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A Comparison of Traditional Versus Computerized Anxiety Assessment Using Personal Digital Assistants

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**A COMPARISON OF TRADITIONAL VERSUS COMPUTERIZED
ANXIETY ASSESSMENT USING PERSONAL DIGITAL ASSISTANTS**

**Thesis submitted to
The Graduate College of
Marshall University**

**In partial fulfillment of the
Requirements for the degree of
Master of Arts
Psychology**

by

Wesley Alan Smith

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Stephen O'Keefe, Ph.D.**

Marshall University

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ABSTRACT

A COMPARISON OF TRADITIONAL VERSUS COMPUTERIZED ANXIETY ASSESSMENT USING PERSONAL DIGITAL ASSISTANTS

By Wesley Alan Smith

The usage of the personal computer has become more prevalent in the field of psychology. The advent of the Personal Digital Assistant (PDA) has opened a new area of possible clinical application. These pen-based devices allow for a more natural interface and more mobility. The feasibility and application of the PDA for personality assessment will be examined in this study. Does having a test administered by a PDA lead to a significant change in response patterns compared to a test administered by the traditional pen and paper method? The purpose of this study was to examine differences in the anxiety levels of light computer users and heavy computer users using a PDA. Eight volunteers were utilized for this study. Analyses revealed no significant differences between groups concerning state anxiety and trait anxiety.

DEDICATION

The author wishes to dedicate this thesis to all those who have supported me through Graduate School. To my parents who have patiently supported me through this period and especially a very special thanks to my wife for her faith and support.

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CHAPTER I

Introduction

It is common knowledge that computers are infiltrating almost all aspects of today's society. The field of psychology is not immune from this invasion. The use of the computer in psychology has a long history. Researchers and clinicians have been trying to apply this technology to the area of assessment since the computer was introduced.

The scoring of psychological tests by hand is tedious, time consuming and error prone. Many psychologists therefore eagerly embraced technology in their quest to improve the efficiency and accuracy of testing. The use of mechanical scoring machines for psychological tests such as the Strong Vocational Interest Blanks (SVIB) first occurred in the 1920s. In 1946 Elmer Hankes built an analog computer for automatic scoring and profiling of the SVIB. By the late 1950s, enthusiasm for psychological assessment began to wane. It was during this time that many psychologists lost interest in assessment after establishing their credentials as psychotherapists. Many began to view the administering and interpretation of tests as demeaning (Fowler, 1985). Ironically, it was during this time period when the community mental health clinic system was established, increasing the demand for psychological testing.

The first computer-assisted psychological assessment program became operational in the early 1960s at the Mayo Clinic in Rochester, Minnesota (Fowler, 1985). The combination of optical scanners, IBM punch cards, and mainframe computers provided

quick, error-free scoring and profile printing of the Minnesota Multiphasic Personality Inventory (MMPI). Test results from such instruments as the SVIB, Sixteen Personality Factor Questionnaire (16PF) and the Rorschach were also evaluated during this time, but it was the MMPI that received the most focus.

By the 1970s, psychologists realized that computers could be integrated into the entire process of psychological assessment. Johnson and Williams (1975) described the use of a mainframe computer with 13 remote terminals to assess an average of 17 psychiatric inpatient administrations per day. Typically, patients completed the following computer-administered tests: MMPI, Beck Depression Inventory, an intelligence test, a memory test, and online social history. A structured mental status exam was conducted by an interviewer and entered directly into the computer. The computer scored the tests and generated a comprehensive narrative report. In a series of research studies, the Utah group demonstrated that these reports were generated in half the time and at half the cost of traditional evaluations (Klinger, Miller, Johnson, & Williams, 1977).

Millstein (1987) looked at the acceptability and reliability of information collected using a computer interview. The study examined response biases in 108 adolescent females randomly assigned to one of three groups: interactive computer group, face-to-face interview, or self-administered questionnaire. Assessment items included questions about general health history, gynecological and sexual history, subjective experience in relation to pelvic examinations, and history of health-related behaviors, such as substance use. Subjects interviewed by a computer reportedly enjoyed the interview more than subjects in the other groups. The participants completing the questionnaires reported the least enjoyment. Results showed no significant differences between subjects in the

groups on reports of sexual behavior, substance use or symptomatology. Reporting of affective states differed by group. Subjects in the computer group were more willing to acknowledge having positive affect than subjects in the other groups.

