The Invisible 1%: Stepping Stones Towards College Among Military Brats

IHELG Monograph

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Abstract

This study examined the differences between civilian and military children in their attainment of milestones towards college during a period of intensive military deployment (2002 – 2004). In spite of this intensive deployment, the process of attainment of milestones toward college among military children from grade 10th to grade 12th was remarkably similar to that of civilian children. Reasons for such notable resilience are examined in light of funds of knowledge framework and self-determination theory.

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Introduction

The process military children undergo in their attainment of milestones towards college is a topic that has not been widely researched. What little we do know suggests keen differences in the ways in which military children experience K-12 education in comparison to their civilian counterparts (Bradshaw et al., 2010, Engel, Gallagher & Lyle, 2010; Huebner & Mancini, 2005; Jeffreys et al., 1997; Lester and Flake, 2013; Smrekar et al., 2001; Smrekar & Owens, 2003; White et al., 2011; Winerip, 2011). Some of those differences include exposure to parent deployments and an increased likelihood of moving (U.S. Department of Defense, N.D). Research on civilian children suggests that exposure to such radical changes in familial and school habitus increases risks of dropping out of high school (Berkner et al., 1997), lowers parental involvement in school activities (Cabrera & LaNasa, 2000; Perna, 2006; Perna & Titus, 2005); and, is less conducive to attaining critical milestones towards college (Berkner et al., 1997). Already some studies seem to show a negative association between deployment, grades, and academic achievement tests among military children (e.g., Huebner & Mancini, 2005; Engel, Gallagher & Lyle, 2010).

Using data from the Educational Longitudinal Study of 2002 (ELS:02), this study seeks to provide insight into similarities and differences in the attainment of milestones towards college between military and civilian children. Two reasons led us to select ELS:02 over the High School Longitudinal Study of 2009 (HSLS:09). Data collection for ELS:02 took place in a period of time especially relevant to our study; military deployment skyrocketed from approximately 4,000 troops in January of 2002 to over 120,000 in January of 2004 (McLean & Tse, June 22, 2011). The second reason is that ELS:02, unlike HSLS:09, has verifiable college transcript measures on taking college admission tests by 12th grade, ameliorating biases associated with self-reported data.

In order to examine the experiences of military children in the aftermath of 9/11, this study focuses on addressing the following research questions:

1. To what extent the measurement component of the milestones towards college is invariant across civilian and military children?
2. To what extent the process underscoring the attainment of milestones towards college holds among military children?
3. Do military children exhibit similar levels of parental encouragement and support towards college as well as attainment of milestones towards college compared to their civilian counterparts?

Literature Review

Several factors have been linked to the likelihood of preparation for and enrollment in college among civilian children, including academic ability (Cabrera & LaNasa, 2000, 2001; Bell, Rowan-Kenyon, Perna, 2009; Hossler et al., 2003; Perna, 2005; Roderick, Coca, & Nagaoka, 2011), parental encouragement (Cabrera & LaNasa, 2000; Arnold, Lu, & Armstrong, 2012; Green et al., 2007; Bryan, Griffin, & Henry, 2013; George-Mwangi, 2015), and socioeconomic status (Gibbons & Borders, 2010; Grodsky & Riegle-Crumb, 2010; Engberg & Wolniak, 2010; Perry & McConney, 2010; Wells & Lynch, 2012). Additional research on civilian children also suggests risk factors that influence the success of students in being prepared for college and successfully completing high school (Beckner et al., 1997).

Educational Risk Factors
Changes in familial home environments can have a profound influence on student development in high school (Berker et al., 1997; Jeynes, 2008, 2012). In particular, research on civilian children suggests that frequent exposure to moving and absence of a parent can impact a student’s success in high school. The work of Wu, Schimmele, and Hou (2015), in particular, emphasizes the impact of parent-level factors on academic socialization and educational outcomes, highlighting a link between diverse family structures and lower educational attainment. Additional research supports similar findings: students in households with more than one parent present are more likely to complete high school and are less likely to drop out of school (Astone & McLanahan, 1991; Ensminger & Slusarcick, 1992; McLanahan & Sandefur, 1994).

**Military Children and Educational Risk Factors**

In the years following September 11, 2001, many military families found themselves without their active duty service member parent for an extended period of time, which renewed researchers’ interest in how military children were coping with deployments socially, emotionally, psychologically, and academically. Since parental absences coupled with high mobility are risk factors for civilian families (Berker et al., 1997; Jeynes, 2002; Jeynes, 2008; Jeynes, 2012), this raises questions about the impact of such conditions on military families.

