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14. ABSTRACT Purpose: Little is known about the role psychosocial factors play in the development of pain following childbirth. The purpose of this preliminary study was to determine the feasibility of collecting psychosocial and pain data in low-income women and to determine the effect of baseline depression, anxiety, catastrophizing, and social support on acute and persistent pain after childbirth in a population of low-income women. Design: This was a prospective, longitudinal study. Methods: Baseline measures of psychosocial variables were obtained during the last 8 weeks of pregnancy. Delivery and acute pain data were collected from the electronic medical record. Follow-up data were obtained eight weeks following delivery. Sample: The sample consisted of 50 low-income women receiving prenatal care at a university-based obstetric clinic. Analysis: Descriptive statistics were used to describe the study population. Nonparametric statistics were used to examine the relationships between psychosocial factors and pain. Findings: Persistent pain (> 0 on a 0 to 10 visual analog scale) after childbirth was present in 72% of study participants (range= 1 to 10, mean= 3.17, SD= 2.02): 15 (37.5%) reported mild pain, 13 (32.5%) reported moderate pain, and 1 (2.5%) reported severe pain. Acute pain was significantly correlated with persistent pain ($r = .74$, $p < .001$) but no significant relationship was found between delivery mode, race, or age on either pain measure. Baseline and follow-up depression were both significantly related to persistent pain ($r = 0.38$, $p = 0.02$ and $r = 0.50$; $p = 0.03$, respectively). Implications for Military Nursing: Results highlight the role of depression in a low-income population. Twenty-nine percent of the enlisted ranks in the Navy are E-1 to E-3, all of whom are considered low income by the US Census Bureau's definition. Routine assessment of depression during pregnancy may identify those at risk of developing persistent pain. Enhanced education of importance of analgesia in the postpartum period for nurses, obstetric providers and patients.		

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Abstract

Purpose: Little is known about the role psychosocial factors play in the development of pain following childbirth. The purpose of this preliminary study was to determine the feasibility of collecting psychosocial and pain data in low-income women and to determine the effect of baseline depression, anxiety, catastrophizing, and social support on acute and persistent pain after childbirth in a population of low-income women.

Design: This was a prospective, longitudinal study.

Methods: Baseline measures of psychosocial variables were obtained during the last 8 weeks of pregnancy. Delivery and acute pain data were collected from the electronic medical record. Follow-up data were obtained eight weeks following delivery.

Sample: The sample consisted of 50 low-income women receiving prenatal care at a university-based obstetric clinic.

Analysis: Descriptive statistics were used to describe the study population. Nonparametric statistics were used to examine the relationships between psychosocial factors and pain.

Findings: Persistent pain (> 0 on a 0 to 10 visual analog scale) after childbirth was present in 72% of study participants (range= 1 to 10, mean= 3.17, SD= 2.02): 15 (37.5%) reported mild pain, 13 (32.5%) reported moderate pain, and 1 (2.5%) reported severe pain. Acute pain was significantly correlated with persistent pain ($r = .74, p < .001$) but no significant relationship was found between delivery mode, race, or age on either pain measure. Baseline and follow-up depression were both significantly related to persistent pain ($r = 0.38, p = 0.02$ and $r = 0.50, p = 0.03$, respectively).

Implications for Military Nursing: Results highlight the role of depression in a low-income population. Twenty-nine percent of the enlisted ranks in the Navy are E-1 to E-3, all of whom are considered low income by the US Census Bureau's definition. Routine assessment of depression during pregnancy may identify those at risk of developing persistent pain. Enhanced education of importance of analgesia in the postpartum period for nurses, obstetric providers and patients.

TSNRP Research Priorities that Study or Project Addresses**Primary Priority**

Force Health Protection:	☐ Fit and ready force ☐ Deploy with and care for the warrior ☒ Care for all entrusted to our care
Nursing Competencies and Practice:	☐ Patient outcomes ☐ Quality and safety ☐ Translate research into practice/evidence-based practice ☐ Clinical excellence ☐ Knowledge management ☐ Education and training
Leadership, Ethics, and Mentoring:	☐ Health policy ☐ Recruitment and retention ☐ Preparing tomorrow's leaders ☐ Care of the caregiver
Other:	☐