Honaker (1988) examined the equivalency of computerized and conventional MMPI administrations. It was argued that findings suggest that the two modes can be perceived and experienced differently by examinees, although it has not been directly studied on how these differences affect the assessment process. Mean score differences were also discussed in context to the inconsistencies reported in the literature concerning these two modes. Some studies found mean score differences while did not find differences. Most of the studies cited in this article revealed mean score differences but with no consistency in the scales in which the inconsistencies were found. It was concluded that studies had not adequately demonstrated that computer administration meets equivalency criteria.

Mead and Drasgow (1993) examined the equivalence of computerized and paper administered cognitive ability tests in a meta-analysis study. The effects of the mediums were examined for time and power tests of cognitive abilities for populations of young adults and adults. Meta-analytic techniques were used to estimate the cross-mode correlation after correcting for measurement error. A total of 159 correlations were meta-analyzed: 123 from timed power tests and 36 from speeded tests. The corrected cross-mode correlation was found to be .91 when all correlations were analyzed simultaneously. Speededness was found to moderate the effects of administration mode in that the cross-mode correlation was estimated to be .97 for time power tests but only .72 for speeded tests. No difference in equivalence was observed between adaptively and conventionally administered computerized tests.

Computer assessment is being extended into further areas today. The usage of the Personal Digital Assistant (PDA) for assessment is an area that has not yet received much attention. This is mostly likely because of the relative newness of the technology. There is relatively no research in this area to date. The increasing popularity of this instrument will lead to further research in its clinical application in the future.

Tseng, et al. (1998) examined the usage of pen-based PDAs in comparison with the conventional computer and pen-and-paper assessment of mood and performance. The study used a group comparative design in which the 136 paid participants were assigned via random stratification by gender and recruitment source to one of three groups: paper, computer or PDA. The study utilized Apple products, including the PDAs. The primary outcome measures were the correlations between ratings of computer anxiety, and measures of mood and cognitive function.

Seven test measures were administered in this study. To assess computer anxiety, the Computer Anxiety Rating Scale (CARS) and the Computer Use Questionnaire (CUQ) were utilized. The Self-Consciousness Scale (SCS) and the Visual Analogue Mood Scale (VAMS) were administered to measure mood. Tests of verbal memory, sentence verification and visual search were employed to measure cognitive functioning. Participants completed the assessments on the allocated medium, in the following medium: VAMS 1; Verbal Memory List 1; visual search; Verbal Memory List 2; sentence verification; verbal memory recall; VAMS 2. All participants were asked to fill in the CARS, CUQ and SCS using paper.

Self-ratings of mood measured by the three modalities covaried divergently with measures of computer anxiety and self-consciousness. In addition, computer anxiety

covariied with reaction time on the visual search task obtained on computers, but there was no such relationship when measured by a PDA. These results show that computer anxiety can affect the results of measurements of cognitive function as well as mood rating and suggest that pen-based systems have advantages over conventional computers in this respect.

The field of psychology is continually evolving. Computers are playing an ever-increasing role. The use of computer-assisted psychological assessment (CAPA) represents the invasion of the computer into many facets of professional life. CAPA holds great promise for the practice of psychology.

An advantage of computer interviews over clinician-administered interviews is the standardization of administrations. Each client is asked the same set of questions in the same manner and context, a feat difficult for a human interviewer (Stilman, Roth, Colby, & Rosenbaum, 1969). Another advantage is the elimination of an expectancy bias effect. Whereas the expectations of a human interviewer may influence the client, a computer has no expectations. In addition, the same program can be translated and normed into different languages facilitating access to services in areas where bilingual providers are scarce.

As the rapid development of information technology has brought, and continues to bring, powerful transformations upon psychological testing, it becomes increasingly important to establish what psychological dimensions may contribute to possible effects of administration medium on psychological testing. The emphasis on the effects of administration medium has been prompted largely by the computerization of paper instruments, as illustrated by the American Psychological Association's (1986)

Guidelines for Computer-Based Tests and Interpretations: “When interpreting scores from the computerized versions of conventional tests, the equivalence of scores from computerized versions should be established and documented before using norms or cutting scores obtained from conventional tests” (p. 18). For the administration modes of an instrument to be considered equivalent, they must produce equal mean scores, comparable distribution and ranking of scores, and correlate to a similar degree with scores on other variables (Hofer & Green, 1985). Mean score differences have traditionally been the primary focus in examining possible response differences between computerized testing and its paper-and-pen counterparts (Honaker, 1988; Mead & Drasgow, 1993).