There are a number of studies that show military children have somewhat a different experience in their K-12 education. Some studies point to high parental involvement in military families despite frequent moves. A 1997 study by the Military Family Institute at Marywood University indicates that a large number of military adolescents reported parental involvement in schoolwork (Shaler, Levine & Giacocfi, 1997). Results of this study were corroborated with Smerker’s et al (2001) report to congress which theorized that military children excelled academically because the uniformed parent would be given time to attend school related events.

Academic achievement during times of deployment has been given more attention since 2001. Huebner and Mancini (2005) found that military adolescents reported their grades suffered during times of deployment. However, Ender (2007) noted that adolescents tended to show resilience during deployments, often taking on certain responsibilities of the absent parent. Lyle, Gallagher, and Engle (2010) observed that parental deployment had a small but deleterious effect on academic achievement tests administered by the DoDEA schools, which seemed to correlate with the length of the deployment. A 2011 literature review of 9 studies on the impact of deployment on military children showed mixed results at best (White et al, 2011). Length of deployment correlated with a decrease in academic achievement was further confirmed by Lester and Flake’s (2013) assessment of the literature.

Military children “move six to nine times during a school career...an average of three times more frequently than nonmilitary families” (U.S. Department of Defense, N.D.). With such frequent moves, military adolescents report stress in school transition and self-consciousness about gaps in their education from such transitions (Bradshaw et. al, 2010). Bradshaw and associates (2010) observed that military adolescents had developed coping strategies, displaying a high resilience.

It is evident that the literature on military families reveals ambiguity and inconsistency in the understanding of the relationship between risk factors and outcomes for students. However, given what is known about the attainment of milestones for
civilian families, military children exposure to changing environments, through a high frequency in moving, coupled with experiencing a high likelihood of parental absence, suggests that children of military families may be at risk in successfully navigating the postsecondary education pipeline.

**Conceptual Framework**

Building upon the literature (e.g., Cabrera & LaNasa, 2000; Flint, 1992; Hossler, et al., 1991; Perna & Titus, 2005; Rowan, et al., 2008; Swell & Shah, 1968), the Milestones Towards College Model (see Figure 1) posits that parental encouragement and involvement helps pave the way for a child’s journey to postsecondary education (Cabrera & LaNasa, 2001; Rowan, et al., 2008). In addition to providing emotional support and encouragement (Sewell, 1968; Steinberg, et al., 1992; Tierney & Auerbach, 2005), parents’ involvement in their students’ experience in school has significant implications for academic development and academic preparation for college (Fan & Williams, 2010; Perna, 2005). Research also suggests that students with parents who are involved in their education develop greater educational aspirations and plans for college (Adelman, 1999; Stage & Hossler, 1989) and have a greater likelihood of applying for and enrolling in college (Cabrera & LaNasa, 2000; Perna & Titus, 2005). Research consistently emphasizes the strong relationship that exists between academic preparation and enrollment in college (Cabrera & LaNasa, 2001; Hossler et al., 1999, 2003; Perna, 2005; Rowan et al., 2008).

[Insert Figure 1 here]

**Methodology**

**Data Source**

This study relies on data from the Education Longitudinal Study of 2002 (ELS:02) to examine the process leading to the attainment of milestones towards college among military children as they transitioned from grade 10 in 2002 to grade 12 in 2004. Our sample is comprised of approximately of 230 and 15,000\(^1\) unweighted individuals, which represent about 46,000 and 3.2 million children of military and civilian families, respectively who were 10th graders in 2002. In examining the base-year and follow-up questionnaires from 2002 and 2004, this current study focuses on the key period of military deployment, in which significant increases in deployment occurred in our nation.

The sample of military children represents 1% of the total population of 10th graders in 2002. Almost 60% of military children were raised in families whose median family income fell in the $35,000 - $75,000 range and among parents with some college education (64%). The population of military children is evenly split in terms of gender. White middle school students make up the majority of the cohort (59%), followed by African Americans (23%), Hispanics (4.5%) and Asian Americans (2.2%). The ethnic diversity noted among military children is consistent with that reported by Segal and Segal (2004).

