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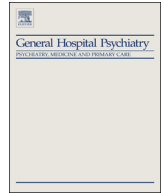
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Parental Iraq/Afghanistan deployment and child psychiatric hospitalization in the US military ☆,☆☆,★,★★

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ABSTRACT

Objective: Members of the US armed forces have been heavily deployed in support of wars in Afghanistan and Iraq. This study examined the affect of a parent's deployment to war on the rate of psychiatric hospitalization among their children.

Methods: This was a retrospective cohort study. Records of children of active duty personnel during fiscal years 2007 through 2009 were linked with their parent's deployment records. Psychiatric hospitalizations were identified using *International Classification of Diseases, Ninth Revision* codes on admission. Odds ratios (OR) of hospitalization were determined using both univariate and multivariate logistic regression. Lengths of hospital stay were also compared by linear regression using Duan's smearing estimate method.

Results: A total of 377,565 children aged 9–17 years were included along with data on both their active duty and civilian parent. Mean child age was 12.53 years (S.D.: 2.5 years); 51% were male. Mean age of active duty parent was 37.8 years (S.D.: 5.2 years); 93% were male, 90% were married and 62% were white. In the study, 2533 children were hospitalized for a mental or behavioral health disorder in fiscal year 2009 with a median length of stay of 8 days. After adjusting for demographic data and past psychiatric history of the child, active duty parent and civilian parent, the OR of hospitalization for children with a recently deployed parent was 1.10 (95% confidence interval: 1.01–1.19). The OR of hospitalization increased with increasing length of deployment with a positive test of trend. There was no statistically significant difference in distribution of admission diagnoses or length of hospital stay based on deployment by the active duty parent.

Conclusions: Psychiatric hospitalization increased by 10% among children aged 9–17 years when a military parent was recently deployed. The odds of hospitalization increased with increasing length of a parent's deployment.

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1. Introduction

Since the September 11th terror attacks on the Pentagon and the World Trade Center, over 2 million American service men and women have deployed in support of Operation Enduring Freedom (OEF) in

Afghanistan and Operation Iraqi Freedom (OIF) in Iraq [1] on over 3.5 million individual deployments [2]. Several studies have shown that combat deployments are associated with higher rates of mental illness in those service members [3–6]. Forty-three percent of US service members have children, leading to greater concern for the psychological impact on these youth [7].

Combat deployments lead to several unique family stressors such as separation from loved ones and a constant sense of uncertainty. As stress leads to mental health issues in adults, it can also lead to emotional and behavioral problems in a service member's child [8]. Deployment is a unique stress on families. Family organization becomes more chaotic [9,10]. The non-deployed parents may become overwhelmed, leading to relaxed rules, routines and expectations [11]. Small studies on children of parents deployed suggest that these children have some increased sadness and modestly increased

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behavioral problems [12–14]. Although these children are generally seen as resilient, a focus group study at schools serving US Army families found that this resiliency seems to decrease over the course of longer or repeated deployments [15]. Another study found that the children of deployed service members have an 11% increased rate of mental health outpatient visits while the parent is deployed [16].

Four studies have observed strong associations between mental health problems in mothers who remain at home during a deployment and mental health problems in their children [15,17–19]. Mansfield et al. found that extended US Army deployments increase the occurrence of mental illness in deployed soldiers' wives [20].

In the most extreme cases, the psychological and behavioral disturbance in children will lead to psychiatric hospitalization. Factors in the decision to admit a child for psychiatric treatment include severity and nature of the child's psychosocial problems and psychiatric symptoms as well as a parent's sense of being overwhelmed by the situation [21]. The Department of Defense Office of Health Affairs demonstrated a 33% increase in the rate of psychiatric hospitalization in children aged 9–11 years and an over 50% increase in children aged 12–17 years between 2006 and 2009 [22].

The estimated direct cost to the Military Health System (MHS) for child psychiatric hospitalizations in fiscal year 2009 alone was approximately US\$247 million [23,24]. The indirect cost of disruption to family, work and school increases this cost enormously. Given this disruption, a child's psychiatric hospitalization could also affect the readiness status of the active duty parent. Given the costs enumerated above along with the continuing reliance on heavy deployment of our service members to conflicts in Afghanistan and Iraq, investigation into this dramatic increase is warranted.

