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ORIGINAL ARTICLE

Accumulation of Risk and Promotive Factors Among Young Children in US Military Families

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Abstract In the families of the new cohort of war veterans now entering the civilian population in the United States are over two million young children (Cozza, Haskins & Lerner, 2013; Institute of Medicine, 2013). Several noteworthy studies have shown that children exposed to separation from a parent due to combat-related deployment are at elevated risk for a variety of negative consequences (Lester & Flake, 2013). Cozza et al. (2013) argue that existing studies of military children focus too much on the stresses or deficits they experience, failing to give sufficient attention to their strengths, the strengths of their families, or the supports around them. In the current study we focus on risk and promotive factors in the lives of children aged 0–10 in military families. We examine the likelihood of negative outcomes as functions of additive, cumulative, and interactive relationships between risk and promotive factors and children's outcomes. Risk factors, particularly parental depression, community poverty, and cumulative risk, were more strongly associated with children's outcomes than promotive factors. There was, however, a significant risk-protective relationship between accumulations of risk and promotive factors, consistent with promotive conditions operating in a protective fashion under conditions of elevated risk.

Keywords Military deployments · Risk factors · Promotive factors · Risk-protective relationships · Cumulative risk

In the families of the new cohort of war veterans now entering the civilian population in the United States are over two million children (Cozza et al., 2013; Institute of Medicine, 2013). Several noteworthy studies have shown that children exposed to separation from a parent due to combat-related deployment are at elevated risk for a variety of negative consequences (Lester & Flake, 2013), including both internalizing behaviors such as anxiety and depression, and externalizing behaviors such as aggression and defiant behavior (e.g., Barker & Berry, 2009; Chandra et al., 2010; Chartrand, Frank, White & Shope, 2008; Lester et al., 2010). Mansfield, Kaufman, Engel and Gaynes (2011), in their study of behavioral health, analyzed medical records of over 300 000 children (aged 5–17) of deployed personnel. They found elevated rates of psychological diagnoses, particularly prominent among boys, older children, and children whose parents' deployments were longer.

The Institute of Medicine (IOM; 2013) recently observed that although "under normal circumstances" military children compare favorably with children in the general population with regard to psychological health and national standardized achievement tests, the influence of the various risk and protective factors confronting military children is not yet well-understood. Based on studies in the general population and a growing literature about children in military families, scholars have proposed that young children may be particularly sensitive to the impact of deployments, perhaps because they lack the skills and

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resources that would be more available to adolescents (Paris, DeVoe, Ross & Acker, 2010). In this study, we focus on children aged 10 and younger.

Cozza et al. (2013) argue that existing studies of military children focus too much on stresses or deficits, and too little on their strengths, the strengths of their families, or the supports around them. For example, due to military accession standards, every military child has at least one parent with at least a high school education or the equivalent, employment, health insurance, competitive financial benefits, and a wide variety of support and educational programs (Hosek & MacDermid Wadsworth, 2013). Thus, military children may be protected from significant risks encountered by children in the general population, such as living in poverty, having an unemployed parent or lacking access to health care.

Nonetheless, children in US military families are disproportionately likely to experience extended parental absences, frequent relocations including to international locations, and other challenges as a result of their parents' service. Although these experiences are associated with negative outcomes for some children, many others display resilience. Consistent with studies in the general population, existing studies of military families, mostly with older children, suggest that children's own characteristics, such as gender and age, and the mental health and behavior of their primary caregivers (e.g., Chandra et al., 2010; Lester & Flake, 2013), are important in explaining children's outcomes. Although so far there has been little attention to community characteristics, there has been considerable speculation that reserve component families might be disadvantaged relative to their active component counterparts because they must rely more heavily on resources in civilian communities. Given the presence of military-connected families in almost every city, town and rural area in the country, it is important to understand as much as possible about the factors accounting for children's outcomes. Because the experiences of military children are so diverse, it is important for researchers to use methods that attend to the unique configuration of risk and promotive factors experienced by each child, a priority that guides the current study.

Risk and Promotive Factors

An extensive body of research documents the importance of risk and promotive factors for children. Risk factors are negative experiences or conditions that increase the likelihood of negative outcomes for children. In contrast, promotive factors decrease the likelihood of negative outcomes (Fergus & Zimmerman, 2005). Sameroff and others (Sameroff, Seifer, Barocas, Zax & Greenspan, 1987), for example, have found that the presence of risk factors significantly increases the probability of negative outcomes. Additive relationships between risk factors and children's outcomes have been found in studies examining infants' development (Burchinal, Vernon-Feagans & Cox, 2008), parenting and temperament in toddlers (Popp, Spinrad & Smith, 2008), and violent behaviors among adolescents (Stoddard et al., 2013). Evidence also suggests that accumulations of risk beginning in childhood may have long-lasting consequences, as demonstrated in a longitudinal study of children with depressive and anxiety disorders (Stansfeld, Clark, Rodgers, Caldwell & Power, 2011).

Numerous studies in the general population have demonstrated that the cumulative effects of risk and promotive factors may exceed those of factors considered individually (Zimmerman et al., 2013). For example, in a study of violent behavior among urban adolescents (Stoddard et al., 2013), higher levels of cumulative risk and promotive factors were, respectively, positively and negatively associated with levels of violent behavior.