The next possible step in the evolution of the computer is the Personal Digital Assistant (PDA). The recent developments of these pen-based devices offer more mobility and a more natural interface than that of a conventional computer. A previous study conducted by Tseng, Tiplady, Macleod and Wright (1998) provided evidence that on the individual characteristics of computer anxiety and private self-consciousness PDA scores were consistent with those of the paper method.

The feasibility and application of the PDA for psychological assessment was examined in the current study. The overall research question that the study proposes: Does having a test administered by a PDA influence a change in response patterns in relation to a test administered by the traditional paper method? The purpose of the study was to examine differences in the anxiety levels of light computer users and heavy computer users being assessed using a PDA.

CHAPTER II

Method

Participants

Ninety-two unpaid volunteers were recruited for this study. Seventy-eight participants were customers at a local retail establishment in north-central West Virginia. Fourteen participants were recruited at from a graduate college. All participants were randomly approached to volunteer. The proposal script (Appendix B) was followed in the recruitment process. Volunteers were treated in accordance with the “Ethical Principles of Psychologists and Code of Conduct” (American Psychological Association, 1992). Twelve participants dropped out of the study. Nine participants were from the local retail establishment group. Three were from the graduate college group.

The volunteers were assigned to one of four groups: Group A1, A2, B1 or B2. Those volunteers that reported limited to no computer usage (less than five hours per week) were placed in either Group A1 or Group A2. Participants in Groups B1 or B2 were those volunteers that reported moderate to heavy computer usage (more than five hours per week).

The participants had a mean age of 36.15 years ($SD = 11.79$, range 19-63 years) with 42 women (52.5%) and 38 men (47.5%). The overall education level mean of the participants was 14.29 years ($SD = 2.414$, range 9-18 years). Group A1 had an education level mean of 15.35 years ($SD = 2.386$). Group A2 had an education level mean of 14.90 years ($SD = 1.619$). Group B1 had an education level mean of 14.00 ($SD = 2.492$). Group B2 had an education level mean of 12.90 ($SD = 2.469$).

Materials

State-Trait Anxiety Inventory, Form Y: The instrument (Appendix A) is based on its authors' theoretical distinction between state anxiety, a transitory condition of perceived tension, and trait anxiety, a relatively stable condition of individual anxiety proneness. In responding to the S (state)-anxiety scale, examinees mark the number that best describes the intensity of their feelings: (1) not at all; (2) somewhat; (3) moderately; and (4) very much so. Examinees mark the number that best describes the way they generally feel by rating the frequency of their feelings in the following T (trait)-anxiety scale: (1) almost never; (2) sometimes; (3) often; and (4) almost always. The STAI Form Y contains two separate scales (S and T) consisting of twenty questions each, for a total of forty questions. Each item on the STAI is given a weighted score of one to four. The score for each part can vary from a minimum of twenty to a maximum of eighty.

The test-retest reliabilities of Form Y are almost identical to Form X, the previous version (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). The stability coefficients for Form Y were based on two groups of high school students tested in classroom settings. The stability coefficients for Form X are based on three different groups of undergraduate college students. The authors (Spielberger, et al., 1983) report that the test-retest correlations for the T- anxiety scale were reasonably high for college students, ranging from .73 to .86 for the six subgroups, but somewhat lower for the high school students, ranging from .65 to .75. The median reliability coefficient for the T- Anxiety scale for college and high school students were .765 and .695, respectively. For the S- Anxiety scale, the stability coefficients for college and high school students were relatively low, ranging from .16 to .62, with a median reliability coefficient of only .33.

Relatively low stability coefficients were expected for the S-Anxiety scale because a valid measure of state anxiety should reflect the influence of unique situational factors that exist at the time of testing (Spielberger, et al., 1983, p 31).

Given the transitory nature of anxiety states, the authors (Spielberger, et al., 1983, p 31) contend that measures of internal consistency such as the alpha coefficient provide a more meaningful index of the reliability of S-Anxiety scales than test-retest correlations. Alpha coefficients for the Form Y S-Anxiety scales, computed by Formula KR-20, reported that all but one of the alphas were above .90 for the samples of working adults, students, and military recruits, with a median coefficient of .93. The alpha coefficients for the T-Anxiety scale were also uniformly high, with a median coefficient of .90. It was also noted that the S-Anxiety and T-Anxiety alpha coefficients for the working adults remained high over the entire age range.