**Accounting for sampling design effects**

ELS:02 follows a complex design, stratified multistage sampling strategy with unequal probability of sample selection, to approach the population of 10th graders in

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\(^1\) All unweighted sample sizes reported in this paper are rounded up or down to comply with NCES’ data security analysis.
2002 (Ingels et al., 2014). We selected the panel weight F1PNLWT. This weight allowed us to include only those 10th graders who participated in the base year (2002) and in the follow-up (2004) when the subjects were 12th graders.

As noted by Stapleton (2013), structural modeling is prone to produce biased point estimates and large sampling variances when using complex sample designs as those incorporated in ELS:02. The former leads to incorrect parameter estimates, while the latter increases the likelihood of making type 1 error (Thomas & Heck, 2001). To address ELS:02’s complex design effect, we relied on Mplus’ pseudomaximum likelihood estimation method (Asparouhov, 2005). Accordingly, stratification (strat_id), clustering (psu) and the weight variable (F1PNLWT) were incorporated in all our models using the complex design option and the variance adjusted weighted least squares estimator (WLSMV) in Mplus 7.31 (Muthén & Muthén, 1988-2015).

**Model testing**
In answering our three research questions, we adopted a three-step strategy as recommended in the structural equation modeling (SEM) literature (Brown, 2015; Wang & Wang, 2012). In the first step, we examined the extent to which the measurement model underscoring the Milestones Toward College model held for civilian and military children individually. Next we performed two types of invariance testing: measurement and structural model invariance. We relied on measurement invariance tests to ascertain whether the form or configuration of the measurement model, the loadings of each construct, the marker indicators for each latent factor and the indicator intercepts apply to both civilian and military children. Then, we conducted a series of invariance tests seeking to determine whether the latent factor variances and covariances apply to the two groups. The SEM literature deems invariance modeling as a key condition before conducting structural equation modeling. Without it, one cannot ascertain that the “…factors measure the same constructs in the same fashion in each group” (Brown, 2015 p. 262).

Having ascertained the extent which the measures reliably appraised the constructs in the Milestones Towards Model for both civilian and military children, we proceeded to answer our second research question by testing our model in both military and civilian groups via SEM. We also estimated indirect and indirect effects in each group. In answering our third research question, we relied on Latent Means Modeling (LMM) to test for differences between civilian and military children on their levels of parental encouragement and attainment of milestones. Similar to ANCOVA, the LMM approach controls for relevant independent variables when drawing comparisons across groups in a simultaneous manner. However, LMM has the added advantage of incorporating measurement errors for both the independent and dependent variable (Thompson & Green, 2006)

Considering the lack of multivariate normality in our data (see Mardia tests in tables 1 and 2) and the presence of categorical and continuous variables, we relied on the WLSMV estimator. WLSMV generates standard errors that are robust to non-normality while taking into account the mixed measurement properties of the variables under consideration (Finney & DiStefano, 2013). In judging alternative measurement and structural invariance models, we relied on Mplus’ DIFFTEST option for testing chi-square differences. Muthén and Muthén (1988-2015) note that the chi-square value for
WLSMV cannot be trusted when comparing two nested models. The chi-square difference resulting from WLSMV does not follow a chi-square distribution.

**Goodness of fit indices**

We relied on several robust measures of fit in judging the different CFA and SEM models we tested. Those indices included: the Comparative Fit Index (CFI), the Tucker Lewis index (TLI), and the Root Mean Square Error of Approximation (RMSEA). We also report chi-square test while noting that this test is highly sensitive to sampling sizes. In general, large sample sizes tend to be associated with significant chi-squares while the opposite is true for small sample sizes (Brown, 2015). Both the CFI and the TLI have a range of possible values between 0 and 1, with values closer to one signifying good fit. In terms of RMSEA, we considered values ranging from 0 to .05 to signify good fit, while values ranging from .08 to .10 were deemed to be a poor or mediocre fit (Byrne 2012). We estimated 90% confidence intervals, hereby referred as CI_{90%}, to check that RMSEA values did not fall beyond the cut off value of .10, signifying the rejection of the model (Brown, 2015; Byrne 2012; Wang & Wang, 2012).

**Handling of missing cases**

We relied on Full Information Maximum Likelihood methods (FIML) to handle missing cases. FIML is considered as a state of art technique in SEM (Brown, 2015; Cox et al., 2014; Enders, 2013; Heck & Thomas, 2015).

**Measures**

The measures we selected reflect predictors of milestones taking place at the 10th grade and then the outcome measures for attainment of milestones at the 12th grade.