No studies have focused on this question among families of service members deployed to Iraq or Afghanistan. None of the previous studies were population based with a defined control population leading to questions of generalizability and validity of the conclusions. One ecological study reported an increase in child and adolescent psychiatric hospitalizations during the 7 months of Operation Desert Storm compared to the months prior and following that period of time [25]. A small descriptive study observed that a disproportionate number of psychiatric hospitalizations at a private psychiatric hospital in Jacksonville, FL, were from families with a deployed parent [21]. Evidence to support an association between the combat deployment of the child's parent and a child's psychiatric hospitalization could have significant military policy ramifications relating to pre-deploy-

ment screening, deployment family care planning and family readiness strategies in general. This study will examine the hypothesis that a parent's recent deployment to Iraq or Afghanistan is associated with increased psychiatric hospitalizations in children between the ages of 9 and 17 years. It is further hypothesized that a parent's recent deployment is associated with increased hospital length of stay per year per child.

2. Methods

This study is a retrospective cohort study on de-identified administrative records between October 1, 2006, and September 30, 2009, to compare psychiatric hospitalization rates and lengths of stay of children between the ages of 9 and 17 years based on the OIF and OEF deployment history of their active duty parents. Children between the ages of 9 and 17 years were selected for this study due to the results of the internal Department of Defense Office of Health Affairs surveillance study showing that these were age groups with significant increases in hospitalization rates as well as the very low rates of hospitalization reported in those younger than age 9 years. This study received institutional review board approval from both the Uniformed Services University of the Health Sciences and the TRICARE Management Authority.

Health care utilization and demographic data were pulled from the Medical Data Repository (MDR), and deployment and other demographic data were provided by the Defense Manpower Data Center (DMDC). Parent and child data were linked using a common medical record number prior to de-identification.

The study sample included all children of US active duty service members that were between the ages of 9 and 17 years on October 1, 2008, and were MHS beneficiaries for the entire period of data collection.

The study excluded children of activated members of the Reserves and National Guard as this population also utilizes other means of health insurance through civilian employers even when on active duty. The study excluded any children with missing data during the period of data collection. Finally, the study excluded any children identified as having two active duty parents as deployment data could only be collected on one of the parents.

Exposure was defined as a child's active duty parent's deployment in support of OIF or OEF per DMDC records during fiscal year 2008. This was measured by the presence or absence of at least one deployment. It was also measured based on length of deployment

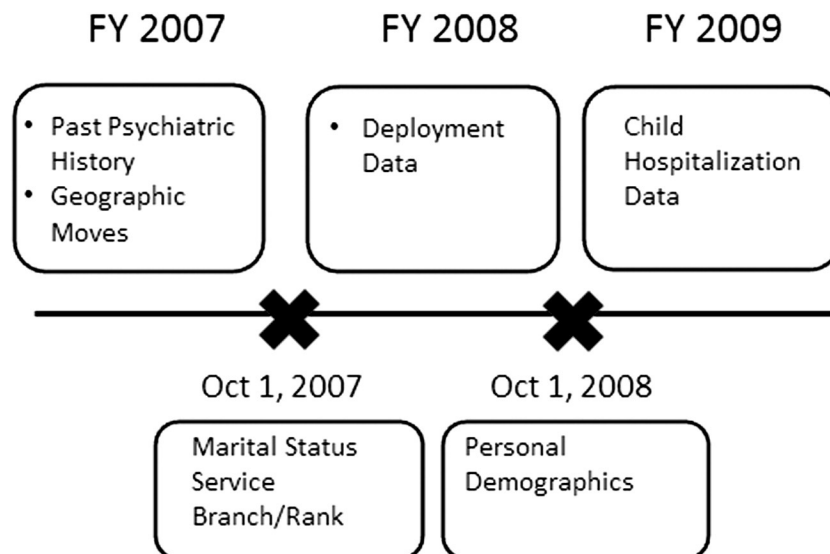


Fig. 1. Temporal design for data collection.

with a category created for no deployment, deployment less than or equal to 6 months in length and deployment over 6 months in length. Six months of deployment was used based on the consistent finding from the Mental Health Advisory Team reports from Iraq and Afghanistan of reduced mental health in the deployed service member 6 months into their deployment [26–28].

