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The Application of Margin in Life Theory in Regard to Attrition and Remediation
Among Emergency Medicine Residents

By

Colleen J. Kalynych

A dissertation to the Department of Leadership, Counseling, and Instructional
Technology in partial fulfillment of the requirement for the degree of

Doctor of Education and in Educational Leadership

University of North Florida

College of Education and Human Services

April 30, 2010

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Acknowledgement

The ability to finish this dissertation came from the love and support of many. First and foremost, my children, Kathryn Elizabeth and Nicholas Andrew, whom I love more than life itself, and who through this dissertation can see that they too can achieve anything they put their mind toward. To my loving and supportive partner, Bert Bates, who cooked many dinners, and stepped in as parent, handy-man, taxi driver, and artistic project coordinator for the family. To my mother, Linda Crane, and sister, Deborah Crane, both who are strong beautiful role models in my life. To my extended family, close friends, and co-workers who have never doubted my ability to finish, and to my committee: Marcia Lamkin, EdD, Joyce Jones, PhD, Pam Chally, PhD, RN, and Paul Eggen, PhD, all of whom are the consummate professionals and leaders in their respective fields. Finally, to Katherine Kasten, PhD, who provided a great deal of assistance and guidance by adding the final touches to this dissertation.

Be strong and of good courage; be not frightened, neither be dismayed; for the Lord your God is with you whenever you go.--Joshua 1:9

"In the confrontation between the stream and the rock, the stream always wins- not through strength but by perseverance." H. Jackson Brown

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Abstract

Medical residency is a time of high stress, long hours, high case loads, fatigue, and lack of free time. Burnout rates among residents have been reported to be between 25-76%. Scant literature exists in regard to resident stress and its impact on learning and attrition during residency. The theory of margin posits that a healthy margin is necessary for adults to learn. Healthy margin exists when a person's ratio of burdens over resources creates a surplus of energy. This study sought to determine if there was a difference between emergency medicine (EM) residents' margin in life scores and remediation, at risk for remediation, and those considering leaving their emergency medicine residency training.

Volunteer EM residents ($n = 279$) completed the Margin in Life Scale for Emergency Medicine (MILS EM) questionnaire, which measures six life areas: Health/Body, Religion/Spirituality, Self-Confidence, Interdependence, Parenting, and EM Work. Residents self-reported if they were considering leaving EM training and program directors provided remediation, at risk for remediation, and attrition rates.

The mean MILS EM score among the 273 included EM residents was .64, which is within the recommended healthy range of .30 to .80. Additionally, all mean subscale scores fell within the healthy range. Only 13% of residents were reported as being on remediation, MILS EM ($M=.63$) with no statistically significant differences between those on remediation versus those not. Only 6% of residents were reported as being in jeopardy of remediation, MILS EM ($M=.63$) versus those not at risk ($M=.64$). Finally, only 5% of EM residents self-reported considering leaving EM training and no residents

left their training program. Women scored lower on the MILS EM, and the life areas Health/Body ($p < .01$), Self-Confidence ($p < .01$), Interdependence ($p = .01$), and Parenting Satisfaction ($p < .01$).

Results of this study suggest that EM residents appear to have sufficient margin overall and in each of the life areas. Few were on or at risk for remediation and even fewer reported they were considering leaving EM residency training. As females scored lower in some of the life areas, further investigation is needed to determine if there are characteristics in the work environment that affect women differently than men.

Chapter 1: Introduction

Training for service in emergency medicine is a time of high stress with many residents experiencing burnout due to long hours, high patient load, and the requirement to acquire a great amount of medical knowledge and clinical application in a short amount of time.

Resident attrition and remediation is tracked by residency programs and must be reported to the Accreditation Council of Graduate Medical Education (ACGME) which provides oversight for all accredited residency programs in the United States. Residency programs can receive citations for high attrition rates and for insufficient remediation policies and procedures. While attrition rates among emergency medicine residents are expected to be low, these data have not been published, nor has an acceptable rate of attrition. Similarly, there are no current studies which report remediation rates among emergency medicine, however, it has been widely published that faculty most likely underreport residents' weaknesses and failures and have difficulty providing constructive feedback. Ways in which to assess resident burnout and/or stressors has been widely studied in the medical literature; however, there are few studies where residents have been asked to identify areas outside of medical training that contribute to stress (burdens) or provide support (resources) and each item's relationship to remediation and attrition.

Howard McClusky (1963, 1964, 1970, 1971) published several book chapters and articles on the *theory of margin* to describe aspects of adult development. Known as the margin in life (MIL) theory, *margin* is created when a person gains more *power* (sources

of positive energy) than he or she are expends (*load*). The ratio of load over power is margin. McClusky hypothesized that a healthy margin is necessary for adults to learn and to deal with life's emergencies and crises. The MIL theory may be particularly useful in identifying residents who are at risk for remediation and/or attrition by assessing loads, powers, and resulting margin during emergency medicine residency training.

Background/Context

Emergency medicine residency programs are charged with educating and preparing physicians in the practice of emergency medicine. The basic knowledge, technical skills, clinical maturity, and judgment required in emergency medicine should be instilled prior to graduation (ACGME, 2007a). It has been well documented that residency is a time of high stress, long hours, high case loads, increased financial burden, fatigue, and lack of free time (Butterfield, 1988). As a result, residents often experience burnout. Maslach, Jackson, and Leiter (1997) described burnout as a syndrome during which a combination of three conditions is present: emotional exhaustion, depersonalization, and a sense of low personal accomplishment. Further, burnout can result in errors in patient care, performance deficits, depression, anger, and feelings of hostility and inadequacy; residents may also question their career choice or specialty (Archer, Keever, Gordon, & Archer, 1991; Motowidlo, Packard, & Manning, 1986; Panagopoulou, Montgomery, & Benos, 2006; Shanafelt, Bradley, Wipf, & Back, 2002; West, Huschka, Novotny, Sloan, Kolars, Habermann et al., 2006). Residents often additionally have combined demanding home and work situations during a time in their lives when work is highly stressful and career development is in full swing (Geurts, Rutte, & Peters, 1999).

While physician well-being goes beyond avoiding burnout, few studies have described components of physician well-being. Some studies suggest characteristics of physician well-being as being married; experiencing religion/spirituality; having a strong social support system and relationships with family, friends, and colleagues; developing a life philosophy; instilling self-care practices; having self-awareness; and having children- all of which will possibly reduce depersonalization and burnout (Brummelhuis, van der Lippe, Kluwer, & Flap, 2008; Geurts et al., 1999; Quill & Williamson, 1990; Shanafelt et al., 2002; Shanafelt, Sloan, & Habermann, 2003; Weiner, Swain, Wolf, & Gottlieb, 2001). The ability to measure these characteristics may provide valuable feedback and assist in identifying residents who may be at risk for remediation and/or attrition.

There is scant literature published in regard to resident stress and its impact on learning during residency training. Residency programs are required to implement an assessment process that includes both formative and summative evaluations in regard to the residents' progress (ACGME, 2007a). However, it is well documented that many residency programs struggle with which are the best mechanisms with which to evaluate residents (Dudek, Marks, & Regehr, 2005; Holmboe, 2004; Watling et al., 2008).

Residents who have fallen behind their peers academically, or who may have behavioral or professional deficiencies, may be placed on remediation. Remediation is classified into the following areas: medical knowledge, clinical application, or behavior (professionalism). Each residency program must develop its own process for remediation in accordance with Accreditation Council for Graduate Medical Education (2007a) guidelines. Of particular importance is the fact that resident remediation rates may be underreported by faculty. Tonesk and Buchanan (1987) found that clinicians were

unwilling to document negative performance on evaluations and were further unwilling to act on a negative evaluation even if it was recorded.

Residents who have difficulty during residency may consider leaving their training program. When a resident leaves a residency program, there are several effects: the remaining residents must cover the absent resident's shifts; the hospital sees fewer patients; the department's income may be reduced; and it is difficult to fill the position with a resident who is at the same point in training (D.C. Baldwin, Rowley, Daugherty, & Bay, 1995; Bergen, Littlefield, O'Keefe, Rege, Anthony, & Kim et al., 2000; Bergen, Turnage, & Carrico, 1998; Moschos & Beyer, 2004).

Howard McClusky in 1963 coined the term *margin in life* as a way to explain or theorize aspects of adult development. Margin is created within a person when he or she is able to gain more *power* or sources of positive energy, through internal or external resources, than is expended, or *load*, also from internal or external sources. The resulting ratio of *load/power* is the *margin*. McClusky hypothesized that a healthy margin is necessary for adults to learn and that education itself can assist adults in achieving greater margin. Stevenson (1982a) created a Margin in Life Scale (MILS) through a factor analysis and test-retest for reliability. The Margin in Life Scale measures five domains: Health/Body, Self-Confidence, Religiosity/Spirituality, Interdependence, and Parenting Satisfaction, all based on a person's self reporting. In accordance with McClusky (1970), a person should have a margin between .30 and .80 in order to cope with new life changes, pressures, or emergencies. An adult who scores below .30 may represent a person who is at risk of living beyond a tolerable stress level (McClusky, 1970;

Stevenson, 1980, 1982a) and those who score above .80 may not be living up to their potential.

Purpose and Research Questions

The primary purpose of the present study was to determine the margin in life scores of emergency medicine residents utilizing a modified Margin in Life Scale (Stevenson, 1994), renamed Margin in Life Scale for Emergency Medicine (MILS EM). This study further sought to determine if the MILS EM could detect a relationship or difference between residents on remediation versus those who were not, those at risk for remediation versus those who were not, and those who were considering leaving their emergency medicine training program versus those who were not. This study further sought to explore the connection between MILS EM scores of residents and gender, age, graduate medical education training, and training year in regard to remediation, and risk for remediation. Residency is a time of high stress during which residents carry heavy burdens or loads. This study aimed to determine if McClusky's (1963, 1964, 1970, 1971) theory of margin could assist in explaining and identifying residents' loads and powers, and their resulting margin or lack thereof.

The Margin in Life Scale may be of particular importance in understanding the load/power ratio in a demanding high-stress environment such as emergency medicine residency. Further, the MILS may assist program administrators and faculty in determining the sorts of powers that residents report having, both internally and externally, and the sorts which are absent. The ability to identify residents early who may be at risk for remediation or attrition may assist programs in developing strategies for intervention.

The following research questions and null hypotheses were utilized:

Research question 1. How do emergency medicine residents enrolled in 1-3 year training programs score overall on the MILS EM?

Research question 2. How do emergency medicine residents enrolled in 1-3 year training programs score in the subscales (life-areas)?

Research question 3. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those at risk for remediation?

Null hypothesis for research question 3. There is no difference between MILS EM and subscale scores of residents on remediation or at risk for remediation versus those who are not.

Research question 4. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those who are contemplating leaving emergency medicine training?

Null hypothesis for research question 4. There is no difference between MILS EM scores of residents who are contemplating leaving EM training (for another specialty, for another EM program, or leaving medicine altogether) versus those who anticipate staying.

Research question 5. Does demographic information such as gender, age, marital status and location of medical graduation (U.S. vs. IMG) have an impact on MILS EM scores?

Null hypothesis for research question 5. There is no difference in MILS EM and subscale scores according to gender, age, marital status, and graduate medical education (USMG or IMG).

Research question 6. Does training year (PGY1, PGY2, & PGY 3) have an impact on MILS EM score?

Null hypothesis for research question 6. There is no difference between the mean MILS EM scores by training year (PGY1, PGY2, & PGY3) of emergency medicine residents.

Research question 7. Does the size of the training program impact the MILS EM scores among emergency medicine residents?

Null hypothesis for research question 7. There is no difference between the mean MILS EM score and subscale scores of emergency medicine residents enrolled in small (<30) versus large (\geq 30) programs.

Research question 8. What areas of the MILS EM do emergency medicine residents report as being more important based on Mikolaj and Boggs (1991) categories (A) In balance, (B) Having Margin, (C) In Crisis, and (D) Barely Even (see Table 2).

Null hypothesis for research question 8. There is no difference in perceived importance of margin categories (Main, 1979; Mikolaj & Boggs, 1991).

Method

The instrument utilized in this study was a modified version of Joanne S. Stevenson's Margin in Life Scale (1994) and is titled Margin in Life Scale for Emergency Medicine (MILS EM). A pilot test was conducted to add a sixth factor to Dr. Stevenson's MILS for items that are specific to EM work. After the pilot phase and with IRB approval, emergency medicine residents and residency program directors of 1-3 year programs were asked to participate. For this study, residents enrolled in accredited emergency medicine 1 to 3-year training programs (American Board of Emergency

Medicine, 2007) in the states of Louisiana, Mississippi, Arkansas, Alabama, Florida, Georgia, Tennessee, South Carolina, and North Carolina ($n = 9$ states) were asked to participate with an anticipated n of 535 emergency medicine residents.

The Margin in Life Scale takes into account internal and external factors that are rated for importance by the participant on a scale of 1-10. Participants select how important an item is. They then rate the load (burden) and power (amount of resource) this item represents at that point in their life on a scale of 1-5. For the present study, participants were also asked to complete a demographic sheet and answer questions that pertained to remediation, attrition, age, race, gender, religion/spirituality, marital status or significant other, and whether they were U.S. (USGM) or international medical graduate (IMG). Residents were asked to participate voluntarily. Once the resident completed the survey, program directors were asked to state whether or not residents who participated were on formal remediation or at risk for remediation; if yes, which problem area (behavior, application, or medical knowledge); and whether or not any of the residents had left their programs.

If any residents had left their training programs, they were asked to complete an additional survey to learn reasons why they left, if they left for another EM program, left emergency medicine for another specialty, or left medicine altogether. If the resident was unavailable, program directors were asked to provide this information.

Data Analysis

In order to address each research question, several analyses were performed utilizing the t -test, ANOVA, MANOVA and the non-parametric test of Wilcoxon-Mann

Whitney, Chi Square, Kruskal-Wallis, and Fisher's Exact. Statistical routines from Excel 2007, SAS 9.2, and SPSS 18 were utilized.

Significance of the Research

Residency is a time of high personal and professional stress, requiring long hours of training, sleep deprivation, high attentiveness, and adaptability, especially for residents of emergency medicine. Burnout among residents is reported to be between 25% and 76% (Eckleberry-Hunt et al., 2009; Shanafelt et al., 2002) and can result in errors in patient care, performance deficits, depression, anger, feelings of hostility and inadequacy, and reconsideration of career choice or chosen specialty (Archer et al., 1991; Motowidlo et al., 1986; Panagopoulou et al., 2006; Shanafelt et al., 2002). Further, emergency medicine training has experienced a steady increase in the number of physicians seeking training and an increase in the number of programs seeking academic residency accreditation (Perina, Collier, Thomas, Korte, & Reinhart, 2005; Perina, Collier, Thomas, Witt, & Reinhart, 2007).

Residents play a vital role in providing cost-efficient care to patients. Residents, under a qualified physician attending, are capable of seeing patients and billing for procedures. This allows hospitals to treat a higher volume of patients and generate a greater income base. In hospitals, as in any business, attrition is of major concern. In medicine, both faculty (attending) and resident attrition is monitored. When a resident leaves a training program, there are several effects. The remaining residents must cover the now absent resident's shifts, the hospital may see fewer patients, the department's income may be reduced, and program directors experience difficulty filling a vacant position with a resident who is at the same point in training as the resident who left,

which creates residents who are now “off cycle.” This further will affect how many new residents can be recruited for the new training year (D.C. Baldwin et al., 1995; Bergen et al., 1998; Moschos & Beyer, 2004). An overall effect that can often be detected is a reduction in morale due to the added stress placed on the remaining residents and faculty. Although ABEM and the Residency Review Committee (RRC) know the national attrition rate of emergency medicine residents as they collect this information, neither organization has published these data.

The Accreditation Council of Graduate Medical Education (ACGME) requires residency programs to report attrition and remediation rates and policies and procedures for residents on remediation (ACGME, 2008). This information is placed in specific Program Information Forms (PIFs) which are reviewed by a visiting site officer representing the ACGME. Residency programs that are found to have high attrition and/or remediation rates or insufficient remediation policies and procedures, may be cited by the ACGME at the discretion of the visiting site officer. All citations must be satisfactorily addressed by the residency program and approved by the Residency Review Committee (RRC) of the ACGME (2007b) in order for accreditation to continue.

Attrition and remediation rates among emergency medicine residents are currently unknown. It has been widely reported, however, that remediation is underreported in medicine (Martin, Reznick, Rothman, Tamblyn, & Regehr, 1996; Schwartz, Donnelly, Sloan, Johnson, & Stodel, 1995; Tonesk and Buchanan, 1987; Vu et al., 1992). Therefore, the full impact of the stressful environment on learning remains unclear. Howard McClusky’s theory of margin (1963, 1964, 1970, 1971) and Joanne Stevenson’s (1980, 1982a, 1982b, 1994) Margin in Life Scale (MILS) may be useful in assisting

academic leaders to identify burdens (loads), resources (powers), and resulting margin of emergency medicine residents. Additionally, it might be useful to determine if those residents who have low margins are at greater risk for remediation or for leaving their residency program. Finally, by identifying areas of resources (support) and burdens, leaders in academic emergency medicine may be able to develop programs to strengthen residents' margins while they are still in training.

Relevance of Leadership Theory

Most work environments struggle with the best method to motivate, lead, and manage employees. Many managers and leaders utilize transactional concepts where there are conditions and rewards. Northouse (2004) described transactional leaders as those who “exchange things of value with subordinates to advance their own as well as their subordinates' agendas” (p.178). Others (Bass & Steidlmeier, 1998; Burns, 1995, Northouse, 2004) suggest that transformational leadership is superior as it concerned with developing and raising the morality and motivation of both the leader and the follower.

It is suggested that leaders in the healthcare setting operate in the realm of transformational leadership rather than that of transactional (Hill & Stephens, 2004; Institute of Medicine, 2004; LeBrasseur, Whissell, & Ojha, 2002; Moe, Pappas, & Murray, 2007; Xirasagar, Samuels, & Stoskopf, 2005). Burns (in Wren, 1995) expressed that “transforming leadership ultimately becomes moral in that it raises the level of human conduct and ethical aspiration of both the leader and the follower” (p. 101). Northouse (2004) similarly described transformational leadership as “the process whereby an individual engages with others and creates a connection that raises the level of motivation and morality in both the leader and the follower” (p. 170).

Transformational leaders stress the importance of the way the follower is performing in addition to the followers' ability to reach full potential. Program directors in emergency medicine may find the goals of transformational leadership to be aligned with academic goals and those of an ethical healthcare provider.

Bass suggested that there are four factors which encompass transformational leadership: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass & Steidlmeier, 1998). Idealized influence, also referred to as charisma, is factor 1 and implies that once a leader draws attention, others wish to emulate him or her by garnering respect and pride. Factor 2, inspirational motivation, suggests the leader is able to communicate a shared vision which is morally uplifting. Intellectual stimulation, factor 3, challenges the followers to be creative and novel in their thinking to solve organizational issues and to challenge the status quo. Xirasagar et al. (2005) stated that intellectual stimulation "is particularly relevant since physician leaders have to influence their cognitively autonomous followers' clinical decision making toward consensual, value-driven goals" (p. 722). Finally, individualized consideration refers to the time and place during which the leader utilizes coaching and mentoring skills to assist the follower in efforts of self-actualization (Northouse, 2004; Xirasagar et al., 2005).

Burn's work (in Wren, 1995), as described by the Institute of Medicine, suggested that transformational leaders have a relationship with their followers whereby the leader establishes "two-way communication and the exchange of information and ideas. On an on-going basis, leaders play the major role in maintaining and nurturing the relationship with their followers" (in Institute of Medicine, 2004, p. 110). Further, it is the job of the

transformational leader to understand the wants and needs of the follower and to teach common goals.

The ability to utilize the transformational leadership model affords the EM program director many tools to assist in the success of his or her residents. Concepts in the transformational leadership model are strong indicators for success and may open lines of communication between program directors and residents. A tool such as the MILS EM may further assist program directors in their efforts to understand more fully the emergency medicine residents' loads and powers in the context of the work and non-work environment, which may guide program directors in coaching and mentoring residents into a successful and conscientious practicing physician.

Limitations

This study was conducted with a convenience sample of emergency medicine residents ($n = 273$) with regional affiliation in the Southeast, and findings may not generalize to other populations or the whole emergency medicine training population. The survey was distributed during resident conference time at the various residency programs invited to participate. This process could have excluded residents who were on vacation or on non-emergency medicine rotations. However, enough surveys were sent to each program so that all residents could take the survey. It was at the discretion of the program directors to distribute surveys at non-conference times. Participation in this study was voluntary. Self-report surveys can have inherent limitations such as participants misinterpreting questions and being dishonest in their answers. However, personal perceptions are a key component to evaluating one's own sources of stress and supportive resources. Finally, because some of the surveys were distributed by the

program directors or program coordinators onsite, there is the possibility that residents self-reported their margins higher than they felt. Even though surveys were placed in sealed envelopes by the residents and their names were not on the surveys, they could have been concerned about blinding being broken.

Definition of Terms

The following terms are defined for clarity:

1. **Attending/Faculty.** A board certified specialty physician who oversees several residents concurrently and has a teaching assignment (ACGME, 2009a).

2. **Resident.** A graduate of medical school (physician) who is in specialty training (e.g., pediatrics, emergency medicine, surgery, internal medicine; ACGME, 2009a).

3. **Residency or Residency Program.** An accredited academic program that trains residents through a structured curriculum and adheres to program requirements in the chosen specialty (e.g., pediatrics, emergency medicine, surgery, and internal medicine; ACGME, 2009a).

4. **Load.** Internal and external pressures or burdens that are connected to family, work, self, friends, community, and others (McClusky, 1963, 1964, 1970, 1971).