**Milestones Toward College measures.** In appraising whether the subject had taken college admission tests by the 12th grade, we relied on an item labeled P2PSEEXM reporting type of college admission test taken based on records provided by the College Board and ACT. For our measure of high school grade point average for all academic courses, we relied on a high school transcript-based indicator labeled F1RAGP. Only one of our three indicators of attainment of milestones by 12th grade measure is self-reported: having applied or planning to apply to a four-year institution (F1S49).

**Parent Involvement measures.** Cabrera and LaNasa (2000) suggest that parental encouragement includes both motivational and behavioral dimensions. While the motivational component of parental encouragement contributes to managing and maintaining educational expectations, the behavioral component is more proactive and has been found to be associated with high school students’ academic achievement (Stewart, 2008) as well as with actual college enrollment (Perna & Titus, 2005). Our examination of ELS:02 revealed 6 indicators of proactive elements of parental involvement, collected when the subjects were at the 10th grade. Those include having discussed with parents school courses (BYS86A), school activities (BYS86B), topics studied in class (BYS86C), grades (BYS86D), preparation for ACT/SAT (BYS86F), and going to college (BYS86G). Each of these items was measured in a Likert scale ranging from to 1 to 3 (Never, Sometimes, Often).

**Socioeconomic Status measures.** Consistent with the literature (Jaeger, 2011; White, 1982), this study accounts for socioeconomic status through the measures of parental education and family income. The data for these variables were all collected during the base year of collection of the longitudinal study in 2002 when students were in 10th grade.
**Academic Ability measure.** Academic ability was measured in 2002, when the students were in 10th grade, using a composite standardized test score (BYTXCST) from the ELS reading and mathematics cognitive tests.

Descriptive statistics, percent of missing values and Mardia tests of multivariate analyses are reported for both military children and civilian children in tables 1 and 2. The proportion of missing cases for military children range from 0 to 28 and the proportions for civilian children range from 0 to 21. We handled missing cases using Mplus’FIML.

[Insert Table 1 here]
[Insert Table 2 here]

**Results**

Results are organized in three parts corresponding to our research questions. In part one, we examine the extent to which the measurement of the attainment of milestones model is invariant across military and civilian children. In part two, we report the extent to which the process underscoring the attainment of milestones holds for civilian and military families. In part three, we answer the question pertaining differences in the attainment of milestones towards college between military and civilian children.

**Part 1: Measurement invariance**

We followed a stepwise procedure to examine the extent to which the measurement model underscoring the milestone model applies equally to both military and civilian populations. Accordingly, we started with testing the CFA model for each group. Next, we conducted two sets of invariance tests. The first test examined the invariance of the measurement component of the CFA model (e.g., loadings), while the second test examined the invariance of the component of the CFA model (e.g., factor variances and covariances). Within each domain, we proceeded with least restrictive solutions to increasing restrictive solutions. At each step, the increasingly restrictive model was evaluated using nested $\chi^2$ tests.

Table 3 reports the results of testing eight models seeking to answer research question one. Panel 1 reports the single CFA solutions for both civilian and military children. Panel 2 reports the results of testing 4 invariance measurement models ranging from configural (also known as equal form) to strong measurement invariance. Panel 3 reports the tests of structural invariance ranging from latent factor invariance to both latent factor and covariance invariance.

[Insert Table 3 here]

