ORTHOSTATIC CHALLENGE RESPONSE OF
ABUSED AND NON-ABUSED WOMEN

By
CATHERINE O. OWEN

A project submitted in partial fulfillment of the requirements for the degree of

MASTER OF NURSING

WASHINGTON STATE UNIVERSITY
INTERCOLLEGIATE COLLEGE OF NURSING

December 2003
To the Faculty of Washington State University:

The members of the Committee appointed to examine the clinical project of CATHERINE O. OWEN find it satisfactory and recommend that it be accepted.

[Signatures]

Chair

[Signature]

[Signature]
I want to express my sincere appreciation to those individuals who assisted me in the preparation of this manuscript. First, I want to thank Michael Rice for his support, suggestions and valuable insights, as well as the time he devoted to help a neophyte complete this work in a timely manner. Renee Hoeksel for reminding me that this was my educational experience, and for encouraging me to follow the path I desired.

To Kathie Records my special gratitude for encouragement, hours of answering phone calls, urging me forward, and for being my lifeline. She truly is a unique individual and a wonderful teacher. To Annie who stepped in when everyone else was too busy, and spent hours of her time to facilitate my work.

To my daughters and son in laws, a thank you for your support and assistance, as well as sacrificing your time in my behalf. And Last, but certainly not least to my husband, Ralph, who always encouraged me in my endeavors to advance my education, rallied me when discouraged and added humor to relieve stress.
ORTHOSTATIC CHALLENGE RESPONSE OF ABUSED AND NON-ABUSED WOMEN

Abstract

by Catherine Onedia Owen
Washington State University
December 2003

Chair: Kathie Records

Post-Traumatic Stress Disorder (PTSD) is a condition characterized by prominent affective symptoms and by a hyperactive nervous system in response to severe stress. Adrenergic receptors, when hyper-stimulated during severe or chronic stress, can become permanently altered. Physiological changes due to stress are being tested for use as assessment tools. Further information is needed to determine if medications commonly administered for PTSD will mask the physiological changes associated with stress. The purpose of this study was to compare the cardiac response rates of a convenience sample of abused and non-abused women. The abused women were recruited from a mental health clinic and were categorized into four groups based on their treatment(s): Benzodiazepines (Benzo), Selective Serotonin Reuptake Inhibitors (SSRI), or both Benzo and SSRI's. Non-medicated group were non-abused women who were recruited from Latter Day Saint Social Services. Stress response theory guided the study.

Cardiac rate responses were then measured at 0, 1, 5, and 10 minutes (lying down) and 0, 1, and 5 minutes (standing). Significant relationships existed
between difference scores at 1 minute lying down and 5 minute standing for abused and non-abused women (r = .854, p ≤ .05, r = .651, p ≤ .05, respectively). The mean differences in pulse rates for all types of abuse indicated that the physiological responses to sexual abuse alone are not as dramatic as responses to physical and sexual abuse. This may have been due to the small sample. The high-low mean for treatment groups show treatment with Benzo and/or SSRI's do not mask the cardiac response rates. Pulse rates continue to be viable assessment tools for identification of traumatic responses, even with individuals on medications. The results are significant for nursing because a physiologic protocol for abuse assessments will improve the ability of clinicians to reveal abused clients and intervene effectively.
DEDICATION

This clinical project is dedicated to the women whose lives have been affected by abuse and who willingly participated in this research.
INTRODUCTION

The Surgeon General reports that the number one cause of injury and the leading cause of death among women in the U.S. is domestic violence (Torpey, 2002). Abuse has more long-term effects than any other crime. Many battered women have persistent psychological emotional and physiological injuries that can last for years. According to the American Medical Association (AMA), (1990) 84% of battered women were found to be suffering from Post-Traumatic Stress Disorder (PTSD). “Between 22% - 35% of women visiting emergency departments in the U.S. are there for symptoms related to ongoing abuse” (As cited by Kilgore, 2002).