Palm IIIc: The Palm IIIc is a handheld organizer produced by Palm Incorporated. It combines functionality, speed and a color display in a pocket-sized package. It operates on a Motorola 68382 20 MHz processor. This model has 8 Mega Bytes of Random Access Memory and flash memory for storage. It utilizes a 4" touch-screen with 8-bit (256 color) resolution, which accepts input via a pen-like stylus. Information is synchronized between the PDA and a computer using a special connecting device. This model operates on a rechargeable lithium ion battery, which can be recharged. It weights 0.4 pounds. The dimensions of the model are: 5" (H) x 3.2" (W) x 0.7" (D). Assessment software utilized for this study was downloaded from the Internet at the Thinkingbytes Company website (2003). The software was modified for the STAI by the examiner.

Procedure

The majority of the volunteers were recruited from a local retail establishment in north-central West Virginia. Customers between the ages 18 to 65 were asked to participate in the study using a set script (Appendix B). Those who gave their approval and fulfilled the age parameters were given a consent form (Appendix C) to read and complete. Any questions or concerns the participants had about the study were addressed. The volunteers were instructed that they could drop out of the study at any time. After the consent form was signed, demographic information was acquired (Appendix D). Included in the demographic questions was a question concerning the amount of computer usage. The volunteers completed the demographic form to insure some level of literacy.

The paper version of the State-Trait Anxiety Inventory (STAI), Form Y was then administered to half of the participants. The PDA version was administered to the other half to help control for practice effects. Instructions for this instrument were printed on the top of the protocol. At the time of completion of the paper version, arrangements were made to conduct the next portion of the study two weeks later at the same location and approximately the same time of day. After the initial baseline information had been gathered, the participants were assigned to one of two overall groups: Group A or Group B. Group A consisted of those participants that reported low average computer usage. Moderate to high computer usage was the criteria for placement into Group B. The participants were further divided into Groups A1, A2, B1, and B2 according to the delivery method in which they were administered the STAI. Groups A1 and B1 were administered the paper version of the STAI. Groups A2 and B2 were administered the

PDA version of the STAI. To insure anonymity, participants were assigned a number code. Results were recorded.

Just before a period of two weeks had passed, participants were contacted by the examiner as a reminder of their appointment for the second portion of the study. At the appointed time, participants in Groups A1 and B1 were then given the PDA version of the instrument. Subjects in Groups A2 and B2 were also then administered the STAI the paper version. All participants received a brief tutorial concerning the use of the PDA, including the usage of a sample question not related to the study. The Palm IIIc utilizes a pen-like stylus to input information. The PDA interview began with a brief introduction to the PDA and a practice question. The examiner remained with the subject during this process to answer any questions. Subjects completed the measure independently.

Each STAI item presents a condition, followed by the response options previously mentioned. On the PDA version of the STAI, subjects were instructed to select the appropriate onscreen letter or phase, which corresponds to their response to each item. After answering the question, the subject's response as well as the question remained on the screen and the subject was presented the options of (1) going to the next question, (2) returning to the previous question, or (3) stopping the interview. After the completion of this portion of the study, participants were debriefed. Results obtained from the PDA were imported to a personal computer using a Hotsync ® attachment cradle. Results were collected and analyzed by the examiner.

CHAPTER III

Results

Analysis of Data

A between-subjects, two-group, quasi experimental design was used for this study. A one-way analysis of variance (ANOVA) was conducted using SPSS Version 11.5 software to analyze the possible effects of state anxiety reported in each group. A one-way ANOVA was also conducted to analyze the possible effects of trait anxiety reported in each group. An alpha level of .05 was used for all statistical tests. Raw scores can be found in Appendix E.

The one-way ANOVA showed no significant differences in the reporting of state anxiety between subjects in all groups using a PDA. With an alpha level of .05, the effect of the PDA administration was not statistically significant, $F(3,76) = 1.040, p = 0.380$, and thus fails to reject the null hypothesis. The one-way ANOVA also showed no significant differences in the reporting of state anxiety between subjects in all groups using paper. With an alpha level of .05, the effect of the paper administration was not statistically significant, $F(3,76) = 1.101, p = 0.354$, and thus fails to reject the null hypothesis. Results of the ANOVA are displayed in Table 1.