Rutter (1979) demonstrated that the likelihood of negative outcomes may accelerate as risks accumulate. Gabalda, Thompson and Kaslow (2010) demonstrated these principles in a study of internalizing and externalizing problems among urban, African American low-income children aged 8–12. Using cumulative indices of risk and protection, they found that, compared to youth with no risk factors, having one risk factor increased the likelihood of developing a problem three to five times, but that with two or three risk factors, the likelihood of developing a problem was 12–19 times greater. Conversely, while children with one promotive factor were significantly less likely to develop a problem, the effect was modest in comparison to those with two or three promotive factors, who were four to six times less likely to develop problems.

According to resiliency theory (Zimmerman et al., 2013), promotive factors may operate in multiple ways to ameliorate risk. Of particular interest in this study are *risk-protective* relationships, where promotive factors buffer risk by interacting with risk factors to reduce the strength of the connection between risks and outcomes (Fergus & Zimmerman, 2005). In such instances, promotive factors are operating as protective factors.

Lucier-Greer, O'Neal, Arnold, Mancini and Wickrama (2014) recently studied risk factors in military families, although with adolescents older than young children who are the focus of the present research. Significant results were found for both additive and cumulative models. The additive model showed that several risk factors were associated with negative psychological well-being outcomes, including minority status, family structure, military paygrade, and dual-military family status. Contrary to expectations, exposure to parental deployment and multiple school transitions were not significantly related to chil-

dren's outcomes. In the cumulative model, total risk was significantly related to well-being outcomes, suggesting that "pileups" of risk were problematic regardless of the specific individual risks. In addition to the additive and cumulative models, a comparative model was tested to assess the relative contributions of military-specific and "normative" risks (i.e., those occurring among both military and civilian children). Here, while both kinds of risk were important, normative risk factors such as minority status were more strongly related than military-specific risks to outcomes for youth in military families.

Military Children in Civilian Communities

Hoshmand and Hoshmand (2007) call on community psychologists to pay greater attention to military families, in part because most military families—regardless of whether they serve in the active or reserve component—live, work, receive medical care, and are educated in civilian communities. Although it may once have been the case that military support systems alone could thoroughly address the needs of military families, the closing of many military installations, the expanded role of the reserve component, financial constraints posed by the federal sequester, and the longest war in our nation's history mean that this is no longer the case. The current study is consistent with three of the research priorities identified by Hoshmand and Hoshmand (2007): it assesses potential stressors impacting military families in the form of specific risk factors; it considers community strengths and needs; and it considers children's resilience in the form of positive outcomes despite adverse experiences. The ecological perspective (Bronfenbrenner & Morris, 2006) reinforces these priorities because it emphasizes that influences on children's functioning include not only microsystems like the family, where developing individuals participate directly, but also exosystems like parents' work environments and community organizations that are more distal to children. Garmezy (1987) and other researchers have organized their consideration of risk and promotive factors into levels corresponding to layers of the ecological perspective: characteristics of individuals themselves, their families, and larger contexts such as communities, although Stoddard et al. (2013) point to a need for empirical studies examining risk and promotive factors across these domains.

In this study we focus on risk and promotive factors in the lives of children aged 0 to 10 in military families. We examine the likelihood of negative outcomes as a function of the unique configuration of factors experienced by each child. We attend to additive, cumulative, and interactive associations of risk and promotive factors with the outcomes of interest. The specific risk and promotive factors considered include seminal features of military life for children, including exposure to relocations and separations from parents (Paris et al., 2010); parental factors including military component, education, depression, and alcohol use (IOM, 2013); family factors including parental relationship stability and family functioning (Saltzman et al., 2011); and community factors previously associated with children's outcomes in the general population but not studied in the military population, including residential stability, health infrastructure, health status, and poverty (Gabalda et al., 2010).

Methods

Data for this study come from a larger investigation of children aged 0 to 10 in families where one or both parents serve in the US Army, Navy, Air Force, or Marine Corps. Data were collected during 2012 and 2013; all children in the sample were born during the Operation Iraqi Freedom and Operation Enduring Freedom conflicts. Furthermore, most children in the sample (66%) were born after their parents already had experienced a military deployment.

The target population comprised military families living in the continental United States and US possessions, who had at least one child younger than 11 years old. The sample was selected using probability methods from a sampling frame compiled by the Defense Manpower Data Center. The July 2012 version of the Active Duty Family and Reserve Duty Family database and the March 2012 version of the PERSTEMPO database were used to determine which families were eligible, and to calculate children's exposures to parental deployments. In dual-military families, the parent most recently deployed was designated as the "primary military" parent, and the other parent was designated as the "primary caregiving" parent—the latter were asked more detailed questions about children. All single parents were designated primary caregiving parents.

Prior to data collection, each family received a letter describing the study and indicating that they would be receiving a telephone call. We then conducted telephone interviews with primary caregiving parents, during which they were asked a series of questions to systematically identify the "focal child"—the specific child about whom both parents would answer questions throughout the data collection process. In two-parent families, the other parent—the primary military parent—was then asked to complete a short-form telephone interview, and both parents were asked to complete a web-based survey. Data for this study came from telephone interviews with the primary caregiving parents. Attempts were made to contact a total of 12 011 households to invite participation in the study.