The AMA published diagnostic and treatment guidelines for domestic violence and the U.S. Joint Commission on Accreditation of Healthcare Organizations (JCAHO) began including an evaluation of emergency room policies and procedures for dealing with abuse victims in accreditation reviews (Torpey, 2002). Despite such efforts, progress is slow in obtaining compliance with JCAHO evaluations. In most countries, doctors and nurses rarely ask women whether they are being abused, even when there are obvious signs of abuse (Torpey, 2002). Facilities that have established guidelines often do not monitor or enforce their implementation (Torpey, 2002).

The traumatic events imposed by abuse activate a stress response. Neural systems in the hypothalamic-pituitary-adrenal axis (HPA), the central nervous system (CNS), and peripheral systems respond to prolonged repetitive activation by altering neurochemical and synaptic sculpting, organization, and
function. These systems often do not return to a normal state after the trauma has ended (van der Kolk et al., 1996). Persistent disruption and lack of homeostasis lead to a permanent state of change of the neuronal system and the clinical disorder known as PTSD.

The Problem

Families in which domestic violence occurs utilize doctors 8 times more often, visit the emergency room 6 times more often, and use 6 times more prescription drugs than the general population (Seattle Domestic Violence Project, 1989). Women who have PTSD are often misdiagnosed for alcoholism, depression, drug addiction, and mental illness. Research has indicated that individuals exposed to violence are at an increased risk for emotional, social, and physical problems (Perry, 1998a).

Because of present barriers to identifying abuse status using paper and pencil questionnaires, an improvement in the identification process of this population by medical personnel could occur if a sensitive and specific biophysical measure was available (Rice & Records, 2000). It has been proposed that the sympathetic nervous system may be used to such an end (Perry, 1994; Rice & Records, 2000). In studying the trauma responses of Vietnam Veterans and PTSD children, Perry (1994) reported a series of studies in which cardiac rate changes were associated with trauma. Rice and Records (2001) argued that this response reflects the emotional tone of victims. Implementation of a standard biophysical protocol could effectively identify abuse victims.
Existing Studies

Studies support the argument of use-dependent (i.e. fight, to flight, to simply giving up) alterations in key neural systems of the brain associated with a stress response following a traumatic event. The brain mediates danger with predictable neurobiological, neuroendocrine, and neuropsychological responses. The response to fear is different in each individual.

Neurobiological and mental responses to stress vary with the nature, intensity, and frequency of exposure to traumatic events. The primary adaptive response pattern caused by extreme threat is hyper-reactivity. This response activates a combination of neural systems.

When the brain activates the neurophysiological system associated with alarm, the body experiences an automatic physical response. As an individual feels threatened, the brain alters its action in an effort to create appropriate mental and physical responses to the threat. The cognitive, emotional, and behavioral functioning of the individual is reflected in this shift. If the trauma is prolonged and symptoms more pronounced during the immediate post-traumatic period, there will be long-term, chronic, and permanent changes in the individual's emotional, behavioral, cognitive, and physiological functioning (Perry, 2001). It is this abnormal persistence of the original adaptive response that results in neuropsychiatric disorders, such as PTSD. The severity of hyper-reactivity depends upon factors such as continuation of trauma, the individual's support system, basic beliefs, and their ability to cope with trauma.
Methodologies used in previous studies include, but are not limited to, clinical interviews (Sutherland, Bybee, & Sullivan, 2002), retrospective studies (Hughes & Jones, 2000), questionnaires (Stoebner, Johnson, Combs, & Nash, 1999), and overviews of previous research (Anderson & Cramer-Benjamin, 1999). Major methodological limitations include problems such as bias, small sample size, and utilization of non-representative samples (Sutherland, Bybee, & Sullivan, 2002). There are also inaccuracies in estimating and tracking the development of PTSD (Ford & Kidd, 1998), and a lack of longitudinal studies that follow the course of the disease. Furthermore, retrospective methodology used in some studies suggests distortions in recall of events (Dubowitz et al., 2001).