TABLE 1. ANALYSIS OF VARIANCE FOR STATE ANXIETY LEVELS IN LOW COMPUTER USERS AND HIGH COMPUTER USERS

		Sum of Squares	df	Mean Square	F	Sig.
PDA	Between Groups	285.438	3	95.146	1.040	.380
	Within Groups	6952.450	76	91.480		
	Total	7237.888	79			
Paper	Between Groups	402.700	3	134.233	1.101	.354
	Within Groups	9268.300	76	121.951		
	Total	9671.000	79			

The one-way ANOVA also showed no significant differences in the reporting of trait anxiety between subjects in all groups using the PDA. With an alpha level of .05, the effect of the PDA administration was not statistically significant, $F(3,76) = 0.356$, $p = .785$, and thus fails to reject the null hypothesis. The one-way ANOVA showed no significant differences in the reporting of anxiety in all groups using paper. With an alpha level of .05, the effect of the PDA administration was not statistically significant, $F(3,76) = 0.832$, $p = 0.480$, and thus fails to reject the null hypothesis. Results of the ANOVA are displayed in Table 2. Frequency data can be found in Appendix E, Tables 3 to 10.

TABLE 2. ANALYSIS OF VARIANCE FOR TRAIT ANXIETY LEVELS OF LOW COMPUTER USERS AND HIGH COMPUTER USERS

		Sum of Squares	df	Mean Square	F	Sig.
PDA	Between Groups	87.750	3	29.250	.356	.785
	Within Groups	6244.200	76	82.161		
	Total	6331.950	79			
Paper	Between Groups	237.637	3	79.212	.832	.480
	Within Groups	7236.850	76	95.222		
	Total	7474.488	79			

Since there is a threat to internal validity in regards to state anxiety's low reliability coefficient, a further analysis was also performed. In particular, the S- anxiety scores obtained by the traditional method were correlated in order to attempt to replicate the results of the STAI's normative data. A Pearson correlation coefficient of $-.076$ was obtained. The results of the Pearson's r were inconsistent with the normative data of the S- Anxiety scale.

CHAPTER IV

Discussion

The application of PDA technology to the field of psychology can lead to better service provided to clients. If clients would be less anxious when taking an assessment via a PDA, then technology will have provided a valuable purpose. If clients are more anxious, then this technological application will have done a disservice to the client.

The test user can potentially benefit from many features of this technology. One potential benefit is that the PDA is as patient and unbiased as the software's programmer makes it. Another benefit is that the testing material is presented in the same manner with every administration. Test bias from halo effects and leniency should be drastically reduced or possibly eliminated. Bias related to social desirability should also be reduced.

Computation errors could also be reduced when using this technology. Because the client interacts directly with the PDA, one step in the testing process is eliminated. In the case of this study, responses on the PDA were tallied and produced a score at the end of each administration. It provided for instant feedback. In comparison, the paper method requires the administrator to either have the results memorized, which can produce errors, or consult the scoring key and compare each response for its number value. Once that is done the values must then be added for each section.

Some limitations of this study must be resolved before this technology can be used more widely. It should be noted that the lack of variability should be further explored to ensure the equivalency of these two methods of assessment. It should also be noted that the overall mean education levels for this study were relatively high at 14.29 years of

education. During the data collection process many people who were approached refused to be a participant on the basis that they were illiterate. Further studies are needed to determine if the results of this study can be replicated in a less educated population. Future studies are also needed to replicate this study utilizing clinical subjects. Future studies should also address the threat to internal validity by using a split-half method. Results of this study should be considered in this light.

Software can be a potential problem in utilizing this technology. A potential problem arose during this study with the software. Software available for the collection of data using a PDA is limited. The reliability of the software for this study was questioned many times by the examiner. In the beginning, certain programming quirks did not allow for the full collection of data. These quirks were resolved before the study was implemented. Another potential problem arose during the study. At unknown intervals the software would skip a question or questions. This did not occur on a regular basis but did occur often enough to warrant the examiner to amend the instructions to the participants to be aware of the quirk and make sure they answered all questions. This issue should be resolved once the PDA is used more frequently for testing purposes.

A possible stumbling block to the utilization of this medium would be privacy concerns. These concerns can be solved with frequent downloading of test data to a main computer. Encryption programs can also be purchased to ensure that private information will be safeguarded in the case of loss or theft.

Another possible stumbling block to the further utilization of this medium would be copyrights. The copyright holders may embrace this technology for all its potential or dismiss it as a fad. Copyright holders will understandably wish to protect their property.