5. **Power.** Resources or positive energy connected to one's skills, position, family, friends, community, and others that provide support (McClusky, 1963, 1964, 1970, 1971).

6. **Margin.** The ratio of loads to powers (Stevenson, 1980, 1982a, 1982b, 1994) that serves as surplus energy. Margin is calculated by the load/power ratio

$$\text{Margin} = 1 - \frac{\text{Load}}{\text{Power}}$$

7. Margin in Life Scale (MILS). A measurement tool for determining margin (Stevenson, 1980, 1982a, 1982b, 1994).

8. Adult Learner as proposed by Malcolm Knowles' concept of andragogy. Andragogy is a theory proposed by Malcolm Knowles, which asserts that adults learn best when learning is self-directed; experience is taken into account; learning is relevant to the student's life; activities are problem-centered versus subject-centered, and motivation involves internal factors (M.S. Knowles, 1990; Merriam, Cafferella, & Baumgartner, 2007).

11. PGY. An acronym for Post Graduate Year and refers to a physician's year of training in residency (Farlex, 2009).

12. Intern. A first year (PGY1) resident (Farlex, 2009).

13. USMG (United States Medical Graduate). A medical student who has graduated from an accredited medical school in the United States or Canada (Farlex, 2009).

14. IMG (International Medical Graduate). A medical student who has graduated from a medical school outside of the United States or Canada (ACGME, 2009a).

15. QQ Plot (quantile-by-quantile): is a graphical plot technique to help determine if two data sets come from populations with a common distribution.

A q-q plot is a plot of the quantiles of the first data set against the quantiles of the second data set. By a quantile, we mean the fraction (or percent) of points below the given value. That is, the 0.3 (or 30%) quantile is the point at which 30% percent of the data fall below and 70% fall above that value. "Quantile-by-Quantile," 2009, section 1.3.3.24)

Chapter 1 Summary

Chapter 1 has provided a brief description of the literature in regard to resident burnout rates, and information on remediation and attrition, and the relevance of margin in life theory to learning. The purpose of this study was outlined with specific research questions and null hypotheses stated. In addition, data analyses utilized were listed. The methods of the study were described as well as the significance of the research to residency training programs in emergency medicine and the relevance of leadership theory to this inquiry. Finally noted were the limitations to this study, and key terms were defined to assist the reader.

A comprehensive review of the literature is provided in Chapter 2. The literature review addresses the development of emergency medicine residency training, burnout rates and characteristics of burnout during residency, and problems surrounding remediation and attrition. The literature review further discusses at length the margin in life theory (MIL) and those who have utilized MIL in research. Chapter 3 describes the methods used in this study and to address the research questions and null hypotheses, defines the sample population, and describes the study design. Chapter 4 provides a thorough report of the results of the data analyses by research question and null hypothesis. Finally, Chapter 5 reviews the purpose of this research, methods utilized, and a summary of the findings of each research question and corresponding null hypothesis. Conclusions are drawn based on the results of the study with a description of further research that is recommended.

Chapter 2: Summary of the Literature

This chapter provides a literature review relative to the present study. A short history of emergency medicine is provided along with a description of emergency medicine residency training, burnout among residents, attrition, and remediation. Further, this chapter provides an overview of McClusky's (1963, 1964, 1970, 1971) margin in life theory (MIL) and the work of researchers who have investigated the utility of the MIL theory as well as those who have utilized Joanne Stevenson's Margin in Life Scale (1982a, 1982b, 1994) in the fields of adult education, nursing research, and health care.

Emergency Medicine

Emergency medicine is a relatively new medical specialty with its first certifying exam held in 1980 (ACEP, 2008; A.L. Williams, Blomkalns, & Gibler, 2003; Zink, 2006). Prior to specialty training in emergency medicine, care in the emergency room was carried out by insufficiently trained practitioners and systems. Many emergency rooms in non-academic centers were staffed by nurses who called in a physician for urgent cases or by physicians who were new, malcontent, had difficulty finding positions, or were physiological impaired (A.L. Williams et al., 2003; Zink, 2006). Similarly, emergency rooms housed within a hospital that had an academic program were often staffed by junior house officers and interns who were regularly unsupervised, were foreign physicians, or were trained in specialties other than emergency medicine (Institute of Medicine, 2006; Pell, 2006; A.L. Williams et al. 2003; Zink, 2006).

It was not until July, 1970, that the first resident entered into a formal training program in emergency medicine at the University of Cincinnati (ACEP, 2008; Zink, 2006). By 1975, there were nine emergency medicine residency programs, 83 in 1990, 123 in 2000, and 139 in 2007 (Perina, Collier, Thomas, Korte, & Reinhart, 2006; Perina et al., 2007). There are several different types of emergency medicine training programs in the United States. PGY is an acronym for Post Graduate Year and is the way that residents in training are identified. The majority of programs are three years in length (71%) versus four years (19%), and a few (10%) are known as PGY2-PGY4 programs (Perina et al., 2007). The PGY2-PGY4 programs require the first year of post graduate training, known as the internship year, to be completed in a specialty other than emergency medicine, such as internal medicine, prior to entering emergency medicine training for the PGY2, PGY3, and PGY4 years. In the 2002-2003 academic year, there were 3,863 emergency medicine residents; 4,116 in 2004-2005 (Perina et al., 2005; and 4,397 in 2006-2007 (Perina et al., 2007).

Emergency medicine residency training programs are charged with educating and preparing physicians in the practice of emergency medicine for which the basic knowledge, technical skills, clinical maturity, and judgment should be instilled prior to graduation (Accreditation Council for Graduate Medical Education [ACGME], 2007a). Residency programs are accredited by the ACGME. Each medical specialty has its own Residency Review Committee (RRC) under the umbrella of the ACGME. The Residency Review Committee for Emergency Medicine, as well as all RRCs, implements a cumbersome peer review process every 5 years to ensure that residency programs in emergency medicine are complying with the *Model of the Clinical Practice of Emergency*

Medicine, known as the EM Model (ACGME, 2009b). The EM Model is designed to guide training programs in adhering to duty hour rules and following established standards and guidelines for Graduate Medical Education (GME; ACGME, 2002, 2007c). Emergency medicine residency programs complete program information forms (PIFs), which are reviewed by a trained peer review officer who visits the training program; this officer interviews faculty, residents, and deans of the GME to determine compliance.

Residency programs may be cited by the site officer for areas of concern or clear violations. Examples of infractions include lack of scholarly work by faculty, noncompliance with duty hours, insufficient clinical procedure logs, insufficient curricula or conference attendance by residents or faculty, or a high percentage of resident attrition (ACGME, 2008). As part of the PIF process, residency programs must address mechanisms in place for teaching and for resident and faculty well-being, remediation procedures, and review measures in place to assist those who may be considering leaving their residency program (ACGME, 2008). Over the past three decades, the medical research literature and commentaries have published numerous papers in regard to burnout due to the high stress of medical training. In efforts to address physician well-being, the ACGME has included in the Common Practice Guidelines for all residency programs the need to document and address physician well-being in residency training (ACGME, 2007a).

Resident Burnout

It has been well documented that residency is a time of high stress typified by long hours, high case loads, increased financial burden, fatigue, and lack of free time (Butterfield, 1988). Herbert Freudenberger coined the term *burnout* in 1974 as part of his

studies completed among workers in free clinics and halfway houses (Jackson, Schwab, & Schuler, 1986). Burnout is most often associated with those in professions that require contact with people who are in need of assistance, such as the health professions.

Examples include nurses, physicians, and social workers (Jackson et al., 1986; Kuhn, Goldberg, & Compton, 2009; Perlman & Hartman, 1982; Shanafelt et al., 2002). Maslach et al. (1997) described burnout as a syndrome in which a combination of three conditions is present: emotional exhaustion, depersonalization, and a sense of low personal accomplishment. McCray, Cronholm, Bogner, Gallo, and Neill (2008) completed a systematic review of the literature in regard to resident burnout and summarized the three components of burnout from Maslach et al. as

(1) emotional exhaustion: the depletion of emotional energy by continued work related demands, (2) depersonalization: a sense of emotional distance from one's patients or job, and (3) low personal accomplishment, which is a decreased sense of self worth or efficacy related to work. (p. 626)

The most widely used tool to study burnout was developed by Maslach, Jackson, and Leiter in 1981, with a third edition in 1996, and is known as the Maslach Burnout Inventory (MBI; Maslach et al., 1997). Maslach, Jackson, and Pines, as cited in Maslach et al. (1997), completed interviews, surveys, and field observations in several human service organizations between 1978 and 1982 that resulted in a 22-item questionnaire. Maslach et al. (1997) reported that burnout could be a factor in job attrition, attendance problems, and low morale. Further, those suffering from burnout often reported physical ailments such as fatigue, alcohol and drug use, and marital and family problems. Burnout on the MBI was measured as an "enduring state of experienced burnout" (Maslach et al., 1997, p. 203) and was multidimensional.

Burnout among medical residents has been estimated to be between 25% and 76% (Eckleberry-Hunt et al., 2009; Shanafelt et al., 2002) and can result in errors in patient care, performance deficits, depression, anger, feelings of hostility and inadequacy, and the questioning of career choice or specialty (Archer et al., 1991; Motowidlo et al., 1986; Panagopoulou et al., 2006; Shanafelt et al., 2002; West et al., 2006).

In a study completed by Jex et al. (1991) among residents of all specialties ($n = 1785$), the authors found that residents who experienced high stress in the areas of exposure to death and suffering, sleep deprivation, excessive work hours, schedule changes, and abusive and non-compliant patients reported greater psychological strain and reacted more negatively through their behavior than those residents who had less exposure to such patients.

In 2004, Thomas completed a review of the medical literature to determine the level of clinically significant burnout among residents, factors that were connected to developmental burnout, health consequences, and, finally, the coping strategies that might assist residents who have burnout. Thomas (2004) reported that, among the 15 articles reviewed, studies suggested a high-level of burnout among residents and numerous factors that determined burnout such as time demands (Purdy, Lemkau, Rafferty, & Rudisill, 1987), lack of control over time, poor work organization, difficult job circumstances, relationship conflicts (Nyssen, Hansez, Beale, Lamy, & De Keyser, 2003), heavy workload, lack of time off and flexibility, ability to control their own schedule, difficult work hours, inadequate feedback, unclear supervision (Biaggi, Peter, & Ulich, 2003), feelings of being overwhelmed (P.J. Baldwin, Dodd, & Wrate, 1997),

and feelings of uncertainty about their future and the significance of personal needs (Shanafelt et al., 2002).

Internal medicine residents and burnout. Several studies have been completed among internal medicine residents where burnout rates were found to be as high as 76% (Shanafelt et al., 2002) and where burnout has been associated with suboptimal patient care, development of mood disturbances among residents, lack of empathy, moderate depression (Rosen, Gimotty, Shea, & Bellini, 2006), and feelings that interns had developed less humanistic tendencies during their training, along with an increase in cynicism (Collier, McCue, Markus, & Smith, 2002).

Additionally, Panagopoulou et al. (2006) found that symptoms of depersonalization were present and that the number of hours worked each week and the amount of emotional labor expended were important to understanding burnout. Emotional labor is characterized by the fact that physicians utilize a high amount of empathy and emotional involvement while working with patients. This finding was consistent with Zapf's (2002) review of the literature, in which he reported that there was a positive relationship between emotional work and emotional exhaustion.

Other specialties and burnout. Although many studies have been completed among internal medicine residents, burnout is not unique to one specialty. Martini, Arfken, Churchill, and Balon (2004) surveyed residents across eight specialties on the MBI to measure burnout and its possible association with area of training, hours worked, year of training (PGY year), level of satisfaction with faculty, and home stressors. Fifty percent of respondents met the criteria for burnout; and year of training, being single, level of stress, and unhappiness with faculty were all associated with burnout.

Sleep loss and fatigue can negatively effect residents in the areas of learning and cognition, job and task performance, professionalism, personal well-being, sexual function, patient care, and relationships with significant others (Papp et al. 2004; Sangi-Haghpeykar, Ambani, & Carson, 2009; Veasey, Rosen, Barzansky, Rosen, & Owens, 2002). Further, the greatest consequence of sleep loss among residents was found to be post-call motor vehicle crashes (Steele et al., 2000; Ware, Risser, Manser, & Karlson, 2006).

Additional stress can be found for those residents who have graduated from schools outside of the U.S. and Canada, known as International Medical Graduates (IMG), particularly those where English is a second language. Although international graduates must pass an English proficiency test to enter into residency training in the U.S., other factors may be present that interfere with international residents' ability to communicate with patients. Fiscella and Frankel (2000) suggested that

considerably less attention has been given to teaching IMGs to recognize regional patient dialects, colloquial speech, body language, and speech inflection, yet studies show that even IMGs who are proficient in standard English may find it difficult to understand patients' more subtle or informal means of communication. (p. 1751)

This causes additional stress on the patient as well as the IMG residents.

Emergency medicine and burnout. In regard to emergency medicine, Katz, Sharp, and Ferguson (2006) reported that depression among EM residents was comparable to the general population (12.1%). The time of year, training year, gender, number of hours worked, and rotation did not predict depression among the residents. Conversely, Whitley, Gallery, Allison, and Revicki (1989) found that stress and depression were higher among female emergency medicine (EM) residents and

unmarried EM residents. Further, year of training was not a factor, suggesting that “residents experience stress throughout the course of training...and that spouses can buffer some of the stress of residency training for men and women residents” (p. 1157).

In 1993, Revicki, Whitley, and Gallery, found that there was a strong relationship between stress and depression among emergency medicine residents and that support from peers and work groups reduced stress. However, others have suggested that residency is only a time of temporary imbalance (Ratanawongsa et al., 2007) noting that emergency medicine residents report an ability to tolerate the shift-work “fairly well,” and have expressed that being young, having no children, and having a preference for “eveningness” assisted with tolerating shift-work (Steele et al., 2000).

Residency training and family. Of particular importance and less studied is the impact of residency on family and friends. Archer et al. (1991) found that time demands and indebtedness accounted for major sources of stress during residency and that social support variables were significantly related to the degree to which the residents successfully coped with daily stress factors.

Seminal work by Geurts et al. (1999) described work-home interference (WHI) among medical residents. WHI is present when a person deals with high pressures from both home and work, during which “job responsibilities are incompatible with home or family responsibilities” (Geurts et al., 1999, p. 1136). Work-home interference is often found among the young and highly educated, and can be time-based (not having time to do both) or effort-based (lack of energy to respond to all needs). Geurts et al. (1999) suggested that “insufficient recovery from the incompatible pressures within both domains (i.e., WHI) is likely to result in psychological health complaints that in the long

run become increasingly serious and chronic in nature” (p. 1136). Residents often have demanding home and work situations during a time in their lives when work is highly stressful and career development is in full swing.

In another study, Brummelhuis et al. (2008) sought to explain the relationship between family involvement and work-related burnout. The authors concluded that having children reduced burnout, but having children in general under the age of 6 increased burnout.

Physician wellness. There are fewer studies describing components of physician well-being. Shanafelt et al. (2003), based on a review of the literature, described physician well-being as “beyond merely the absence of distress and includes being challenged, thriving and achieving success in various aspects of personal and professional life” (p. 514). Studies in the field of psychology and medicine have been in agreement for characteristics that are associated with happiness or well-being such as being married; experiencing religion/spirituality; having a strong social support system; developing a life philosophy; practicing self-care; being self-aware; enjoying relationships with family, friends, and colleagues; and having children might reduce depersonalization and burnout (Brummelhuis et al., 2008; Geurts et al., 1999; Quill & Williamson, 1990; Shanafelt et al., 2002, 2003; Weiner et al., 2001;). Additionally, there have been only a scant number of articles published in regard to resident stress and its impact on learning during residency training. The ability to measure characteristics that represent loads and powers may assist in developing programs that can boost powers, thus improving margin which may assist residents in avoiding burnout.

Resident Remediation

The Accreditation Council for Graduate Medical Education Residency Review Committee for Emergency Medicine (ACGME RRC- EM) requires residency programs to implement an assessment process which includes both formative and summative evaluations in regard to the residents' progress (ACGME, 2007a). Overall, programs must assess residents' competence in patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice; utilize a variety of evaluators (e.g., patients, faculty, peers); record progression; provide documented evaluation and feedback; evaluate the resident on pre-determined expectations; and provide a plan for remediation. The plan should

...remedy deficiencies [and] must be in writing and on file. Progress and improvement must be monitored at a minimum of every three months if a resident has been identified as needing a remediation plan (ACGME, 2007a, p. 22).

Residents who are placed on remediation often suffer additional stress, and other residents in the program and the department also suffer due to the fact that other residents need to carry additional burdens and faculty need to increase supervision and educational opportunities (Ratan, Pica, & Berkowitz, 2008).

Many residency have programs struggled with the best mechanisms with which to evaluate residents. Most residency programs utilize in-training evaluation reports (ITERs) to assess progress among those in training (Dudek et al., 2005; Scheuneman, Carley, & Baker, 1994; Watling et al., 2008). In-training evaluation reports consist of a member of the faculty or other observer completing an evaluation after the resident has finished a monthly rotation. R.G. Williams, Klamen, and McGaghie (2003) described the clinical performance assessment approach.

The practitioner is observed performing routine clinical tasks under real clinical conditions. A global rating scale containing relatively nonspecific items is designed to be used in a range of clinical situations [and] is employed to direct the observer's attention to common, important, aspects of clinical performance and to calibrate the ratings of performance quality. (p. 272)

Whereas it has been widely reported that the reliability and accuracy of these evaluations are lacking (Dudek et al., 2005; Herbers et al., 1989; Holmboe, 2004; Noel et al., 1992; Scheuneman et al., 1994; R.G. Williams et al., 2003), the resident-teaching system has not yet developed an improved system for resident evaluation.

Residents who have fallen behind their peers academically or have behavioral or professional deficiencies might be placed on remediation. Remediation is often categorized in the areas of medical knowledge, clinical application, or behavior (professionalism). Each residency program, regardless of medical specialty, must develop its own process for remediation in accordance with ACGME (2009c) guidelines.

Several papers have been published describing models for implementing a program which identifies and addresses residents in remediation. Ratan et al. in 2008 suggested confirming the resident's level of performance with several faculty members, documenting areas of concern in the resident's file, discussing concerns with the Graduate Medical Education committee and departmental educational committee, and developing a formal program with specific objectives for clarity. Boiselle (2005) suggested the use of in-service exam scores to identify early residents at risk, incorporate resident reflection and feedback in the process, and implement an evaluation and monitoring program to determine success of the remediation. Smith, Stevens, and Servis (2007) offered three major components to their framework for working with residents who were experiencing difficulty. The authors suggested (a) *preparing for difficulties* by

having policies, procedures, and resources such as mental health experts and educational specialists in place, and clearly outlining what constitutes below-minimum performance levels; (b) *categorizing difficulties* by appropriately recognizing areas of concern (i.e., competence or learning difficulties) versus misconduct versus issues that constituted disability, for example, learning disabilities, mental health concerns, or substance abuse; and (c) *responding to difficulties* once a problem has been identified in a manner appropriate to the needs of the resident and the program.

Kimatian and Lloyd (2008) suggested in their research that remediation should first include helping the resident acknowledge there is a problem. Many high performers often rate their performances unrealistically high and might be unwilling to accept that they were not doing well. Once there is acknowledgement, the resident must engage in (have motivation for) improvement and assess his or her level of stress and available support systems. The institution should also assess resources available to the resident from the program, address any perceived conflicts expressed by the resident, and provide appropriate mentorship to the resident.

Also of importance has been the fact that resident remediation rates might be underreported. Tonesk and Buchanan (1987) found that clinicians were unwilling to document negative performance on evaluations and were furthermore unwilling to act on a negative evaluation even if it was recorded. Several studies have reported that physicians overestimated clinical competence (Martin et al., 1996; Schwartz et al., 1995; Vu et al., 1992), and many physicians avoided failing students and residents (Barzansky, Jonas, & Etzel, 1998; Dudek et al., 2005; Tonesk & Buchanan, 1987; Vu, Henkle, & Colliver, 1994; Yao & Wright, 2000). Dudek et al. (2005) completed a qualitative study

to determine reasons that supervisors avoided reporting poor performance on evaluations. The authors reported that even though physician supervisors recognized and were committed to the importance of physician competence to society, the program, and the trainee, four broad barriers existed, including lack of consistent documentation (attributed to time), uncertainty as to which issues to document, anticipation of the appeal process, and insufficient choices for remediation. Schwind, Williams, Boehler, and Dunnington (2004) found that, among surgery residents, attending physicians who wrote comments and relied less on numerical ratings were more likely to detect performance and learning deficits. In a study completed by Burdick et al. (1996) among first year emergency medicine residents, the authors found that assessing performance-based skills utilizing standardized patients was reliable (Cronbach alpha for the global score was 0.85).

Hobgood, Ma, and Swart (2000) completed a national survey among residency directors to determine if residents who committed medical errors were required to be placed on remediation. Forty-eight percent of programs did not require remediation after committing a medical error. Of those programs that did, a combination of remedial events was required such as providing a lecture or a written report, completing extra clinical shifts, or attending a meeting with the residency director.

Additional studies identifying and then formally placing residents on remediation with a clear plan of assistance and goal attainment is needed. Residents who have not performed well are at risk of voluntarily or involuntarily leaving their residency program.