Rice and Records (2002) tested Perry’s (1994) premise and examined the cardiac responses of abused and non-abused childbearing aged women. Heart rates of twenty abused (10 pregnant, 10 non-pregnant) and twenty non-abused women (10 pregnant, 10 non-pregnant) were monitored and recorded at set intervals before and after an orthostatic challenge. Results indicated that abused women, whether pregnant or not, could accurately be identified through the use of the biophysical protocol 83% of the time (Rice & Records, 2002).

Previous studies hold promise for practitioners who understand the impact of trauma and can use systematic recordings of physical outcomes to assist in the development of new treatment directions. This information may assist in identifying more abuse victims in various health care settings and facilitate the development of research-based protocols, thus contributing to the knowledge base for treatment of PTSD (Rice & Records, 2002).
Statement of the Purpose

The purpose of this study is to determine if the sympathetic nervous system’s response to stress is different for abused women using SSRI’s, Benzodiazepines, a combination of both, or CBT from responses of non-abused women.

Significance for Nursing

This study is significant for nursing in that it may provide validation of a biophysiological assessment for abuse in a clinical setting. Cardiac rate is an initial indicator that an individual is in a state of hyperarousal and may be the victim of either current abuse or experiencing PTSD. This will aid the medical professional by offering a screening protocol to initially alert social workers or psychiatric liaisons of potential abuse. Nurses can then offer or provide alternative interventions such as counseling, safety, and access to professionals who can assist abused subjects further. Information or assistance can then be provided without excessive questioning of individuals in unfamiliar settings, or in the presence of possible abusers, where abused women may feel unsafe in answering.

Neuropsychiatric Framework

The framework for this study is based on the neurodevelopmental impact of violence theory of Perry (2001). His theory states that the original adaptive neurophysiological aspects associated with response to threat become the norm, rather than the exception (Perry, 1998a). This theory proposes that persistent fear and neurophysiological adaptations to fear can alter neuropathways of the
brain, resulting in changes in physiological, emotional, behavioral, cognitive and social functioning.

During the hyperarousal stage of fear many physiological systems required for survival are activated, as well as the stress response hormones, cortisol and adrenaline. These responses cross multiple brain areas such as the locus coeruleus, the amygdala, the hypothalamus, and the brainstem nuclei. These areas of the brain are responsible for automatic nervous system regulation (Perry, 2001).

A relationship exists between abuse status and cardiac heart rate as well as the prospect of developing PTSD as a maladaptive response to trauma. This is a combination of both neurodevelopmental and psychosocial responses to persistent states of fear (Figure 1).

![Figure 1: Model of abuse status, cardiac rates and measurement](image.png)
Literature reviews show that exposure to trauma is related to extreme stress disorders and becomes a subsequent risk factor for the development of PTSD. In an analysis of children exposed to domestic violence, the findings suggested chronic and abnormal activation of the sympathetic nervous system (Perry, 1994; Perry, 1999). Evidence of brain-mediated alterations of cardiovascular functioning occurs in both the acute and chronic post-traumatic period. The resting heart rate is different from comparison populations of children not exposed to domestic violence.

A growing body of evidence is now supporting a neuropsychiatric impact of trauma on the neuronal systems in the brain. The literature shows how persistent fear can alter the brain. Perry (1999) has shown that there is an altered Pituitary-Adrenal Axis response to trauma. “Neurons and neuronal connections (synapses) change in an activity dependent fashion” (Perry, 1994, p. 311-326).

Perry (1999) stated that continuous or chronic activation of the adaptive fear response resulted in a maladaptive and persistent state of fear. The activation of the fear response causes a state of hypervigilence, with increased muscle tone, a focus on threat-related cues, anxiety, and behavioral impulsivity that are an adaptive response during a threatening event. These responses become ingrained and maladaptive when the immediate threat has passed. Repeated exposure to abuse increases catecholamines through the arousal or
alarm response and can result in adaptive failure. Adaptation for the stress response is aggravated and similar to responses found in PTSD.