An outcome was defined as any MHS funded hospitalization of a child where the primary diagnosis is included in Major Diagnostic Category 19 or 20 of the International Statistical Classification of Diseases (*International Classification of Diseases, Ninth Revision*) during fiscal year 2009 (eTable1). MHS funded hospitalizations include all hospitalizations within the MHS direct care system and all TRICARE reimbursed civilian hospitalizations.

Other data elements collected on the child include gender, age, past psychiatric history in fiscal year 2007 and presence of geographic moves in fiscal year 2007. Past psychiatric history was defined as at least two outpatient clinic visits or one inpatient hospitalization with a primary mental health diagnosis in fiscal year 2007. History of geographic moves was included due to a previous study suggesting a connection between psychiatric hospitalizations and residential instability in the child [29]. Gender, age, race, marital status, rank, service branch and past psychiatric history were collected on the active duty parent. Race of the active duty parent was used as a proxy for the race of the child since the administrative data use did not consistently collect data on race of the child. Gender, age and past psychiatric history were collected on the civilian parent. Data were not collected on civilian parents who were not registered with MHS for the entire period of observation. Civilian parents without coverage in MHS for the entire period of study were assumed to not be married to the active duty parent at some point during the observation period. Since the child was the unit of analysis, for siblings, parental characteristics were included separately for each child. Fig. 1 shows the temporal design for data collection of the study variables.

To test the two hypotheses, a two-stage model was used [30]. In stage one, logistic regression was performed to calculate odds ratios (OR) for risk of child psychiatric hospitalization based on deployment and length of deployment as well as other possible variables using univariate and multivariate models. Basic demographic characteristics of the child were included as covariates. Other characteristics were included in the final model based on univariate statistical significance and statistically contributing to the final model. In stage two, ordinary linear regression fitted for those with at least 1 day in the hospital were performed with the dependent variable being the log transfor-

mation of the hospital length of stay. Prediction bias was accounted for by using Duan's smearing estimate method.

3. Results

3.1. Study sample

Our initial study sample, with the children of activated National Guard and Reserves excluded, comprised 397,923 children of members of the active duty US military. From that, 1204 (0.3%) were excluded due to missing data. After that, another 19,154 (4.8%) were excluded due to being identified as having two active duty parents. This left a highly conserved sample of 377,565 children, 94.9% of our initial sample.

3.2. Sample characteristics

The children in our study sample were roughly evenly distributed between male and female with an average age of 12.3 years. Of these, 23.3% had changed residences in fiscal year 2007 and 10.8% had a past psychiatric history in fiscal year 2007. The active duty parents of the child were overwhelmingly male (92.5%) and married (89.8%) with an average age of 37.8 years. Of these, 61.5% were white, over two thirds were enlisted and 41% were in the Army. Only 5.2% of the active duty parents had a past psychiatric history in fiscal year 2007. Although 89.8% of the active duty parents were listed as married, only 85% of the children in the sample had a civilian parent included in the study. Those civilian parents were overwhelmingly female with an average age of 37.4 years. Of these, 12.8% of the civilian parents had a past psychiatric history in fiscal year 2007.

Thirty-two percent (121,033) of children in the study sample had a parent who deployed in support of OIF or OEF at least once in fiscal year 2008 (see Table 1). The median deployment length was 332 days with only 23.2% of the deployments lasting less than 180 days. Less than one percent (0.71%) of children in the study had at least one psychiatric hospitalization. The median hospital length of stay for the year was 8 days.

