Effect of Deployment on the Occurrence of Child Maltreatment in Military and Nonmilitary Families

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War has a profound emotional impact on military personnel and their families, but little is known about how deployment-related stress impacts the occurrence of child maltreatment in military families. This time-series analysis of Texas child maltreatment data from 2000 to 2003 examined changes in the occurrence of child maltreatment in military and nonmilitary families over time and the impact of recent deployment increases. The rate of occurrence of substantiated maltreatment in military families was twice as high in the period after October 2002 (the 1-year anniversary of the September 11th attacks) compared with the period prior to that date (rate ratio = 2.15, 95% confidence interval: 1.85, 2.50). Among military personnel with at least one dependent, the rate of child maltreatment in military families increased by approximately 30% for each 1% increase in the percentage of active duty personnel departing to (rate ratio = 1.28, 95% confidence interval: 1.20, 1.37) or returning from (rate ratio = 1.31, 95% confidence interval: 1.16, 1.48) operation-related deployment. These findings indicate that both departures to and returns from operational deployment impose stresses on military families and likely increase the rate of child maltreatment. Intervention programs should be implemented to mitigate family dysfunction in times of potential stress.
in military families. Although the military has become increasingly involved in the prevention, intervention, treatment, and research of child maltreatment in military families (10), no studies have been published that examine the role of the threat of war and deployment on the occurrence of child maltreatment. Research is needed on this topic so that service providers will be able to better address the needs of military families in times of stress. This study examines the occurrence of child maltreatment in military and nonmilitary families before and during intense military operations in the Middle East. We hypothesized that increases in departures to and returns from operation-related deployment would increase stress in military families and, consequently, the occurrence of child maltreatment.

MATERIALS AND METHODS

This study used monthly individual-level child maltreatment data and state-level population estimates to calculate rates of substantiated child maltreatment in military and nonmilitary families. State-level military data on departures to and returns from operational deployments were used to examine the relation between deployment and the occurrence of child maltreatment for each month of the study period.

Maltreatment data

The primary data source for information on child maltreatment was the 2000–2003 Child Files for the state of Texas from the National Child Abuse and Neglect Data System (NCANDS). The data are voluntarily submitted by state child protective services agencies and are maintained by the National Data Archive on Child Abuse and Neglect (Cornell University, Ithaca, New York). NCANDS provides data on all maltreatment reported in the state, including the month of report and substantiation, the type of maltreatment (physical abuse, sexual abuse, emotional abuse, other abuse, and neglect), and characteristics of the maltreatment victims. NCANDS data also specify whether a child victim was the legal dependent of an active duty military soldier in the Army, Navy, Air Force, or Marine Corps (inactive Reserve and National Guard members were excluded). Because Texas had the most complete information on military family status of child victims and a large military population, our analyses were restricted to all substantiated cases of child maltreatment that were reported between January 1, 2000, and June 30, 2003, in that state. More than one child may be listed on each report of child maltreatment, and one child may appear on multiple reports (i.e., abuse of the same child may reoccur). The first appearance of each child in the data set was used to calculate descriptive statistics of the child victim (147,982 total children; 1,399 military children and 146,583 nonmilitary children), and each unique combination of a report and a child, referred to as a “report-child pair” \( n = 164,239 \); 1,539 military and 162,700 nonmilitary), was the focus for the calculation of rates.

Deployment data

State-level deployment information for active duty military personnel residing in Texas came from the Department of Defense’s personnel tempo (PERSTEMPO) data set, which is maintained by the Defense Manpower Data Center. PERSTEMPO comprises a record for each time a service member, pursuant to orders, is performing active service by participating in a training exercise or operation at a location that makes it infeasible for the member to spend off-duty time in the housing in which the member resides (11). Because the period when a parent is away on operational deployment and the period when the parent returns from deployment are stressful for military families, we obtained monthly data on the total number of individuals on active duty service (i.e., inactive Reserves and National Guard members were not included) who returned from or departed to operation-related PERSTEMPO deployment. These data were restricted to those who permanently resided in the state of Texas and were stratified by whether or not the soldier had at least one child. Because the total number of active duty military personnel varied over the study period, we calculated the monthly percentage of 1) total active duty military personnel and 2) active duty military personnel with at least one child who returned from or departed to operation-related deployment between October 2000 and June 2003.