Research conducted by Heim, Newport, Bonsall, Miller, and Nemeroff's (2001) suggests a sensitization of the anterior pituitary and a counter-regulation adaptation of the adrenal cortex in abused women without major depressive disorder. With ensuing exposure to stress, women with a history of abuse may hypersecrete corticotrophin releasing factor (CRF), resulting in down-regulation of adenohypophyseal CRF receptors and symptoms of depression and anxiety.

**Research Questions**

This study will validate previous findings that interpersonal domestic violence causes a hyperarousal state leading to increased and prolonged return to baseline cardiac heart rates after an orthostatic challenge. This extends Rice and Records’ (2002) research to a population not previously explored. This study also adds to the existing knowledge base by providing baseline data regarding the 'normal' cardiac response rates of non-abused women. The following research questions will be addressed:

1. Do abused women have different cardiac response rates than non-abused women?

2. Is there a significant difference in the cardiac response rates of abused women being treated with SSRI's, Benzo's, or no medications (Cognitive Behavioral Therapy) and women who have not been abused?

**Definition of Terms:**

For the purposes of this study, the concepts will be defined as follows:
1.) Abuse is defined as past, and/or ongoing events that involve actual or threatened death or serious injury, or a threat to the physical integrity of an adult female, obtained from diagnosis.

2.) PTSD is described as the development of characteristic symptoms stemming from a psychologically traumatic human experience. PTSD will be identified by a positive diagnosis from a clinical therapist or psychiatrist.

3.) Demographic variables measured include: age, marital status, alcohol, drug use, medication, CBT, income. The demographic questionnaire is in (Appendix A).

**Design**

A counter balanced Latin square design allowed for counterbalancing of the main effects of SSRI's (SSRI), Benzodiazepines (Benzo's), Benzos and SSRI's (Benzo and SSRI), no abuse and cognitive behavioral therapy (CBT) and comparison of the cardiac response rates of the individual groups. The subjects had a diagnosis of PTSD and abuse (SSRI, Benzo, Benzo and SSRI, CBT), and the control group had a history of no abuse. After completion of demographic questionnaires, cardiac responses to an orthostatic challenge were measured.

**Population and Sample**

The setting for the study was individual treatment rooms at Columbia River Mental Health Clinic (CRMH) Vancouver, Washington, and Latter Day Saints (LDS) Family Services Oregon Agency, Portland, Oregon. Women 18 years of age and older were recruited. A treatment and control group were
sought to participate in the study. The treatment group included females with a current diagnosis of PTSD and previous or current abuse. This group was recruited from CRMH. The second group, a control group, consisted of women who had never been abused and without a diagnosis of PTSD. The control group was recruited from LDS Family Services.

**Sampling method**

Convenience sampling was utilized. The strength of convenience sampling is that it was inexpensive, subjects were accessible, and it required less time to acquire a sufficient sample than other sampling methods (Burns & Grove, 2001). “Convenience samples provide means to conduct studies on topics that could not be examined through the use of probability sampling” (Burns & Grove, 2001, p. 374). Convenience sampling is not acceptable for confirming studies but is useful for exploratory and descriptive studies. The weakness of convenience sampling is that “subjects are included in the study because they happen to be accessible: in the right place at the right time” (Burns & Grove, 2001, p. 374).

The sample may not be representative of the general population for the variables of education, socioeconomic level, mental intelligence, and religion. The patient population of CRMH is composed of chronically mentally ill individuals. Due to the nature of their illnesses, this group is often unemployed and without a high school or college education. This may limit the generalizability of the findings. The Vancouver and Portland areas have a large Caucasian population base, which will not provide full ethnic and cultural
representations for generalization. The limitation of using a particular religious

group that has a patriarchal order has the potential to confound the non-abused

sample, as the LDS church may not encourage full recognition and reporting of

abuse.

Measurement and Instrumentation

A demographic questionnaire (Appendix A) and biophysical

measurements were used in the study. Their description, reliability, and validity

follow.