Of those, 10 360 were either nonworking (n = 1908) or unreachable (n = 6474) telephone numbers, or ineligible or impaired (i.e., sick or physically unable to participate due to impairment; n = 1978). Of the 1651 families reached, 680 (41%) consented to participate and completed part or all of the telephone interview. The analysis sample was similar to the sampling frame in terms of service branch (48.1% vs. 46.8% Army, 16.9% vs. 19.3% Navy, 23.8% vs. 22.5% Air Force, 11.2% vs. 11.4% Marine Corps, respectively, for sample and sampling frame) and gender (94% vs. 92% females, respectively, for sample and sampling frame). The analysis sample contained overrepresentations of officer (41.4% vs. 20.2%) and active component (87% vs. 73.6%) families; and a slight underrepresentation of families who had experienced two or more deployments (61.5% vs. 66.9%), relative to the sampling frame. Prior to final analyses, all data were weighted to be representative of the population in terms of child age, service member gender and paygrade, military branch and component, and number of deployments.

Participants

Of the 680 parents who participated in telephone interviews, 123 lacked archival data regarding deployments and 96 lacked data on one or more risk or promotive factors. To strengthen our analyses and increase our statistical power, regression models were estimated in Mplus v.7.2 using sample weights and sample strata. Maximum likelihood for missing values (FIML) was used to estimate results using all observations (n = 680), including those with missing values on some variables (Arbuckle, 1996).

Most respondents were female (94%), married (97%), and had at least a high school education (98%). Of the parents who had completed high school, 29% had a Bachelor's degree, and 14% had a graduate degree. The average age of respondents was 33.5 for females and 38.1 years for males. About 77 percent (77.2%) were White, 8.3% were African American, 4.9% were Asian, and about 9% had another race. A total of 10.6% of the sample considered themselves Spanish, Hispanic, or Latino. More than fifteen percent (15.7%) had served in the military and 6.6% were in the military at the time of the telephone interview. On average, there were 2.2 children under the age of 18 living in the home.

Measures

The dependent variables for this study focused on children's outcomes during three developmental periods (birth to 2, 3–5, and 6–10 years of age). We focused on indicators of socioemotional behavior theoretically or empirically linked to parental deployment in existing literature, and used widely used and well-validated screening instruments tailored to children's specific ages as described below:

Developmental Problems (ages 0–2) was measured using the Ages and Stages Questionnaire: Social-Emotional (ASQ:*SE*; Squires, Bricker & Twombly, 2002), a screening tool with questions tailored for children's development at 6 (19 items), 12 (22 items), 18 (26 items), 24 (26 items), and 30 (29 items) months of age. Items include "When upset, can your baby calm down within a half hour?," and "Does your child try to hurt other children, adults, or animals?" Parents indicated the frequency of a behavior (0 = *rarely or never*, 5 = *sometimes*, and 10 = *most of the time*) and whether the behavior was a concern for them (0 = *no* and 5 = *yes*). Following standardized procedures, a total score was calculated by summing frequency and concern scores. Previously established reliability scores for this scale ranged from α = 0.69 to 0.88 for children between the ages of 6 months and 30 months (Squires et al., 2002); in our sample, α = 0.69.

Anxiety (ages 3–5) was measured using the preschool version of the Spence Anxiety Scale, which contains 28 items, rated from 0 (*not true at all*) to 4 (*very often true*). Items include "Has difficulty stopping himself/herself from worrying", and "Is afraid of meeting or talking to unfamiliar people." Following standardized procedures, a total score was calculated by summing these 28 items (Spence, Rapee, McDonald & Ingram, 2001). Previous research found that the internal consistency reliability of the total anxiety scale was α = 0.86 (Broeren & Muris, 2008); in our sample, the reliability was α = 0.89.

Total Difficulties (ages 6–10 only) was assessed using the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), a parent-report scale developed to screen children's emotional and behavioral problems. This measure correlates well with other parent-completed child behavior rating scales including the CBCL (Achenbach, 1991), and discriminates between clinical and nonclinical populations (Goodman & Scott, 1999). Items include "Often loses his/her temper," and "Is restless, overactive, cannot stay still for long". Parents rated 25 items on a scale from 0 (*not true*) to 2 (*certainly true*). The total difficulties score was calculated by summing these 25 items. The total difficulties scale has a reported reliability score of α = 0.82 (Goodman, 2001); in our sample the reliability was α = 0.83.

Children's Risk Status (ages 0–10). In order to conduct analyses that included all children regardless of age, we constructed a variable for each child indicating whether he or she had exceeded an established risk threshold on the age-appropriate screening assessment. For children aged 0–2, developmental problems cutoff scores were derived in previous research (Squires et al., 2002) by comparing ASQ:*SE* scores with several well-established

criterion measures such as the Child Behavior Checklist (CBCL) (Achenbach, 1991) or professional diagnoses. Based on these findings, in this study children scoring above 70 were considered "at risk." The proportion of children in our sample with elevated scores was smaller than the proportion of children in the community sample (10.8% in this study vs. 17.4% in the community norm sample; Squires et al., 2002).

For children aged 3–5, scores one standard deviation above the national "normal" mean were considered indicators of elevated anxiety symptoms, consistent with practices in studies of children in the general population (Nauta et al., 2004). The proportion of children in our sample with elevated scores was higher than the proportion of children in a norm sample (17.5% in this study vs. 12.8%; Spence et al., 2001).