3.3. Psychiatric hospitalization rates

Of the 121,033 children who had a parent who deployed, 858 (0.71%) had a psychiatric hospitalization. Of the 256,532 who did not deploy, 1675 (0.65%) had a psychiatric hospitalization. The unadjusted OR was 1.09 [95% confidence interval (CI): 1.00–1.18]. After

Table 1
Study sample characteristics

	Child (total: 377,565)	Active duty parent (total: 377,565) ^a	Civilian parent (total: 321,680) ^a
Male (%)	50.8	92.5	4.7
Age [mean (S.D.)]	12.3 (2.5)	37.8 (5.2)	37.4 (5.6)
Past psychiatric history in FY07 (%)	10.8	5.2	12.8
Geographic move in FY07 (%)	23.3	–	–
Psychiatric hospitalization in FY08 (%)	0.7	–	–
Married (%)	–	89.8	–
Race (%)			
White	–	61.5	–
Black	–	22.8	–
Asian	–	7.8	–
Other	–	7.9	–
Service branch (%)			
Army	–	41.1	–
Air Force	–	24.1	–
Navy	–	23.6	–
Marine Corps	–	7.6	–
Other	–	3.6	–
Deployment in FY08 (%)	–	32.1	–

^a Since the child was the unit of analysis, for siblings, parental characteristics were included separately for each child.

Table 2
Univariate and multivariate analysis for risk of child psychiatric hospitalization in 2009

Variable	Hospitalized in FY09 (total: 2533)	Not hospitalized in FY09 (total: 375,032)	Univariate OR (95% CI)	Multivariate OR (95% CI adjusted)
Deployment in FY08 (n, %)	858 (33.9)	120,175 (32.0)	1.09 (1.00–1.18)	1.10 (1.01–1.20)
Length of deployment (%)				
No deployment	1675 (66.1)	254,857 (68.0)	1 (reference group)	1 (reference group)
≤180 days	186 (7.3)	28,032 (7.4)	1.02 (0.87–1.18)	1.03 (0.88–1.20)
>180 days	672 (26.5)	93,001 (24.6)	1.11 (1.01–1.21)	1.12 (1.02–1.23)
Male child (%)	1350 (53.3)	190,465 (50.8)	1.11 (1.02–1.20)	0.92 (0.85–0.999)
Age of child [mean (S.D.)]	13.7 (2.3)	12.5 (2.5)	1.20 (1.18–1.22) per year	1.21 (1.19–1.23) per year
Child past psychiatric history (%)	1253 (49.5)	39,411 (10.5)	8.34 (7.71–9.02)	7.48 (6.89–8.13)
Geographic move in FY07 (%)	672 (26.5)	87,948 (23.3)	1.19 (1.09–1.30)	1.22 (1.11–1.33)
Active duty race (%)				
White	1715 (67.7)	230,243 (61.5)	1 (reference group)	1 (reference group)
Black	420 (16.6)	86,067 (22.8)	0.66 (0.59–0.73)	0.82 (0.74–0.92)
Asian	196 (7.7)	29,576 (7.8)	0.90 (0.73–1.04)	0.96 (0.83–1.12)
Other	202 (8.0)	29,679 (7.9)	0.92 (0.80–1.07)	1.03 (0.89–1.20)
Active duty past psychiatric history (%)	229 (9.0)	19,384 (5.2)	1.82 (1.59–2.09)	1.24 (1.07–1.42)
Civilian past psychiatric history (%)				
No psychiatric history	1470 (58.0)	279,145 (74.4)	1 (reference group)	1 (reference group)
Positive psychiatric history	631 (24.9)	40,434 (10.8)	2.96 (2.70–3.26)	1.77 (1.60–1.95)
Single active duty parent	432 (17.1)	55,453 (14.8)	1.48 (1.33–1.65) ^a	1.35 (1.21–1.51) ^a

^a Values vs. married parent with no psychiatric history in civilian parent.

adjusting for child's gender, age, past psychiatrist history and change of residence; the active duty parent's race and past psychiatric history and the civilian parent's past psychiatric history, the adjusted OR was 1.10 (95% CI: 1.01–1.19). When comparing hospitalization rates based on length of deployment, a dose–response relationship was found as demonstrated by a positive adjusted test for trend [OR: 1.06 (95% CI: 1.01–1.11)] with the predominant excess risk seen in those children with a parent deployed for longer than 6 months [OR: 1.12 (95% CI: 1.03–1.23)].