The demographic questionnaire that was used to describe the sample is

included in Appendix B. The investigator collected information from both the

abused and non-abused subjects and their medical records for age, marital

status, personal habits, and current treatment.

The cardiac rate response procedure was developed and defined by Perry

and (1994) and Rice and Records (2002). Cardiac response rates were first

recorded with the subject lying down at 0, 1, 5, and 10 minutes after the subject

was in a comfortable, reclining, position. At the 10 minute time line the subject

stood and cardiac rates were reassessed at 0, 1 and 5 minutes. Perry (1994)

notes that at 10 minutes, the cardiac rate returns to normal baseline. Rice and

Records (2002) report that the highest percent of change occurs within the 5

minute standing interval and delete the 10 minute standing time period as the

heart rate returns to baseline. Cardiac response rate measurement is further

described under ‘data collection procedures’.
Data Collection Procedures

Data were collected within a three-month period of time. Posters were placed at both sites asking for volunteers. The investigator met with case managers at both sites and an explanation of study was given. Case managers questioned the potential participants as to whether or not they were interested in speaking with the investigator and in participating in the study. Names and phone numbers of interested participants were given to the investigator. The investigator contacted the potential participants, made arrangements to meet them at the clinic and obtained informed consent.

After informed consent (Appendix B) was obtained, data collection took place in treatment rooms at Columbia River Mental Health Clinic and LDS Family Services. The participants completed the questionnaires during one time period. Cardiac rate responses were then measured for all participants.

Cardiac rates were measured using a Tanito cardiac rate monitor placed on the subject’s finger. The Tanito monitor is an established instrument and measures the cardiac rate with EKG level accuracy within +/- 1 beat per minute. The subject was asked to lie down on a mat or table for 10 minutes. Baseline cardiac responses were recorded at one, five, and ten minutes after the subjects initially lied down. Subjects were then asked to stand and heart rate responses were recorded at one and five minutes. After that period of time the finger clip was removed and the subject was thanked for their participation.

Data collection forms contained subject code to identify which medications or combination of medicines the subject was/was not taking. A subject
identification number allowed for identification of abused and non-abused women (Appendix C). Data were stored in locked files and entered manually into a computer using a Statistical Package for the Social Sciences (SPSS), Version 11.0 computer program. Color-coded instrument packets were utilized to identify the four different groups participating in data collection.

**Ethical Considerations**

The study was approved by Washington State Intercollegiate College of Nursing, and Washington State University Institutional Review Board (Appendix B). The study was also approved by CRMH and LDS Family Services. All subjects were invited to participate and were provided a consent form (Appendix B). The investigator answered any questions and received the signed consent form before subject’s assessment was initiated. The consent form described the subject's right to privacy, confidentiality, and anonymity. Special care was taken to confirm that the participants understood the information in the consent form by allowing time to both ask and clarify questions, as well as a single individual giving the same instructions to all participants.

**Analysis**

**Demographics**

The final sample consisted of 26 women divided into 4 treatment groups. The Cognitive behavioral treatment group (CBT) consisted of non-abused women who were not on medications (46.2%, n=12). These women were recruited through LDS social services where they participated in various activities, such as counseling. Abused women (n=14) were recruited from
Columbia River Mental Health services and were receiving medications for treatment of PTSD. The abused women were divided into three groups based on their treatment regimes, with 23.1% (n=6) received only SSRI's, 23.1% (n=6) received both benzodiazepines and SSRI's, and 7.7% (n=2) received only benzodiazepines.

The sample recruitment was not accomplished as easily as expected due to the fact that abused women were reluctant to talk to individuals that they were unfamiliar with until a basic relationship was established. The subject sample was therefore smaller than expected at 26.

The mean age of the total sample was 38.77 years (SD = 10.43, range = 21 - 64). The majority (53.8%, n = 14) of the sample were married, 3.8% of the subjects were single (n = 1), 30.8% were divorced (n = 8), and 11.5% had partners (n = 3) (Table 1).