For the children ages 6–10, using US normative data, score ranges have been established to identify children experiencing low, medium, and high levels of difficulties (Bourdon, Goodman, Rae, Simpson & Koretz, 2005). In this study, children with a score at or above the medium benchmark were considered to be "at risk." The proportion of children in our sample with elevated scores was higher than the proportion of children in norm samples (22.0% in this study vs. 18% in norm sample; Bourdon et al., 2005).

Children who exceeded their age-appropriate risk threshold were assigned a value of 1 on the "at risk" variable; children who did not exceed their age-appropriate risk threshold were given a value of 0. In our sample, 18.4% of all children were designated "at risk."

We also included several control variables, including child age (in months), child gender (1 = male, 0 = female), paygrade (1 = enlisted; 0 = officer), and service branch (1 = Army; 0 = other branches).

Risk factors. Military-connected risk factors focused on childrens' exposure to parental deployments and family relocations (see Masten, 2013 for a review). *Parental and family factors* included depressive symptoms reported by parents, and parental alcohol problems (Trentacosta et al., 2008). *Community* factors included residents' reports of health, and community poverty rates, which in a review of existing studies, Curtis et al. (2013) found to be related to problems among children. Using procedures similar to previous studies (e.g., Gabalda et al., 2010; Stoddard et al., 2013), risk factors were operationalized as follows:

1. *Child exposure to deployment*—Percent of child's age in months that the military parent had been deployed, based on deployment records (77% of children had been exposed to deployment at least once); families in the highest quartile (25%) of exposures were assigned a score of 1; others were assigned a score of 0.
2. *Child exposure to relocation*—Average number of moves per year during the child's life, based on parental report; families in the highest quartile (25%) were assigned a score of 1; others were assigned a score of 0.
3. *Parental depressive symptoms*—Families in which the parent's responses exceeded the established cutoff score of 9 for major depression on the PHQ-8 (Kroenke & Spitzer, 2002) were assigned a score of 1; others were assigned a score of 0.
4. *Parental alcohol misuse*—Families in which the parent's responses exceeded the established cutoff score of 3 (for women) or 4 (for men) for alcohol misuse on the Alcohol Use Disorders Identification Test (AUDIT-C: Bush, Kivlahan, McDonell, Fihn & Bradley, 1998; Bradley et al., 2007) were assigned a score of 1; others were assigned a score of 0.
5. *Community poverty*—Families living in a zip code in the highest nationwide quartile (25%) of the percent of the population with income below the poverty level during the last 12 months, based on CDC Community Health Status Indicator data, were assigned a score of 1; others were assigned a score of 0.
6. *Community unhealthy days*—Families living in a zip code in the highest nationwide quartile (25%) of the average number of unhealthy days reported by residents during the past 30 days, based on CDC Community Health Status Indicator data, were assigned a score of 1; others were assigned a score of 0.

We created a summed score to reflect the total number of risk factors described above; this score was centered on the mean to prevent multicollinearity in analyses of interactions between cumulative risk and protection.

Promotive factors. Military-related promotive factors included service in the active component, based on the possibility that active component members have better access to military support services (IOM, 2013). *Parental and family factors* included relationship stability, higher level of education, and more positive levels of family functioning (Gabalda et al., 2010). *Community factors* included residential stability (e.g., Hatch et al., 2011) and per capita rates of primary care physicians. Promotive factors were operationalized as follows:

1. *Military component*—Families in which the military parent served in the active component were assigned a score of 1; others were assigned a score of 0.
2. *Parental education*—Families in which the parent held at least a Bachelor's degree were assigned a score of 1; others were assigned a score of 0.
3. *Parental relationship stability*—Families in the lowest quartile (25%) of scores on the Marital Instability Index (representing high stability; MII: Booth, Johnson

& Edwards, 1983) were assigned a score of 1; others were assigned a score of 0.
4. *Positive family functioning*—Families in the lowest quartile (25%) of scores on the General Family Functioning subscale of the Family Assessment Device (representing high functioning; Epstein, Baldwin & Bishop, 1983; Miller, Epstein, Bishop & Keitner, 1985) were assigned a score of 1; others were assigned a score of 0.
5. *Community residential stability*—Families living in a zip code in the highest nationwide quartile (25%) of the percent of houses owned with a mortgage or loan, based on 2010 Census data, were assigned a score of 1; others were assigned a score of 0.
6. *Community health infrastructure*—Families living in a zip code in the highest nationwide quartile (25%) of primary care physicians per 100 000 population, based on CDC Community Health Status Indicator data, were assigned a score of 1; others were assigned a score of 0.

We also created a summed score to reflect the total number of promotive factors described above; this score was centered on the mean to prevent multicollinearity in analyses of interactions between cumulative risk and protection.

Analyses

We first examined *additive* relationships between our four outcomes and individual risk and promotive factors. Using linear (for developmental problems, anxiety, and difficulties) and logistic (for risk status) regression analyses, we first ran separate models for risk and promotive factors. These analyses enabled us to examine the unique or additive effects of individual risk and promotive factors in the presence of the control variables.