Secondary Priority

Force Health Protection:	☐ Fit and ready force ☐ Deploy with and care for the warrior ☐ Care for all entrusted to our care
Nursing Competencies and Practice:	☒ Patient outcomes ☐ Quality and safety ☐ Translate research into practice/evidence-based practice ☐ Clinical excellence ☐ Knowledge management ☐ Education and training
Leadership, Ethics, and Mentoring:	☐ Health policy ☐ Recruitment and retention ☐ Preparing tomorrow's leaders ☐ Care of the caregiver
Other:	☐

Progress Towards Achievement of Specific Aims of the Study or Project

Findings related to each specific aim, research or study questions, and/or hypothesis:

Specific Aim #1: To examine the relationships between preoperative psychosocial factors (e.g., anxiety, depression, and catastrophizing and perceived social support) and acute pain intensity in women following childbirth.

Hypothesis: Women with higher levels of preoperative state anxiety, depression, and catastrophizing and less perceived social support will experience greater acute postoperative pain intensity in the immediate postpartum period (measured for 24 hours postpartum) following childbirth.

Table 1. Spearman correlations between psychosocial measures and acute pain.

	N	Acute Pain
Baseline		
Depression	50	0.19
Catastrophizing	50	0.18
Social Support	50	-0.15
Anxiety	50	0.19

* Significance at the 0.05 level (two tailed).

** Significance at the 0.001 level (two-tailed).

This hypothesis was not supported by the data, as shown in Table 1

Specific Aim #2: To investigate the relationships between preoperative psychosocial factors and persistent pain intensity two months following childbirth.

Hypothesis: Women with higher levels of preoperative state anxiety, depression, and catastrophizing and less perceived social support will experience greater persistent pain intensity eight weeks following childbirth.

Table 2. Spearman correlations between psychosocial measures and acute and persistent pain.

	N	Persistent Pain
Baseline		
Depression	50	0.38*
Catastrophizing	50	0.01
Social Support	50	-0.10
Anxiety	50	0.26
Follow-up		
Depression	19	0.50*
Catastrophizing	19	0.35
Social Support	19	-0.36
Anxiety	19	0.69**

* Significance at the 0.05 level (two tailed).

** Significance at the 0.001 level (two-tailed).

This hypothesis was partially supported by the data. Baseline depression scores were positively correlated with higher persistent pain scores measured eight weeks following delivery ($r = .38, p = .01$). In addition, depression scores at follow up ($r = .50, p = .03$) and anxiety scores at follow up ($r = .69, p = .001$) were significantly associated with persistent pain as shown in Table 2.

Specific Aim #3: To investigate the relationship between acute pain intensity and persistent pain intensity eight weeks following childbirth.

Hypothesis: The degree of acute pain intensity in the immediate postpartum period (measured for 24 hours following delivery) will be positively correlated with the incidence of persistent pain eight weeks following childbirth.

This hypothesis was supported by the data. The degree of acute pain intensity in the immediate postpartum period, measured for 24 hours following delivery, was positively correlated with persistent pain intensity eight weeks following childbirth ($r = .74, p < .001$).

Specific Aim #4: To investigate if the relationships between preoperative psychosocial factors and the presence of persistent pain is mediated by acute pain intensity.

Hypothesis: The effect of state anxiety, depression, perceived social support, and catastrophizing on persistent pain will be mediated through acute pain.

Because the performance site and scope of the study was modified, this specific aim/hypothesis was not investigated.

The following additional **specific aim** was identified following these modifications:

To test the feasibility of collecting psychosocial survey data at routine prenatal appointments and at eight weeks following delivery in low income women.

Of the 58 women who met inclusion criteria, 50 (86%) agreed to participate and gave informed consent. There is complete baseline data on all 50 participants. Data about delivery (type and characteristics) and acute pain (for 24 hours following delivery) was collected on 47 of the 50 participants. It was not possible to collect this data on three of the participants because they did not deliver at the study hospital. Complete follow up survey data was collected for 19 (38%) participants, and an additional 21 (42%) participants provided follow up data about persistent pain intensity via telephone follow up.