Alcohol and recreational drugs (i.e. marijuana, cocaine, methamphetamines, etc) were based on weekly consumption, while cigarettes and caffeine were based on use by subjects on a daily basis. There were no significant differences between the groups for any of the demographic variables.

Table 1: Demographic Characteristics of Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent</th>
<th>n</th>
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<tbody>
<tr>
<td>Socioeconomic</td>
<td></td>
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</tr>
<tr>
<td>&lt;$12,000</td>
<td>26.9</td>
<td>07</td>
</tr>
<tr>
<td>$12,001 - 25,000</td>
<td>11.5</td>
<td>03</td>
</tr>
<tr>
<td>$25,001 - 50,000</td>
<td>15.4</td>
<td>04</td>
</tr>
<tr>
<td>$50,001 &gt;</td>
<td>46.2</td>
<td>12</td>
</tr>
</tbody>
</table>
Differences Between Groups

A paired sample t-test was used to determine whether there were differences between groups for recreational drug use, physical and or sexual abuse, and alcohol consumption. An analysis of the demographic variables of sexual abuse and alcohol consumption between abused and non-abused women, alcohol (M= .346, SD= .629, t= 2.807, p= .010), and recreational drug use (M= .269, SD= .667, t=2.059 p= .050) showed no significance.

Paired sample t-tests using the variables of physical/sexual abuse, treatment, alcohol consumption, and recreational drug use were analyzed against 10-minute lying pulse rates and 5-minute standing. A t-test was conducted using a difference variable that was calculated by subtracting the pulse rates of the subjects at 5-minute standing and 10-minute lying. In
essence, women using recreational drugs had a statistically significant difference of 3.25 beats per minute for 10-minute lying and 5-minute standing heart rates.

**ROC Analysis**

An ROC curve (Receiver Operating Characteristic curve) (Appendix D) was completed to show the relationship between specificity and sensitivity of the cardiac rate response procedure. This procedure is a useful way to evaluate the performance of classification schemes in which there is one variable with two categories by which subjects are classified. When sensitivity increases specificity increases. Variables used to calculate the ROC curve were cardiac rates at 5 minutes standing and 10 minutes lying and physical and or sexual abuse.

Graphical analysis (Graph 2, Appendix E) of the High Low Comparison's for heart rates revealed the heart rates of non-abused subjects ranged from 70 - 82 beats per minute while in contrast, heart rates of physically abused subjects were 80 - 90 beats per minute. Although differences were statistically non-significant possibly due to the small sample size (n=3) of physical abuse only, visualization of differences was obvious. Heart rates of subjects who had experienced sexual abuse responded within a narrow range of change from 75 - 83 beats per minute. Heart rates of individuals who experienced both physical and sexual abuse were narrow in range, but seem to be comparatively similar to the heart rates of physically abused subjects at 5-minutes.

The analysis of the data indicated that the 5-minute standing cardiac response index was a good biophysical indicator of abuse. Graph 1 (Appendix
D) showed that individuals with both physical and sexual abuse had an increased pulse rate or hyperarousal no matter what treatment they were using (i.e., cognitive behavioral, benzodiazepines, and/or SSRI's).

Sensitivity and specificity of the cardiac response rate measure (n=4) for abuse showed a perfect score of 1. Regression on curve (or ROC Curve) showed the results at 75% confidence, 75% specificity, and above 100% predictable (Appendix F). The data did not change the outcome of expectation of an increased pulse rate at 5 minutes standing and 10 minutes lying, using medications. This data showed a 68% assurance that this test will predict a trauma exposed individual.

Discussion

There was less drug and alcohol abuse among this group than was encountered in previous studies. The literature shows an increase in alcohol and substance abuse problems in individuals with anxiety and hypervigilence (Saunders, Kilpatrick, Hanson, Resnick, & Walker, 1999). That finding was not supported in this sample. It is possible that the way the question was asked did not allow for disclosure of current or past use of these substances.