**CFA Results.** As shown in Panel 1 of Table 3, our CFA results show that our measures are robust indicators of the three constructs underscoring the Milestones Towards College Model for both civilian and military children. All goodness of fit indicator values fell within acceptable ranges for civilian children ($\chi^2 = 640.6$; $p < 0.000$; *RMSEA = 0.028, *CI$_{90\%}$ = [0.026, 0.030]; *CFI = 0.969, *TLI = 0.960) and military children ($\chi^2 = 50.0$; $p = 0.512$; *RMSEA = 0.000, *CI$_{90\%}$ = [0.000, 0.041]; *CFI = 1.000, *TLI = 1.004). Moreover, the pattern of factor loadings within the model across both groups also supported its strength. In the case of civilian children, the loadings ranged from 0.583 for family income, an indicator of SES, to 0.974 for having planned or taken college admission tests, an indicator of Milestones. Among military children, the range of loadings was of 0.586 for BYS86C, an indicator of parental involvement, to 0.932 for having planned or taken college admission tests, an indicator of Milestones.
Measurement invariance results. The configural form model served as the baseline against which a series of hierarchal invariance models were tested. Those tests ranged from invariance of marker item factor loadings model, weak measurement invariance model to strong measurement invariance model. The configural model fits data well ($\chi^2 = 545.8, p < 0.000$; *RMSEA = 0.024, *CI90% = [0.022, 0.026]; *CFI = 0.997 *TLI = 0.971) suggesting that the pattern of factor loadings and covariance holds for both civilian and military children populations. The likelihood ratio test based on the model $\chi^2$ difference between the configural model and the marker item factor loadings model ($\Delta\chi^2 = 1.4, \Delta df = 3$) is not statistical significant ($p = 0.551$) implying that father’s education (FAED), discussing with parents school activities (BYS86B) and having planned or taken college admission tests (TESTED) are invariant indicators of SES, Parental Involvement and Milestones across both populations. Moreover, the invariance of marker item factor loadings displays excellent indicators of fit (*RMSEA = 0.022, *CI90% = [0.020, 0.024]; *CFI = 0.979 *TLI =0.974). The weak measurement model posits that both marker and non-marker factor items are invariant across civilian and military children. Results indicate that there is indeed metric invariance. The difference in chi-square tests between the configural and the weak measurement model was non-significant ($\Delta\chi^2 = 7.2, \Delta df = 9, p = 0.619$). Moreover the weak measurement model fits the data well (RMSEA = 0.019, *CI90% = [0.018, 0.021]; *CFI = 0.983 *TLI =0.980).

The strong measurement invariance model tests the null hypothesis that the factor loadings as well as their intercepts with the latent construct are invariant across groups. The likelihood ratio test based on the model $\chi^2$ difference between the strong measurement invariance model and the configural one shows a decrease in chi-square that is not statistically significant ($\Delta\chi^2 = 18.8, \Delta df = 17, p = 0.340$). The strong measurement model displays good fit indices as well (RMSEA = 0.018, *CI90% = [0.016, 0.020]; *CFI = 0.985 *TLI =0.983). Thus, the null hypothesis that factor loadings and item intercepts are invariant across military and civilian children cannot be rejected.

Structural invariance. The strong measurement model served as the baseline against which a series of hierarchal invariance tests regarding the structural components of the CFA model; namely, invariance of latent factors variance, and invariance of latent covariances and variances. The difference in chi-square tests between the latent factor variance and the strong measurement model was not significant ($\Delta\chi^2 = 1.7, \Delta df = 3, p = 0.635$) suggesting that the latent factors SES, Parental Involvement and Milestones towards college have the same distribution across military and civilian children while having invariant loadings and intercepts as well. The model itself has excellent indicators of fit (RMSEA = 0.015, *CI90% = [0.014, 0.017]; *CFI = 0.988 *TLI =0.988), which further supports this hypothesis. Subsequent tests reveal that not only the variances of the latent factors do not vary across the two groups, but neither their covariances ($\Delta\chi^2 = 3.4, \Delta df = 3 p = 0.635$).

Taken altogether our measurement and structural invariance tests indicate that the relationships among the latent constructs SES, Parental Involvement in School Activities in 10th grade and Attainment of Milestones by 12th grade measured by the 12 items hold for both across civilian and military children. Having met this condition, we report the results of our SEM model testing and differences in latent means in the following sections.

Part II: SEM Results
**Attainment of milestones among civilian 12th graders.** Figure 2 depicts the structural coefficients associated to the different equations underscoring the milestone towards college model. Hypothesized effects found significant are represented with a straight line. Dotted lines depict hypothesized paths found non-significant. Table 4 reports the direct and indirect effects of SES and Academic Ability on attainment of milestones towards college among civilian children. We report all paths in standardized units.

As indicated by CFI and the Tucker-Lewis Fit Index (TLI) values of 0.962 and 0.952, the hypothesized model displays a good fit to the data. This conclusion is further strengthened by a REMSA of 0.030, which is far below Hu and Bentler’s (1999) recommended threshold. Moreover, the 90% confidence interval associated to REMSA falls in a range that Byrne (2012) characterizes as signifying a good fit (*CI<sub>90%</sub> = [0.028, 0.031]).