Relationship of current findings to previous findings: These results demonstrated an unusually high incidence of persistent pain in this population when compared with previous studies. With the exception of a large study (N= 1,228) by Eisenach and colleagues (2008), this study is the only one that assessed persistent pain prospectively. Previous studies required participants' to recall their pain at a follow up time ranging from six to 21 months (Nikolajsen et al., 2004; Kainu et al., 2009 & Sng et al., 2009). A unique feature of our study is that we only enrolled low-income women with a self-reported household income less than or equal to 200% of the federal poverty limit. For a family of four, for instance, this equates to an annual income of not more than \$47,000. Because other studies did not examine the effect of income on pain measures, it is unknown if the unusually high prevalence of persistent pain in our study is attributable to the low-income status of the participants.

The hypothesis that acute pain intensity is related to persistent pain intensity was supported by our findings and is consistent with other studies examining persistent pain after surgery and childbirth. Studies of subjects undergoing such procedures as hernia repair, thoracotomy, limb amputation, cesarean section and vaginal delivery have all demonstrated a significant relationship between acute and persistent pain (Tasmuth, et al., 1996; Katz, et al., 1996; Callesen, et al., 1999, Eisenach et al., 2009, Lavand'homme, 2006). Notably, other studies in the past have primarily relied on retrospective recall of acute pain, and have had variable follow-up times ranging from a month to several years. Our study was similar to one by Eisenach and colleagues (2009) that prospectively measured acute pain and the incidence of persistent pain at eight weeks and found a significant relationship between the two pain measures. Their findings demonstrated a 12.7% increase in the odds of having persistent pain eight weeks following delivery for every point increase in acute pain ratings after delivery. Consistent with their findings, we did not find a difference in persistent pain related to delivery mode (cesarean section or vaginal delivery). Moderate to severe acute pain, greater than or equal to four on a 0-

10 scale, was present in 34 (68%) of the participants in our study and the highest acute pain score was a nine.

The results of our study demonstrated a significant relationship between baseline and follow-up depression scores and persistent pain. In contrast to the findings of Eisenach and colleagues, the results of our study did not show a significant relationship between acute pain and postpartum depression at eight weeks. The two studies both demonstrated a significant relationship between depression at eight weeks following delivery and persistent pain. Anxiety at follow up was significantly related to persistent pain but not to acute pain in our study. A cut point of 39-40 has suggested as possibly detecting clinically significant anxiety (Knight, Waal-Manning & Spears, 1983). Of 50 participants, 24 (48%) had baseline anxiety scores of 40 or greater and 11 of the 19 (58%) who returned the measurement tools, reported anxiety scores of 40 or greater at follow-up. It is unclear, however, if women with higher anxiety scores were more likely to return the follow-up surveys than those that did not respond at follow-up.

These findings confirm that childbirth is painful. Despite advancements in pain management, it appears that little progress has been made in controlling acute pain following childbirth, either by vaginal delivery or by cesarean section. It is unclear why pain is poorly controlled after childbirth and some speculations are offered. There may be barriers to treating acute postpartum pain by nurses, especially in this low-income population. It would be interesting to examine if there is a difference in the nurses' willingness to offer and encourage analgesia related to socioeconomic status. Furthermore, the women may have cognitive barriers to requesting analgesia. They may think pain is a necessary part of childbirth, be embarrassed to ask for analgesia, or be concerned about the effects of analgesia (narcotic and non-narcotic pain relievers) to themselves or their newborn, if they are breastfeeding. There were no differences in acute or persistent pain based on age or race. Younger age was predictive of acute pain following breast cancer surgery (Katz et al., 2005), however, the age range (27-81 years) was much larger than in our study.

Conversely, the results of other studies did not find a relationship between age and pain. Since only 12 participants in the current study were older than 30 years, it may be that the sample size was not large enough to demonstrate a difference in pain based on age. Similar to the findings of previous studies, neither delivery mode, previous cesarean section, previous abdominal surgery, nor placement of an epidural during labor were related to the development of persistent pain (Eisenach et al., 2005, Nikolajsen et al., 2004). Unlike these studies, however, none of the variables was related to acute pain in our study. It is plausible that because, acute pain was measured for the first twenty-four hours following arrival to the post-partum unit, the use of neuraxial opioids or local anesthetic used for laceration or episiotomy repair, could have had an effect on the time to first perception of pain..

Effect of problems or obstacles on the results: A larger sample size, as originally proposed, may have yielded different results. However, it is unknown what the effect of income had on the results and low-income status was not a requirement for enrollment in the original proposal, nor was socioeconomic data proposed to be collected.