There must be safeguards in place to protect copyrights holders in order for this medium to be widely accepted.

PDA technology has the potential to make psychological assessment easier for the clinician. It can help relieve some common assessment problems while providing quicker results. The benefits have to be balanced with the drawbacks. Further research is needed to assure the viability of this medium.

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Appendix A

mind garden

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-1

Please provide the following information:

Name _____ Date _____ S _____

Age _____ Gender (Circle) M F T _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

NOT AT ALL
 SOMEWHAT
 MODERATELY SO
 VERY MUCH SO

- | | | | | |
|--|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I am tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel comfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I am jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

ALMOST NEVER
SOMETIMES
OFTEN
ALMOST ALWAYS

- | | | | | |
|---|---|---|---|---|
| 21. I feel pleasant | 1 | 2 | 3 | 4 |
| 22. I feel nervous and restless | 1 | 2 | 3 | 4 |
| 23. I feel satisfied with myself | 1 | 2 | 3 | 4 |
| 24. I wish I could be as happy as others seem to be | 1 | 2 | 3 | 4 |
| 25. I feel like a failure | 1 | 2 | 3 | 4 |
| 26. I feel rested | 1 | 2 | 3 | 4 |
| 27. I am "calm, cool, and collected" | 1 | 2 | 3 | 4 |
| 28. I feel that difficulties are piling up so that I cannot overcome them | 1 | 2 | 3 | 4 |
| 29. I worry too much over something that really doesn't matter | 1 | 2 | 3 | 4 |
| 30. I am happy | 1 | 2 | 3 | 4 |
| 31. I have disturbing thoughts | 1 | 2 | 3 | 4 |
| 32. I lack self-confidence | 1 | 2 | 3 | 4 |
| 33. I feel secure | 1 | 2 | 3 | 4 |
| 34. I make decisions easily | 1 | 2 | 3 | 4 |
| 35. I feel inadequate | 1 | 2 | 3 | 4 |
| 36. I am content | 1 | 2 | 3 | 4 |
| 37. Some unimportant thought runs through my mind and bothers me | 1 | 2 | 3 | 4 |
| 38. I take disappointments so keenly that I can't put them out of my mind | 1 | 2 | 3 | 4 |
| 39. I am a steady person | 1 | 2 | 3 | 4 |
| 40. I get in a state of tension or turmoil as I think over my recent concerns and interests | 1 | 2 | 3 | 4 |

Appendix B

Recruitment Script

The following statements will be read in the process of recruiting subjects for the study. This script will be adhered to for the recruitment of all potential subjects.

Hello! My name is Wesley Smith. I am a graduate student at Marshall University Graduate College, working on my Master's Degree in psychology. I am currently working on my thesis project, which concerns assessment procedures. Would you like to participate in this study?

The following will be stated if the response is negative:

Thank you for your time. Have a good day!

The following will be stated if the response is affirmative:

Your participation is completely voluntary and you will be free to refuse or stop at any time without penalty. If you decide to participate in this study, your involvement will take no more than 1 hour of your time, spread between two individual sessions. All personal information collected during this study will be strictly confidential. Are you between the ages 18 and 65?

The following will be stated if the response is negative:

I am sorry, but the parameters of the study call for participants between the ages 18 and 65. Thank you for your time. Have a good day!

The following will be stated if the response is affirmative:

OK. I would now like you to read this form and follow the instructions (handing the participant a consent form). Please let me know if you have any questions.

Appendix C

Adult Consent for Own Participation

I would like to participate in a research study entitled: “A Comparison of Traditional Versus Computerized Anxiety Assessment Using Personal Digital Assistants.” The purpose of this study is to gain a better understanding of different assessment delivery methods. If I decide to participate in this study, my total involvement will take no more than 1 hour of my time. It will involve two separate sessions, timed two weeks apart. I will be asked to read and listen to the instructions and complete the questions on the instrument to the best of my ability. At a later time, I will be asked to complete the same instrument, using a different medium of delivery. There are no monetary benefits from my participation. The main potential risk associated with this study is the sudden awareness of an anxiety problem. In the unlikely event of illness or injury as a direct result of participating in this study, no compensation, financial or otherwise, will be provided by the investigators or Marshall University.

My participation is completely voluntary and I will be free to refuse or stop at any time without penalty. All information will be number coded and strictly confidential. My identity will not be revealed without my written consent.