Overall, we found support for the hypothesized relationships among the constructs underscoring the Milestones towards College as it applies to the civilian population. All hypothesized paths were significant and the size of the structural path regressions ranged from being small (Ability → Parental Involvement = 0.140) to being moderately high (Ability → Attainment of Milestones = 0.484). The model accounted for 23.4% of the variance in Academic Ability, explained nearly 10% of the variance in Parental Involvement in School Activities and elucidated nearly 60% of the variance in Attainment of Milestones. Parental SES has significant and positive effects on Ability (0.484), Parental Involvement (0.219) and Attainment of Milestones (0.2858). SES’ also exerts indirect effects on Milestones. Those three indirect effects are exerted thru: (1) Ability (0.218), (2) Parental Involvement (0.053*), and (3) via Ability and then thru Parental Involvement (0.016). The total effect of SES on Attainment of Milestones is significant and moderately large (0.575). Of the total effect SES has on Milestones half of it is accounted by indirect effects (0.287). Academic ability exerts a direct, though small, effect on Parental Involvement (0.140) while exerting a moderate high direct (0.452) on this latent factor. Ability also positively moderates the effect Parental Involvement has on attainment of Milestones towards college. However, of the total effect Ability has on Milestones most of it is accounted by its direct effect (0.452 of 0.485). All in all, our results are quite consistent with the extant literature (Fan & Chen, 2001; Hossler & Stage, 1992; Hossler et al., 1999; Stage & Hossler, 1989; Swell & Shah, 1968).

**Attainment of milestones among military 12th graders.** Figure 3 reports the regression coefficients in standardized units, while table 5 reports the direct, indirect and total effects of the Attainment of Milestones Model among military children.

Results from the estimation of the model for military children produced goodness of fit indices signifying excellent fit to the data (*χ² = 62.3, df = 61, p = 0.438; *RMSEA = 0.009, *CI<sub>90%</sub> = [0.000, 0.042]; *CFI = 0.997, *TLI = 0.996). The SEM model accounted for almost 60% of the variance in the attainment of milestones towards college. It also explained 10 of the observed variance in military parental involvement in
school activities while accounting for 17% of the variation in military children’s academic ability. As in the case of civilian children, military children’s attainment of milestones towards college is affected by their parent’s socioeconomic status (0.388) and their parental involvement in school activities (0.388) as well as by their academic ability (0.339). Strikingly, however, military families’ involvement in their children’s school activities is neither affected by their socioeconomic background, nor by their offspring’s academic ability (see Figure 3 and Table 5). Unlike the case of the civilian population, SES was found to exert indirect effects on Milestones via Academic Ability only (0.141*). SES neither mediates the relation between Ability and Attainment of Milestones, nor does it mediate joint interaction between Academic Ability and Parental Involvement on Milestones. Most of the total effect SES exerts on attainment of milestones among military children is accounted by the direct SES exerts on attainment of milestones (0.388* of 0.620*). Unlike the case of the civilian population, academic ability was found to exert no indirect effect on the attainment of milestones among military children. Nearly 90% of the total effect of Ability on Milestones was due to its direct path with this outcome (0.339* out of 0.385*).

Part III: Differences in milestones towards college civilian and military families

Latent means differences (LLM). Goodness of fit indices, as a whole, are supportive of the latent means model as a viable framework to test differences in the attainment of milestones between civilian and military families ($\chi^2 = 825.7$, $df = 71$, $p < 0.000$; *RMSEA = 0.026, *CI90% = [0.025, 0.028]; *CFI = 0.966, *TLI = 0.956). The LLM reveals that military children do not differ in relation to their civilian counterparts in terms of academic ability ($z = -0.009$, $p > .05$) and levels of support and encouragement they receive from their parents ($z = 0.018$, $p > .05$). However, military children display lower levels of attainment of milestones towards college by 12th grade ($z = -0.026$, $p < .05$); yet, this difference in percentile points is small if not trivial. Net of measurement error and the joint effects of latent factors in the model, a military child test score is, on average, 1.03 percentage points below that of a civilian child.

Limitations

Our study has several limitations. To begin with, the nuances associated with living in military bases, civilian communities, overseas, or a combination of all those arrangements is absent in our study. In addition, the diversity of school arrangements military children experience is not captured by ELS:02. Moreover, the lack of significant associations between SES and parental encouragement and support among military children could also be attributed to differences in samples sizes between civilian and military children.