Subjects who were sexually abused did not have the greatest change in cardiac response rate. The response rate was higher in subjects who were physically abused, and highest in subjects who were both physically and sexually abused. These findings are congruent with Perry's theory that traumatic events activate a stress response. Neural systems in the HPA, the CNS, and peripheral nervous systems respond to prolonged repetitive activation by altering
neurochemical and synaptic sculpting organization and function (Perry, 1994; 1998b; 1999; Rice & Records, 2002). The theory proposes that the hypervigilant symptoms often do not return to a normal state. Findings from this study provide evidence in support of the theory and validate the findings of Perry (1994; 1998b; 1999) and Rice and Records (2002).

The data supported the hypothesis that the cardiac rate is increased in women who have experienced physical abuse alone or both physical and sexual abuse, and is not affected by medications. When an individual lives in a state of hyperarousal, an elevated cardiac rate becomes the norm rather than the exception.

Limitations

A limitation of the study was that the abused women were hesitant to participate. This has been an issue identified in other studies of abuse as well. Women are hesitant to participate due to fear of losing their children or having no shelter available for alternative housing should they leave their current situation. Most important, there is always violence should they attempt to leave and not succeed (Dowd, Kennedy, Knapp, & Stallbaumer-Royer, 2002; Tolman & Rosen, 2001).

Sample size was a limitation of the study as abused women were hesitant to participate unless personally introduced by the professionals they knew in the clinic. Once introductions were made using clinic health care providers, abused women were more than willing to participate in data collection and, afterward,
were certain to ask for a copy of the results. A longer period of recruitment would have facilitated obtaining more abused individuals into the study.

Another limitation may have been that individuals have stress other than abuse and there was no control for other stress in the subject's life. The sample was also primarily Caucasian.

**Implications for practice**

Rice and Records (2002) protocol for orthostatic evaluation of cardiac rates in women at 10-minute lying and 5-minute standing could be used in hospitals and clinics for evaluation of abuse. Identification of clients with increased cardiac rates could facilitate earlier identification of abuse than exists with existing screening methods. The current method of assessing for abuse in health care settings is to ask patients about domestic violence and sexual abuse. Unfortunately, health care workers often fail to ask even when there are obvious signs of abuse. When health care providers do assess for abuse, there is often hostility and indifference evidenced in their interactions which tend to make the woman feel victimized again (The John Hopkins School of Public Health, 2002) or there are a number of women who won't disclose abuse. This health care provider response reinforces isolation, self-blame, and makes it difficult for the woman to try to discuss her abusive situation again.

By using the Rice and Records (2002) biophysical assessment method of recording cardiac rates for all female patients, concerns associated with the present protocol could be alleviated. For example, there are patients with no obvious signs of abuse who are not disclosing that they need help. With the
biophysical assessment of cardiac responses, abuse can be detected and intervention can take place, thereby decreasing the risk of long-term emotional, physical, and psychological damage. This method would eliminate healthcare workers noncompliance with JCAHO regulations and serve as a standard protocol that is not subject to individual biases. Perhaps victim's perceived feelings of indifference and hostility from health care professionals, as well as concerns for personal safety, might be avoided.

When abuse is disclosed by either the victim or the changed cardiac rate response, social services can become involved. They can provide information on topics such as crisis services, safe homes, and counseling services. By making these and other services available, victims are given the ability to modify their life choices in positive ways, possibly saving their own life.
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APPENDIX A
Orthostatic Challenge Study
Data Collection Instrument

Subject#  

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<th>Code</th>
<th>Research Codes</th>
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1. Age________

2. Marital Status  S  M  W  D  SEP  Partnr
   S=1,M=2,W=3,D=4,SEP=5,Partnr=6

3. Socio-economic________

4. Psych/Emotional (DSM IV)________

5. Drink alcoholic beverages?
   (Yes=1)  (No=0)
   How Often?
   Daily _____  Weekly _____  Monthly _____
   (D=1, W=2, M=3)