After adjusting for the other variables in the model, a past psychiatric history in the child increased the odds of child psychiatric hospitalization by a factor of 7.46 (95% CI: 6.86–8.10). A past psychiatric history in the civilian parent increased the odds by a factor of 1.77 (95% CI: 1.60–1.95) and a past psychiatric history in the active duty parent increased the odds by a factor of 1.24 (95% CI: 1.07–1.42) (Tables 2 and 3).

3.4. Hospital length of stay

The median hospital length of stay among the 858 children with a hospitalization whose parent deployed was 9 days [25%, 75% (5, 20)]. The median hospital length of stay among the 1675 children with a hospitalization whose parent did not deploy was 8 days [25%, 75% (5, 20)]. This difference was not found to be statistically significant ($P=.4675$).

4. Discussion

These analyses of automated health system data suggest that parental deployment in support of US military operations in Afghanistan or Iraq is associated with a small but important increase in subsequent risk of psychiatric hospitalization among children aged 9–17 years, with increasing risk associated with a greater duration of

parental deployment. No significant relationship was found, however, between parental deployment and length of hospital stay among the children who were psychiatrically hospitalized. No previous comparative studies of deployment and child psychiatric hospitalization were identified, but our estimate of a 10% increased risk (OR: 1.10) for the child of a deployed parent is similar to the 11% increased risk of outpatient mental health service use in military children aged 3–8 years whose parent had deployed [16].

The study findings may not generalize to two populations that our study does not address, children from dual military families and children of Reserve Component families (i.e., National Guard and Reserve). The data did not allow an estimate of deployment impact on the children of two active duty military parents because the Department of Defense MDR only links one of the two parents as the child's military sponsor. Children with two military parents represented 5% of our original sample. This growing segment of our military merits more focused study. Children from Reserve Component families were excluded from analyses because these children are only eligible for MHS care when the parent is in an active duty status. Current analyses focused on the children of Active Component families, and the deployment experience and its impact on families may differ between Active and Reserve Component families due to differences in demographic factors and in military culture, cohesion and context. Of particular importance are the differences between Active and Reserve Components with regard to health benefits and proximity and access to many health and support services. Further study is necessary to investigate how deployment impacts Reserve Component children and their families.

Our study was able to demonstrate a risk of psychiatric hospitalization from a parent with a military deployment in the previous year. Our study does not address the cumulative impact of multiple parental deployments on the mental health of children. Given the high number of service members who have been deployed multiple times in support of OIF and OEF, this merits further study. It is likely that other elements of the parent's deployment such as combat exposure, injury or death would significantly affect their children. The administrative data reviewed for our study did not allow for analyses of these potential factors and should be investigated in any follow-up studies on our results.

Our study has a number of important strengths. This is the first population-based study to examine the relationship between child psychiatric hospitalization and parental deployment. The power to detect an association was increased due to the size of our population of study. Given the scope of the administrative and medical records

Table 3
Comparing psychiatric hospitalization risk based on deployment length

Deployment length	Total	OR (95% CI)	OR (95% CI) adjusted ^a
No deployment	256	1 (reference group)	1 (reference group)
≤180 days	28	1.02 (0.87–1.18)	1.03 (0.88–1.20)
>180 days	93	1.11 (1.01–1.21)	1.12 (1.02–1.23)
Test of trend		1.05 (1.01–1.10)	1.06 (1.01–1.11)

^a Adjusted for child's gender, age, past psychiatric history, change of residence; active duty parent's race and past psychiatric history and civilian parent's past psychiatric history.

that were reviewed, this study examined the link between parental deployment and psychological sequelae in the children while accounting for a parent's mental health history and the presence of recent geographic moves.