Limitations: A limitation of this study is the small sample size. However, one purpose of this study was to examine the feasibility of this type of prospective, longitudinal study in low income, pregnant women. At baseline, most eligible women agreed to participate. There was attrition over time, however, and the 2-month follow-up response rate in this study 90 was lower than other published studies. Only 19 participants (38%) returned the follow up questionnaires by mail. When phoned, however, an additional 21 (42%) provided follow up data persistent pain data when called by the researcher. Of those providing persistent pain data through telephone follow-up, the majority had either no pain or mild pain at follow-up. Perhaps, those participants with moderate or severe persistent pain were more likely to return the surveys and provide phone follow-up. Providing a second “gift” once the surveys were returned may have increased the response rate. Eliminating the follow up questionnaires may have increased the response rate since completing the visual analog pain scale takes mere seconds versus 15 minutes or more to complete the surveys, however, valuable data of psychosocial factors at follow-up would be lost.

A factor that may have contributed to the low response rate is the time of year that the study was conducted. Participants tended to be more likely to return the follow-up materials if the follow-up occurred in April or May compared to those whose follow-up occurred in June or July. For the vast majority of participants, this was not their first pregnancy or child. It may be that when their other children were home (not in school in the summer) that they were busier and less likely to respond to the follow-up. It may be advisable to conduct future studies in this population during the academic school year.

Complete information about the quality of the persistent pain was not examined in this study. It is not possible, therefore, to ascertain if the persistent pain caused any interference or activity limitations. Furthermore, it is not clear if the pain affected infant bonding or the woman’s ability to care for her newborn. Although there is a question on the Edinburgh Postnatal Depression Scale regarding sleep (“I have been so unhappy that I have had difficulty sleeping--”), data were not collected about sleep quality so it was not possible to determine if sleep played a role in depression or persistent pain. At follow-up, the participants were instructed to report only the presence and intensity of pain since delivery but the location, quality, or emotional and physical impact was not elicited. Data regarding analgesic consumption was also not obtained at any point during the study. Although, this may account for the high percentage of participants reporting persistent pain, it is still notable that there is such a high percentage of persistent pain and that there is a significant relationship between both depression measures and persistent pain.

Conclusion: In conclusion, 72% of the participants in this study reported some level of persistent pain two months following childbirth, and almost half reported moderate or severe pain at follow-up. This study provided confirmation that acute pain intensity correlates with persistent postpartum pain. It also illustrated the significant number of women in the study who experienced moderate to severe acute pain following delivery, allowing recommendations to be made about the importance of decreasing acute postpartum pain. Although none of the psychosocial factors at baseline correlated with acute pain, anxiety at follow-up and depression at baseline and at follow-up were significantly correlated with persistent pain. Although measurements of the variables remained stable over time, anxiety and catastrophizing became more severe. Further research is needed to identify means of reducing acute pain and depression after delivery.

Significance of Study or Project Results to Military Nursing

Forty eight percent of the US population is classified as low income, which is defined as 200% or less of the poverty line. The poverty line for a family of three is \$19,530 and the low-income threshold is \$39,060. Nationally, 32% of families and 42% of families in Jacksonville are at or below the low-income threshold. Twenty nine percent of the enlisted ranks in the Navy are E-1 to E-3, all of whom are considered low income by the US Census Bureau's definition. An E-3 with four years active duty earns \$24,177 annually with an additional \$14,940 housing allowance (total \$39,117), which is right at the low-income threshold. The populations seen at the clinic at UF Health Jacksonville and that of the Navy have similar low-income rates.