6. Used street drugs?
   (Yes=1)  (No=0)

Personal Habits:

7. Smoke cigarettes?
   (Yes=1)  (No=0)

8. Drink caffeine?
   (Yes=1)  (No=0)
9. Non-Abused ______

10. Abuse: ____________________________

Physical _____ (NA=0, P=1, S=2, P&S=3)

Sexual _____

Treatment:

Cognitive Behavioral _____

SSRI's _____

Benzotropines _____

Benzotropine & SSRI _____

(CB=0, SSRI=1, Benzo=2, B+ SSRI=3)

Subject # __________________
Date: ______________________
APPENDIX B
MEMORANDUM

TO: Michael Rice & Kathie Records
   ICNE, Spokane

FROM: Misty Cato (for) Michael Hendryx, Chair, WSU Institutional Review Board (3140)

DATE: 30 July 2002

SUBJECT: Approved Human Subjects Protocol

Your Human Subjects Review Summary Form and additional information provided for the proposal titled "Orthostatic Challenge responses of Abused vs. Non-abused childbearing women," IRB File Number 4058-c was reviewed for the protection of the subjects participating in the study. Based on the information received from you, the WSU-IRB approved your human subjects protocol on 19 July 2002.

IRB approval indicates that the study protocol as presented in the Human Subjects Form by the investigator, is designed to adequately protect the subjects participating in the study. This approval does not relieve the investigator from the responsibility of providing continuing attention to ethical considerations involved in the utilization of human subjects participating in the study.

This approval expires on 18 July 2003. If any significant changes are made to the study protocol you must notify the IRB before implementation. Request for modification forms are available online at http://www.ogrd.wsu.edu/Forms.asp.

In accordance with federal regulations, this approval letter and a copy of the approved protocol must be kept with any copies of signed consent forms by the principal investigator for THREE years after completion of the project.

This institution has a Human Subjects Assurance Number M1344 which is on file with the Office for Human Research Protections. WSU's Assurance of Compliance with the Department of Health and Human Services Regulations Regarding the Use of Human Subjects can by reviewed on OGRD's homepage (http://www.ogrd.wsu.edu/) under "Electronic Forms," OGRD Memorandum #6.

If you have questions, please contact Misty Cato at OGRD (509) 335-9661. Any revised materials can be mailed to OGRD (Campus Zip 3140), faxed to (509) 335-1676, or in some cases by electronic mail, to ogrd@mail.wsu.edu. If materials are sent by email attachment, please make sure they are in a standard file type, (i.e., ASCII text [.txt], or Rich Text Format [.rtf]).

Review Type: REN
Review Category: EXP
Date Received: 2 July 2002
## R2 Research Programs

### Orthostatic Challenge Study

**Data Collection Sheet**

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<th>SUBJECT #</th>
<th>Lying</th>
<th>Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 min.</td>
<td>1 min</td>
</tr>
<tr>
<td>OG001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 005</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 007</td>
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</tr>
<tr>
<td>OG 008</td>
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<td></td>
</tr>
<tr>
<td>OG 009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OG 010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ROC Curve

Case Processing Summary

<table>
<thead>
<tr>
<th>Valid N (listwise)</th>
<th>all abuse</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is 1.00.

ROC Curve

1 - Specificity

Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s): 5 min

<table>
<thead>
<tr>
<th>Area</th>
<th>Std. Error$^a$</th>
<th>Asymptotic Sign$^b$</th>
<th>Asymptotic 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>.678</td>
<td>.111</td>
<td>.133</td>
<td>.450</td>
</tr>
</tbody>
</table>

The test result variable(s): 5 min has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5
APPENDIX E
GRAPH 1: Cardiac rate of subjects at 0 & 5 min standing

[Diagram showing heart rate measurements for different conditions: not abused, physical, sexual, both at 0 min and 5 min.]
Graph 2: Cardiac rate of subjects at 5 min standing & 10 min lying