Through the longitudinal design for data collection (see Fig. 1), our study ensured that psychiatric hospitalization occurred after parental deployment. In order to ensure a temporal relationship between deployment and psychiatric hospitalization, our study allowed for a possible significant time delay between the two variables. By ensuring a temporal association, our study erred in the direction of a type II error. For example, our study design would miss any child psychiatric hospitalization that occurred in fiscal year 2008 after the start of deployment by the parent. In effect, our study design increases the confidence that the observed association between deployment and child psychiatric hospitalizations is likely to be a true positive association, though it likely underestimates the true strength of that association.

These data suggest an important association between the mental health of a child's parents and a child's vulnerability for psychiatric hospitalization. Given previous studies demonstrating increases in mental health problems following deployment among service members and spouses, these results point to the need for further study to identify those at greatest risk, development of preventive strategies and targeted interventions and continued policy consideration of changes that can optimize the utilization of scarce medical resources as well as maximize the support, welfare and long-term success of service members and their families [5,15,17,19,20]. Considering the long-term nature of most mental illness and that the average service member and his or her family will contribute many more life years to society at large than to the military per se, there is much at stake for both the US military and for all Americans.

These findings add to a growing body of evidence linking deployment to increased mental health burden on service members and their families [20,26–28] and speak to the need for a continued push for mental health services for military families. Increased mental health service use in military families suggests that the presence and needs of the children of active duty members should be carefully considered during all stages of the deployment cycle – pre-deployment, during deployment and post-deployment as well as in peacetime. Preparations for deployment have long required proper family care plans, spousal powers of attorney, formal family support networks and other measures. However, these efforts require additional attention to the health services available to American military families. Unfortunately, the rising cost of military health care, national shortages of mental health support for children, the apparent end of two prolonged wars and growing concern over US debt threaten to reduce our capacity and resolve to respond.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.genhosppsy.2013.04.015>.