Attrition in Residency

Residents play a vital role in providing cost-efficient care to patients. Residents, serving under a qualified attending physician, are capable of seeing patients and billing

for procedures. This service allows hospitals to see a higher volume of patients and generate a greater income base. As with any business, attrition is a major concern. In medicine, both faculty (attending physicians) and resident attrition are monitored. When a resident leaves a residency program, there are several effects: the remaining residents must cover the absent resident's shifts; the hospital sees fewer patients; the department's income may be reduced; it is difficult to fill the position with a resident who is at the same point in training; and the loss may create residents who are "off-cycle" and will affect the number of new residents recruited for the new year (D.C. Baldwin et al., 1995; Bergen et al., 1998, 2000; Moschos & Beyer, 2004). An overall effect that also can be detected has been a reduction in morale due to the added stress placed on the remaining residents and faculty. Although the ABEM and the RRC collect data to determine the national attrition rate of emergency medicine residents, neither organization has published this information. Other specialties such as surgery, obstetrics, and ophthalmology have investigated drop out rates and have attempted to determine whether they can predict which residents will drop out, the reasons residents give for leaving, and possible ways to better select residents from medical school in order to reduce attrition.

On a national level, D.C. Baldwin, Daugherty, and Eckenfels (1988) mailed a survey to 6,342 program directors of residency training programs nationwide, covering all specialties, asking them to report the number of residents who left training early, either voluntarily or by severance in the preceding year. The rate of attrition was 1.8% with the majority of residents leaving for another program within the same specialty or to a new specialty (48%). Other reasons for leaving included incompetence (18.6%), family

concerns (7.2%), psychiatric reasons (5.1%), joining a spouse (4.9%), time off from medical career (3.6), and financial problems (3.6%).

D.C. Baldwin et al. (1995) revisited national attrition rates among residents in the 1991-1992 academic year. Authors in this study utilized the American Medical Association to survey program directors in regard to which residents left training. Results were taken from 89,368 residents enrolled in 6,302 programs throughout the United States. In the 1991-1992 academic year, 2,449 residents withdrew or were terminated, resulting in a 2.7% attrition rate nationally. Most residents left for a specialty designation change or change in program location.

No further national surveys have been completed in recent years; however, several studies have been completed in regard to surgical residency and attrition. Most surgical residents reported voluntarily leaving surgical training to switch specialties due to the lifestyle of a surgeon or for family reasons, with more females leaving than males. (Aufses, Slater, & Hollier, 1998; Bergen et al., 1998; Dodson & Webb, 2005; Morris, Leibrandt, & Rhodes, 2003).

In the field of ophthalmology, Hatton and Loewenstein (2004) conducted a retrospective study to determine reasons ophthalmology residents voluntarily left their residency training. Of the 121 program directors queried, 102 responded, reporting that 13 programs had lost only one resident, for an attrition rate of 1.1%. The most frequent reason for leaving was to switch specialties.

Moschos and Beyer (2004) investigated gender as a factor in resident attrition among OB/GYN residents throughout the U. S. The authors sent surveys to 246 program directors of residency programs in obstetrics and gynecology. Results indicated a 4%

attrition rate over four years. The majority of males who left OBGYN residency did so in order to change specialties, whereas females mainly left for family reasons or to join a spouse in another location.

Van Zanten, Boulet, McKinley, and Whelan (2002) explored the attrition rates across specialties to determine if there was a difference between U.S. Medical Graduates (USMGs) and International Medical Graduates (IMGs) in the areas of family practice, internal medicine, obstetrics and gynecology, pediatrics, and psychiatry. Program directors were asked to report attrition rates of residents (both USMG and IMG) who left voluntarily (transferred to another program) or involuntarily (terminated). For USMGs, 10% voluntarily left their training program to transfer to another program, and another 2.5% were terminated from their program. Among IMGs, 9% transferred to another program voluntarily, and nearly 4% were terminated. The authors reported that IMGs “may be somewhat less prepared to enter postgraduate training in the United States due to differences in medical training” (van Zanten et al., 2002, p. 177) and might suffer possible language adjustments.

Finally, the only study in regard to attrition and emergency medicine is from Ginde, Sullivan, and Camargo (2009) who sought to estimate the attrition rate of emergency medicine physicians in clinical practice (post-residency). The authors completed a cross-sectional analysis of 30,864 emergency medicine physicians (those trained in emergency medicine or those board-certified in emergency medicine). Most who left emergency medicine did so within the first 2 years (6.5%), after 20 years (18%), or after 30 years (25%). However, “between 5 and 40 years, the rates remained low (<1%). The overall annual attrition rates from emergency medicine clinical practice,

including estimated death rate, was approximately 1.7%” (Ginde et al., 2009, p. 1). The authors concluded that “despite the high stress and demands of the specialty, overall attrition remains low and compares favorably with that of other medical specialties” (Ginde et al., 2009, p. 5) and further suggested that emergency physicians experience job satisfaction due to the fact that they encounter a high variety of patients, possess a high skill-set, earn a high salary, and have opportunities for teaching and leadership.

Summary of the Literature in Regard to Burnout, Remediation, and Attrition

As evidenced through the literature, residency is a time of high stress characterized by long hours, lack of sleep and free time, financial concerns, and fatigue. Many residents experience burnout during residency when emotional exhaustion, depersonalization, and a low sense of self-worth may surface. Because of this, work performance and the resident’s education may suffer during residency. Additionally, remediation requirements in residency might be underreported, and residency programs may not include comprehensive mechanisms to address remediation. Finally, friends and family are often affected by the resident’s program and can provide either negative or positive reinforcement to the resident. Most studies utilized the MBI to assess a resident’s level of burnout but might not have considered resources available to the resident that could increase the resident’s persistence rates or resilience. Residency occurs at a time when most residents are experiencing adult development (ages 25-45; McClusky, 1963), and residents appear to exist developmentally somewhere between the traditional student and the adult learner.

Attrition additionally is a major concern for residency programs as well as the RRC. While ABEM collects data in regard to attrition rates, these data have not been

published. The Residency Review Committee can cite residency programs for high attrition rates, however, an acceptable rate of attrition has not been revealed by the RRC. It appears that most residents leave their training program for life-style reasons. The ability to identify sources that serve as burdens or resources may assist programs in identifying those at risk for burnout or attrition. The margin in life theory may have educational and developmental implications that assist in the identification of resources and burdens in the lives of learners.

Margin in Life Theory

In 1963, Howard McClusky published a chapter titled “The Course of the Adult Life Span” in which he described his thesis for studying development in the adult years (p. 10). McClusky cited Buhler (1935), Henry (1956), and Peck (1956), and asserted that the stereotypical description of adult development as “growing up and settling down” underestimated the realities of the way that adults matured. McClusky stated that

Adulthood is marked by a tendency toward a developing integrative person (self) together with a “built-in” tendency for self protection which is complemented by an equally basic tendency to seek goals which will help the individual become better than he now is. (p.15)

Further, McClusky noted that adults have a “tendency in adulthood to protect against internal and external threats to adjust mental integrity” (p.15). This suggests that adults adjust their powers and loads as best possible to maintain mental health. McClusky posited that developing meant that the adult was constantly dealing with change and integration and engaged in efforts constantly to improve.

McClusky (1963) introduced the concept of *margin* by explaining load and power as key components in the adult life. Both load and power have internal and external properties. Load is defined as internal and external pressures or burdens that are

connected to family, work, self, community, and others; and power is explained as resources such as skills, position, family, friends, community, and others that assist one in coping with load. The concept of margin is determined by a ratio of load to powers; if one has an excess of powers over loads, the result will be extra energy (McClusky, 1963, 1964, 1970, 1971). A key component to McClusky's theory is that, in order for adults to learn and deal with crisis, a sufficient margin must be in place. McClusky stated

If, however, *load* and *power* can be controlled, and better yet, if a person is able to command a *margin* of latent *power*, he has more autonomy. He is thus prepared to meet emergencies. He can engage in exploratory or creative activities. He can take risks and do things that enable him to live above the plateau of mere self-maintenance. (p. 27)

McClusky (1970) further correlated load with stress and power with resilience. He defined margin as a net-profit or a surplus that provides enough energy to participate in activities that are above maintenance. A person who has margin has more options available to him to contend with life's demands above baseline. McClusky also stated that it was crucial to remember the importance of *self*.

...the individual uses himself as a point of reference. Thus a major portion of our psychological experience takes place in a referential framework of the self. The unifying character of this fact adds greatly to the utility of the self construct as the basis for a theory of motivation. (p. 29)

If one is comfortable with oneself and one's margin, motivation to participate should be increased and should result in a healthier integrative person over all (McClusky, 1963, 1970).

While McClusky (1970) did not develop a tool to measure load and power, he did theorize that load served as the numerator and power served as the denominator, resulting in a ratio or margin. A person whose margin was close to 1.00 for an extended period of

time might be close to collapse. A margin between .30 and .80, according to McClusky, represented the ability to meet life's emergencies (p. 17).

Researchers and educators have sought to apply McClusky's (1963, 1964, 1970, 1971) theory of margin in their investigations and theoretical premises, particularly in the areas of adult education, nursing research, and healthcare. A variety of assessment scales have been utilized to determine load, power, and margin. The following section will be organized into two segments to assist with clarity. The first segment discusses studies and papers that have utilized a variety of assessment tools for load, power, and margin and will be separated by area of study: adult education, nursing research, and healthcare. The second segment will review the work of researchers who have utilized different versions of Joanne Sabol-Stevenson's Margin in Life Scale (MILS; 1980, 1982a, 1982b, 1994) to assess and explain load, power, and margin.

Margin in Life Theory Research Utilizing Various Measurement Tools

Adult education. Many scholars in the field of adult education have investigated ways by which better to understand, reach, and retain adult learners. As Merriam et al. (2007) stated

Knowing who participates in adult education activities and why adults are participating (or not) is necessary information for both providers and policymakers. Since participation in adult education is largely a voluntary activity, knowing who is participating, reasons for participating, and what conditions are likely to promote greater participation can help providers better serve adult learners. An understanding of participation patterns can also raise important questions about assumptions underlying what is offered, who is benefiting from participating, and whose needs are *not* being met. (p. 53)

There is no one definition or clear theory of the way that adults learn (Knowles, Holton, & Swanson, 2005; Merriam et al., 2007). Examples of researchers who have utilized McClusky's theory of margin to assist in reaching and retaining adult learners

and, additionally, improving adult learning include Main (1979), Demko (1982), Day and James (1984, 1985), James (1986), Londoner (1993), and Wolfen (1999a, 1999b).

Main (1979) developed a teaching model based on the theory of margin (McClusky 1963, 1970, 1971) by which instructors could develop curricula and instructional materials or guide teacher action. Main's objective was to develop a teaching model that went beyond the model that he termed the Power-Load-Margin (PLM) formula and sought to incorporate more of McClusky's writings in regard to "developmental and differential psychology of the adult learner" (p. 20). Essentially, McClusky asserted that the Stimulus-Response (S-R) theory of learning worked well for simple kinds of learning, but S-R was inferior for learning for more complex theories and for students who were more mature. McClusky offered S-O-R, in which the "O" is the adult learner and the teacher "reinstat[e]s the learner as the indispensable focus in understanding and influencing the learning experience" (Main, 1979, p. 22). The Power-Load-Margin formula is particularly important, McClusky stressed, as margin is required to access learning. Main stated the significance of margin in this fashion

A margin is essential to the mental hygiene of the adult. The adult has far less than perfect control over the situation in which he must exercise responsibility. He must at times be prepared to meet unpredictable crises which make unusual demands on the ability to respond and possess a reserve margin.

A margin allows a person to invest in life extension projects and experiences including learning experiences. (p. 23)

Main's (1979) teaching model was implemented in phases. In the first phase, the individual (self) becomes aware of PLM and utilizes this concept throughout the model. Additionally in Phase I, the learner takes an active role in his or her learning by reflecting on his or her basic values and motivation for learning with the instructor. In Phase II, the

learner determines a sense of direction in regard to learning and issues in the inner circle of his or her interests. In Phase III, the learner must take responsibility for setting learning objectives, and Phase IV is implementation of the educational objectives and should include active participation, problem centered-learning, and meaningful learning. The instructor in this model takes an active role by serving as facilitator, resource agent, and guide. The final components of the model incorporate principles of reaction (mutual respect and responsibility for learning), a social system (inquiry in small groups or individualized learning situations), and a support system (in which margin and motivation must be present).

Demko (1982) stated that he utilized both McClusky's (1963) theory of margin and Gubrium's (1972) socio-environmental theory as tenets for studying the variables that influenced older learners to participate in certain educational settings. These included those who were about the same age (age-homogeneous), varied in age (age-heterogeneous), on-campus learners (traditional setting), or off-campus learners (non-traditional). Demko found that older adults' decisions to participate in higher education programs were positively influenced by resources available to the adult and suggested that instructors of older adults consider reducing the environmental loads that may prevent participation.

Day and James (1984, 1985) and James (1986), recognizing that adults must adjust to constant change in their personal and professional lives while also responding to societal changes, introduced a co-operative diagnostic tool which utilized McClusky's theory of margin (1963, 1970, 1971) in the adult education setting. Day and James (1984) supported the National Commission on Excellence in Education's (1983) assertion that

life-long learning was a necessity in order to meet the challenge of change in the adult world. Day and James suggested that McClusky's theory of margin may assist in explaining adult participation in learning activities and that the development of a tool that measures an adult's loads, powers, and resulting margin may offer the opportunity to create an educational broker. The educational broker in theory could implement the margin assessment tool and determine the "probability of participation," which Day and James cited as a concept that was developed by Darkenwald and Merriam (1982).

James (1986), building on a previous study completed by Day and James in 1985, primarily sought to clarify adult part-time college students' perception of instructor-generated load in the categories of behavior, attitude, environment, and task. Instructor-generated load is defined as "an instructor creating unwanted, unwarranted, and unexpected load within a teaching/learning transaction..." (James, p. 4). James found that adult learning satisfaction was related to instructor-generated load and that the more the student perceived instructor-generated load to be present, the less effective the teacher was perceived as being.

Londoner (1993) is included in this section due to the fact that she sought to assist human resource directors in educating others within the organization on ways to assess life situations and then respond appropriately. Londoner presented a theoretical framework that combined McClusky's theory of margin (1963, 1970, 1971) and Lewin's (1946, 1967) force field analysis into a pencil and paper exercise that Londoner claimed met "a variety of adult learner needs" (p. 123). The exercise's objective was for the participant to assess his or her personal and professional workloads and the powers s/he

possessed to counteract the loads, and then manipulate loads and powers to achieve margin.

Wolfen (1999a) completed a study to determine overloaded adults readiness for learning by implementing the Type E Stress Inventory (Braiker, 1986) and a readiness for change questionnaire, developed by Wolfen, to 78 adults in the general population. Sixty participants were classified as Type E stressed which identified them as being overloaded, and, of those 60, twenty-one agreed to be called and interviewed. Wolfen reported the following findings; most people in the study were classified as overloaded; most participants who were interviewed read books or magazines; a third of the respondents felt their stress levels assisted or did not negatively impact their readiness to learn; overloaded women reported they were less ready to learn than males; those who perceived that their load was too high and that they did not have enough powers felt they could not participate in learning activities; a lack of knowledge in regard to options for learning might have prohibited some from participating, and people close to the participants (family and friends) might impact decisions to participate in learning activities. Several limitations to this study should be taken into consideration. These include a small sample size and sampling method (as this was a convenience sample).

Margin in life theory in nursing research and general health care. Gleit (1976), Gessner (1979), and Sutton (2004) each investigated the utility of margin in the nursing profession. Gleit's (1976) study sought to determine whether nurses ($n = 6,136$) who had more than two children were less likely to work full time in the nursing profession and would participate less in continuing education programs. Gleit utilized McClusky's theory of margin (1963, 1970, 1971) to hypothesize that nurses who juggle

work and family (particularly children) would have greater load and therefore be less likely to work continuously in the nursing field. Gleit found that a relationship existed between number of children and work status, particularly among younger married nurses. Women aged 26-30 with two or more children were less likely to work full time. Additionally, Gleit found that work status, not the number of children, restricted participation in continuing education among nurses.

Gessner (1979) hypothesized that nurses who participated in continuing education had greater margin scores than those who did not, based on McClusky's assertion that those who have substantial reserve or margin have a greater propensity to participate in educational activities. Nurses ($n = 173$) were separated into three groups, those who chose to participate in a televised continuing education program, those who did not, and those who did but chose not to re-enroll in the program. Gessner developed an instrument for measuring power and load, power on the right side and load on the left, resulting in a two-directional scale on which the nurses had to choose one or the other and rank the choice between 1 (*low*) and 5 (*high*). The study failed to find significant differences between the groups of nurses participating in a continuing education program. Gessner recommended further refinement of the measuring instrument and suggested expansion of the power load items.

Sutton's dissertation work in 2004 sought to determine first the relationship between grades in nursing courses, standardized test scores, and prerequisite course grades to outcome results (pass/fail) for nurses on the National Council Licensure Examination for Registered Nurses (NCLEX-RN; $n = 235$); and second whether McClusky's (1963, 1970, 1971) load/power and resulting margin could predict licensure

passage. The author determined load “as the maximum attainable grade/score for each component of the nursing program...” (p.76), and power by the actual score or grade achieved by the student. The resulting margin score was then tested as a predictor for passing or failing the licensure examination, where it was hypothesized that the higher the margin the greater the likelihood of passing the NCLEX-RN on the first attempt. Results reported by Sutton suggested that grades in certain nursing courses during each year of training did correlate with passing of the NCLEX-RN and that margin scores for the predictor variables of nursing course grades, prerequisite course grades, and standardized test scores were significantly associated with the likelihood of passing or failing the NCLEX-RN exam.

In the area of general health care, Baum (1980) and Herman (1990) each sought to determine the impact of margin among those who were experiencing a stressful event with loved ones. Baum conducted interviews with 100 widows to determine areas that provided assistance (power) and those that served as problems (load) after losing one’s husband. Baum utilized McClusky’s load, power, and margin theoretical concepts for providing an explanation of the way that the widows were coping and found that family members and friends were important sources of power in adjusting. No instrument was developed or utilized; this was solely a concept paper.

Herman’s study (1990) first sought to determine if caregivers of elderly parents who were part of a short-term support group perceived greater margin than those not enrolled in a support group. Second, if there was a perception of greater margin, what aspects increased margin? Herman administered pre- and post-tests to 25 adult daughters enrolled in a support group and 20 adult daughters who were not part of a support group.

The author reported that the observed increase in margin was insignificant for those enrolled in the support group, but that the daughters in this group reported feeling less isolated and experienced an increase in their perceived self-worth. Additionally, this group expressed to Herman a better ability to get along with their parent(s), express feelings, and to cope with being caregivers.

Studies Utilizing Stevenson's Margin in Life Scale(s)

Seminal research in developing a tool to measure load and power was completed by Joanne S. Stevenson, first published in 1980 with a follow-up study in 1982.

Stevenson and colleagues first developed a 211-item questionnaire incorporating six areas of life, including religiosity/spirituality, self-concept, body, family, other human relationships, and environment and administered it to over 300 adults aged 20-70 years. Selected items were taken from the Religiosity Scale by Swenson (1959), the Cornell Medical Index (1965), the Tennessee Self Concept Scale (Fitts, 1964), the Life Satisfaction Scale (Neugarten, 1961), and the Locus of Internal-External Control Scale (Rotter, 1966) to develop the Margin in Life Scale (MILS). Factor analysis and test-retest reliability analysis were completed, resulting in the reduction of the questionnaire to 94 items. An importance rating was added on which participants were asked to rate the importance of an item on a scale of 1-10, which served as the weighting factor, and then were asked to rate the load or burden of that item currently in their life on a scale of 1-5, and rate the power or resource of that item on a scale of 1-5. A formula was developed to combine importance, load, and power into a composite score for each item; items within a factor were combined for subscale scores, and then finally, an overall MILS score (Appendix A).

In 1982, Stevenson administered the MILS to 63 stabilized chronically ill patients (those with diabetes, multiple sclerosis, cardiac problems, and mental illness). Stevenson suggested that

In health the ratio of load over power should fluctuate in the range delineated by McClusky of .30 to .70 in order to provide a margin to meet new challenges, changes, or emergencies. Margin below .30 may reflect danger, indicating that a person is living beyond the tolerable limits of stress or is in the terminal stages of life. A margin above .70 may reflect too little load, indicating that the person is not operating to potential. (p. 222)

The mean MILS composite score for the chronically ill population was 55.5%, compared to 103 healthy volunteers' MILS mean score of 60%. Although this difference in overall scale scores was not statistically significant, three of the subscale scores were statistically significant, showing more load than power for the chronically ill in the areas of body, self, and extra family relationships. In efforts to continue work on the MILS instrument, Stevenson completed further validation studies to refine and reduce the items on the MILS questionnaire. In 1994, Stevenson produced a manual for researchers interested in utilizing the MILS. The newest version of the MILS was reduced from 94 items to 58 by administering the survey to 104 normal adults aged 25-60. Factor analysis of data from this sample resulted in five factors. This version was subjected to further refinement using data from 283 normal adult volunteers aged 23-52. A test-retest reliability analysis was completed with 61 normal adult volunteers within a four-week period. The factors were renamed with the resulting Cronbach alpha and test-retest reliability results reported in Table 1.

Table 1
MILS Psychometric Properties

	Cronbach Alpha	Test-Retest (Pearson Correlation Coefficient)
Health	.90	.67
Religiosity/Spirituality	.86	.90
Self- confidence	.81	.69
Interdependence	.80	.58
Parenting Satisfaction	.92	.97
Total Scale	.95	

Note. Taken from Stevenson, 1994

Several studies have been conducted utilizing Stevenson’s MILS (1980, 1982a, 1982b, 1994) in an attempt to operationalize McClusky’s margin in life theory (1963, 1970, 1971). Researchers Murphy (1981), Weiman (1987), Knepper (1990), Mikolaj and Boggs (1991) and Roberts and Fitzpatrick, (1994) all utilized Stevenson’s 94-item scale on which there were six subscales: Body/Health, Self, Family, Religion/Spirituality, Extra-Familial Relationships, and Environment (Stevenson, 1980, 1982a, 1982b).