If I have any questions later, I may contact:

Tony Goudy, Ph.D.
Psychology Department
Marshall University Graduate College
(304) 746-1926

Elizabeth Boyles, Ph.D.
Psychology Department
Marshall University Graduate College
(304) 746-2032

If I have questions regarding my rights as a participant in a research study, I may contact Henry K. Driscoll, M.D., IRB Chairperson, at (304) 696-7320.

Please Initial Here _____

I understand that my confidentiality will be kept to the extent the law and institutional policy will allow. I understand that appropriate state and/or federal agencies and the Marshall University Institutional Review Board may review the information obtained from this study.

Signature _____ Date _____

Investigator _____ Date _____

Witness _____ Date _____

Please place your initials here acknowledging receipt of a copy of this consent form.

Appendix D

Name: _____

Address: _____

City: _____

State: _____

Telephone Number: _____

Age: _____

Last Year Completed of Education: _____

Employment: _____

Do you spend: (please check one)

More than 5 hours per week using a computer? _____

Less than 5 hours per week using a computer? _____

Appendix E
Frequency Tables

TABLE 3. STATE ANXIETY FREQUENCIES OF PARTICIPANTS IN LOCAL RETAIL ESTABLISHMENT ASSESSED BY PAPER

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20	3	4.3	4.3	4.3
21	4	5.8	5.8	10.1
22	3	4.3	4.3	14.5
23	2	2.9	2.9	17.4
24	7	10.1	10.1	27.5
25	2	2.9	2.9	30.4
26	2	2.9	2.9	33.3
27	4	5.8	5.8	39.1
29	2	2.9	2.9	42.0
31	1	1.4	1.4	43.5
32	4	5.8	5.8	49.3
33	2	2.9	2.9	52.2
34	3	4.3	4.3	56.5
35	2	2.9	2.9	59.4
36	2	2.9	2.9	62.3
37	4	5.8	5.8	68.1
38	1	1.4	1.4	69.6
39	3	4.3	4.3	73.9
40	3	4.3	4.3	78.3
42	1	1.4	1.4	79.7
44	3	4.3	4.3	84.1
45	2	2.9	2.9	87.0
47	1	1.4	1.4	88.4
50	1	1.4	1.4	89.9
51	1	1.4	1.4	91.3
52	1	1.4	1.4	92.8
55	1	1.4	1.4	94.2
57	1	1.4	1.4	95.7

59	1	1.4	1.4	97.1
66	1	1.4	1.4	98.6
67	1	1.4	1.4	100.0
Total	69	100.0	100.0	

TABLE 4. STATE ANXIETY FREQUENCIES OF PARTICIPANTS IN LOCAL RETAIL ESTABLISHMENT ASSESSED BY PDA

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20	1	1.4	1.4	1.4
21	2	2.9	2.9	4.3
22	5	7.2	7.2	11.6
23	3	4.3	4.3	15.9
24	3	4.3	4.3	20.3
26	2	2.9	2.9	23.2
27	4	5.8	5.8	29.0
28	3	4.3	4.3	33.3
29	4	5.8	5.8	39.1
30	2	2.9	2.9	42.0
31	3	4.3	4.3	46.4
32	3	4.3	4.3	50.7
33	2	2.9	2.9	53.6
34	2	2.9	2.9	56.5
35	3	4.3	4.3	60.9
36	1	1.4	1.4	62.3
37	4	5.8	5.8	68.1
38	3	4.3	4.3	72.5
39	1	1.4	1.4	73.9
40	1	1.4	1.4	75.4
41	1	1.4	1.4	76.8
42	4	5.8	5.8	82.6
43	2	2.9	2.9	85.5
44	1	1.4	1.4	87.0
48	2	2.9	2.9	89.9
49	1	1.4	1.4	91.3
50	2	2.9	2.9	94.2
53	1	1.4	1.4	95.7
55	1	1.4	1.4	97.1
56	1	1.4	1.4	98.6