Next, we focused on the *cumulative* effects of risk and promotive factors, testing whether the total number of risk or promotive factors were associated with developmental problems, anxiety, total difficulties, or children's risk status. Finally, guided by Jessor, Van Den Bos, Vanderryn, Costa and Turbin (1995) we conducted analyses to determine whether there was a significant interaction between risk and promotive factors consistent with a risk-protective model.

Results

Common Method Variance Analysis

Because caregiving parents provided much of the data about both parents and children, there was a risk of systematic measurement error due to common method variance (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). We evaluated this potential problem using Harman's one-factor test, in which all the variables were entered into exploratory factor analyses using version 9.2 of SAS software (SAS Institute Inc., Cary, North Carolina, USA). None of the analyses suggested that a general factor was apparent—the percentage of variance accounted for by the first factor extracted was only 14% with seven Eigenvalues exceeding 1. Next, we conducted a one-factor confirmatory factor analysis, which revealed a high chi-square (χ^2 (136, n = 385) = 2064.23), a high RMSEA (0.09), and a low CFI (0.81), all indicating poor fit to the data. Based on these results, we concluded that there was little evidence of systematic measurement error due to common method variance.

Descriptive Results

We next conducted descriptive analyses to assess the presence of each risk and promotive factor among children in the sample. More than a fifth of the children (22.3%) had zero risk factors, 35.6% had one, 28.6% had two, and 13.5% had three or more. With regard to prevalence, the most common risk factors were children's exposure to parental deployments (defined as top quartile of exposures) and caregiving parents' problematic alcohol use (27%) and the least common was parental depressive symptoms (8%). In terms of promotive factors, 3.1% of children lacked all promotive factors, 17.9% of children had one, 34.0% had two, 26.0% had three, and 19.0% had four or more promotive factors. Most common was active military component (73%) and least common were residential stability and availability of primary health providers in the community (27% each).

Additive Models

Risk Factors

Table 1 presents the results of analyses assessing relationships between individual risk factors and children's outcomes. The first three columns contain regression coefficients of separate analyses by age group. For children younger than three, there were no significant relationships between individual risk factors and developmental problems. Among children aged 3–5, anxiety was positively related to parents' depressive symptoms and health among members of the local community. Among children aged 6–10, total difficulties were positively related to parents' depressive symptoms and community poverty.

The fourth column of Table 1 contains odds ratios for the likelihood that children across the entire sample would be at risk. Children's age was a significant control variable, with older children more likely to be at risk than

Table 1 Additive effects of individual risk factors

Explanatory variables	Developmental problems (ages 0–2) (n = 185) Coefficients (SE)	Anxiety (ages 3–5) (n = 213) Coefficients (SE)	Total difficulties (ages 6–10) (n = 266) Coefficients (SE)	Risk status (ages 0–10) (n = 680) Odds ratio (95% Confidence intervals)
Control variables				
Child age (in months)				1.15*** [1.06, 1.25]
Child sex (0 = male; 1 = female)	13.44 (8.39)	−2.88+ (1.69)	1.62* (0.73)	1.16 [.69, 1.94]
Paygrade (0 = Officer; 1 = Enlisted)	−7.43 (9.05)	0.39 (1.89)	0.62 (0.79)	1.72+ [.95, 3.11]
Military branch (0 = other; 1 = Army)	0.18 (6.08)	1.54 (1.79)	1.15 (0.82)	0.90 [.53, 1.54]
Risk factors				
Child exposure to deployment (0 = other; 1 = highest quartile)	6.54 (7.67)	1.51 (1.79)	−0.19 (0.93)	1.21 [.67, 2.21]
Child exposure to relocation (0 = other; 1 = highest quartile)	5.63 (5.93)	0.90 (2.13)	−0.27 (0.96)	1.37 [.74, 2.53]
Parental depressive symptoms (0 = other; 1 = score above 9)	5.64 (8.76)	10.89** (3.49)	3.15* (1.36)	3.18*** [1.58, 6.40]
Parental alcohol abuse (0 = other; 1 = score above 3–4)	1.60 (7.62)	3.41+ (1.98)	−0.10 (0.98)	1.17 [.64, 2.13]
Community poverty (0 = other; 1 = highest quartile)	9.32 (8.09)	−1.58 (2.10)	1.95* (0.99)	1.75* [1.00, 3.05]
Community unhealthy days (0 = other; 1 = highest quartile)	−4.38 (8.51)	3.70* (1.81)	1.29 (1.06)	1.75* [1.02, 3.00]

+$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

younger children. Results also indicated that parental depression, community poverty, and community health were significantly related to risk status. Children with a parent who reported symptoms of major depression were three times more likely to be at risk than children whose parent did not report such symptoms. Children living in communities with a high proportion of low-income residents and where local residents reported poorer health were 1.8 times more likely to be at risk than children in communities where incomes were higher or residents reported better health.

Promotive Factors

Table 2 presents results of analyses of the relationships between individual promotive factors and children's outcomes. For children aged 0–2, positive family functioning was significantly and negatively related to developmental problems. There were no significant relationships between individual promotive factors and child outcomes for children aged 3–5 or 6–10. In analyses of the full sample, odds ratios for analyses of children's risk status, shown in the fourth column, indicated that older children were slightly but significantly more likely to be at risk than younger children, similar to earlier analyses; there were no significant effects for any individual promotive factors.