Studies Utilizing Stevenson’s MILS 94-Item Questionnaire. Murphy (1981) sought to determine whether there were differences between MILS scores among two types of diabetic patients. One set of patients was controlling their diabetes through insulin and diet ($n = 11$) while the other set of patients controlled through hypoglycemic agents and diet ($n = 7$). Murphy hypothesized that those patients who were insulin dependent had lower margin scores than those who were on hypoglycemic medications. Results revealed no difference among the two group’s MILS score. However, the group of patients on hypoglycemic medications did score significantly higher on subscale scores of Family Issues and Religiosity/Spirituality.

Weiman, in her 1987 dissertation, posited several research questions relative to the psychometric integrity of the MILS scores. The first question was designed to determine if there was a relationship between MILS scores and grade point average among 28 students seeking a master's degree in computing science education. The second sought to ascertain whether participation in the master's program had an impact on the subscales. None of the areas of inquiry produced significant results. To determine whether the factors identified in Stevenson's MILS matched those in Weiman's research, Weiman completed a factor analysis using principal factoring with iteration and varimax rotation. Weiman reported "...the underlying structure of the MIL scale can be explained by only one pattern (Factor 1)...[T]he factor loadings show the relatively high positive relationship that exists between the first five variables and the pattern" (p. 182). However, Weiman's sample size was small ($n = 26$), and the factor analysis was completed on the subscale scores instead of the item scores to adjust for the small size of the sample.

Knepper (1990) used data from 324 community college students completing the MILS to determine whether there was a correlation between MILS score and academic achievement as measured by grade point average (GPA). Additionally, Knepper sought to determine whether age, gender, major, credit hours attempted, and previous academic experience impacted that relationship. The average MILS score for the sample was .57. Knepper found no relationship between low GPAs and low MILS scores.

Mikolaj and Boggs (1991) studied 129 women re-entering higher education to complete their undergraduate degrees, both bachelor of arts and bachelor of science. The cohort's average age was 38, and participants were either married, living with someone

of the opposite sex, or head of household. A concern in Weiman's (1987) study was the fact that both Low Load/Low Power and High Load/High Power ratings were treated the same (.50), when in fact a High Load/High Power rating might mean more to the participant and might represent the fact that the person was much closer to breakdown than the person with a Low Load/Low Power rating. To adjust for this, Mikolaj and Boggs incorporated Main's (1979) examples of classifying margins into four categories: Margin A=Low Load/Low Power (breaking even), Margin B=Low Load/High Power (having margin), Margin C=High Load/Low Power (crisis offing), and Margin D=High Load/High Power (barely maintaining balance). This allows Margin A and B to serve as two different groups of break-evens and, Margin C & D two different groups of crisis (see Table 2). Mikolaj and Boggs found that women in this study perceived the areas of child care, expectations of self, relations with mate and children, and health status as highly important. Also, nearly a third of participants rated items in the area Margin C (crisis offing); a third fell into Margin D (barely maintaining balance), 16% in Margin B (having sufficient margin), and 30% in Margin A (balance with minimal effort). The areas of time management, child care, and expectations of self provided the most conflict among these students, with a majority of responses falling in Margin C or Margin D.

Table 2
Margin In Life Categories Correlated with Ratings of Load Over Power

<u>Margin Categories</u>			
A. In balance	B. Having Margin	C. In crisis	D. Barely Even
<u>Ratio of Load Over Power</u>			
A. <u>Low Load</u> Low Power	B. <u>Low Load</u> High Power	C. <u>High Load</u> Low Power	D. <u>High Load</u> High Power

Note. Ratings of load and power on a scale of 1-5 where 1-3 are low values, and 4 or 5 is a high value. (Main, 1979; Mikolaj & Boggs,1991)

Roberts and Fitzpatrick (1994) investigated whether elderly hospitalized patients ($n = 39$) had higher MILS scores than elderly patients in the community ($n = 44$). Each group had heart disease, and members were 65 years or older. Roberts and Fitzpatrick hypothesized that hospitalized elderly patients might have more resources available to them, thus reducing their overall load more than those in the community.

Roberts and Fitzpatrick (1994), in similar fashion as Weiman (1987), further investigated the construct validity of Stevenson's MILS subscales. Roberts and Fitzpatrick reported on the reliability of scores on the subscales of physical function (health), self-concept (self), family, and spiritual (religiosity/spirituality). Cronbach alphas were .90, .98, .63, and .77, respectively. However, community and work subscale items were re-examined. Removal of some items in the work category resulted in a standardized alpha of .70. The community subscale items were reviewed, and it was determined that the subscale contained more than one dimension. A principal component factor analysis with varimax rotation was completed resulting in three factors with eigenvalues greater than 1. These resulting subscales were added to Stevenson's (1982a) original six subscales of job outside interests, and finances representing the community category. Therefore, data analysis was defined in the six dimensions of life, which included Physical Function, Work, Spirituality, Family, Self Concept and Community (broken down into Job, Outside Interests, and Finances). Results did not indicate statistically significant differences between the hospitalized elderly patients and elderly patients in the community.

Studies Utilizing Stevenson's MILS 58-Item Questionnaire. Schawo (1997), Walker (1997), Johnson (1996); Johnson, Schwartz, & Bower, 2000; Hanpachern 1997;

Hanpachern, Morgan, and Griego (1998), and Madsen, John, Miller, and Warren (2004) have utilized the most current MILS from Stevenson (1994).

Schawo (1997) appears to be the first researcher to utilize Stevenson's 58-item scale in a published journal article or dissertation. Schawo's study sought to determine if there was a relationship between MILS scores and female students' (25 years and older; $n = 263$) perception of an ideal classroom environment, an ideal amount of classroom involvement, and an ideal amount of affiliation within the ideal college classroom environment. The author utilized the Ideal Adult Classroom Environment Scale (ACES), the Involvement dimension of Ideal ACES, and the Affiliation dimension of Ideal ACES respectively to measure students' perceptions of the classroom environment. Results revealed a correlation between MILS scores and the total Ideal ACES scores, and between MILS scores and the involvement dimension of the Ideal ACES, but not the affiliation dimension score. The author suggested that a correlation between high involvement dimension scores and high MILS scores might mean that students with high margin could have the energy for involvement in the classroom setting.

Walker (1997) investigated the utility of the MILS total score and subscale scores in predicting educational persistence among nontraditional students in two colleges ($n = 519$). Students enrolled in two different colleges were asked to complete the MILS (Stevenson, 1994) and were tracked over three consecutive quarters to determine whether they stayed in school. Neither the overall MILS score nor any of the subscale scores were able to effectively predict retention among the study population.

Johnson (1996) and Johnson et al. (2000) conducted studies was to determine the MILS subscale scores for the life areas identified in Stevenson's work of Health,

Religiosity/Spirituality, Self Confidence, Interdependence, and Parenting Satisfaction among 350 female community college students. The load/power ratios for each subscale were above the .30 level in all areas except parenting satisfaction. These results indicated that in the life areas of Health/Body ($M = .35$), Religiosity/Spirituality ($M = .35$), Interdependence ($M = .46$), and Self-Confidence ($M = .47$), this population of women on average had enough margin or reserve energy according to McClusky's (1963, 1970, 1971) hypothesis to meet the demands of their current life and changes or emergencies that might arise. However, in the area Parenting Satisfaction, many of these women did not have enough resources available to them to cope with demands.

Johnson (1996) and Johnson et al. (2000) further investigated whether age, partnership, or parental status made a difference in the subscales. The following groups were created for analysis: age groups 25-29 years, 30-39 years, and 40 years or older; those with partners and those without; and those who had children and those without. In regard to age, statistically significant differences were found in the area of Health and Parenting Satisfaction. Women older than 40 years had a significantly higher load/power ratio average ($M = .38$) than the younger aged groups of 25-29 years and 30-39 years ($M = .32$). In the subscale of Parenting Satisfaction, women with children who were 40 years and older had significantly higher load/power average than the groups of younger women.

In the area of partnership, Johnson (1996) completed five *t*-tests to determine the significance of having a partner. Statistically significant differences were found in the subscales of Religiosity/Spirituality, Interdependence, and Self-Confidence ($p \leq .05$) on which women with partners had significantly higher mean scores.

Hanpachern (1997) and Hanpachern et al. (1998) explored the utility of McClusky's theory of margin (1963, 1970, 1971) in the work force. The authors pointed out the importance of organizations' having the capacity to change for survival. Organizational development often requires engagement in activities that keep the organization viable and might result in organizational changes, such as new policies, work flow, and structure. Change of this nature is often met with employee resistance. Hanpachern et al. noted that organizations often use the participative approach to organizational development, during which employees have greater involvement in the process (Pasmore & Fagans, 1992) to increase employee satisfaction, motivation, and job satisfaction. However, Kanter (1982) has suggested that a greater emphasis should be placed on the employees' openness and readiness for change. Hanpachern et al. utilized McClusky's theory of margin to determine whether eight aspects that represent margin in life (management-leadership relations, social relations in the workplace, job demands, job knowledge and skills, health, family, and self) and demographic variables predicted readiness for change. A total of 131 employees at one company in different departments completed two questionnaires, a revised questionnaire of Stevenson's MILS (1994), and a revised Readiness for Change instrument that combined scales by Hanpachern (1995) and McNabb and Sepic (1995). Stevenson's MILS was revised to a 50-item instrument, with Cronbach alphas ranging from .62 to .90 on each of the eight factors. Results supported the hypothesis that a statistically significant positive relationship existed between MILS scores and Readiness for Change; as MILS scores increased, so did scores on the Readiness for Change Scale, and vice versa ($r = .28, p < .01$).

Madsen et al. (2004) first sought to replicate the Hanpachern et al. (1998) study. Madsen et al. examined whether employees with higher MILS scores were more ready and apt to change than those who scored lower on the MILS. In order to determine margin, Madsen et al. significantly reduced Hanpachern's et al. 50-item questionnaire to 9 questions with a Likert-type rating scale of

1- takes *a lot* of my energy-it physically or mentally drains- a load on my shoulders, 2- takes *some* of my energy-it *somewhat* drains me-somewhat of a load on my shoulders, 3- Neither takes energy nor provides joy, pleasure, strength, or richness for me, 4- provides or creates some joy, pleasure, strength, or richness for me-gives me *some* energy/power in life, 5- provides or creates *a lot* of joy, pleasure, strength, or richness for me gives me some energy/power in life. (Madsen et al., p. 35)

The investigators concluded from this study that employees with higher MIL levels, in work and non-work areas which supplied more power than load, appeared to be more open to change required by the organization.

Summary of Margin in Life Theory

The literature focused on margin in life theory reveals a substantial interest in understanding the way margin can be measured and applied to various aspects of life such as adult education, persistence in education, application in the healthcare field, adaptation to life events, and increased success in organizational change. As described by others in this literature review, the margin in life theory seems intuitive but may be difficult to measure as the concept is dynamic in nature.

The medical literature clearly illustrates that residency is a time of high personal and professional stress, requiring long hours of training, sleep deprivation, high attentiveness, and adaptability. Emergency medicine has seen a steady increase in the number of physicians seeking training and an increase in the number of programs seeking

academic residency accreditation. Howard McClusky's (1963, 1970, 1971) margin in life theory may provide a way of explaining or theorizing aspects of adult development and ways in which adults are able to cope with life's emergencies and the learning environment. The ability to identify residents' loads and powers and determine overall margin may identify residents at risk for remediation or for leaving their residency programs. Moreover, identification of areas of loads and powers may assist residency programs in developing curricula or more sophisticated resources that support residents during training.

Chapter 2 Summary

This chapter reviewed the literature in regard to the development of residency training in emergency medicine, burnout among residents, and remediation and attrition rates and explored the published literature in regard to the margin in life theory first introduced by Howard McClusky in 1963. The literature clearly demonstrated that burnout among residents was high, between 25-76% (Eckleberry-Hunt et al., 2009; Shanafelt et al., 2002) and might be due to such factors as long hours, sustained fatigue, emotional exhaustion, depersonalization, a sense of low self-worth, and financial burden (Butterfield, 1998; Jackson et al., 1986; Kuhn et al., 2009; Perlman & Hartman, 1982; Maslach et al., 1997; Shanafelt et al. 2002).

Currently, there appear to be no published studies in the literature that report remediation or attrition rates among emergency medicine residents. However, it is widely acknowledged that remediation rates may be underreported among all residency specialties, and, although attrition data are collected by the American Board of Emergency Medicine, these data have not been published. Residency programs can be

cited for insufficient remediation policies and for high attrition rates; however, an unacceptable rate of attrition has not been announced by the Residency Review Committees under the Accreditation Council for Graduate Medical Education.

The margin in life theory (McClusky 1963, 1964, 1970, 1971), which suggests that one must have a surplus of resources (more resources than burdens) to engage in learning and deal with life's emergencies and crises, might provide insight into the reported burdens (loads) and resources (powers) of emergency medicine residents. Stevenson (1980, 1982a, 1982b, 1994) created an instrument to measure one's loads and powers and a formula to calculate one's overall margin in life score based on loads/power. Numerous researchers, mostly in doctoral work, have investigated the utility of the Margin in Life Scale (Stevenson, 1994) in the areas of adult education, nursing, healthcare in general, higher education, and the human resource field. The present study explored the utility of a modified version of Stevenson's MILS, titled the Margin in Life Scale for Emergency Medicine (MILS EM) to determine if residents who score below .30 (McClusky, 1963, 1964, 1970, 1971; Stevenson, 1980, 1982a, 1982b, 1994) on the MILS EM appear to be on remediation or at risk for remediation, or for leaving their EM training program, or whether there is a different benchmark for EM residents. Further, the present study sought to determine whether demographic variables affected MILS EM scores and, finally, whether there were areas of the MILS EM on which residents scored as being crisis offing (Margin C) and barely maintaining balance (Margin D) as identified by Main (1979) and Mikolaj & Boggs (1991).

Based on the literature reviewed, Chapter 3 discusses the methods utilized in this research to address specific research questions, corresponding null hypotheses, and data

analyses. Additionally, Chapter 3 describes the sample population, study design, and the development of the MILS EM questionnaire.

Chapter 3: Methods

This cross-sectional study of adult emergency medicine residents investigated the utility of the Margin in Life Scale (MILS) amended as the Margin in Life Scale for Emergency Medicine (MILS EM) in determining residents' ratio of load to power while in training. Chapter 3 describes the sample population, study design, research instrument utilized and proposed statistical analyses to address the following research questions and stated null hypotheses.

Research Questions and Null Hypotheses

Research question 1. How do emergency medicine residents enrolled in 1-3 year training programs score overall on the MILS EM?

Research question 2. How do emergency medicine residents enrolled in 1-3 year training programs score in the subscales (life-areas)?

Research question 3. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those at risk for remediation?

Null hypothesis for research question 3. There is no difference between MILS EM and subscale scores of residents on remediation or at risk for remediation versus those who are not.

Research question 4. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those who are contemplating leaving emergency medicine training?

Null hypothesis for research question 4. There is no difference between MILS EM scores of residents who are contemplating leaving EM training (for another specialty, for another EM program, or leaving medicine altogether) versus those who anticipate staying.

Research question 5. Does demographic information such as gender, age, marital status and location of medical graduation (USGM vs. IGM) have an impact on MILS EM scores?

Null hypothesis for research question 5. There is no difference in MILS EM and subscale scores according to gender, age, marital status, and graduate medical education (USMG or IMG).

Research question 6. Does training year (PGY1, PGY2, & PGY 3) have an impact on MILS EM score?

Null hypothesis for research question 6. There is no difference between the mean MILS EM scores by training year (PGY1, PGY2, & PGY3) of emergency medicine residents.

Research question 7. Does the size of the training program impact the MILS EM scores among emergency medicine residents?

Null hypothesis for research question 7. There is no difference between the mean MILS EM score and subscale scores of emergency medicine residents enrolled in small (<30) versus large (≥ 30) programs.

Research question 8. What areas of the MILS EM do emergency medicine residents report as being more important based on Mikolaj and Boggs (1991) categories (A) In balance, (B) Having Margin, (C) In Crisis, and (D) Barely Even (see Table 2).

Null hypothesis for research question 8. There is no difference in perceived importance of margin categories (Mikolaj & Boggs, 1991).

Population and Sample

The population from which the research sample was drawn included emergency medicine physicians (PGY1, PGY2, and PGY3) enrolled in accredited 1-3 year emergency medicine residency training programs in the Southeastern states of Louisiana, Mississippi, Arkansas, Alabama, Florida, Georgia, Tennessee, South Carolina, and North Carolina ($N = 9$ states; ABEM, 2007). These states were chosen as the investigator had contacts within the Southeastern Regional Society of Academic Emergency Medicine. In further review of the accredited emergency medicine training programs in these states, all but two programs were 1-3 year training programs (SAEM, 2008). The non 1-3 year training programs were the University of Mississippi which is a 2, 3, 4 program and Louisiana State University at New Orleans a 1-4 year training program. As these programs are the only non 1-3 year training programs and each has a different training format, they would be easily identifiable in data analysis; therefore these programs were excluded as possible study sites, leaving a total of 18 emergency medicine residency programs representing the population. A consensus group consisting of the investigator and emergency medicine attendings who serve on local and national committees further broke down the training programs into large (≥ 30) and small (< 30) by the total number of residents approved to be enrolled in each of the programs by the American Board of Emergency Medicine (ABEM, 2007). Table 3 lists the population from which the sample for this study was drawn.

Table 3
Population of EM Residency Programs in the Southeastern Region

Small Programs		Large Programs	
Programs	Number of Residents	Programs	Number of Residents
LSU-Shreveport	7	LSU-Baton Rouge	36
Univ Arkansas	24	Emory Univ	54
MC Georgia	27	Orlando RMC	36
UF Gainesville	24	UF/Jax	48
Univ South Florida	24	Vanderbilt	36
MUSC	6	Palmetto Richland	30
Duke Univ	4	Eastern Carolina	36
Univ North Carolina	27	Carolina MC	42
Univ Alabama	24	Wake Forest	30
	<i>*n</i> = 187		<i>**n</i> = 348

Total §N = 535

Note. *Approximate number of residents in small programs. **Approximate number of residents in large programs. §Approximate number of residents in all 1-3 year training programs in the Southeastern region. Taken from SAEM, 2007.

Program directors for each emergency medicine training program listed in Table 3 were contacted and invited to participate in this study. Of the 18 programs invited, 10 agreed to participate and are listed in Table 4. Also listed as part of Table 4 is the number of possible residents during the first year of data collection and added residents in year 2, as a new class of PGY1s entered into training during data collection. This increased the total possible participants to 452 over a 2-year period of data collection.

Study Design

This study was implemented in two phases. The first phase was to develop a modified version of the 58-item Margin in Life Scale (MILS) first developed by Joanne S. Stevenson, Ph.D. from Ohio State University (1982a, 1982b, 1994). The second phase was to implement a slightly revised MILS, renamed the Margin in Life Scale for Emergency Medicine (MILS EM), to a convenience sample of volunteer emergency medicine residents.

Table 4
EM Programs that Agreed to Participate Over a 2-Year Period

Small Programs	Number of Residents		Large Programs	Number of Residents	
	Year1	Year 2		Year1	Year 2
Univ Arkansas	24	8	LSU- Baton Rouge	36	12
MC Georgia	27	9	Emory Univ	54	18
UF Gainesville	24	8	UF Jacksonville	48	16
Univ of Alabama	24	8	Eastern Carolina	36	12
Univ of South Florida	24	8	Carolina MC	42	14
	* <i>n</i> = 164			** <i>n</i> = 288	
<u>Overall Total Possible <i>N</i> = 452</u>					

*Approximate number of residents in small programs that agreed to participate.

**Approximate number of residents in large programs that agreed to participate.

§Approximate number of residents in all 1-3 year training programs in the Southeastern region that agreed to participate. Taken from SAEM, 2007.

Phase One: The Instrument. The first phase of this study was to determine face and content validity with the population of interest (Hair, Black, Babin, Anderson, & Tatham, 2006) by pilot testing Joanne Stevenson’s (1994) MILS among a subset of senior emergency medicine residents and to assist in developing a sixth factor through expert opinion, to the Margin in Life Scale. Stevenson’s MILS consists of 58 questions representing five factors and a separate demographics questionnaire. Table 5 lists the factors and the number of items in each factor. The MILS measures the ratio of a person’s loads (sources of burdens) and powers (resources) to determine whether a person has enough margin to meet life’s demands. Participants are asked to rate each item for importance on a scale of 1-10 or if the item is non-applicable (NA). Once participants have selected how important an item is, they are then asked to rate the amount of load (burden), and power (amount of resource) that item is currently representing in their lives on a scale of 1-5 (example shown as Table 6).

Table 5
The 5 Factors (Life Areas) and the Number of Items in Each Factor

Factors	Number of Items
Health/Body	18
Religiosity/Spirituality	12
Self Confidence	13
Interdependence	10
Parenting Satisfaction	5

Note. Stevenson’s 58-Item Questionnaire (1994). Specific items in each factor can be found in Stevenson’s Guidebook

Table 6
Example of Question and Rating Scale

	IMPORTANCE OF ITEM	LOAD	POWER	NA
Generally speaking.... My spouse is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□

Validity. To determine face and content validity, 25 senior emergency medicine residents attending a national conference were asked to assess the ease of the survey and their understanding of the content and its relevance, and to provide feedback for a sixth factor that would represent internal and external resources and burdens that may be unique to emergency medicine work and training. An additional panel of experts consisting of three EM attending physicians who hold administrative and clinical positions provided feedback, and along with the investigator agreed on 16 additional questions to add to Stevenson’s (1994) MILS (Table 7). A factor analysis was performed and Cronbach alphas were run for each identified subscale. These results are reported in Chapter 4.

Due to the addition of the sixth factor, the instrument utilized in this study was named Margin in Life Scale for Emergency Medicine (MILS EM) and consisted of 74 questions (58 original items from Stevenson’s 1994 MILS and 16 additional questions to

represent EM work), demographic questions, and questions in regard to remediation and attrition. The Margin in Life Scale for Emergency Medicine can be found as Appendix B.