	59	1	1.4	1.4	100.0
	Total	69	100.0	100.0	

TABLE 5. TRAIT ANXIETY FREQUENCIES OF PARTICIPANTS IN LOCAL RETAIL ESTABLISHMENT ASSESSED BY PAPER

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20	1	1.4	1.4	1.4
21	3	4.3	4.3	5.8
23	1	1.4	1.4	7.2
24	5	7.2	7.2	14.5
25	3	4.3	4.3	18.8
26	2	2.9	2.9	21.7
27	5	7.2	7.2	29.0
28	3	4.3	4.3	33.3
29	4	5.8	5.8	39.1
30	4	5.8	5.8	44.9
31	1	1.4	1.4	46.4
32	2	2.9	2.9	49.3
33	2	2.9	2.9	52.2
34	4	5.8	5.8	58.0
35	4	5.8	5.8	63.8
36	1	1.4	1.4	65.2
37	2	2.9	2.9	68.1
38	3	4.3	4.3	72.5
39	4	5.8	5.8	78.3
40	3	4.3	4.3	82.6
42	3	4.3	4.3	87.0
43	1	1.4	1.4	88.4
45	3	4.3	4.3	92.8
46	1	1.4	1.4	94.2
51	1	1.4	1.4	95.7
55	1	1.4	1.4	97.1
56	1	1.4	1.4	98.6
66	1	1.4	1.4	100.0
Total	69	100.0	100.0	

TABLE 6. TRAIT ANXIETY FREQUENCIES OF PARTICIPANTS IN LOCAL RETAIL ESTABLISHMENT ASSESSED BY PDA

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 21	4	5.8	5.8	5.8
23	4	5.8	5.8	11.6
24	3	4.3	4.3	15.9
25	3	4.3	4.3	20.3
26	3	4.3	4.3	24.6
27	3	4.3	4.3	29.0
28	2	2.9	2.9	31.9
29	2	2.9	2.9	34.8
30	4	5.8	5.8	40.6
31	3	4.3	4.3	44.9
32	1	1.4	1.4	46.4
33	3	4.3	4.3	50.7
34	3	4.3	4.3	55.1
35	4	5.8	5.8	60.9
36	3	4.3	4.3	65.2
37	3	4.3	4.3	69.6
39	2	2.9	2.9	72.5
40	2	2.9	2.9	75.4
41	1	1.4	1.4	76.8
42	3	4.3	4.3	81.2
43	4	5.8	5.8	87.0
44	1	1.4	1.4	88.4
45	2	2.9	2.9	91.3
46	1	1.4	1.4	92.8
47	1	1.4	1.4	94.2
50	1	1.4	1.4	95.7
51	1	1.4	1.4	97.1
54	1	1.4	1.4	98.6
59	1	1.4	1.4	100.0
Total	69	100.0	100.0	

TABLE 7. STATE ANXIETY FREQUENCIES OF GRADUATE STUDENTS ASSESSED BY PDA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20	1	9.1	9.1	9.1
	21	1	9.1	9.1	18.2
	22	1	9.1	9.1	27.3
	23	1	9.1	9.1	36.4
	25	1	9.1	9.1	45.5
	30	1	9.1	9.1	54.5
	34	1	9.1	9.1	63.6
	35	1	9.1	9.1	72.7
	36	1	9.1	9.1	81.8
	39	1	9.1	9.1	90.9
	48	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

TABLE 8. TRAIT ANXIETY FREQUENCIES OF GRADUATE STUDENTS ASSESSED BY PDA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21	2	18.2	18.2	18.2
	25	1	9.1	9.1	27.3
	26	1	9.1	9.1	36.4
	29	1	9.1	9.1	45.5
	31	1	9.1	9.1	54.5
	35	2	18.2	18.2	72.7
	41	1	9.1	9.1	81.8
	46	1	9.1	9.1	90.9
	54	1	9.1	9.1	100.0
	Total	11	100.0	100.0	

TABLE 9. STATE ANXIETY FREQUENCIES OF GRADUATE STUDENTS ASSESSED BY PAPER

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20	2	18.2	18.2	18.2
23	1	9.1	9.1	27.3
24	1	9.1	9.1	36.4
25	1	9.1	9.1	45.5
26	1	9.1	9.1	54.5
27	1	9.1	9.1	63.6
28	1	9.1	9.1	72.7
32	1	9.1	9.1	81.8
41	2	18.2	18.2	100.0
Total	11	100.0	100.0	

TABLE 10. TRAIT ANXIETY FREQUENCIES OF GRADUATE STUDENTS ASSESSED BY PAPER

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20	1	9.1	9.1	9.1
21	1	9.1	9.1	18.2
27	3	27.3	27.3	45.5
31	1	9.1	9.1	54.5
35	1	9.1	9.1	63.6
38	1	9.1	9.1	72.7
43	1	9.1	9.1	81.8
46	1	9.1	9.1	90.9
51	1	9.1	9.1	100.0
Total	11	100.0	100.0	