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References

- [1] Tan M. A million soldiers deployed since 9/11. *Army Times* 2009.
- [2] Contingency Tracking System; 2010 . Accessed 31 July 2010.
- [3] Group TIPGS. Self-reported illness and health status among gulf war veterans. *JAMA* 1999;277(3):238–45.
- [4] Hoge C, Auchterlonie J, Milliken C. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA* 2006;295(9):1023–32.
- [5] Hoge C, Castro C, Messer S, McGurk D, Cotting D, Koffman R. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *NEJM* 2004;351(1):13–22.
- [6] Unwin C, Blatchley N, Coker W, et al. Health of UK servicemen who served in Persian Gulf War. *Lancet* 1999;353(9148):169–78.
- [7] International I. Demographics 2007 profile of the military community. Policy OotDSoDMCaF; 2007 Washington D.C.
- [8] Seiffge-Krenke I. Causal links between stressful events, coping style, and adolescent symptomatology. *J Adolesc* 2000;23(6):675–91.
- [9] Kelley M. The effects of military-induced separation on family factors and child behavior. *Am J Orthopsychiatry* 1994;64(1):103–11.
- [10] McFarlane A. Military deployment: the impact on children and family adjustment and the need for care. *Curr Opin Psychiatry* 2009;22:369–73.
- [11] Amen D, Jellen L, Merves E, Lee R. Minimizing the impact of deployment separation on military children: stages, current preventive efforts, and system recommendations. *Mil Med* 1988;153:441–6.
- [12] Birgenheier P. Parents and children. War and separation. *Pediatr Nurs* 1993;19(5):471–6.
- [13] Kelley M, Hock E, Smith K, Jarvis M, Bonney J, Gaffney M. Internalizing and externalizing behavior of children with enlisted Navy mothers experiencing military-induced separation. *J Am Acad Child Adolesc Psychiatry* 2001;40(4):464–71.
- [14] Rosen L, Teitelbaum J. Children's reactions to the desert storm deployment: initial findings from a survey of Army families. *Mil Med* 1993;158(7):465–9.
- [15] Chandra A, Martin L, Hawkins S, Richardson A. The impact of parental deployment on child social and emotional functioning: perspectives of school staff. *J Adolesc Health* 2010;46(3):218–23.
- [16] Gorman GH, Eide M, Hisle-Gorman E. Wartime military deployment and increased pediatric mental and behavior health complaints. *Pediatrics* 2010;126(6):1058–66.
- [17] Al-Turkait F, Ohaeri J. Psychopathological status, behavior problems, and family adjustment of Kuwaiti children whose fathers were involved in the first gulf war. *Child Adolesc Psychiatry Mental Health* 2008;29(1):12.
- [18] Jensen P, Watanabe H, Richter J, Cortes R, Roper M, Liu S. Prevalence of mental disorder in military children and adolescents: findings from a two-stage community survey. *J Am Acad Child Adolesc Psychiatry* 1995;34(11):1514–24.
- [19] Lester P, Peterson K, Reeves J, et al. The long war and parental combat deployment: effects on military children and at-home spouses. *J Am Acad Child Adolesc Psychiatry* 2010;49(4):310–20.
- [20] Mansfield A, Kaufman J, Marshall S, Gaynes B, Morrissey J, Engel C. Deployment and the use of mental health services among U.S. Army wives. *NEJM* 2010;362(2):101–9.
- [21] Levai M, Kaplan S. The effect of father absence on the psychiatric hospitalization of Navy children. *Mil Med* 1995;160(3):104–6.
- [22] OASD(HA). Mental Health Summary: OASD HA, Office of Strategy Management; 2010, unpublished.
- [23] Medical Data Repository; 2009 . Accessed October, 2010.
- [24] Saba DK, Levit KR, Elixhauser A. Statistical Brief #62. Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality; 2008.
- [25] Levai M, Kaplan S, Daly K, McIntosh G. The effect of the Persian Gulf Crisis on the psychiatric hospitalization of Navy children adolescents. *Child Psychiatry Hum Dev* 1994;24(4):245–54.
- [26] MHAT-5. Mental Health Advisory Team (MHAT) V: Operation Iraqi Freedom 06–08. MNF-Iraq; 2008.
- [27] MHAT-6. Mental Health Advisory Team (MHAT) 6: Operation Enduring Freedom 07–09. USFOR-Afghanistan; 2009.
- [28] MHAT-6. Mental Health Advisory Team (MHAT) VI: Operatoin Iraqi Freedom 07–09. MNC-Iraq; 2009.
- [29] Mundy P, Robertson J, Greenblatt M, Robertson M. Residential instability in adolescent inpatients. *J Am Acad Child Adolesc Psychiatry* 1989;28(2):176–81.
- [30] Liu X, Engel C, Gore K. Reducing selection bias in analyzing longitudinal health data with high mortality rates. *J Mod Appl Stat Methods* 2011 [in press].

Appendix – Psychiatric ICD-9 Codes

List of 3-digit diagnosis codes that fall under MDC 19 and 20

MDC	3-Digit DX Code
MDC 19 (Mental Diseases and Disorders)	
Dementias	290
Transient Organic Psychotic Conditions	293
Other Organic Psychotic Conditions	294
Schizophrenic Disorders	295
Episodic Mood Disorders	296
Paranoid States	297
Other Nonorganic Psychoses	298
Psychosis with origin specific to childhood	299
Neurotic Disorders (Anxiety, Dysthymia)	300
Personality Disorders	301
Psychosexual Disorders	302
Physiological malfunction arising from mental factors elsewhere	306
Special symptoms or syndromes (sleep, tics, eating disorders)	307
Acute reaction to stress	308
Adjustment Reaction (Adjustment DOs, PTSD)	309
Specific Nonpsychotic mental dos following organic brain damage (TBI)	310
Depression, NOS	311
Disturbance of Conduct	312
Disturbance of Emotions specific to childhood and adolescence	313
Hyperkinetic Syndrome of Childhood (ADHD)	314
Specific Delays in Development (learning disability)	315
Psychic factors associated with diseases classified elsewhere (kids)	316
Mild Mental Retardation	317
Other Specified Mental Retardation	318
Unspecified Mental Retardation	319
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3-Digit DX

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