Table 7
Items in Factor 6 Representing EM Work

Program Support	Lifestyle	Finances	Learning
Team work	Sleep	Respect from others	Mentorship
Free time	Career	Support from peers	Significant other
Support from family	Alcohol	Work Conditions	Moonlighting

Phase Two: Instrument implementation and data collection. It was necessary to obtain two IRB approvals for this study. One from the University of Florida (Appendix C) to collect the data as this study was supported by a University of Florida College of Medicine Jacksonville Dean’s grant. Once data were collected and de-identified, an IRB from the University of North Florida (Appendix D) was obtained for archival data analysis. Once the MILS EM was finalized and approved by the IRB from the University of Florida, residency program directors who had agreed to participate in the study were contacted to determine their preferred method of implementation. The investigator either a) sent the questionnaires and key to each program director (PD) for implementation; or b) administered the questionnaire in person. In either case, study participants were asked to read the informed consent that was part of the survey and were provided a sealed envelop in which to place their completed questionnaires. All surveys were numbered and a key was kept to track resident MILS EM scores, demographics, and remediation and attrition data. Completion of the questionnaire represented the participants’ implied consent to participate in this study as outlined in the approved IRB protocol. All PDs were blinded from residents’ results, as residents placed their completed surveys in sealed

envelopes. Residents were asked to self-report remediation status and whether or not they anticipated leaving emergency medicine training. Further, to validate remediation rates, assess at risk for remediation rates, and actual attrition, PDs were asked to provide names, training year, and remediation and at risk for remediation status of residents enrolled in this study and in their program (Appendix E), as well as names of any residents who left their programs. Once the MILS EM and PD questionnaires were returned to the investigator, data were entered into Excel 2007.

Data Analysis. In order to address each research question, several analyses were performed. Table 8 represents the statistical analyses to address the null hypotheses.

Chapter 3 Summary

This chapter has outlined the methodological approach to investigating the utility of the Margin in Life Scale amended as the Margin in Life Scale for Emergency Medicine (MILS EM) in determining residents' ratio of load to power while in training. This study was completed in two phases: phase one was the development of the MILS EM, and phase two consisted of implementing the MILS EM questionnaire to PGY1, PGY2, and PGY3 EM residents. The study population was described as being drawn from 1-3 year training programs in the Southeastern states of Louisiana, Mississippi, Arkansas, Alabama, Florida, Georgia, Tennessee, South Carolina, and North Carolina. Of the 18 EM residency training programs in these states, 10 agreed to participate over a 2-year period with a possible population of 452 EM residents. Program directors of these programs were asked to provide remediation, at risk for remediation, and attrition information of residents in their programs who participated in this study. Program directors were blinded to the resident's answers on the MILS EM, and residents were

Table 8
Research Questions and Appropriate Analyses Addressing the Null Hypotheses

Research Questions and Null Hypotheses for Appropriate Research Questions (RQ)	Analysis
Research Question 1: How do emergency medicine residents enrolled in 1-3 year training programs score overall on the MILS EM?	MIL Formula (Appendix A)
Research Question 2: How do emergency medicine residents enrolled in 1-3 year training programs score in the subscales (life-areas)?	MIL Formula (Appendix A)
Null RQ3. There is no difference between MILS EM scores or subscale scores of residents on remediation or at risk for remediation versus those who are not.	Frequency Statistics, <i>t</i> -test, Wilcoxon Mann Whitney
Null RQ4. There is no difference between MILS EM scores of residents who are contemplating leaving EM training (for another specialty, for another EM program, or leaving medicine altogether) versus those who anticipate staying.	Frequency Statistics, <i>t</i> -test, Wilcoxon Mann Whitney
Null RQ5. There is no difference in MILS EM and subscale scores according to gender, age, marital status, and graduate medical education (USMG or IMG).	ANOVA, and <i>t</i> -tests, Chi Square, Fisher's Exact Test
Null RQ6. There is no difference between the mean MILS EM score by training year (PGY1, PGY2, & PGY3) of emergency medicine residents.	ANOVA, Kruskal-Wallis
Null RQ7. There is no difference between the mean MILS EM score and subscale scores of emergency medicine residents enrolled in small (<30) versus large (≥30) programs.	<i>t</i> -test
Null RQ8. There is no difference in perceived importance of margin categories (Main, 1979; Mikolaj & Boggs, 1991).	Frequency Statistics, MANOVA, and 2 ranking formulas for importance

asked to self-report if they were considering leaving their EM training program. Finally, this chapter described the specific research questions and null hypotheses, for this inquiry, and the statistical analyses utilized. Chapter 4 provides a review of the primary purpose of this study, the study population and sample population, and describes the comprehensive results of each research question and corresponding null hypothesis.

Chapter 4: Results

The primary purpose of this study was to determine the margin in life scores of emergency medicine residents utilizing a modified Margin in Life Scale (Stevenson, 1994) renamed Margin in Life Scale for Emergency Medicine (MILS EM) and to determine if the MILS EM could detect a relationship or difference between residents on remediation versus those who were not, those at risk for remediation versus those who were not, and those who were considering leaving their emergency medicine training program versus those who were not. This study further sought to explore the relationship between MILS EM score of residents and gender, age, graduate medical education training, and training year in regard to remediation and at risk for remediation. This chapter presents findings of this study by presenting first a profile of the sample, then the data analyses and results, in each case addressing the research questions and corresponding null hypotheses testing.

Sample Population

The sample consisted of emergency medicine residents enrolled in 1-3 year training programs in the states of Alabama, Arkansas, Louisiana, Georgia, North Carolina, South Carolina, Florida, Tennessee, and Mississippi with approximately 535 emergency medicine residents. In Chapter 3, Table 3 outlined the possible study participants (programs and residents) and Table 4 listed those programs where the program directors agreed to participate. Table 9 lists the *n* from each site and identifies

those programs that are considered large programs (≥ 30 residents) versus small (< 30 residents). Programs were classified based on the number of residents approved to enroll by the RRC labeled in this study as small (< 30) or large (≥ 30).

Table 9
Study Participants

Small Programs			Large Programs		
	Surveys Turned In	Complete		Turned In	Complete
	<i>N</i>	<i>n</i>		<i>N</i>	<i>n</i>
Univ Arkansas	15	14	LSU- Baton Rouge	24	23
MC Georgia	32	31	Emory Univ	52	51
UF Gainesville	12	12	UF Jacksonville	40	40
Univ of Alabama	32	31	Eastern Carolina	18	18
Univ of South Florida	29	29	Carolina MC	25	24
	*120	**117		§159	§§156

Note. *Number of surveys turned in to investigator from small programs. **Number of surveys included in the study from small programs. §Number of surveys turned in to investigator from large programs. §§Number of surveys included from large programs. Total number of surveys (participants) included in the study $n = 273$

A total of 10 out of the possible 18 program directors voluntarily agreed to participate in this study, representing a total sample population of 452 residents over a 2 year period. Of the 452 residents, 279 voluntarily completed and turned in a survey. Program directors reported only three residents who declined participating in the study when approached during conference time. Of the 279 surveys returned, only 273 completed the surveys adequately to include them in the study resulting in a 60% return rate. Table 10 describes the sample population where 59% were male and almost as many were female (41%), most were between the ages of 18-30 years (67%) and White (81%). Nearly all (88%) were United States Medical Graduates and almost evenly split as being married (49%) versus unmarried (50%). Unmarried included those single, divorced, or separated.

Table 10
Characteristics of the Study Participants

Variable	<i>N</i>				
Gender:	Males 162 (59%)	Females 111 (41%)			
Age Group:	18-30 183 (67%)	31-40 76 (28%)	>40 14 (5%)		
Year Training:	PGY1 88 (32%)	PGY2 112 (41%)	PGY3 73 (27%)		
Ethnicity:	White 222(81%)	Asian 27(9%)	Black 20(7%)	Hispanic 7(2%)	Other 4(1%)
Marital Status:	Married 134 (49%)	Unmarried 137 (50%)	Unknown 2 (1%)		
GME:	USGM 240 (88%)	IGM 21 (8%)	Unknown 12 (4%)		
Program:	Small 117 (43%)	Large 156 (57%)			

Note. n = 273

Validity and reliability. To determine validity for scores on the sixth factor, a factor analysis on the 16 items (questions) was performed to determine underlying constructs with a principal component analysis utilizing a varimax rotation. The analysis resulted in four components using an Eigenvalue of 1 (Table 11). After rotation, the first component was labeled Support for Work, and accounted for 19.92% of the variance; the second component labeled Personal Support, accounted for 18.52%; the third component, Other Support, accounted for 9% of the variance, and the final component, Distraction,

accounted for 8% of the variance. The Cronbach alphas for the four components were .79 (Support at Work), .78 (Personal Support), .43 (Other Support), and .24 (Distraction).

To determine a reliability alpha for scores on all 16 items, as was used in a study by Hanpachern (1997), a unified item score was necessary. The following formula was utilized to “integrate the separate importance scores, load scores, and power into a unified item score” (p. 52).

$$\frac{\hat{I}_1}{\hat{I}_1 + \dots + \hat{I}_k} \cdot \frac{L_1}{L_1 + P_1} \quad \text{where} \quad \frac{\hat{I}_1}{\sum \hat{I}}$$

[This] is a weighting factor using importance and where $\sum \hat{I}$ is the summation of the importance scores of the relevant subscale; and where L_1 is the load score and P_1 is the power score of the first item in the relevant subscale. (Hanpachern, 1997, p. 52)

The resulting Cronbach alpha for scores on all 16 items was .80. Because two out of the four component reliability alphas were low, it was decided that the 16 additional items (questions) should be presented as one factor and not divided into four separate factors. This resulted in the MILS EM remaining as six factors as presented in Chapter 3. The factors or subscales are Health/Body, Religion/Spirituality, Self-Confidence, Interdependence, Parenting Satisfaction, and EM Work.

Research Questions and Testing the Null Hypotheses

This study investigated eight research questions and six hypotheses stated in the null. Analytical tests included the *t*-test, ANOVA, MANOVA and the non-parametric test of Wilcoxon-Mann Whitney, Chi Square, Kruskal-Wallis, and Fisher’s Exact test employing the .05 level of significance for five out of the six null hypotheses and the 0.01 significance level for one null hypothesis; null hypothesis five. This is due to the fact that

multiple variables were tested in this research question. Statistical packages of Excel 2007, SAS 9.2, and SPSS 18 were utilized.

Table 11
Factor Loading for Exploratory Factor Analysis With Varimax Rotation

Item	Components			
	Support-Work	Personal Support	Other Support	Distraction
Team Work	.827	.066	.033	.035
Support Peers	.800	-.011	.032	.050
Work Conditions	.654	.234	.119	.032
Program Support	.597	.398	.010	-.057
Mentorship	.525	.167	.341	-.243
Respect of Others	.508	.224	.285	-.015
Lifestyle	.240	.747	.009	.095
Career	.162	.676	.358	-.114
Sleep	.325	.662	-.271	.157
Finances	-.151	.645	.205	.044
Learning	.215	.629	.194	-.223
Free Time	.429	.580	-.285	.033
Significant Other	.003	.241	.625	.331
Family Support	.320	-.037	.621	.072
Moonlighting	-.017	-.059	-.018	.726
Alcohol	.033	.062	.234	.653

Note. Bolded are the start of the loading values in each of the components.

Research question 1. How do emergency medicine residents enrolled in 1-3 year training programs score overall on the MILS EM?

As previously stated, 273 emergency medicine residents were included in the study. In utilizing Stevenson's (1994) formula to calculate the MILS EM score (Appendix A), emergency medicine residents' overall MILS EM mean score was .64 (95%CI: .63-.65) with a standard deviation (*SD*) of .082. This mean is between .30 and .70 suggested by Stevenson (1980, 1982, 1994) and .50-.80 suggested by McClusky (1970), and indicates a normal MILS score.

Research question 2. How do emergency medicine residents enrolled in 1-3 year training programs score in the subscales (life-areas)?

The subscale (life-areas) mean and standard deviation results are listed below (Table 12) with the following representation: Health/Body, Religion/Spirituality, Self-Confidence, Interdependence, Parenting Satisfaction, and EM Work.

Table 12
Mean Scores: MILS and Subscales (Life Areas) of Emergency Medicine Residents

	<i>M</i>	<i>SD</i>	95% CI	Minimum	Maximum
MILS EM	.64	.082	.63-.65	.43	.83
Subscales:					
Health/Body	.66	.089	.65-.67	.35	.83
Religion/Spirituality	.68	.099	.67-.69	.26	.85
Self-Confidence	.61	.101	.60-.62	.26	.83
Interdependence	.65	.100	.64-.66	.30	.83
Parenting Satisfaction	.92	.155	.90-.94	.36	1.0
EM Work	.59	.097	.58-.60	.35	.83

Research question 3. Do lower MILS EM and subscale scores among emergency medicine residents enrolled in 1-3 year training programs identify those at risk for remediation?

Null hypothesis for Research Question 3. There is no difference between MILS EM and subscale scores of residents on remediation or at risk for remediation versus those who are not.

Throughout all 10 programs, 33 of 251 residents were reported by program directors as being on formal remediation (13%). The *n* is reported at 251, as 22 of the resident cohort were removed due to two program directors incorrectly completing the key during data collection. This made it impossible to link residents' surveys to their names and, therefore, remediation information. Residents, however, could self-report as being on remediation. If all surveys are taken into account, then 33 of 273 residents were on formal remediation (12%). The mean MILS score for residents on remediation (all 10

programs) was .63 ($SD = .084$). A t -test was run to determine if there was a statistically significant difference between those who were on remediation versus those who were not (Table 13), resulting in a failure to reject the null ($p = .36$).

Table 13

MILS Score of Those Residents on Remediation

Remediation Status	<i>N</i>	MILSM	<i>SD</i>	<i>df</i>	95% CI	<i>t</i> -value	<i>p</i> value
Not on Remediation	218	.64	.084	217	.63-.65	.92	.36
On Remediation	33	.63	.082	32	.60-.66		

The subscale scores for those on remediation versus those who were not are listed in Table 14. The QQ plots suggested normal distribution for the subscale variables except for Parenting Satisfaction and a t -test was run for each subscale to determine a difference between those on remediation versus those who were not. The Pooled or Satterthwaite t -test was utilized based on the equality of variances. None of the subscales resulted in statistically significant differences. Because the observations for those on remediation were small and to adjust for Parenting Satisfaction, the Wilcoxon-Mann Whitney non-parametric test was also run with each subscale again resulting in no statistically significant differences.

When combining both remediation and at risk for remediation for all 10 programs, 49 out of 251 (22 omitted) or 19.5% were on remediation or at risk for remediation. The mean MILS score for those on remediation or at risk was .63 ($SD, .079$; 95% CI: .60-.65) and those not .64 ($SD, .083$; 95% CI: .63-.65). The QQ plots suggested normal distribution for each group in regard to the MILS score and all the subscales except Parenting Satisfaction for each group. A t -test was run for each of the variables (Table 15) and the Pooled or Satterthwaite t -test was utilized as appropriate based on the

equality of variances. However, statistical significance was not found in regard to MILS score or any of the subscale scores, resulting in a failure to reject the null. Additionally, the Wilcoxon Mann Whitney non-parametric test was also run for subscale Parenting Satisfaction resulting in no statistically significant difference ($p = .49$).

Table 14:
Subscale Scores for Those on Remediation versus Those Who Were Not

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	<i>df</i>	95% CI	<i>t</i> -value	<i>p</i> value
Health/Body							
Not on Remediation	218	.66	.088	217	.65-.67	.48	.63
On Remediation	33	.65	.102	32	.62-.69		
Religion/Spirituality							
Not on Remediation	218	.66	.102	217	.67-.69	.52	.60
On Remediation	33	.67	.094	32	.64-.70		
Self-Confidence							
Not on Remediation	218	.62	.110	217	.60-.63	.42	.68
On Remediation	33	.61	.103	32	.57-.64		
Interdependence							
Not on Remediation	218	.66	.100	217	.64-.67	.97	.33
On Remediation	33	.64	.107	32	.60-.67		
EM Work							
Not on Remediation	218	.59	.097	217	.58-.60	.69	.49
On Remediation	33	.57	.099	32	.54-.61		
Parenting Satisfaction							
Not on Remediation	218	.92	.152	217	.90-94	.45	.65
On Remediation	33	.91	.186	32	.84-.97	.04	.97

Note: CI= confidence interval.

*Wilcoxon Mann Whitney

Another aspect to the remediation data is that Programs 1 and 2 contributed to most of the cases of remediation (20 of the 33) or 61%. The investigator felt that these two programs likely had similar remediation policies; therefore, statistical analyses were

Table 15

Those on Remediation or At Risk for Remediation- All Programs

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	<i>df</i>	95% CI	<i>t</i> -value	<i>p</i> value
MILS							
Not Remed/At Risk	202	.64	.084	201	.63-.65	.107	.29
On Remed/At Risk	49	.62	.079	48	.60-.65		
Health/Body							
Not Remed/At Risk	202	.66	.088	201	.65-.67	.12	.91
On Remed/At Risk	49	.66	.100	48	.63-.69		
Religion/Spirituality							
Not Remed/At Risk	202	.68	.103	201	.67-.69	.27	.79
On Remed/At Risk	49	.68	.095	48	.65-.70		
Self-Confidence							
Not Remed/At Risk	202	.62	.111	201	.60-.63	.99	.32
On Remed/At Risk	49	.60	.104	48	.57-.63		
Interdependence							
Not Remed/At Risk	202	.65	.101	201	.64-.67	.82	.41
On Remed/At Risk	49	.64	.110	48	.61-.67		
EM Work							
Not Remed/At Risk	202	.59	.096	201	.58-.60	1.79	.07
On Remed/At Risk	49	.56	.010	48	.53-.59		
*Parenting Satisfaction				<i>df</i>		<i>z</i> score	<i>p</i> value
Not Remed/At Risk	202			1		-.69	.49
On Remed/At Risk	49						

Note: CI= confidence interval.

* Wilcoxon Mann Whitney

run isolating these two programs to determine if there was a difference in MILS EM scores in regard to those on remediation versus those who were not. As stated in the literature, remediation rates may be underreported, and there is no uniform standard for placing residents on remediation. A discussion of this phenomenon will be further explored in Chapter 5 of this dissertation. Not all of the variables (MILS and subscales) were normally distributed on the QQ plots; therefore, the Wilcoxon Mann Whitney non-

parametric test was utilized. A statistically significant difference was not found in the MILS score or for any of the subscales; resulting in a failure to reject the null (Table 16).

Table 16
Those on Remediation versus Those Who Were Not, Programs 1 and 2 Combined

Variable	z Score	df	p value
MILS	-.50	1	.61
Health/Body	-.72	1	.48
Religion/Spirituality	-.24	1	.81
Self-Confidence	-.36	1	.72
Interdependence	-1.0	1	.32
Parenting Satisfaction	-1.7	1	.09
EM Work	.12	1	.90

Note. *n* omitted to protect the identity of the 2 programs

While those on remediation versus those who were not did not result in statistically significant differences in MILS EM and subscale scores, it would be useful to determine if there is a difference between those who are at risk for remediation versus those who are not.

Therefore, in regard to those at risk for remediation throughout all 10 programs, only 16 of 251 (or 6%) were reported as being at risk for remediation by program directors. Again, 22 were omitted. Those at risk for remediation had a mean MILS score of .63 (*SD*, .068) compared to those not on remediation .64 (*SD*, .083). The QQ plots suggested normal distribution was not met among those at risk for remediation; therefore a non parametric Wilcoxon Mann Whitney test was run resulting in a failure to reject the null ($p = .71$). In each of the subscale areas, again, the non-parametric test Wilcoxon Mann Whitney was run, and none of the areas resulted in statistically significant differences; a failure to reject the null (Table 17).

Table 17

Subscale Scores for Those At Risk for Remediation versus Those Who Were Not

Variable	<i>N</i>	<i>df</i>	<i>z</i> score	<i>p</i> value
Health/Body				
Not At Risk	235	1	0.64	.52
At Risk Remediation	16			
Religion/Spirituality				
Not At Risk	235	1	.26	.79
At Risk Remediation	16			
Self-Confidence				
Not At Risk	235	1	-0.59	.56
At Risk Remediation	16			
Interdependence				
Not At Risk	235	1	-0.14	.89
At Risk Remediation	16			
Parenting Satisfaction				
Not At Risk	235	1	-.69	.49
At Risk Remediation	16			
EM Work				
Not At Risk	235	1	-1.77	.08
At Risk Remediation	16			

Residents can be placed on remediation in the areas of medical knowledge, behavior/professionalism or clinical application. Additionally, residents can be placed on more than one type of remediation at a time. In this study, 30 (62%) of residents were on remediation for academics, 10 (21%) for behavioral/professionalism remediation, and 8 (17%) for clinical application. Table 18 outlines those on remediation, those at risk, and those who were on remediation in multiple areas.

In summary, it appears as though EM residents have sufficient margin to sustain learning and deal with life's emergencies and crises, as the mean MILS EM score was .64

Table 18

Those on Remediation, At Risk for Remediation, and in Multiple Areas of Remediation

Areas of Remediation	Academics	Behavior	Clinical Application
	<i>N</i>	<i>N</i>	<i>N</i>
Those on Remediation	33	30	8
Those At Risk	16		
<u>Multiple Areas</u>	<u><i>N</i></u>		
Residents on Remediation in all areas	6		
Residents on Remediation in 2 areas	3		

Note. Residents can be on remediation in more than one area

(SD=.082; 95%CI: .63-.65) and is well within the suggested healthy range of .30-.80 (McClusky, 1970; Stevenson, 1980, 1982a, 1982b, 1994). Additionally, all of the mean scores in the life areas (subscales) were also well within the suggested healthy range (see Table 11). Finally, no statistically significant differences were found between MILS EM scores and subscale scores for those EM residents on remediation or at risk for remediation versus those who were not. Research question 4 addresses attrition among emergency medicine residents.