Denominator data

Data on the number of children aged 17 years or less residing in Texas were obtained from the US Census Bureau’s Public Use Microdata Sample files for year 2000. These data were categorized by the child’s age, race/ethnicity, and gender and by whether or not the child resided in a household with at least one active duty military family member. Because the population statistics represent the year 2000, we multiplied the population estimates by 3.5, representing the number of years of follow-up time in the entire study period (from January 2000 to June 2003), and by 2.75, representing the number of years of follow-up time in the restricted study period (from October 2000 to June 2003). These calculations are based on the assumption that the population of children in military and nonmilitary families does not change over time.

Statistical analysis

The data represented in NCANDS Child Files do not strictly represent incidence or prevalence because child maltreatment may be ongoing (i.e., it is not “new” maltreatment that occurred during the study period) and/or not reported (i.e., it is not the total fraction of the population that experienced maltreatment during the study period). Therefore, we use the term “rate of occurrence of substantiated maltreatment” in this study to describe child maltreatment reported and substantiated within the study period.

The unit of observation for this study is time measured in months. Rates of occurrence of substantiated child maltreatment were calculated within categories of age, gender, and race/ethnicity of the study sample and for each reporting month of the study period. These rates were stratified by whether the child had a military family member. Negative binomial regression was used to calculate the rate of occurrence of substantiated maltreatment, adjusting for potential
The negative binomial models provided an adequate fit to the data, with overdispersion parameters less than 1.5 in all models. Confidence limit ratios were calculated for all rate ratios (14).

This study was approved by the University of North Carolina Public Health Institutional Review Board.

### RESULTS

Military and nonmilitary victims of child maltreatment were similar with respect to the distribution of gender (table 1). The rate of occurrence of substantiated maltreatment was slightly higher for male and female children in nonmilitary families. Maltreated children in military families...
were more likely to be non-Hispanic Whites and aged less than 4 years than were children in nonmilitary families. In both groups, non-Hispanic Whites had lower rates compared with all other race and ethnic categories. The rate of occurrence of child maltreatment dropped with increasing age in both military and nonmilitary families, with those younger than 4 years of age having the highest rate of maltreatment in both populations. The rate ratio for the youngest age group versus the oldest age group was 2.60 (95 percent confidence interval (CI): 2.57, 2.64) in nonmilitary families versus 2.10 (95 percent CI: 1.78, 2.47) in military families, indicating a slightly greater age differential between younger and older children in nonmilitary families.

The rate of occurrence of substantiated child maltreatment was relatively stable for nonmilitary families over the study period. The rate for military families, however, appeared to increase during the last 6 months of 2002 and rose dramatically in January 2003 (figure 1). Children in military families generally had a lower rate of substantiated child maltreatment than did children in nonmilitary families before January 2003. However, after this date, the rate for military families was consistently higher than the rate for nonmilitary families. This coincides with intensive operational military activities in the Middle East that resulted in a higher percentage of Texas service personnel assigned to operational deployments (figures 1 and 2).

After inspection of the data, we decided to compare the rate of occurrence of substantiated child maltreatment before October 1, 2002, with the rate on and after October 1, 2002. The date of October 1, 2002, was suggested by the observation that the rate in military families appeared to be rising during this period and also by the fact that it was approximately 12 months following the terrorist attacks of September 11, 2001, and therefore captures the experience of the US military response to those attacks approximately 1 year later. The rate of substantiated child maltreatment in

### TABLE 2. Rate ratios for the occurrence of child maltreatment in a comparison of children in military and nonmilitary families, Texas, 2000–2003

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Rate ratio</td>
<td>95% confidence interval</td>
</tr>
<tr>
<td>Unadjusted</td>
<td>0.67</td>
<td>0.62, 0.72</td>
</tr>
<tr>
<td>Adjusted*</td>
<td>0.71</td>
<td>0.65, 0.78</td>
</tr>
</tbody>
</table>

* Adjusted for child’s age (<4, 4–11, 12–17 years), child’s race/ethnicity (non-Hispanic White, other), and child’s gender (male, female).