Cumulative Models

Figure 1 illustrates the relationship between children's negative outcomes and accumulations of risk (dashed lines) and promotive factors (solid lines) for children in the whole sample. Under conditions of one risk factor, 11% children were at risk while under conditions of four or more factors the percentage jumped to 40%; this was a statistically significant relationship (OR 1.5, $p < .001$). In contrast, increasing numbers of promotive factors were associated with reductions in the likelihood that children would be at risk. When no promotive factors were present, 27% of children were at risk, while about 15% of children with four or more promotive factors were at risk; this relationship was also statistically significant (OR 0.8, $p = .030$). When tested separately by age group, accumulations of risk were significantly associated with risk status for children aged 3–5 ($F(4,208) = 2.34$, $p < .01$) and 6–10 ($F(4,261) = 0.86$, $p = .01$), and at the level of a trend for children aged 0–2 ($F(4,180) = 4.32$, $p = .08$). Accumulations of promotive factors, however, were not associated with risk status when examined separately by age group.

Risk-Protective Models

Table 3 presents results of analyses of accumulations of risk and promotive factors in relation to the risk status of all children in the sample. Model 1 examined main effects, showing that cumulative risk was significantly and positively related to children's risk status. A one-unit increase in the number of risk factors increased the odds of negative child outcomes by 56%. In addition, older chidren and children of parents in enlisted paygrades were more likely to be at risk. Model 2 of Table 3 added an interaction effect

Table 2 Additive effects of individual promotive factors

Explanatory variables	Developmental Problems (ages 0–2) (n = 185) Coefficients (SE)	Anxiety (ages 3–5) (n = 213) Coefficients (SE)	Total difficulties (ages 6–10) (n = 266) Coefficients (SE)	Risk status (ages 0–10) (n = 680) Odds ratio (95% Confidence intervals)
Control variables				
Child age (in months)				1.13** [1.05, 1.22]
Child sex (0 = male; 1 = female)	10.93 (6.82)	−2.73 (1.69)	1.59* (0.72)	1.20 [.73, 1.98]
Paygrade (0 = Officer; 1 = Enlisted)	−11.66 (7.22)	−1.13 (2.27)	1.28 (0.84)	1.61 [.86, 3.01]
Military branch (0 = other; 1 = Army)	2.56 (6.58)	1.79 (1.62)	1.60* (0.77)	1.13 [.68, 1.86]
Promotive factors				
Military component (0 = Reserve; 1 = Active)	−0.60 (6.52)	0.17 (2.03)	0.79 (0.85)	1.26 [.73, 2.17]
Parental education (0 = <BA; 1 = BA or more)	−0.72 (5.84)	−3.58+ (2.15)	0.28 (0.87)	0.80 [.45, 1.43]
Parental relationship stability (0 = other; 1 = lowest quartile)	−1.44 (6.96)	−0.49 (2.23)	−0.37 (0.88)	0.55+ [.29, 1.05]
Positive family functioning (0 = other; 1 = lowest quartile)	−15.55** (5.61)	−2.76 (1.87)	−1.53+ (0.92)	0.84 [.47, 1.52]
Community residential stability (0 = other; 1 = highest quartile)	−4.46 (6.01)	−0.78 (2.16)	−1.42 (0.90)	0.78 [.42, 1.48]
Community health infrastructure (0 = other; 1 = highest quartile)	−5.36 (5.53)	−0.26 (1.96)	0.12 (0.92)	1.15 [.65, 2.04]

+p < .10; *p < .05; **p < .01.

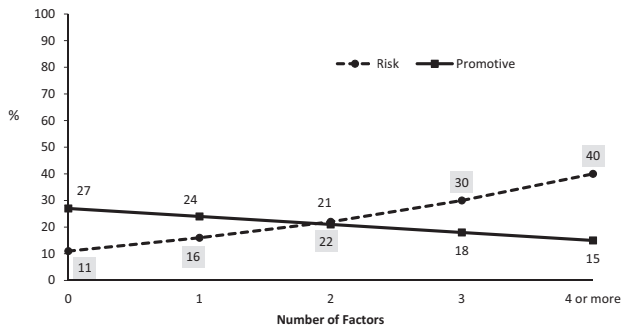

Fig. 1 Children's risk status by risk and promotive factors

consistent with a risk-protective model. The main effect for risk factors and child age remained significant. There was also a significant interaction between risk and promotive factors, which is illustrated in Fig. 2. As the figure shows, the relationship between promotive factors and children's risk status strengthened as the number of risk factors increased. Under conditions of four or more risk factors, the relationship was much stronger than under conditions of no risk factors. Statistically, follow-up slope analyses showed that the relationship between children's risk status and cumulative promotive factors was significant under conditions of 3 (z = −3.02, p < .01) and 4 or more risk factors (z = −3.98, p < .01), but not when the children had 0 (z = 1.93, p = .06), 1 (z = 0.39, p = .70), or 2 (z = −1.81, p = .07) risk factors.