Because of those reasons our study should be considered an exploratory examination of the role that SES, family encouragement and support, as well as academic ability play in the attainment of milestones towards college among military children. In so doing, however, we relied on a representative national database that follows military children in their attainment of milestones towards college in one of the most difficult periods experienced by military families in recent memory. Moreover, our selection of variables is guided by what the extant literature acknowledges as relevant in appraising our constructs. Furthermore, we incorporated the transcript data provided within ELS:02,
giving us objective measures for college admission tests and high school grade point average in all academic subjects.

**Discussion**

This study examined the differences in attainment of milestones towards college between the civilian and military children populations during the 2002-04 period of time. To this end, we first ascertained the extent to which the measurement component of the milestones toward college was invariant across civilian and military children. Then, we examined whether the process underscoring the attainment of milestones towards college held among military children, and whether military children had similar levels of parental encouragement and support towards college, as well as attainment of milestones towards college. Drawn from the literature on factors exposing high school students to academic risk along with the sparse literature on military adolescents, our hypothesis was that military children would not attain the appropriate milestones toward college upon reaching the 12th grade in comparison to their civilian peers. Surprisingly, we found that military children attained milestones toward college at levels comparable to their civilian peers. However, the model showed non-significant relationships between parental involvement and ability and parental involvement and socio-economic status for military children, while these relationships were significant for civilian children. Those remarkable results indicate a level of resilience in military families as the children face parental absence due to deployments and frequent relocation during their K-12 years. These unexpected results led us to a re-examination and revision of the attainment of milestones framework for children of the military based on the unique military culture, as well as such perspectives as funds of knowledge and self-determination theory.

**Revising the Attainment of Milestones Framework for Military Children**

Given the robustness of the attainment of milestones model and the unexplained non-significant relationships between both parental involvement/ability and parental involvement/SES for military children, we propose revisions to the attainment of milestones theoretical framework as it applies to children of military families. These revisions take into account military culture, using self-determination theory (Deci, et al., 1991) and Funds of Knowledge (González, Moll, & Amanti 2013; Kiyama, 2010). Such perspectives offer an alternative way of thinking about the results of this study and the attainment of milestones framework in context of military children and families.

**Parental Involvement and the Concept of the “Military Family”**

Although the data for our study were taken during a time of sharply increased deployments, parental involvement for children of the military did not seem to wane, as one would have expected from what we know of the literature on at-risk children. Part of the explanation for this surprising result could be traced back to the unique culture of the military community. In the military community, military parents often do not parent alone: there is a powerful set of networks tying the family to other families in their unit, as well as with churches, and various military base and non-military affiliated groups. The extensive services and networks military families rely upon may compensate for the absence of a parent during deployment: in short those networks constitute unique funds of knowledge (González et al., 2013; Kiyama, 2010) which influence the ways in which military children and their parents make decisions about and prepare for postsecondary educational opportunities. Moreover, those networks and services may in and of themselves be a unique source of encouragement and support that expand, if not
complement, the support coming from the immediate family (George Mwangi, 2015). For the purposes of our revised model, we would include the “Military Family” alongside Parental Involvement acknowledging that one is, indeed, an extension of the other for purposes of support for young people.

**Student Ability, Parental Involvement, and Self-Determination Theory**

Our results suggest that military families encourage their children to attain academic milestones towards college irrespective of their academic ability, a finding that stands in sharp contrast to the one among civilian families. Self-determination theory could assist in explaining this lack of connection between a student’s academic ability and parental encouragement in the military context (Deci et al., 1991). Self-determination theory posits that motivation is on a continuum, with internal factors as the strongest source of motivation and external factors as a weaker source of motivation but salient nonetheless (Deci et al, 1991). The internal factors are the strongest motivators precisely because they are within an individual’s locus of control, which provides an individual with a feeling of power to change their circumstances (Deci et al, 1991). The military family, according to the definition discussed above, may act as a motivator for military children, providing a sustaining source of support throughout the attainment of milestones process. This commitment can be traced back to the military culture of advancing careers of commissioned and noncommissioned officers via education. In the military context, education is earned rather than bestowed, relocating the locus of control from external influences to the individual. Operating on the philosophy that the military is a meritocracy, the perception that hard work trumps ability empowers the military family and the military child in their attainment of milestones. Consequently, in our revision of the attainment of milestone framework for military children, we posit that self-determination is a construct that can be placed side-by-side with ability in affecting attainment of milestones towards college while having links to socioeconomic status (a proxy for rank in the military) as well.