The first hypothesis was that women with higher levels of baseline state anxiety, depression, and catastrophizing and less perceived social support will experience greater acute pain intensity in the immediate postpartum period (measured for 24 hours postpartum) following childbirth. This hypothesis was not supported by the data. The second hypothesis was that woman with higher anxiety, depression, and catastrophizing and less perceived social support at baseline will experience greater persistent pain intensity following childbirth measured eight weeks after delivery. This hypothesis was partially supported by the data. Baseline depression scores were positively correlated with higher persistent pain scores measured eight weeks following delivery ($r = .38, p = .01$). In addition, both depression scores at follow up ($r = .50, p = .03$) and anxiety scores at follow up ($r = .69, p = .001$) were significantly associated with persistent pain. The third hypothesis was that women with greater acute pain intensity after childbirth would have greater persistent pain intensity following delivery. This hypothesis was supported by the data. The degree of acute pain intensity in the immediate postpartum period, measured for 24 hours following delivery, was positively correlated with persistent pain intensity eight weeks following childbirth ($r = .74, r < .001$). No significant relationships were found between demographic variables and either acute or persistent pain intensity. Furthermore, no significant relationship was found between delivery variables and acute or persistent pain intensity. There were no changes in anxiety or depression over time. However, there was a significant change in both social support and catastrophizing from the baseline measures and those at follow up. There was an increase in catastrophizing over time ($p = .02$) and a decrease in social support ($p = .001$) between the two times.

To the best of our knowledge, this was the first prospective study that tested the relationships between baseline psychosocial measures and acute and persistent pain two months following childbirth. It also examined the change in psychosocial measures over time. The prospective study design and non-reliance on participants' retrospective recall of acute pain intensity are strengths of this study. The use of an electronic medical record made recording acute pain and delivery data feasible, accurate, and complete. Additionally, the willingness of the women at the study site to participate in the study allowed completion of the study in a short period. A limitation of this study is the small sample size. However, one purpose of this study was to examine the feasibility of this type of prospective, longitudinal study in low income, pregnant women. At baseline, most eligible women agreed to participate. There was attrition over time and the 2-month follow-up response rate in this study was lower than other published studies. Only 19 participants (38%) returned the follow up questionnaires by mail. When phoned, however, an additional 21 (42%) provided follow up data persistent pain data when called by the

researcher. Of those providing persistent pain data through telephone follow-up, the majority had either no pain or mild pain at follow-up. Perhaps, those participants with moderate or severe persistent pain were more likely to return the surveys and provide phone-follow-up. Providing a second “gift” once the surveys were returned may have increased the response rate. Eliminating the follow up questionnaires may have increased the response rate since completing the visual analog pain scale takes mere seconds versus 15 minutes or more to complete the surveys, however, valuable data of psychosocial factors at follow-up would be lost.

A factor that may have contributed to the low response rate is the time of year that the study was conducted. Participants tended to be more likely to return the follow-up materials if the follow-up occurred in April or May compared to those whose follow-up occurred in June or July. For the vast majority of participants, this was not their first pregnancy or child. It may be that when their other children were home (not in school during the summer) that they were busier and less likely to respond to the follow-up. It may be advisable to conduct future studies in this population during the academic school year. Complete information about the quality of the persistent pain was not examined in this study. It is not possible, therefore, to ascertain if the persistent pain caused any interference or activity limitations. Furthermore, it is not clear if the pain affected infant bonding or the woman’s ability to care for her newborn. Although there is a questions on the Edinburgh Postnatal Depression Scale regarding sleep (“I have been so unhappy that I have had difficulty sleeping--”), data were not collected about sleep quality so it was not possible to determine if sleep played a role in depression or persistent pain. At follow-up, the participants were instructed to report only the presence and intensity of pain since delivery but the location, quality, or emotional and physical impact was not elicited. Data regarding analgesic consumption was also not obtained at any point during the study. Although, this may account for the high percentage of participants reporting persistent pain, it is still notable that there is such a high percentage of persistent pain and that there is a significant relationship between both depression measures and persistent pain.

Implications for Practice

Women who had higher levels of depression at baseline and in the post-partum period were more likely to experience persistent pain. These findings highlight the role of depression in this population, and suggest that regular assessment of depression should be conducted. Use of the Edinburgh Postnatal Depression Scale in the prenatal period might provide information about which patients are more likely to develop persistent pain following childbirth. In addition, the results from this study are consistent with previous studies that acute pain intensity is related to persistent pain regardless of delivery mode or use of anesthesia during labor and delivery. These findings need to be disseminated among physicians and nurses caring for women in the postpartum period so that attempts can be made to decrease acute pain intensity following childbirth. Education regarding the importance of analgesia in the postpartum period should be enhanced for nursing staff, obstetric providers and patients. Furthermore, there may be reluctance to use opioid analgesics among patients and staff. Use of an around-the-clock schedule of multimodal analgesia is recommended in the perioperative period. A similar approach to acute pain following childbirth may be efficacious in reducing acute pain intensity in this population while limiting opioid consumption. Discharge teaching and instructions provided

by nurses need to include information in the importance of decreasing pain in the acute postpartum period to lessen the likelihood of developing persistent pain.