Research question 4. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those who are contemplating leaving emergency medicine training?

Null hypothesis for Research Question 4. There is no difference between MILS EM scores of residents who are contemplating leaving EM training (for another specialty, for another EM program, or leaving medicine altogether) versus those who are anticipating staying.

Study participants self-reported whether they were contemplating leaving their residency program for another specialty, leaving for another EM training program,

leaving medicine altogether, or staying in their current program. Additionally, program directors were asked to report residents who participated in the study but later left residency training. Program directors reported that not one resident left his or her EM training program, resulting in a 0% attrition rate. Moreover, only 13 study participants self-reported contemplating leaving their training program. The mean MILS score for those contemplating leaving was .61 (*SD*, .074) versus those who reported they anticipated staying in EM training (.64; *SD*, .082). A *t*-test was run to determine statistical differences between the two groups ($p = .15$). Due to the low number of observations in the group of residents contemplating leaving their EM training, the Wilcoxon Mann Whitney non-parametric test was also run resulting in a *p* value of .11. The result is a failure to reject the null hypothesis. Frequency statistics are reported in Table 19 in regard to the categories of those who anticipated leaving their EM training program for another EM program, leaving for another specialty, or leaving medicine.

Table 19
Residents Self-Reporting of Contemplation of Leaving or Staying in EM Training

	<u><i>n</i></u>	<u>Gender</u>	<u>PGY</u>
Contemplate Leaving EM Training	7	4 (males) 3 (females)	4 (PGY1s) 2 (PGY2s) 1 (PGY3s)
Contemplate Leaving Current Program	6	4 (males) 2 (females)	3 (PGY1s) 3 (PGY2s)
Leaving Medicine All together	0	0	0
All Program Directors Report of Attrition	0	0	0
<u>Total Contemplating leaving (attrition):</u>	<u>13/273 = 5%</u>	<u>(95% CI 2.2% - 7.3%)</u>	

It appears that attrition, in regard to those contemplating leaving (13/273) and those who actually left (0), EM residency training represents a rare phenomenon.

Research question 5. Does demographic information such as gender, age, marital status and location of medical graduation (USMG vs. IGM) have an impact on MILS EM and subscale scores?

Null hypothesis for Research Question 5. There is no difference in MILS EM and subscale scores according to gender, age, marital status, and graduate medical education (USMG or IMG).

An ANOVA was performed for the variable age group, and a series of *t*-tests was run for the variables gender, marital status, and graduate medical education (USMG and IMG). To adjust for the four tests run on the MILS EM as a dependent variable, the level of significance was amended to 0.01. Table 20 contains the results of the ANOVA and *t*-tests in regard to the four variables that were statistically significant utilizing the .01 level of significance. In the area of gender, there was a statistically significant difference between male and female residents in the MILS EM score ($p < .01$; Cohen's $d = .37$) and the life-areas (subscales) Self-Confidence ($p < .01$; Cohen's $d = .56$), and Interdependence ($p = .01$; Cohen's $d = .32$) with females having lower mean scores than males, resulting in a rejection of the null. In the area of marital status, a statistically significant difference was found in the subscale area of Parenting Satisfaction ($p = .001$; Cohen's $d = .53$) with those married having higher mean scores than those who were not, resulting in a rejection of the null. The variables of age and graduate medical education did not result in statistical differences, resulting in a failure to reject the null hypothesis. The statistical testing results of all the variables in this section can be found in Appendix F. The

Cohen's *d* results suggest a small effect for the differences between males and females in the areas of MILS EM score and the life area of Interdependence, and a moderate effect in the area of Self-Confidence.

Table 20

Areas of Statistical Differences in Variables Gender and Marital Status

<u>Gender</u>	<u>N</u>	<u>MILS EM Score(SD)</u>	<u>t-test: df</u>	<u>t value</u>	<u>p value</u>
Male	162	.65(.084)	271	2.91	0.00
Female	111	.62(.076)			
	<u>N</u>	<u>Self-Confidence(SD)</u>			
Male	162	.64(.106)	271	4.26	0.00
Female	111	.58(.107)			
	<u>N</u>	<u>Interdependence(SD)</u>			
Male	162	.66(.100)	271	2.61	0.01
Female	111	.63(.097)			
<u>Marital Status</u>					
	<u>N</u>	<u>Parenting Satisfaction(SD)</u>			
Married	134	.96(.121)	269	4.30	<0.001
Unmarried	137	.88(.175)			

Further, through Chi Square testing, all demographic variables (age, gender, training year, marital status, graduate medical education, and program size) were found not to be related to remediation and at risk for remediation, therefore, they were not included as covariates for further analyses to determine if MILS or subscale scores could predict those on remediation and at risk for remediation (Table 21).

Research question 6. Does training year (PGY1, PGY2, & PGY 3) have an impact on MILS EM score?

Null hypothesis for research question 6. There is no difference between the mean MILS EM score by training year (PGY1, PGY2, & PGY3) of emergency medicine residents.

Table 21

Chi Square Analyses for Demographic Variables Age, Gender, Marital Status, Training Year, Graduate School and Program Size in Regard to Remediation and At Risk for Remediation

Variable	<i>df</i>	<i>N</i>	Value	<i>p</i>
Age Groups 18-30; 31-40; and >40	2	251	3.13	.21
Gender	1	251	0.55	.46
Marital Status	1	249	0.64	.43
Training Year	2	251	2.52	.28
Program Size	1	251	0.96	.33
Graduate Medical Education	Fisher's Exact Test			1.0

The mean MILS EM score for PGY1 residents was .63, with a standard deviation of .076; and .63 with a standard deviation of .076 for PGY2 residents. PGY3 residents' mean MILS EM score was .66, with a standard deviation of .095. A one-way analysis of variance (ANOVA) was performed on the mean MILS EM and subscale scores across training year. All the life areas met the assumptions of normality except EM Work; therefore, the non-parametric test Kruskal-Wallis was utilized. Tables 22 and 23 illustrate the results that training year does not appear to affect MILS or the life areas, resulting in failure to reject the null hypothesis.

Table 22

Training Year, MILS EM score, and Analysis of Variance

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	ANOVA:	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i> value
Training Year					2, 270	.032	.01	2.39	0.09
PGY1	88	.63	.076						
PGY2	112	.63	.075						
PGY3	73	.66	.095						

Table 23
Training Year and Subscale Scores, and Analysis of Variance

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	ANOVA:	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i> value
Health/Body					2, 270	.039	.02	2.47	0.09
PGY 1	88	.65	.087						
PGY 2	112	.66	.091						
PGY3	73	.68	.087						
Religion/Spirituality					2, 270	.007	.00	0.37	0.69
PGY 1	88	.68	.089						
PGY 2	112	.67	.102						
PGY3	73	.69	.107						
Self-Confidence					2, 270	.047	.24	1.97	0.14
PGY 1	88	.60	.109						
PGY 2	112	.61	.010						
PGY3	73	.63	.124						
Interdependence					2, 270	.025	.01	1.23	0.29
PGY 1	88	.65	.101						
PGY 2	112	.65	.092						
PGY3	73	.67	.109						
Parenting Satisfaction					2, 270	.010	.01	0.41	0.66
PGY 1	88	.92	.149						
PGY 2	112	.92	.150						
PGY3	73	.90	.169						
*EM Work					<i>df</i>		<i>H</i>		<i>p</i> value
PGY 1	88	.58	.092		2		3.35		0.19
PGY 2	112	.58	.086						
PGY3	73	.61	.113						

*Wilcoxon NPAR1WAY

Research question 7. Does the size of the training program impact the MILS EM score among emergency medicine residents?

Null hypothesis for research question 7: There is no difference between mean MILS EM score and subscale scores of emergency medicine residents enrolled in small (<30) versus large (≥30) programs.

Programs are informally classified as large and small programs based on the number of residents approved by the RRC to enroll. This bifurcated variable was used in lieu of a continuous variable in order to offer comparisons based on the large and small programs even though use of a continuously scaled variable would have better honored the variance in program size. The use of the bifurcation is consistent with the way programs size is referred to in emergency medicine residency training. This study sought to determine if program size would make a difference in MILS scores. The mean MILS EM score among those residents enrolled in small training programs was .66 ($SD=.090$) versus large training programs .63 ($SD=.073$). A t -test was performed to determine the difference between the two groups resulting in a p value = $<.05$ (Cohen's $d = .39$); the null can be rejected (Table 24). Additionally, each of the subscales except Religion/Spirituality were statistically significant utilizing the t -test: Health/Body, $p <.05$ (Cohen's $d = .37$), Self-Confidence, $p <.05$ (Cohen's $d = .40$), Interdependence, $p = .05$ (Cohen's $d = .28$), Parenting, $p = 0.01$ (Cohen's $d = .35$), and EM Work, $p = .02$ (Cohen's $d = .31$); resulting in a rejection of the null for the subscale areas. In each instance, those who were in smaller programs had higher mean scores than those in large programs, except in the parenting subscale. The Cohen's d results suggest a small to moderate effect size for the MILS EM score and life area scores. Table A2 in the Appendix G outlines the MILS and each subscale statistical results.

Table 24
Training Program Size and MILS EM Score

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i> -test: <i>df</i>	<i>t</i> value	<i>p</i> value
Size Training Program				271	-3.23	0.00
Small (<30)	117	.66	.090			
Large (>30)	156	.63	.073			

Research question 8. What areas of the MILS EM do emergency medicine residents report as being more important based on Main (1979) and Mikolaj and Boggs' (1991) categories (A) In balance, (B) Having Margin, (C) In Crisis, and (D) Barely Even (see Table 2).

Null hypothesis for research question 8. There is no difference in perceived importance of margin categories (Main, 1979; Mikolaj & Boggs, 1991).

In an effort to determine the percentage of scores that fell into different margin categories and to determine if there was a difference in the areas of importance ratings among items on the survey and by EM residents, three analyses were performed.

The first analysis run sought to replicate Mikolaj and Boggs' (1991) method of categorizing survey items into margin classifications originally identified by Main (1979) as Margin A, B, C, or D. Margin A represents maintaining balance or breaking even; Margin B represents having life space within which to maneuver, creating surplus; Margin C represents crisis offing in which one would be susceptible to breakdown; and Margin D represents barely maintaining balance, but breaking even. Mikolaj and Boggs (1991), reported the margin categories in decreasing order as B, A, D, and C. Table 25 lists items in percentages that residents rated as being in margin A, B, C, or D by factor with the majority of items in each of the factors falling into margin A & B versus C & D. Chi Square analysis between categories AB versus CD resulted in a statistically significant difference ($p < .0001$; $df = 5$; value = 518.66). The results of this analysis represents the fact that the residents feel they have enough margin in regard to items on the MILEM to continue learning and to meet life's unexpected emergencies and crises.

Table 25

Margin Categories: Percent of A & B versus C & D by Factor

Factor	Margin A & B	Margin C & D
Health/Body	90%	10%
Religion/Spirituality	93%	7%
Self-Confidence	79%	21%
Interdependence	87%	13%
Parenting Satisfaction	83%	17%
EM Work	77%	23%

Note. Margin Categories

Margin A: Maintaining Balance/Breaking Even

Margin B: Life Space within which to Maneuver/Surplus

Margin C: Crisis Offing/Susceptible to Breakdown

Margin D: Barely Maintaining Balance

The second analysis (Table 26), again utilizing a technique by Mikolaj and Boggs (1991), examined ranking the factors by their overall importance score using the formula below:

$$\frac{\sum \text{of importance items in the factor}}{\# \text{ of items} \times \# \text{ of participants} - N/As}$$

Table 26

Ranking of Importance by Item

<u>Factors</u>	<u>Mean by Item</u>
Self-Confidence	8.79
Health/Body	8.51
Interdependence	8.50
EM Work	8.40
Parenting Satisfaction	8.14
Religion/Spirituality	6.79

The third analysis (Table 27) lists the factors in order of importance when utilizing a mean score for each resident for each factor. Figure 1 is an example of the formula utilized for factor 1. The subscale of Parenting Satisfaction was omitted, as only 70 residents reported having at least one child.

Figure 1: Formula Utilized to Determine Factor 1 Mean Score by Resident

1) For each resident $\frac{\sum \text{Importance Scores of Resident}_i}{\# \text{ of responses for Resident}_i}$ = average of Resident_i

2)
$$\frac{(\sum_{i=1}^n \text{Average of Residents}_i)}{\# \text{ of residents}}$$

The formula in Figure 1 differs from Mikolaj and Boggs' (1991) because not all residents responded to all importance items. Additionally, it was determined that an average score of the resident's responses versus an analysis by overall item scores (Table 26) was more representative of each resident's individual perspective. A repeated measures MANOVA test (Table 28) was run to determine if there were differences among the means of importance items, as computed above, for the 5 factors. Because the test yielded a statistically significant ($p < .01$) result, a follow-up analysis was performed consisting of all multiple comparisons among the 5 means. The overall repeated measures MANOVA resulted in a .59 effect size, utilizing 1 – lambda (Olejnik & Algina, 2000), which is a moderate effect. All the subscales resulted in statistically significant differences in regard to the average of importance item score when compared to each other, except subscales Health/Body and EM work and that of Self-Confidence and Interdependence.

Table 27
Ranking of Importance by Resident

<u>Factors</u>	<u>Mean by Resident</u>
Interdependence	8.82
Self-Confidence	8.79
Health/Body	8.51
EM Work	8.40
Religion/Spirituality	6.76

* Parenting Satisfaction Subscale omitted

Table 28
Repeated Measures MANOVA for Importance Scores by Mean

Testing the equality of the 5 means:	<i>df</i>	<i>F</i> value	<i>p</i> value
	4	95.5	<.01
Difference between: 1st (J1) and J2	1	155.97	<.001
1st (J1) and J3	1	25.25	<.001
1st (J1) and J4	1	27.83	<.001
1st (J1) and J6	1	3.81	.05
2nd (J2) and J3	1	232.07	<.001
2nd (J2) and J4	1	258.74	<.001
2nd (J2) and J6	1	146.71	<.001
3rd (J3) and J4	1	.061	.44
3rd (J3) and J6	1	65.19	<.001
4th (J4) and J6	1	101.30	<.001

Note. J1 (Health/Body), J2 (Religion/Spirituality), J3 (Self-Confidence), J4 (Interdependence), J5 (Parenting Satisfaction), and J6 (EM Work). J's were utilized as J's are part of Stevenson's 1994 MILS calculations in determining subscale scores.

In regard to research question 8, when looking at the margin categories proposed by Main (1979) and Mikolaj and Boggs (1991), EM residents clearly report enough margin by the majority of items falling into categories A&B, which are the categories representing maintaining balance and breaking even versus C&D, which represent not enough margin (barely maintaining and crisis offing). Additionally, EM residents ranked other factors in their life as more important than EM Work by ranking factors in order of importance as Interdependence, Self-Confidence, Health/Body, and then EM Work.

Chapter 4 Summary

Chapter 4 has described the results of this study by addressing the research questions and null hypotheses. In general, the Margin in Life Scale for Emergency Medicine was not able to detect statistically significant differences between emergency medicine residents on remediation and those not, those at risk for remediation and those not, and those contemplating leaving emergency medicine training and those not in terms of the MILS score and subscale scores, resulting a failure to reject the null hypotheses. There were statistical differences with the variables gender, marital status, and program size in certain subscales. The implications of the results of this study will be discussed in Chapter 5.

Chapter 5: Conclusions

This chapter is organized in the following fashion: first, the purpose of this study; second, methods for completing the study; third, study results and discussion; and fourth, implications for future research and conclusions.

Purpose of the Research

The primary purpose of this study was to determine the margin in life scores of emergency medicine residents utilizing the Margin in Life Scale for Emergency Medicine (MILS EM) and to further determine if the MILS EM could identify residents who may be on remediation, at risk for remediation, or contemplating leaving their residency program.

This study further sought to determine (a) the effect of demographic variables such as age, gender, marital status, and graduate medical education (USGM or IGM), program size and training year on MILS EM and subscale scores; (b) whether certain subscales or items of importance would more likely fall in the categories that represent *crisis offing* (Margin C) and *barely maintaining balance* (Margin D) as described by Main (1979) and Mikolaj and Boggs (1991); and (c) those categories that were rated as most important among emergency medicine residents.

Methods

Once IRB approval was obtained by the University of Florida/Jacksonville (Appendix C), a convenience sample of program directors of 1-3 year emergency

medicine residency programs in the Southeastern United States was asked to participate. Ten out of the 18 programs agreed to participate over a 2-year period, with 273 emergency medicine residents voluntarily completing the MILS EM questionnaire sufficiently for inclusion. Margin in life was measured by the Margin in Life Scale for Emergency Medicine (Appendix B), which is a revised questionnaire of Stevenson's 1994 Margin in Life Scale. Analyses utilized were descriptive and frequency statistics, ANOVA, the *t*-test, MANOVA, and the non parametric tests of Wilcoxon Mann Whitney, Kruskal-Wallis, Chi Square, and Fisher's Exact Test.

Summary of Findings and Discussion by Research Question

Research questions 1-2. How do emergency medicine residents enrolled in 1-3 year training programs score overall on the MILS EM? How do emergency medicine residents enrolled in 1-3 year training programs score in the subscales (life-areas)?

Emergency medicine residents in this study were found to have adequate margins overall to participate in learning and meeting life's crises and emergencies. The average MILS EM score was .64, with a standard deviation of .082, which is within the normal range of .30 - .70 (Stevenson, 1980, 1982, 1994) and .50 - .80 (McClusky, 1970).

Additionally, participants in this study were found to have adequate margin in each of the six life areas of Health/Body ($M=.66$; $SD=.082$), Religion/Spirituality ($M=.68$; $SD=.099$), Self-Confidence ($M=.61$; $SD=.101$), Interdependence ($M=.65$; $SD=.100$), Parenting Satisfaction ($M=.92$; $SD=.155$), and EM Work ($M=.59$; $SD=.097$).

The literature reported high rates of burnout among residents, 25-76% (Eckleberry-Hunt et al., 2009; Shanafelt et al., 2002) due to such issues as long hours, high work loads, emotional exhaustion, increased financial burden, and lack of free time

(Brummelhuis et al., 2008; Butterfield, 1988; Geurts et al., 1999; Shanafelt et al., 2002). The literature further discussed characteristics that addressed burnout and promoted well-being, which included being married, having religion/spirituality, being challenged, valuing self-care, possessing a strong support system such as family and friends, and having children (Quill & Williamson, 1990; Shanafelt et al., 2003; Weiner et al., 2001).

The Margin in Life Scale for Emergency Medicine measured aspects of life through the subscales that represented characteristics mentioned above. Nearly half the residents in this study were married (49%), and 26% had children. The average subscale score for Health/Body, Religion/Spirituality, Self-Confidence, and Interdependence was .65, suggesting a high degree of margin. This would suggest that residents are surrounding themselves with enough resources that foster resilience (power). McClusky (1970) suggested that power was associated with resilience, and that a surplus of margin provided necessary energy to contend with life's demands above one's baseline and maintain one's mental health. Further, EM residents may be particularly good at viewing residency as a time of temporary imbalance, perceiving themselves as able to tolerate shift work, and having a preference for "eveningness" as reported by Ratanawongsa et al., (2007) and Steele et al., (2000). The results of this study suggested that EM residents are at low risk for burnout due to possessing sufficient margin.

Research question 3. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those at risk for remediation?

Overall, remediation rates in this study population were found to be between 12%-13% and those at risk for remediation at 6%. Those on remediation were found to have a mean MILS score of .63 (SD, .084; 95% CI: .60-.66). However, more than half

(61%) of the residents reported as being on formal remediation were from only two programs. These programs were combined for analyses in regard to those on remediation, as the investigator felt these programs most likely had similar remediation policies. No statistically significant differences were found within these two programs on the MILS or the subscales.

The majority of residents reported as being on remediation in this study were found to be on remediation for medical knowledge (62%). Assessment of medical knowledge, however, is easier for faculty to measure as all residents are required to take in-service exams during each year of their training. These standardized tests allow program directors to place residents on remediation for a low-score value without much deliberation or resistance from the resident, thus representing less stress on the program director.

Other areas of remediation (behavior/professionalism and clinical application) are more difficult to assess. The fact that two programs reported more than half the cases of remediation most likely validates the literature that remediation is underreported due to inefficient evaluation systems, lack of standardization of qualifying factors of remediation, and/or unwillingness of faculty to contend with the appeal process (Tonesk & Buchanan, 1987; Dudek et al., 2005).

Research question 4. Do lower MILS EM scores among emergency medicine residents enrolled in 1-3 year training programs identify those who are contemplating leaving emergency medicine training?

As previously noted, attrition rates are of concern to the Residency Review Committee (RRC) and to each medical specialty and residency training program. In this

study, however, not one resident who participated left their training program during the study period, and very few self-reported anticipating leaving their training program (5%; 95% CI: .02-.07). Residents in this study who were contemplating leaving their training program had a mean MILS score of .61 (*SD*, .074; 95% CI: .56-.65) versus those who were not .64 (*SD*, .082; 95% CI: .63-.65), which suggests that residents who are contemplating leaving have sufficient margin to engage in learning and meet life's emergencies and crises. Again, while the American Board of Emergency Medicine (ABEM) and the RRC know national attrition rates among emergency medicine residents as they collect these data, this information has not been published. Nationally, in 1988, D.C. Baldwin et al. determined that the attrition rate among all specialties was only 1.8%. In 1995, these rates were revisited and found to be at 2.7% (D.C. Baldwin et al., 1995). When residents do choose to leave their training program, the majority seem to leave to switch specialties or for life-style reasons (Aufses et al., 1998; Bergen et al., 1998; Dodson & Webb, 2005; Hatton & Loewenstein, 2004; Moschos & Beyer, 2004; Morris et al., 2003). These reasons may not be independent, meaning residents may leave their training program for another specialty to improve their lifestyle.