**FIGURE 2.** Percentage of resident soldiers departing for or returning from operational deployments within each month of the study period, Texas, 2000–2003. Months are indicated by their first three letters; years, by the last two numbers.
TABLE 3. Rate ratios for the occurrence of substantiated child maltreatment among children in military and nonmilitary families based on month of departure to and return from operational deployment, Texas, 2000–2003

<table>
<thead>
<tr>
<th>Based on month of departure</th>
<th>Based on month of return</th>
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</thead>
<tbody>
<tr>
<td>With dependents</td>
<td>Total</td>
</tr>
<tr>
<td>Rate ratio</td>
<td>95% confidence interval</td>
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<tr>
<td>Confidence limit ratio</td>
<td></td>
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<tr>
<td>Each 1% increase in operational deployment</td>
<td></td>
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<tr>
<td>Maltreatment in military families</td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>1.28 1.20, 1.37 1.14</td>
</tr>
<tr>
<td>Adjusted*</td>
<td>1.25 1.19, 1.30 1.09</td>
</tr>
<tr>
<td>Maltreatment in nonmilitary families</td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>1.04 0.99, 1.11 1.12</td>
</tr>
<tr>
<td>Adjusted*</td>
<td>1.04 1.03, 1.06 1.03</td>
</tr>
<tr>
<td>≥3% increase in operational deployment vs. &lt;3%</td>
<td></td>
</tr>
<tr>
<td>Maltreatment in military families</td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>2.22 1.72, 2.87 1.67</td>
</tr>
<tr>
<td>Adjusted*</td>
<td>2.05 1.76, 2.38 1.35</td>
</tr>
<tr>
<td>Maltreatment in nonmilitary families</td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>1.10 0.88, 1.38 1.57</td>
</tr>
<tr>
<td>Adjusted*</td>
<td>1.10 1.04, 1.18 1.13</td>
</tr>
</tbody>
</table>

* Adjusted for child’s age (<4, 4–11, 12–17 years), child’s race/ethnicity (non-Hispanic White, other), and child’s gender (male, female).
military families after October 2002 was approximately double the rate before October 2002 (rate ratio (RR) = 2.15, 95 percent CI: 1.85, 2.50); however, the rates were not elevated in children of nonmilitary families (RR = 1.05, 95 percent CI: 0.95, 1.17). Between January 1, 2000, and September 30, 2002, the rate of occurrence of substantiated child maltreatment was 37 percent lower among military families than nonmilitary families (RR = 0.67, 95 percent CI: 0.62, 0.72) (table 2). However, from October 1, 2002, to June 30, 2003, the rate of substantiated maltreatment was 22 percent higher among children in military families than children in nonmilitary families (RR = 1.22, 95 percent CI: 1.10, 1.36). These estimates did not change substantially when controlling for child’s age, race/ethnicity, and gender.

In order to more fully characterize the effect of the post-September 11th era on the rate of child maltreatment, we included the percentage of active duty personnel departing to and returning from operation-related deployments in each month as predictor variables in two sets of negative binomial regression models. For these analyses, child maltreatment data were restricted to those substantiated cases that were reported between October 2000 and June 2003 in order to correspond to the available deployment data. The percentage of total personnel departing to operational deployment ranged from 0.52 percent to 5.76 percent, and the percentage of total personnel returning from operational deployment ranged from 0.44 percent to 4.92 percent (figure 2). Among children in military families, for each 1 percent increase in the percentage of active duty personnel (with at least one child) who departed to or returned from an operation-related deployment, the rate of occurrence of child maltreatment increased by 28 percent (95 percent CI: 1.20, 1.37) and 31 percent (95 percent CI: 1.16, 1.48), respectively. These patterns were consistent whether examining all soldiers or only soldiers with at least one child and changed little when controlling for child characteristics (table 3). Small increases in the rate of maltreatment in nonmilitary families were also associated with increases in the percentage of operation-related deployments. To capture the large increases in the monthly percentage of departures to and returns from operational deployment at the end of the study period, we dichotomized the percentages as 3 percent or more versus less than 3 percent. When the monthly percentage of departures to or returns from operational deployments was 3 percent or more, compared with less than 3 percent, the rate of occurrence of substantiated maltreatment approximately doubled in children of military families and remained the same in children of nonmilitary families (table 3). These rate ratios were largely unchanged when adjusted for child’s age, gender, and race/ethnicity.

The majority of substantiated child maltreatment that occurred in military families was perpetrated by a parent (table 4). Before October 2002, the average numbers of military parent and nonmilitary parent perpetrators per month were roughly equal. However, between October 2002 and June 2003, the average number of parents as perpetrators in military families per month approximately doubled, with the largest increase seen among nonmilitary parents. An increase was also observed for nonparents.