Table 3 Cumulative and interactive effects of risk and promotive factors

Explanatory variables	Risk status (ages 0–10) (n = 680) Odds ratio (95% Confidence intervals) Model 1	Model 2
Control variables		
Child age (in months)	1.15*** (1.07–1.25)	1.16*** [1.08, 1.26]
Child sex (0 = male; 1 = female)	1.16 (0.71–1.91)	1.15 [.69, 1.90]
Paygrade (0 = Officer; 1 = Enlisted)	1.91* (1.02–3.56)	1.88+ [1.00, 3.54]
Military branch (0 = other; 1 = Army)	0.95 (0.58–1.54)	0.92 [.56, 1.52]
Cumulative risk and promotive factors		
Cumulative Risk Index	1.56*** (1.23–1.97)	1.48*** [1.17, 1.87]
Cumulative Promotive Index	0.94 (0.77–1.15)	0.96 [.79–1.18]
Cumulative Risk Index × Cumulative Promotive Index		0.76** [.63, .91]

+p < .10; *p < .05; **p < .01; ***p < .001.

Discussion

This study is the first to examine configurations of risk and promotive factors among military children aged 0–10. We considered additive, cumulative, and risk-protective models, incorporating both risk and promotive factors

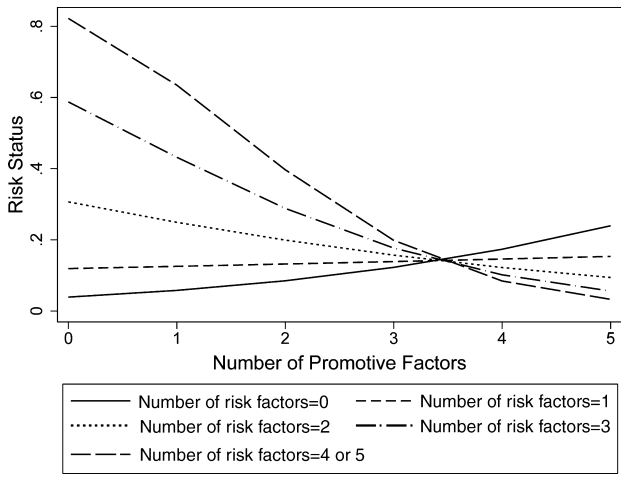

Fig. 2 Predicted probabilities of children's risk status

related to the characteristics of individuals, families, and communities. On average, the youngest military children (aged 0–2) in this study appeared to be doing better on the outcomes of interest, but the preschool- and school-aged children were not doing quite as well as children in community samples. Similarly, with regard to the control variables, the most consistent finding was a significant tendency for older children to be more at risk than younger children. It is possible that these differences are artifacts of the different measures that had to be used to appropriately assess children's status at different ages, but they also could reflect less opportunity for younger children to be exposed to deployments or other challenging experiences, and less time for the effects of those exposures to produce negative consequences.

With regard to the prevalence of risk and promotive factors, more than 20% of the children had no risk factors, while 13.5% had three or more risk factors. More than a quarter of children were exposed to high levels of parental deployment or alcohol misuse; the latter rate was somewhat higher than the 21.7% observed in a sample of women patients in primary care (Rubinsky, Kivlahan, Volk, Maynard & Bradley, 2010). Overall, 8% of the children in this sample were exposed to depression of their parent, a rate lower than the 12% reported in a national study of children in Canada (Bassani, Padoin, Philipp & Veldhuizen, 2009). Only 3% of children had no promotive factors; the least common factors were community residential stability and health infrastructure, with rates similar to those in the general population.

Additive Models: Individual Risk and Promotive Factors

We found no significant relationships between individual risk factors and developmental problems among children aged 0–2. Depressive symptoms among parents of preschoolers or school-aged children, however, were associated with 3–11-fold increases in the likelihood that children would be considered at risk. Similar results have been found in multiple studies of civilian families (e.g., Gabalda et al., 2010). Although parental depression was one of the least common risk factors, it was the one most strongly associated with children's risk status. We were concerned about the depression distortion effect found in prior studies, where mothers rated their children less favorably as a function of their own depression (Müller & Furniss, 2013). Although we had earlier found no evidence of problematic common method variance, we conducted an additional analysis using a crude adaptation of Müller and Furniss' effort to apply a correction factor to depressed mothers' reports of children's outcomes. We reduced children's outcome scores by 25% for mothers with elevated depression scores and reran our final set of analyses, with no changes in the results.

Similar to Lucier-Greer et al.'s (2014) study of older children, we found that military-specific risk factors such as frequent relocation and exposure to parental deployment were outweighed in relation to children's risk status by factors common among children in the general population, such as mental health problems among parents.

Regarding promotive factors, we found only one significant relationships between individual factors and children's risk status: children aged 0–2 were significantly less likely to evidence developmental problems when their families were functioning better. Benson, Scales, Hamilton and Sesma (2006) and others assert that accumulations of promotive factors are more important than individual factors.

Cumulative Models: Accumulations of Risk and Promotive Factors

Statistical analyses of accumulations of risk and promotive factors showed that cumulative risk was significantly related to children's negative outcomes. With every additional risk factor, children's likelihood of negative outcomes increased, rising from 11% to 40%. While this pattern is similar to what has been observed among children in the general population, we found little evidence of acceleration, where the likelihood of negative outcomes rises more steeply as risk factors accumulate. Future studies will need to determine whether acceleration is less likely to occur in military populations, or whether our results are unique to this study.