Research question 5. Does demographic information such as gender, age, marital status, and location of medical graduation (U.S. vs. IGM) have an impact on MILS EM and subscale scores?

The study also investigated the effects of age, gender, marital status, size of the program (small versus large), and graduate medical education (USGM and IGM) on MILS EM scores and subscale scores. In regard to gender, the mean MILS EM score ($M=.62$; $SD, .076$), Self-Confidence ($M=.58$; $SD, .107$), and Interdependence ($M=.63$; $SD,$

.097) among females were all statistically different from males' scores $p < .01$. However, the practicality of distinguishing a MILS EM score or subscale score that is only separated by 2 or 3 percentage points may be difficult. The largest difference between males and females was in the subscale Self-Confidence, which for males was .64, and for females .58 ($p < .01$) with a moderate effect size (Cohen's $d = .56$). This may suggest that females could benefit from programs that strengthen Self-Confidence or future research could determine if there are environmental issues that affect the Self-Confidence of women emergency medicine physicians.

Similar practical issues were found with the variables marital status and program size. In the area of marital status, a statistically significant difference was found among those who are married versus those who are not in the life area of parenting satisfaction ($p < .01$). However, the area of parenting satisfaction should be cautiously interpreted as in Stevenson's (1994) MILS calculations, those who do not have children score a 0 in this subscale and offer no contribution to this subscale. In most instances in the analyses, subscale Parenting Satisfaction did not have normal distribution and resulted in less rigorous statistical testing.

Research question 6. Does training year (PGY1, PGY2, & PGY 3) have an impact on MILS EM score?

The mean MILS EM scores for PGY1 and PGY2 residents were both .63, and .66, for PGY3 residents suggesting that training year does not appear to significantly impact residents' life areas. Each year of training may bring its share of stress. For example, residents who are in their intern year (PGY1) are most likely experiencing a high learning curve, yet those in their second year (PGY2s) are experiencing an increase in

responsibility and care for higher-acuity patients. Seniors (PGY3s), who have the most experience, are in the midst of at least two significant life events, interviewing at various locations for jobs post-graduation, and most likely planning a move. Examples such as these suggest that stress most likely remains consistent across training years, and that training year itself does not improve the MILS score or subscale scores.

Research question 7. Does the size of the training program impact the MILS EM score among emergency medicine residents?

Results of the *t*-test show a statistical difference ($p < .05$) between small and large residency training programs with the mean MILS EM score for small training programs at .66 (*SD*, .090) versus large training programs at .63 (*SD*, .073). Additionally, each of the subscales except Religion/Spirituality was statistically significant utilizing the *t*-test: Health/Body, $p = 0.00$, Self-Confidence, $p = 0.00$, Interdependence, $p = .05$, Parenting, $p = 0.01$, and EM Work, $p = .02$. Again, however, the actual MILS EM score and subscale scores are only separated by only ≤ 3 percentage points, so applying meaning to the differences would be difficult. Therefore, it does not appear that being enrolled in a program with a large number of residents (≥ 30) versus a smaller number of residents (< 30) impacts the MILS score or subscale scores meaningfully.

Research question 8. What areas of the MILS EM do emergency medicine residents report as being more important based on Main (1979) and Mikolaj and Boggs' (1991) categories (A) In balance, (B) Having Margin, (C) In Crisis, and (D) Barely Even (see Table 2).

In regard to importance ratings, each of the analyses utilized ranked Religion/Spirituality as least important (6.79; 6.76), EM work nearly last (average 8.40 in

both analyses), and Interdependence, Self-Confidence, and Health/Body in the top three slots. Additionally, in regard to Main (1979) and Mikolaj and Boggs' (1991) categories of maintaining balance (Margin A), having margin (Margin B), crisis-offing (Margin C), and barely maintaining (Margin D), most of items in each of the factors fell into Margins A or B versus C or D, suggesting emergency medicine residents are maintaining margin or are in surplus to meet life's demands.

It may be important to note that no resident fell below the .30 margin level on the MILS EM. EM work had the lowest mean score of the subscales, at .59 (*SD*, .097) as reported by the residents, but was ranked nearly last in terms of importance. This may suggest that while EM work is difficult and has burnout qualities, residents have an awareness of the importance of family, friends, and taking care of themselves. These life areas were ranked above EM work and Religion/Spirituality in terms of importance. Again, as reported earlier, areas that facilitate physician well-being include being married, having religion/spirituality, being challenged, having self-care, possessing a strong support system such as family and friends, and having children (Brummelhuis et al., 2008; Geurts et al., 1999; Quill & Williamson, 1990; Shanafelt et al., 2002, 2003; Weiner et al., 2001;). Although Religion/Spirituality ranked as least important, this area is often under-developed in young adults. Stevenson (1980) reported that young/middle age adults (20 years to 50 years) often are nonchalant about religion and take their faith for granted. Additionally, as residents have little spare time, this may be an area that receives less attention.

Conclusions:

One of the first conclusions that can be drawn from this study is that although burnout during residency, across all specialties, has been found to be high (between 25% and 76%; Eckleberry-Hunt et al., 2009; Shanafelt et al., 2002), emergency medicine residents may be at low risk of burnout due to a high degree of reported margin ($M = .64$). Moreover, emergency medicine residents in this study consistently reported other factors in life (Interdependence, Self-Confidence, and Health/Body) as more important than EM Work. This may suggest that EM residents have a good awareness of the importance of family, friends, care for their own health, and realization that residency most likely is a temporary state of imbalance and that resilience is key.

In this study, there were no statistically significant differences in margin scores between those on remediation versus those who were not, and those at risk for remediation versus those who were not. However, two out of 10 programs in this study reported the most cases of remediation. Some programs (large and small) reported that none of their residents were on remediation or at risk for remediation. It seems unlikely that this would occur if placing residents on remediation was not a cumbersome and stressful process for program directors. Therefore, there is a strong indication that remediation and at risk for remediation rates is an underreported phenomenon in emergency medicine residency training. This supports the literature, which describes there is a need for assessment tools and standard criterion for placing residents on remediation and early notification of those at risk. Whereas the ACGME has provided residency programs with flexibility in determining remediation policies and procedures, a more uniform approach and training would be useful, especially in the areas of behavior

(professionalism) and clinical application, as these programs are the most difficult to assess.

Also found in this study was a low rate of attrition in regard to those contemplating leaving their current EM residency program (5%) and those who actually left (0%). A low attrition rate is an important accreditation criterion for the RRC; however, an acceptable rate of attrition has not been published by the RRC. Because program directors are apprehensive about receiving citations for attrition, program directors may err on the side of caution, and not release residents who should be withdrawn from EM residency training. In terms of residents choosing to leave training, early national studies by D.C. Baldwin et al. (1988) and D.C. Baldwin et al. (1995) among all specialties found low rates of attrition, 1.8% and 2.7% respectively. Additionally, Ginde et al. (2009) found low attrition rates (1.7% annually) among emergency medicine physicians in practice (post graduation). It may be that residents who choose emergency medicine as a specialty are particularly good at selecting a specialty they can relate to and further recognize characteristics that are needed in emergency medicine such as the ability to tolerate shift work, a preference for “eveningness,” the ability to take care of high acuity patients, and work in a chaotic and exciting environment (Ginde et al., 2009; Ratanawongsa et al., 2007; Steele et al., 2000). As the American Board of Emergency Medicine and the RRC collect attrition data from all emergency medicine residency programs, it would be useful for these data to be published so that an acceptable range of attrition could be established. An acceptable rate of attrition may reduce the pressure of keeping residents who may be in specialty that may not be optimal for them and, ultimately, their patients.

In regard to demographic data, specifically gender, females in this study consistently had lower margin in life scores than males. As there are more and more females seeking training in emergency medicine, 1392 in 2005 (D.G. Perina, et al., 2005), 1490 in 2006 (D.G. Perina, et al., 2006), and 1619 in 2007 (D.G. Perina, et al., 2007), it becomes important to ensure that there are not characteristics or situations taking place in the work environment that produce additional loads on females than males. Identification of differences could assist female residents and program directors in building resources (powers) that provide additional support. Already recognized by the Society of Academic Emergency Medicine (SAEM) is the fact that there are far fewer female leaders in academic EM positions (SAEM, 2009). The Academy for Women in Academic Emergency Medicine was established in 2009 “to promote the recruitment, retention, advancement and leadership of women in academic emergency medicine throughout their careers” (SAEM, 2009). However, most of the material is directed after residency graduation, whereas the material would most likely benefit residents while still in training.

Finally, there are several problems associated with the Margin in Life Scale (Stevenson, 1994) as an assessment instrument. The survey itself is too long to implement multiple times during residency training. Several assessments of residents’ margin are necessary as margin is a dynamic event and residency, in most cases, is 3-years in length. There is a need to revisit the factors or life areas, particularly Religion/Spirituality and Parenting Satisfaction. The Margin in Life Scale (Stevenson, 1994) has numerous questions assessing Religion/Spirituality that appear repetitive, and the wording slants more to those of Christian faiths than to a broader application. In

regard to parenting, clearly the questions only pertained to those who had children. The majority of residents in this study did not have children and had to answer this entire subscale as non-applicable. It may be that residents could perceive not having children during residency as a resource, but, due to the wording on the survey, residents without children received a zero on this subscale. Last, there are numerous errors in the guidebook provided by the Ohio State University and developed by Stevenson (1994). Those who wish to utilize this guidebook should carefully review the formula provided.

Implications for the Field and Future Research

The ability to maintain margin in one's life has a profound impact on one's ability to engage in and maintain learning, as well as to deal with life's crises. Residency is a time of high stress; however, the representation that emergency medicine residents may suffer high-rates of burnout may be artificial. A national study is needed to confirm results of this study in areas in which emergency medicine residents were found to have sufficient margin during their training, and therefore were less likely to suffer burnout. Furthermore, it would be beneficial to explore, through qualitative means, residents' perceptions of resources that create resiliency in a demanding, high-stress environment and further to explore the implications of religion and spirituality among young/middle age adult physicians, particularly as this area has been found to assist in physician well-being. Additionally, because females consistently scored lower on several of the subscales, this area should be further investigated to determine if there are characteristics in the work environment that affect women more meaningfully than men.

In terms of remediation, as in any learning environment, residents can fall behind their peers and have a need to be placed on remediation. Standardization, however, in

regard to remediation policies and procedures has been eluded in residency training. Many program directors and faculty find identifying residents at risk and placing them on remediation cumbersome and stressful (Tonesk & Buchanan, 1987). This may lead to graduation of residents who are in need of remediation not receiving the full benefit of their education and possibly, and more importantly, have negative consequences regarding patient safety issues. Further, this would lead to an underreporting of remediation rates. While the Accreditation Council on Graduate Medical Education (ACGME, 2007d) has posted on its website evaluation tools to guide program directors in assessment, additional training is needed to assist program directors in assessing learning needs and disabilities of residents. Further, residency programs would benefit from someone who is trained in educational assessments and learning theory, as program directors themselves already have a great deal of pressure and high workload. Finally, because physicians are known as high achievers, it may be beneficial to reduce the stigma the word *remediation* offers and perhaps make the process appear less punitive.

Attrition is a concern for any business or practice, and is of concern to the Residency Review Committee (RRC) when reviewing residency programs for accreditation. While the American Board of Emergency Physicians (ABEM) collects attrition information from residents, the organization has not published these data. However, Ginde et al. (2009) completed a study where the attrition rate was found to be low (1.7% annually) among emergency medicine physicians in practice. A national study would help clarify whether residency attrition parallels those already in clinical practice (post-graduation) and whether characteristics reported to assist with retention such as an exciting environment for practicing medicine, a wide-variety of patient encounters, the

requirement of a high skill-set and the substantial pay is also relevant among residents. Such information may assist the RRC and emergency medicine residency training programs for accreditation purposes, since an acceptable rate of attrition appears arbitrary. Other specialties in medicine have reported that the main reason residents left their training programs was for life-style issues. Future research or program development that more realistically provides a picture of the type of hours and workload of a specialty may benefit medical students prior to choosing their specialty, thereby reducing attrition for this reason.

The application of the margin in life theory in the field of emergency medicine residency training, and the field of medicine in general, has merit. Medicine is in its infancy in educating and providing resources for physician well-being. The Margin in Life Scale for Emergency Medicine measures life areas that support the characteristics of physician well-being. Future studies and program development are needed to assist residents and physicians post-graduation with tools to build margin. The ability to accurately measure aspects that provide resource or power to physicians in training and those areas that burden residents would greatly benefit the leaders in emergency medicine training.

Program directors who are transformational leaders would find this information useful in supporting the four factors of transformational leadership (Bass & Steidlmeier, 1998): idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Program directors who are aware and practice aspects that support well-being are more likely to share these concepts and resources and serve as role models for residents in their training programs (idealized influence). A program director

that has his or her life in balance is more likely to be able to communicate these aspects appropriately and credibly to the residents (inspirational motivation). As concepts of well-being challenge the status-quo and require organizational challenges, the aspect of intellectual stimulation would be met. Often, aspects that promote well-being are in direct conflict with organizational goals of seeing a high volume of patients in a stressful environment. Finally, program directors can excel in the area of individualized consideration by coaching and mentoring residents toward incorporating practices of well-being consistently into their daily lives.

The Margin in Life Scale (Stevenson, 1994) and resulting MILS EM, however, require major modification in order to prove more useful. The tool itself is too long for multiple implementations during training. Multiple assessments are necessary, as margin is a dynamic event. Further, there are significant problems with calculating the margin score with the current subscales. In particular, the areas of religion/spirituality and parenting satisfaction provided the most difficulty for residents. Many residents chose “not-applicable” for all the religion and spirituality questions and parenting satisfaction. There may be more appropriate questions to ask in terms of Religion/Spirituality that more accurately reflects the young adult’s perception of this subject, whether lack of time has an impact, and perhaps if the questions should be adjusted to reflect more cultural sensitivity. Additionally, the majority of residents did not have children, which may have falsely inflated the parenting satisfaction scores due to limited responses. More psychometric studies are needed on measures of margin, as others have noted; margin is a difficult concept accurately to measure and may remain an intuitive theoretical concept.

Chapter 5 Summary

In summary, Chapter 5 discussed the purpose of this study, methods utilized, and provided a comprehensive discussion of findings by research question and overarching conclusions. Additionally, this chapter provided thoughts in regard to future research. Like other researchers who have investigated the margin in life theory as a logical premise needed in learning, this dissertation sought to determine if those who may be struggling in their learning environment would also be more likely to have lower margin scores. It is intuitive that when life is out of balance, learning new information and applying new skills may prove more difficult. This dissertation particularly sought to determine if emergency medicine residents on remediation or at risk for remediation, and those who were contemplating leaving or left emergency medicine training would have significantly lower margin in life scores than those not. Emergency medicine residents appear to be resilient and possess a healthy balance between the issues that burden them and the people and events that provide support. However, women in emergency medicine training consistently scored lower than their male counterparts on the MILS EM. As more women are seeking careers in medicine, and particularly emergency medicine, it is important to determine if there are environmental causes for these differences, and further determine if there are other resources women may need to bolster their margin. The margin in life theory remains appealing to researchers; however, a rigorous and more accurate tool to measure margin is still needed. Otherwise, the margin in theory may remain a theoretical construct that eludes accurate measurement.

Appendix A: Margin in Life Scale Scoring Formula (Stevenson, 1994)

- (vi) Divide the result obtained in step (iv) by the result obtained in step (v). This number is a subscale score, J_i .

For example, using subscale 4, suppose the importance scores are as above in 2 (iii) and let L_i be the load score and P_i be the power scores where $i=14, 19, 20, 23, 27, 33, 37, 54, \& 55$. Assume the following responses on the scale items were obtained from one subject:

$L_{14}=3$	$P_{14}=4$
$L_{19}=3$	$P_{19}=5$
$L_{20}=3$	$P_{20}=5$
$L_{23}=4$	$P_{23}=3$
$L_{27}=5$	$P_{27}=3$
$L_{33}=4$	$P_{33}=5$
$L_{37}=5$	$P_{37}=3$
$L_{54}=4$	$P_{54}=3$
$L_{55}=3$	$P_{55}=5$

Completing the steps in 3 yields the following score, J_4 , where

$$J_4 = \frac{W_{14}L_{14} + W_{19}L_{19} + W_{20}L_{20} + W_{23}L_{23} + W_{27}L_{27} + W_{33}L_{33} + W_{37}L_{37} + W_{54}L_{54} + W_{55}L_{55}}{W_{14}(L_{14} + P_{14}) + W_{19}(L_{19} + P_{19}) + W_{20}(L_{20} + P_{20}) + \dots + W_{55}(L_{55} + P_{55})}$$

$$J_4 = \frac{10 \times 3 + 8 \times 3 + 9 \times 3 + 8 \times 4 + 6 \times 5 + 6 \times 4 + 5 \times 5 + 6 \times 4 + 9 \times 3 = 243}{10(3+4) + 8(3+5) + 9(3+5) + 8(4+3) + \dots + 9(3+5) = 518}$$

$$J_4 = \frac{243}{518} = .469$$

Now, repeat the above process to obtain all the subscale scores, J_i

($i=1, 2, 3, \text{ and } 5$ for the remaining subscales).

4. To obtain a total Margin-In-Life score;
- (i) Multiply each subscale score with the associated weighted importance average for that subscale;

For example, using subscale 4 again, multiply $A_4=7.44$ and $J_4=.469$. Result is 3.489.

Do this for each subscale.

- (ii) Add together all the results obtained in step (i)

$$\text{i.e. } A_1J_1 + A_2J_2 + A_3J_3 + A_4J_4 + A_5J_5 = \sum_{j=1}^5 A_jJ_j$$

- (iii) Add together all the weighted importance averages of the subscales

$$\text{i.e. } A_1 + A_2 + A_3 + A_4 + A_5 = \sum_{j=1}^5 A_j$$

- (iv) Divide the result obtained in step (ii) by the result obtained in step (iii) to get a weighted average individual score.

$$\frac{A_1J_1 + A_2J_2 + A_3J_3 + A_4J_4 + A_5J_5}{A_1 + A_2 + A_3 + A_4 + A_5} = \frac{\sum_{j=1}^5 A_jJ_j}{\sum_{j=1}^5 A_j}$$

- (v) Subtract the weighted average individual score obtained in step (iv) from 0.5 to get the Margin-In-Life score.

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Note. In Step (v), the weighted average individual score in step (iv) was subtracted from 1, not .05. Stevenson's papers (1980, 1982a, & 1982b) all state the formula for Margin is 1- load/power. Further, Knepper (1990) specifically addresses the fact that Stevenson subtracts from 1 to eliminate negative numbers. Additionally, all authors reviewed who utilized Stevenson's MILS, subtracted from 1, except one (Walker, 1997).

Appendix B: Margin in Life Scale for Emergency Medicine

Emergency Medicine Residents:

Thank you for taking the time to consider participating in this study.

Informed Consent:

Participation in this study means taking the survey as many as three times during your residency training dependent on your year of training. **The survey should only take about 20-30 minutes to complete.** Your participation in the entirety of this study will be greatly appreciated and your honest answers may provide valuable feedback to assist residency programs in retaining emergency medicine residents and may improve training environments. Program Directors as part of this study will provide remediation and attrition information on residents who participate in this study for the duration of the study only. Your participation is voluntary and will not affect your evaluations as a resident.

The Specific aims of this study are to:

Determine the utilization of the Margin In Life scale to 1) identify internal and external resources of residents which may assist emergency medicine residents in avoiding attrition and remediation; and 2) determine if the scale will help predict or identify those residents who may be at risk for leaving emergency medicine training or remediation. Information of this nature may help residency programs in creating programs that will help reduce resident attrition rates and remediation and may help explain attrition phenomena. **Your answers are kept confidential and your program director will not receive individual or institution specific data. All reported data will be in aggregate form with approximately 300 or more emergency medicine residents.**

For more information on this study, contact the study's Investigators: Colleen Kalynych, MSH or Robert L. Wears, MD, MS at the UF /Jacksonville at XXXXXXXX. You may at anytime remove yourself from this study by contacting the principal investigators by phone or by email: XXXXXXXXX or in writing at 655 West 8th Street Box C506, Jacksonville, FL 32209. The University of Florida IRB Office Chair XXXXXX can be contacted in regards to this study or to enquire about the rights as a study participant at XXXXXXXX.

By completing this survey, you are consenting to participate in the study. Study participants may be asked to be removed from the study at anytime; however, data already collected may be used.

Directions for the Survey:

The purpose of this survey is to find out how people view their present life. The survey asks for demographic information and presents 58 common experiences in adult life. Next, there are several questions germane to common experiences in academic emergency medicine training. You are asked to rate each of the questions in three ways (importance, load, and power). **In this survey, you will see that questions in certain domains are asked several times, in slightly different versions, this is intentional. Additionally, some questions may seem odd to your age group, but are essential components of the survey.**

Across from each of the items are four columns headed by the words:

IMPORTANCE OF ITEM LOAD POWER ITEM NOT APPLICABLE

In the *Importance of Item* column, you will be asked to rate on a scale of 1-10 how important this item is to you; generally. The object is for you to choose any number from 1-10 to *indicate the relative importance of that item in your life* (1 less important; 10 most important).

The next two columns ask you to rate the **Load** and **Power** of each item on a scale of 1-5 (1 representing low load or low power and 5 high load or high power). **Load** refers to the amount of *burden* or responsibility **this item currently is putting on you**. The **Power** refers to the *joy, pleasure, strength or richness* this item currently adds to your life. **It is necessary to circle BOTH a Load and a Power** for each item to signify the balance which exists in adult life between responsibilities and satisfaction. If an item has no relevance in your life, for example, if asked about a spouse and you have never had one; then choose Item Not Applicable.