## DISCUSSION

This time-series analysis examined the impact of operational deployments on the occurrence of child maltreatment in military and nonmilitary families. The rate of occurrence of substantiated maltreatment in children of military families doubled in the period after October 2002 (the 1-year anniversary of the response to the September 11th terror attacks) compared with the period prior to that date. The rate in children of military families increased approximately 30 percent with each 1-percentage point increase in the proportion of soldiers, with at least one child, who departed to or returned from operational deployment. The rate in nonmilitary families was essentially static over this time period. Further, when controlling for child characteristics, we found that all rate ratios presented in these analyses decreased slightly for children in military families and stayed approximately the same for children of nonmilitary families. These findings indicate that both departures to and returns from operational deployment impose stresses on military families and likely increase the rate of child maltreatment. Such increases in child maltreatment may also extend to families at risk of being deployed. We lack the family-level deployment data that would allow us to definitively identify whether the increase was throughout all active duty families.
or isolated to those who actually experienced deployment of a parent.

Nonmilitary caretakers perpetrated the largest proportion of substantiated maltreatment in military families. Particularly, nonmilitary caretakers in military families were responsible for the majority of the maltreatment reported from December 2002 to April 2003, which coincides with an increase in the rate of maltreatment, the greatest percentage of soldier departures, and the lowest percentage of soldier returns. This finding further suggests that the stress of war extends beyond the soldier to the family left behind.

These time-series analyses combine individual child maltreatment data with state-level population estimates and military deployment information. A limitation of these multilevel data is the potential for ecologic bias, which is the failure of effect estimates at the ecologic level to equate to estimates at the individual level (15). This bias can arise from unmeasured confounding by other ecologic factors, such as improved reporting of child maltreatment by military authorities to child protective services over the study period. The use of state-level deployment data with individual child maltreatment data leads to some temporal ambiguity. For individual soldiers, we are unable to determine whether child maltreatment occurred before, during, or after deployment. Despite these limitations, the time-series study design does allow us to control for confounding by factors that do not change with time, even if we are unable to measure them.

We verified that the population of military and nonmilitary children residing in Texas did not increase markedly over time by examining yearly population estimates from the US Census Bureau’s American Community Survey, which uses a sample of the population to estimate yearly statistics. Data for Texas show that from 2000 to 2003 there was a 43 percent decrease (from 38,442 to 21,909) in the number of children residing in active duty military households and a 5.1 percent increase (from 5,919,507 to 6,220,548) in the number of children residing in nonmilitary households (16). Although these estimates are based on samples (not a complete enumeration), they suggest that the study results do not appear to be biased by an increase over time in the number of children of military families residing in Texas. We did not incorporate American Community Survey data into our analysis because this survey holds and a 5.1 percent increase (from 5,919,507 to 6,220,548) in the number of children residing in nonmilitary households (16). Although these estimates are based on samples (not a complete enumeration), they suggest that the study results do not appear to be biased by an increase over time in the number of children of military families residing in Texas. We did not incorporate American Community Survey data into our analysis because this survey was still in the pilot phase during the first part of our study period.

There is no consensus in the literature on how military rates of child maltreatment compare with nonmilitary rates (17–22). However, this study suggests that the rate of occurrence of substantiated child maltreatment is generally lower in military families but may increase as military families are threatened by war. These findings are important, given the ongoing deployment and mobilization of troops to the Middle East and the fact that over one third of active duty military personnel are married with children and an additional 6 percent are single parents (23).

In general, the risk factors for child maltreatment are not as prevalent in military families as nonmilitary families. Military families receive health care and housing at least partially funded by the government, and all are financially supported by at least one employed family member. Soldiers are also required to pass aptitude tests and may be discharged if severe drug or alcohol use is discovered. Military families also have resources aimed at mitigating negative aspects of the military lifestyle. Family support services are available in each branch of military service to assist troops and their families in preparing for and coping with family separations. However, it appears that either families do not utilize the resources available to them during periods of high stress (such as the departure of a family member to an operation-related deployment) or the services alone cannot adequately respond to the needs of the families. Possible interventions could include providing additional support and educational programs for family members remaining behind during separations, as well as increased monitoring of family function during stressful periods.

Future studies are needed to address child maltreatment in inactive duty military families, such as the National Guard, where not as many social support services may be available (1). Studies should also be replicated in different states with large military populations and include family-level deployment data and characteristics of the deployment to determine if there are differences based on location, length, and/or frequency of deployment. Intervention programs should be evaluated to determine which are most effective in mitigating family dysfunction in times of stress.

ACKNOWLEDGMENTS
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REFERENCES