Consistent with studies in the general population, accumulations of risk were more strongly related to children's outcomes than risk factors considered individually. This finding has implications for practitioners because it suggests that prevention and intervention efforts may need to

focus more on child-specific rather than risk-specific patterns. That is, it may be more impactful to prevent or reduce risks from *accumulating* in children than to concentrate on eliminating or reducing particular risks. This is consistent with recent calls by Layne and others to attend to caravans of risk (Layne, Briggs & Courtois, 2014). Some of the seminal features of military life such as relocations and separations are complex experiences that may invoke other risks, such as when the deployment of a military parent leads to depressive symptoms in the at-home parent. In addition, military practices may intentionally "bundle" transitions, inadvertently creating an accumulation or caravan of risk for children, such as when relocations are assigned to occur during or soon after returns from deployment.

Cumulative promotive factors were significantly associated with children's outcomes when examined on their own, but the main effect for promotive factors was not significant when examined in the presence of cumulative risk. Thus, there was little evidence that protective factors operated in an additive fashion alongside risk.

Risk-Protective Models: Interactions Between Risk and Promotive Factors

We found that promotive factors were related to negative outcomes for children only under conditions of greater risk, indicating a buffering or risk-protective relationship. More specifically, while there was no relationship between promotive factors and children's outcomes when risk was low (i.e., two or fewer risk factors), there were significant and increasingly strong relationships between protective factors and children's outcomes at higher levels of risk. Had we failed to include risk-protective models in our analyses, confining our examination to only additive or cumulative models, we would have concluded that promotive factors play much less important roles in children's outcomes than appears to be the case. Similar to the results obtained by Gabalda et al. (2010) and Rutter (1979), these findings suggest that promotive factors should not be overlooked in relation to children's outcomes. The relationships depicted in Fig. 2 are consistent with the proposition that promotive factors may be "banked" until activated by risk. Researchers and practitioners thus should take care not to underestimate their importance—lack of findings in additive or cumulative models may not mean that promotive factors are irrelevant. It may be important to routinely check for risk-protective relationships.

The Role of Community Characteristics

Unexpectedly, we found no differences between children in active and reserve component families, belying concerns that reserve component families might be especially challenged because of their distance from installation-based military support services. Perhaps the recent creation of military family assistance centers in communities around the country has eliminated a vulnerability that previously existed, or perhaps concerns about reserve component families were unwarranted.

We also found no significant results for the community resources we considered. That is, we found no differences among children's risk status as a function of residential stability or the availability of primary care physicians. In contrast, vulnerability in the local community, in the form of poverty and residents' reports of poor health, were positively associated with the risk status of children. Regardless of component, most military families live in civilian communities, and our results suggest that neither families in the active or reserve components were exempt from community vulnerabilities. Thus, our study underscores the importance of considering community characteristics when trying to understand the diverse configurations of risk and promotive factors surrounding children in military families.

Our results are quite preliminary, however. The community characteristics we studied focused primarily on formal infrastructure, and future research would do well to include both formal and informal elements of community functioning. For example, Lucier-Greer, Arnold, Mancini, Ford and Bryant (2015) found that social connections in the local community were significantly related to depression, academic performance and self-efficacy among adolescents at Army installations, and Welsh, Olson, Perkins and Travis (2015) found that multiple types of informal support buffered the relationship between negative deployment experiences and depression among Air Force personnel.

Limitations

Our study has important limitations. Although we were able to use probability methods to weight our sample to represent the military population, the response rate was low and participants skewed toward families of officers. Our focus on children aged 0–10 meant that different measures had to be used for each major age group, which substantially limited statistical power. We created an index of "risk status" to allow analyses of all age groups together, which had the advantage of greater power but the disadvantage of assigning risk status based on different measures for children in different age groups. Our classification methods did, however, use accepted standards, and were chosen to be conservative estimates of the number of children screening positive for difficulties.

Our understanding of children's functioning would have been greatly enhanced by data from sources beyond parents that would have reduced the possibility of confounds between parents' own mental state and their assessments of their children. Longitudinal data collection would have allowed examination of the predictive power of risk and promotive factors. And a comparison group of children in the general population could offer instructive insights, although appropriate matching would be difficult to achieve given the combination of educational, employment, and resource selectivity in the military population.

While our selection of risk and promotive factors was guided by prior literature, the most important risk and promotive factors to consider in relation to children in military families have yet to be definitively identified. Child maltreatment, for example, is a powerful risk factor for children in existing literature, but could not be included in this study due to regulatory barriers (McCarthy et al., 2015), and only a small number of risk and promotive factors were considered. More precise measurement of interaction with formal and informal support systems (military or civilian) would have been helpful in capturing more precisely the role of community characteristics. We used zip code as a geographic unit, but census tract or even block would have provided even more fine-tuned assessment of children's environments.

Implications

Children whose parents are now serving or once served in the US military live in almost every city, town, and rural area in the United States. Many of these children have been exposed to distressing and potentially stressful experiences as a result of their military parents' wartime deployments. Especially once their parents leave military service but even before, these children rely on community-based professionals for education, support, and treatment. Understanding the diversity of children in military families, and the role of both proximal and distal risk and promotive factors in their functioning and well-being is important not only for the children of this generation of war veterans but also for children whose parents are deployed in the future.

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