Example of completed questions:

Generally speaking...	IMPORTANCE OF ITEM (how important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
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My eyesight is:	1,2,3,4,5,6,7,8, 9 ,10	1, 2 ,3,4,5	1,2, 3 ,4,5	<input type="checkbox"/>
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In this example, eyesight is important to this person and their eyesight is fine; causing them no burden and is a medium resource to them. Another example:

My spouse is :	1,2,3,4,5,6,7,8,9, 10	1,2,3,4, 5	1,2,3,4,5	<input type="checkbox"/>
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In this example, his/her spouse is very important, but the couple may be experiencing problems (spouse lives in another city; marital issues) which is causing a burden (load) and therefore is not a resource or strength (power) at this time. Or another example:

My spouse is : 1,2,3,4,5,6,7,8,9,10 1,2,3,4,5 1,2,3,4,5 □
 In this example, his/her spouse is very important, and is supportive (providing power) and causing a low burden or (load).

Begin Questions:

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
Generally speaking....				
1. My mental health is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
2. My eyesight is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
3. Living with my spouse is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
4. Our children are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
5. Frequent prayer is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
6. My hearing is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
7. My physical health is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
8. Reading religious material is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
9. My sense of smell is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
10. I would rate my present life as:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□
11. Breathing is: (are you having trouble with: i.e. asthma, anxiety)	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	□

12. My sense of taste is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
13. Religious faith is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
14. My ability to concentrate is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
15. My belief in God (or other higher power) is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
16. My blood circulation is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
17. My appetite is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
18. The extent to which my family members cooperate with each other is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
19. Having goals in life is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
20. Being independent is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
21. My children's attitude towards me is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
22. My sexual abilities are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
23. Making decisions is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

24. My hands and arms are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
25. Being married is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
26. My type of employment is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
27. Being responsible is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
28. My digestion is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
29. My back is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
30. Belief in a religion is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
31. My family's way of coping with problems is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
32. My feet and legs are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
33. Self-reliance is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
34. Relating with my Co-workers is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
35. The way my children and I get along:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
36. Having a few close friends is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

37. Controlling my temper is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
38. A high standard of morality is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
39. My coordination is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
40. Consideration of others is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
41. The way my children act with each other is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
42. My body is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
43. The way my spouse handles responsibility is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
44. Mobility is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
45. My children's progress in school:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
46. The need for religion is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
47. The people I've met at church are: (or other faith-based facility)	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
48. My attitude toward family is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
49. Membership in a religion is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

50. My muscle are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
51. Getting along with people is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
52. A spiritual way of life is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
--------------	---	--	---	----------------------------

53. Rest is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
54. Frequently finding it necessary to stand up for what I believe in:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
55. Self confidence is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
56. Participating in religious practices is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
57. Manual dexterity is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
58. My concern for my family is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Residency/Work Specific Questions:

59. Sleep is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
60. Lifestyle is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
61. Finances are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

62. Learning is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
63. Career is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
64. Mentorship is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Scale	IMPORTANCE OF ITEM (How important is this to you, now?)	LOAD (Is this causing a burden?)	POWER (Is this a resource/strength to you?)	ITEM NOT APPLICABLE
--------------	---	--	---	----------------------------

65. Respect from others is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
66. Support from family is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
67. Work conditions are:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
68. Support from peers is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
69. Teamwork is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
70. Free time is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
71. Program support is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
72. Having a Significant other is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
73. Alcohol use is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>
74. moonlighting is:	1,2,3,4,5,6,7,8,9,10	1,2,3,4,5	1,2,3,4,5	<input type="checkbox"/>

Circle Demographic Information: Gender: Male Female Age Group: 18-30 31-40 Over 40

Year of Residency & medical degree: PGY1 PGY2 PGY 3 M.D. or D.O. USGM or IMG

Present Marital Status: Single Engaged Married Separated Divorced Widowed

Race/Nationality: Caucasian Hispanic Black/African-Amer. Asian Native Amer.

Other: _____

Final Questions:

Questions	Circle or Fill in your answer
At this point in your training are you: (circle appropriate answer)	a) anticipating or contemplating leaving EM residency for another specialty?*
	c) anticipating or are contemplating leaving the residency program you are currently enrolled for another EM residency?*
	d) anticipate staying in EM residency?
Have you been placed on remediation?	Yes No If Yes, circle all that apply: Academic Professionalism Clinical Application
What type of community did you live in for most of your life?	United States: Rural Small town Medium-sized city Large Metropolitan area International: Rural Small town Medium-sized city Large Metropolitan area
How often are you anxious about your economic welfare?	Always Often Occasionally Rarely Never
Rate your present state of health	Long-term health problem Temporary health problem Average health Good health Excellent
If you saw a physician, how do you think he/she would rate your present health?	Very poor Poor Fair Good Excellent
Do you smoke? Use Smokeless Tobacco	Yes No Occasionally
How would you rate your alcohol use?	Always Often Occasionally Rarely Never
Are you a member of an organized church or religious group?	Yes No
Do you attend church or another religious facility regularly?	No _____. No, but I would if I had time____ or Yes, Daily Nearly every week About once a month About once a year

- *If you answered that you are anticipating or contemplating leaving EM residency for another specialty or for another EM program, please provide reasons why you are considering leaving:

Feel free to add any additional comments in regards to this questionnaire or topic:

PLEASE PLACE YOUR COMPLETED SURVEY IN THE ENVELOPE PROVIDED AND SEAL IT. TURN THE SEALED ENVELOPE TO THE PROCTOR WHO WILL MAIL THE ENVELOPES BACK IN A SEALED BOX. Thank you for your participation!!

Appendix C: University of Florida IRB Approval Letter

UF Institutional Review Board
UNIVERSITY of FLORIDA

Health Science Center / Jacksonville
College of Medicine
Institutional Review Board
FWA00005790

580 West Eighth Street
Tower II, 9th Floor, Suite 9015
Jacksonville, FL 32209
(904) 244-9427
(fax) (904) 244-9035

MEMORANDUM

DATE: October 11, 2007
TO: David J. Vukich, M.D.
655 W. 8th Street, CC-Basement, Emergency
Medicine Dept
Jacksonville, FL 32209
FROM: Sheila Heim, CIP
Coordinator, Institutional Review Board for
Alan Halperin, MD
Chair, Institutional Review Board
SUBJECT: Expedited Review of UFJ 2007-123
TITLE: UFJ 2007 123 Emergency Medicine Resident Attrition Rates and the Application of "Margin"

Your request for approval of the above study under the classification of expedited has been reviewed and as IRB Chair I am pleased to inform you that your study is now approved under the expedited category(s):

- ___ 1. Clinical studies of drugs and devices only when:
 - a. An investigational new drug application (IND) or investigational device exemption (IDE) is not required, and there is no significant increase in risk or decrease in acceptability of risk, or
 - b. The device is cleared or approved for marketing and is being used in accordance with its labeling.
- ___ 2. Collection of blood samples by finger, heel, or ear stick, or venipuncture no more than twice weekly as follows:
 - a. From healthy non-pregnant adults weighing at least 110 pounds, in amounts less than 550 ml per 8 weeks.
 - b. From other adults and children, considering the health and habitus of the subjects, in amounts less than 50 ml or 3 ml per kg (whichever is less) per 8 weeks.
- ___ 3. Prospective collection of biological specimens for research purposes by noninvasive means. Examples:
 - a. Hair and nail clippings (non-disfiguring).
 - b. Deciduous teeth at exfoliation or indicated extraction
 - c. Permanent teeth excreta at indicated extraction
 - d. Excreta and external secretions including sweat
 - e. Uncannulated saliva
 - f. Placenta removed at delivery
 - g. Amniotic fluid at the time of rupture of the membrane prior to or during labor
 - h. Supra- and sub-gingival dental plaque during routine prophylactic scaling
 - i. Mucosal and skin cells by buccal scraping or swab, skin swab, or mouth washings.
 - j. Sputum after saline mist nebulization

SUBJECT: Expedited Review of UFJ 2007-123

TITLE: UFJ 2007 123 Emergency Medicine Resident Attrition Rates and the Application of "Margin"

4. Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Examples:
- a. Physical sensors that do not involve input of significant amounts of energy or invasion of privacy.
 - b. Weighing or testing sensory acuity.
 - c. Electro-cardiography, electro-encephalography, thermography, detection of naturally-occurring radioactivity, electroretinography, ultrasound, diagnostic infrared imaging, doppler blood flow, and echocardiography.
 - d. Moderate exercise, muscular strength testing, body composition assessment and flexibility testing where appropriate for age, weight and health.
5. Research involving materials (data, documents, records, specimens) that have been or will be collected solely for non-research purposes (such as medical treatment or diagnosis).
6. Collection of data from voice, video, digital, or image recordings made for research purposes.
7. Research on individual or group characteristics or behavior (such as studies of perception, cognition, motivation, identity, language, communication, cultural beliefs and practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

You must inform the Board of any modifications or changes to this research (protocol or consent changes) since they could affect its expedited status.

Please note the category of informed consent listed below that has been approved for this study.

You have been granted approval to conduct this study using the enclosed stamped, IRB-approved consent form. This consent must be photocopied and used when enrolling subjects into this project.

OR

You have been granted a waiver of documentation of informed consent, in lieu of a verbal consent.

OR

You have been granted a waiver of informed consent.

Your protocol is approved until 10/11/2008 at which time you will need to submit a regular continuing review report in order to continue the study.

Thank you for informing the Board of your proposal.

Appendix D: University of North Florida IRB Letter



UNIVERSITY of
NORTH FLORIDA
Office of Research and Sponsored Programs
1 UNF Drive
Jacksonville, FL 32224-2665
904-620-2455 FAX 904-620-2457
Equal Opportunity/Equal Access/Affirmative Action Institution

MEMORANDUM

DATE: October 22, 2009
TO: Ms. Colleen Kalynych
Dr. Marcia Lamkin
FROM: Dr. Katherine Kasten, Chairperson
UNF Institutional Review Board
RE: Review by the UNF Institutional Review Board IRB#09-123:
Emergency Medicine Residents and the Application of "Margin"

This is to advise you that your project, Emergency Medicine Residents and the Application of "Margin," has been reviewed on behalf of the UNF Institutional Review Board and has been declared "Exempt from Further IRB Review, category 4."

As you may know, your **CITI Course Completion Report** is valid for 3 years. Ms. Kalynych's completion report is valid through 06/01/2012. Dr. Lamkin's completion report is valid through 09/16/2012.

This approval applies to your project in the form and content as submitted to the IRB for review. Any variations or modifications to the approved protocol and/or informed consent forms as they relate to dealing with human subjects must be cleared with the IRB prior to implementing such changes. Any unanticipated problems involving risk and any occurrence of serious harm to subjects and others shall be reported promptly to the IRB.

Should you have any questions regarding your project or any other IRB issues, please contact the Office of Research and Sponsored Programs at 904.620.2455.

Thank you,

Research Integrity Staff

UNF IRB Number: 09-123
Approval Date: 10.22.09
Revision Date: _____

Appendix E: Program Director's Survey

Study Title: Emergency Medicine Resident Attrition Rates and the Application of "Margin"

Program Director: Thank you for taking part in this study, your honest answers is extremely appreciated!

Emergency Medicine Residency Program: _____
Program Director's Name: _____

The following residents are participating in the Margin in Life Study that was sent to your program. Please indicate if any of the residents listed are currently on remediation or at risk for remediation. *At risk* for remediation includes the fact that this resident has been discussed among faculty as someone that needs more assistance, monitoring, or increased medical knowledge or professionalism.

Circle Type of Remediation or at risk for remediation:

				<u>Currently On Remediation</u>				<u>At Risk</u>				
1. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
2. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
3. <u>First</u> <u>Last Name</u>	PGY1	2	3		Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
4. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
5. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
6. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
7. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
8. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
9. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
10. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
11. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
12. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App
13. <u>First</u> <u>Last Name</u>	PGY	1	2	3	Acad	Behav	Clinical	App	Acad	Behav	Clinical	App

Attrition: Have any of the residents listed above left your program? Y N

Name of Resident who left the program: _____

Please print legibly

Year of Training: _____ Gender: _____

Appendix F

Statistical Analyses on the Variables Gender, Marital Status, Graduate Medical
Education, Age Group

Appendix F

Variables Gender, Marital Status, Graduate Medical Education, Age Group

<u>Gender</u>	<i>N</i>	<i>M MILS EM (SD)</i>	<u><i>t</i>-test: <i>df</i></u>	<u><i>t</i> value</u>	<u><i>p</i> value</u>	<u>Cohen's <i>d</i></u>
Male	162	.65(.084)	271	2.91	0.00	.37
Female	111	.62(.076)				
	<i>N</i>	<i>Health/Body Score (SD)</i>				
Male	162	.67(.091)	271	2.08	0.03	
Female	111	.65(.085)				
	<i>N</i>	<i>Religion/Spirituality (SD)</i>				
Male	162	.67(.104)	271	-1.27	0.20	
Female	111	.69(.091)				
	<i>N</i>	<i>Self-Confidence (SD)</i>				
Male	162	.64(.106)	271	4.26	<0.00	.56
Female	111	.58(.107)				
	<i>N</i>	<i>Interdependence (SD)</i>				
Male	162	.66(.100)	271	2.61	0.01	.32
Female	111	.63(.097)				
	<i>N</i>	<i>Parenting Satisfaction (SD)</i>				
Male	162	.91(.155)	271	-1.13	0.26	
Female	111	.93(.154)				

	<i>N</i>	<i>M</i> MILS EM (<i>SD</i>)	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
EM Work (<i>SD</i>)							
Male	162	.60(.100)		271	2.22	0.03	
Female	111	.57(.088)					

Appendix F

Variables Marital Status

<u>Marital Status</u>	<i>N</i>	<i>M</i> MILS EM (<i>SD</i>)	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
Married	134	.63(.082)		269	-2.16	0.03	
Unmarried	137	.65(.082)					
	<i>N</i>	Health/Body(<i>SD</i>)					
Married	134	.66(.087)		269	-.46	0.65	
Unmarried	137	.66(.091)					
	<i>N</i>	Religion/Spirituality (<i>SD</i>)					
Married	134	.67(.103)		269	-1.88	0.06	
Unmarried	137	.69(.095)					
	<i>N</i>	Self-Confidence (<i>SD</i>)					
Married	134	.60(.113)		269	-1.63	0.10	
Unmarried	137	.62(.106)					
	<i>N</i>	Interdependence (<i>SD</i>)					
Married	134	.64(.104)		269	-1.57	0.12	
Unmarried	137	.66(.097)					

	<i>N</i>	Parenting Satisfaction (<i>SD</i>)	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
Married	134	.96(.121)		269	4.30	<0.001	.53
Unmarried	137	.88(.175)					
	<i>N</i>	EM Work(<i>SD</i>)					
Married	134	.57(.093)		269	-2.28	0.02	
Unmarried	137	.60(.097)					

Appendix F

Variable Graduate Medical Education

Graduate Medical Education

	<i>N</i>	MILS EM(<i>SD</i>)	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value
USMG	240	.64(.083)		259	0.52	0.60
IMG	21	.63(.075)				
	<i>N</i>	Health/Body(<i>SD</i>)				
USMG	240	.66(.089)		259	00.19	0.85
IMG	21	.66(.096)				
	<i>N</i>	Religion/Spirituality (<i>SD</i>)				
USMG	240	.68(.100)		259	1.47	0.14
IMG	21	.65(.090)				
	<i>N</i>	Self-Confidence (<i>SD</i>)				
USMG	240	.61(.113)		259	0.11	0.91
IMG	21	.61(.088)				

	<i>N</i>	Interdependence (<i>SD</i>)	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value
USMG	240	.65(.101)		259	0.06	0.95
IMG	21	.65(.102)				
	<i>N</i>	Parenting Satisfaction (<i>SD</i>)				
USMG	240	.92(.154)		259	1.09	0.28
IMG	21	.88(.187)				
	<i>N</i>	EM Work(<i>SD</i>)				
USMG	240	.59(.099)		259	0.60	0.55
IMG	21	.57(.087)				

Appendix F
Age Group

Age Group

	<i>N</i>	MILS EM(<i>SD</i>)	<i>df</i>	<i>F</i> value	<i>p</i> value
18-30	183	.64(.081)	2	0.06	0.94
31-40	76	.64(.084)			
>40	14	.64(.088)			
	<i>N</i>	Health/Body(<i>SD</i>)			
18-30	183	.66(.089)	2	0.78	0.46
31-40	76	.65(.089)			
>40	14	.65(.100)			
	<i>N</i>	Religion/Spirituality (<i>SD</i>)			
18-30	183	.68(.098)	2	0.85	0.43
31-40	76	.68(.103)			
>40	14	.69(.010)			

	<i>N</i>	Self-Confidence (<i>SD</i>)	<i>df</i>	<i>F</i> value	<i>p</i> value
18-30	183	.61(.110)	2	0.48	0.62
31-40	76	.61(.110)			
>40	14	.64(.116)			
	<i>N</i>	Interdependence (<i>SD</i>)			
18-30	183	.66(.099)	2	0.76	0.47
31-40	76	.65(.101)			
>40	14	.62(.114)			
	<i>N</i>	Parenting Satisfaction (<i>SD</i>)			
18-30	183		2	0.76	0.47
31-40	76				
>40	14				
	<i>N</i>	EM Work (<i>SD</i>)			
18-30	183	.59(.094)	2	0.14	0.86
31-40	76	.58(.100)			
>40	14	.57(.108)			

Appendix G: Small versus Large Programs- Each Subscale

Appendix G

Small versus Large Programs- Each Subscale

MILS EM										
Variable	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
Size Training Program							271	-3.23	0.00	
Small (<30)	117	.66	.09	.43	.83					
Large (≥30)	156	.63	.07	.43	.80					
Health/Body										
Size Training Program							271	-3.07	0.00	.37
Small (<30)	117	.68	.09	.43	.83					
Large (≥30)	156	.65	.09	.35	.79					
Religion/Spirituality										
Size Training Program							271	-1.57	0.12	
Small (<30)	117	.69	.10	.45	.85					
Large (≥30)	156	.67	.10	.26	.84					
Self-Confidence										
Size Training Program							271	-3.23	0.00	.40
Small (<30)	117	.64	.12	.36	.83					
Large (≥30)	156	.60	.10	.26	.83					

Appendix G

Small versus Large Programs- Each Subscale Continued

Interdependent Variable	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	<i>t</i> -test	<i>df</i>	<i>t</i> value	<i>p</i> value	Cohen's <i>d</i>
Size Training Program							271	-2.02	0.05	
Small (<30)	117	.67	.09	.30	.83					
Large (≥30)	156	.64	.10	.40	.81					
Parenting										
Size Training Program							271	2.82	0.01	.35
Small (<30)	117	.89	.17	.36	1.0					
Large (≥30)	156	.94	.14	.44	1.0					
EM Work										
Size Training Program							271	-2.54	0.02	.31
Small (<30)	117	.60	.11	.35	.83					
Large (≥30)	156	.57	.08	.39	.80					

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Biographical Sketch

Colleen Kalynych, MSH, Ed.D. is the Director of Research and Educational Development at the University of Florida College of Medicine/Jacksonville Department of Emergency Medicine, and past Director of the Community Pediatrics Training Initiative at the University of Florida College of Medicine/Jacksonville, Department of Pediatrics and Duval County Health Department's Institute for Health, Policy and Evaluation Research. Additionally, she served as Assistant Director of Northeast Florida Area Health Education Center for seven years. She completed her undergraduate work at San Diego State University, San Diego, CA., and her Masters of Science in Health at University of North Florida, Jacksonville, FL. Dr. Kalynych has written numerous federal and foundation grants and has served as co-investigator on numerous research studies.

Selected Presentations and Publications

Zeretzke C, McIntosh M, Wylie T, Kalynych C. (2010, June). *Impact of an immunization registry on fever with source in children aged 6-24 months who present to the Pediatric Emergency Department*. Poster presented at Society of Academic Emergency Medicine Annual Meeting, Phoenix, AZ.

McIntosh M, Kalynych CJ, Vukich C, Kumar V, Lott M, Lerman RH. (2010, April). *Global improvement in multiple cardiovascular disease risk factors with a medical food containing soy, phytosterols, hops rho iso-alpha acids, and acacia proanthocyanidins and a Mediterranean-style low glycemic load diet in women with metabolic syndrome*. Poster presented at Experimental Biology 2010 Conference, Anaheim, CA.

McIntosh M, Kalynych C, Vukich C, Lott M, Lerman RH. (2010, April). *Racial differences in fasting lipids: low levels of triglycerides in overweight and obese non Hispanic black women*. Poster presented at Experimental Biology 2010 Conference, Anaheim, CA.

McIntosh M, Lerman RH, Kalynych C, Vukich C, Fernandez ML, Harris WS. (2010, April). *Effects of a Mediterranean-style, low glycemic load diet on RBC omega-3 index and fatty acid profile in women with metabolic syndrome*. Poster presented at Experimental Biology 2010 Conference, Anaheim, CA.

Andersen C, Jones J, Barona J, Calle M, Lerman RH, McIntosh M, Kalynych C, Vukich C, Volek JS, Fernandez ML. (2010, April). *A Mediterranean-style low glycemic diet decreases inflammation and insulin resistance in subjects classified with the metabolic syndrome*. Poster presented at Experimental Biology 2010 Conference, Anaheim, CA.

McIntosh M, Westenbarger R, Kalynych CJ, Wylie T. (2010, June). *Use of just-in-time training to teach EM physicians new stabilization techniques for dental avulsions and fractures*. Innovations in Emergency Medicine Education at SAEM National Meeting, Phoenix, AZ.

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