1: Please select the best answer for each of the following questions with respect to your current job.

Perf01: I always complete the duties in my job description.

Perf02: I fulfill all responsibilities required by my job.

Perf03: I never fail to perform essential duties.

Perf04: I usually meet my obligations on the job.

Perf05: I meet all of the formal performance requirements of the job.



Sub-Section 2: Again, please select the best answer for each of the following questions with respect to your performance on your current job.

Perf06: I create new ideas for improvement.

Perf07: I search out new working methods, techniques, or instruments.

Perf08: I generate solutions to problems.

Perf09: I mobilize support for innovative ideas.

Perf10: I acquire approval for innovative ideas.

Perf11: I make important organizational members enthusiastic about innovative ideas.

Perf12: I transform innovative ideas into useful applications.

Perf13: I introduce innovative ideas into the work environment in a systematic way.

Perf14: I evaluate the utility of innovative ideas.

#### *Section 4: Achievement-Quotient Scale*

The achievement-quotient scale features two subsections. Items from the first subsection were evaluated against a five-point Likert scale with the following anchor points: Rarely / Never, Occasionally, Sometimes, Frequently, Almost Always. Items from the second subsection were evaluated against a five-point Likert scale with the following anchor points: Strongly Disagree, Somewhat Disagree / Disagree, Neither Agree or Disagree, Somewhat Agree/Agree, Strongly Agree.

Sub-Section 1: Please select the best answer with respect to your attitudes and behaviors.

AQ01: I learn from my mistakes.

AQ02: Clear goals help me to focus.

AQ03: Persistence and hard work lead to success.

AQ04: Some risk is necessary for success.

AQ05: People earn what they get.

AQ06: Assessing progress is key to success.

AQ07: I correct the situation when I make a mistake.

AQ08: My life seems like a series of random events.

AQ09: I tend to play it safe.

AQ10: I only work hard enough not to get fired.

AQ11: I admit when I am wrong.

AQ12: I seek approval before taking action.

AQ13: I set goals for myself.

AQ14: Other people control my life.

AQ15: I deserve better than I get.

Sub-Section 2: Again, please select the best answer with respect to your attitudes and behaviors.

AQ16: I like having control over my work.

AQ17: I have accomplished difficult goals.

AQ18: I earn the respect and honors I receive.

AQ19: I should not be subjected to performance appraisals.

AQ20: Job security should be an employee's right.

AQ21: I can develop a plan to achieve a given objective.

AQ22: The success I have is largely a matter of chance.

AQ23: When it comes to results, measuring is less important than doing.

AQ24: People must be the master of their own fate.

AQ25: The first step in solving a problem is to assign blame.

AQ26: People are entitled to be promoted based on time with their company.

AQ27: Personal responsibility is important to me.

AQ28: "Only those who dare to fail greatly can ever achieve greatly." -Robert F. Kennedy

AQ29: "Make no small plans for they have no power to stir the soul." -Niccolo Machiavelli

AQ30: "Two roads diverged in a wood, and I ... I took the one less traveled by, and that has made all the difference." -Robert Frost

### *Section 5: Demographic Information*

The following demographic information will be used to help categorize your responses. All information will be kept strictly confidential and not shared with anyone at the university or elsewhere. Individual results will never be published in anyway that would compromise confidentiality.

DI01: Please indicate your age. (Under 21, 21–25, 26–30, 31–35, 36–40, 41–45, 46–50, 51–55, 56–60, 61–65, Over 65)

DI02: Indicate your gender. (Male, Female)

DI03: Indicate your race / ethnicity. (Black, non-Hispanic, American Indian / Alaska Native, Asian / Pacific Islander, Hispanic, White, non-Hispanic)

- DI04: Indicate the academic degree you are currently pursuing. (Associates, Bachelors, Masters)
- DI05: Indicate your approximate percent completion of this degree to date. (0% (just started), 0-19%, 20-39%, 40-59%, 60-79%, 80-99%, 100% (graduating this term))
- DI06: When do you expect to graduate from this degree program? (Winter 2006, Spring 2006, Summer 2006, Fall 2006, Winter 2007, Spring 2007, Summer 2007, Fall 2007, Winter 2008, Spring 2008, Summer 2008, Fall 2008, Winter 2009, Spring 2009, Summer 2009, Fall 2009, Later than Fall 2009)
- DI07: How many courses do you complete during the typical term? (Less than 1, 1, 2, 3, 4, 5, More than 5)
- DI08: Indicate your overall GPA in current degree program. (Less than 2.00, 2.00–2.24, 2.25–2.49, 2.50–2.74, 2.75–2.99, 3.00–3.24, 3.25–3.49, 3.50–3.74, 3.75–3.99, 4.00)
- DI09: Indicate your total annual income from all sources of employment (not including income from other sources or household members). (Less than \$20,000, \$20,000 - \$39,999, \$40,000 - \$59,999, \$60,000 - \$79,999, \$80,000 - \$99,999, Over \$100,000)