Directions for Future Research

As discussed previously, this was the first study that examined the relationship between psychosocial factors on acute and persistent pain in a population of low-income women following childbirth. Future studies should include a larger sample size of participants from all income levels. Data should be collect regarding household income and possibly other determinants of socioeconomic status such as employment and years of education. A more comprehensive pain assessment would be useful. Addition of a qualitative pain measurement and acute pain data until discharge may provide important information about the onset and characteristics of acute pain. Research is needed to identify factors associated with acute pain following delivery. Depression has been shown to be related to the development and intensity of persistent pain at two months following delivery. Postpartum depression can negatively affect maternal-infant bonding and have long-term developmental consequences for children. There was a significant correlation between baseline social support and depression and anxiety. It is plausible that affecting one of the variables could cause a change in the other variables. Therefore, future studies should test interventions to decrease depression or anxiety and increase social support in this population of women. Examples of interventions might be organized maternal support groups or routine public health home visits during the postpartum period.

Changes in Clinical Practice, Leadership, Management, Education, Policy, and/or Military Doctrine that Resulted from Study or Project

None to date

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Summary of Dissemination

Type of Dissemination	Citation	Date and Source of Approval for Public Release
Publications	none	
Publications in Press	none	
Published Abstracts	none	
Podium Presentations	Daniel, C. A., <i>The Effect of Psychosocial Factors on Acute and Persistent Pain after Childbirth</i>, American Association of Nurse Anesthetist Annual Congress, Salt Lake City, August 31, 2015 Daniel, C.A., <i>The Effect of Psychosocial Factors on Acute and Persistent Pain after Childbirth</i>, TriService Nursing Research Program Dissemination Course, San Antonio, Sep 1, 2015, The Henry M. Jackson Foundation.	

Poster Presentations	Daniel, C. A.& Horgas, A., <i>The Effect of Psychosocial Factors on Acute and Persistent Pain after Childbirth</i>, American Association of Nurse Anesthetist Annual Congress, Salt Lake City, August 29 - 31, 2015 Daniel, C.A. & Horgas, A. <i>The Effect of Psychosocial Factors on Acute and Persistent Pain after Childbirth</i>, TriService Nursing Research Program Dissemination Course, San Antonio, August 31 - Sep 3, 2015, The Henry M. Jackson Foundation.	
Media Reports	none	
Other	none	

Reportable Outcomes

Reportable Outcome	Detailed Description
Applied for Patent	None
Issued a Patent	None
Developed a cell line	None
Developed a tissue or serum repository	None
Developed a data registry	None

Recruitment and Retention Table

Recruitment and Retention Aspect	Number
Subjects Projected in Grant Application 200 in original application, 50 in revised and approved application	200/50
Subjects Available	200
Subjects Contacted or Reached by Approved Recruitment Method:	65
Subjects Screened:	65
Subjects Ineligible:	7
Subjects Refused:	8
Human Subjects Consented:	50
Subjects Who Withdrew :	0
Subjects Who Completed Study:	50
Subjects With Complete Data:	19
Subjects with Incomplete Data:	31

Demographic Characteristics of the Sample

Characteristic	
Age (yrs)	26.34±6.55
Women, n (%)	50 (100%)
Race	
White, n (%)	14(28%)
Black, n (%)	33(66%)
Hispanic or Latino, n (%)	3 (6%)
Native Hawaiian or other Pacific Islander, n (%)	0 ()
Asian, n (%)	0 ()
Other, n (%)	0()
Military Service or Civilian	
Air Force, n (%)	0 ()
Army, n (%)	0()
Marine, n (%)	0 ()
Navy, n (%)	0()
Civilian, n (%)	50 (100%)
Service Component	
Active Duty, n (%)	0 ()
Reserve, n (%)	0 ()
National Guard, n (%)	0 ()
Retired Military, n (%)	0 ()
Prior Military but not Retired, n (%)	0 ()
Military Dependent, n (%)	()
Civilian, n (%)	50 (100%)