**Socio-Economic Status, Military Family/Culture, and Self-Determination Theory**

The finding that military children’s socioeconomic status does not impact parental involvement goes against what we have learned from almost five decades of research on civilian families (Fan & Chen, 2001; Hossler & Stage, 1992; Hossler et al., 1999; Stage & Hossler, 1989; Swell & Shah, 1968). The lack of relationship may be explained in part by the military’s organizational culture. Military families live in a culture where education pays in the form of increasing earnings by the attainment of a higher rank. Educational opportunities provided by the military demystify the path to success and the value of academics, giving the individual a sense of control over their career path and monetary rewards. Self-determination theory, again, impacts the military child and their families because rank is tied to education (Deci et al, 1991). The military child, as a witness to their uniformed parents’ continuing education and moving through the ranks, internalizes the power of degrees in relation to socio-economic status. The importance of a bachelor’s degree in the everyday earnings and well-being of a family is also internalized by the military parent, incentivizing their investment in their child’s education and future. A more nuanced understanding as to why families stress education for their children can be enhanced by the incorporation of rank in a revised framework for the attainment of milestones for military children. Such a revised model for the attainment of milestones among military children is depicted in Figure 4.
Conclusion

Between 2002 and 2004, military families experienced the beginning of a cycle of deployments that lasted more than a decade (McLean & Tse, 2011). The absence of the uniformed parent coupled with the increased likelihood of changing schools may suggest military children were at high risk in their attainment of milestones towards college during the 2002-04 period of time. Save for the lack of an effect of SES and academic ability on parental involvement, this study reveals that the process of attainment of milestones toward college among military children is remarkably similar to that of civilian children. Moreover, there were no differences in academic readiness, parental encouragement and support, nor differences in the attainment of milestones toward college between civilian and military children.

The lack of an impact of SES along with the remarkable level of resilience displayed by military children calls into question what we know about the applicability of the role of SES and at risk factors from the civilian population to the military population. Our results seem to confirm Bradshaw and associates’ (2010) findings about the resiliency of military children by noting how military adolescents had developed coping strategies for addressing deployment of parents and change of schools. Reasons for such remarkable endurance among military children call for a re-examination of the attainment of milestones towards college for this unique student population.
# Tables

Table 1. Descriptive statistics and tests of multivariate normality for civilian children

<table>
<thead>
<tr>
<th>Construct/Item</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>% Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic Ability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standardized test composite at 10th grade (bytxcst)</td>
<td>50.7</td>
<td>9.971</td>
<td>0</td>
</tr>
<tr>
<td><strong>Socioeconomic Status (SES)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s highest education (MOED)</td>
<td>1.93</td>
<td>0.871</td>
<td>16</td>
</tr>
<tr>
<td>Father’s highest education (FAED)</td>
<td>1.95</td>
<td>0.892</td>
<td>21</td>
</tr>
<tr>
<td>Family income (BYINCOME)</td>
<td>9.06</td>
<td>2.427</td>
<td>0</td>
</tr>
<tr>
<td><strong>Parental Involvement at the 10th grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussed School Courses (BYS86A)</td>
<td>2.10</td>
<td>0.683</td>
<td>18</td>
</tr>
<tr>
<td>Discussed school Activities (BYS86B)</td>
<td>2.19</td>
<td>0.710</td>
<td>18</td>
</tr>
<tr>
<td>Discussed Items Studied in Class (BYS86C)</td>
<td>2.10</td>
<td>0.664</td>
<td>18</td>
</tr>
<tr>
<td>Discussed Grades (BYS86D)</td>
<td>2.42</td>
<td>0.620</td>
<td>18</td>
</tr>
<tr>
<td>Discussed SAT/ACT Prep (BYS86F)</td>
<td>1.76</td>
<td>0.727</td>
<td>18</td>
</tr>
<tr>
<td>Discussed Going to College (BYS86G)</td>
<td>2.35</td>
<td>0.670</td>
<td>18</td>
</tr>
<tr>
<td><strong>Attainment of Milestones towards College (Milestones)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking or planning to take admission tests by 12th grade (TESTED)</td>
<td>0.658</td>
<td>0.421</td>
<td>0</td>
</tr>
<tr>
<td>Cumulative GPA in academic subjects by 12th grade (GPA)</td>
<td>2.58</td>
<td>0.831</td>
<td>08</td>
</tr>
<tr>
<td>Planning or having applied to a 4-year institution (PLAN4YR)</td>
<td>0.606</td>
<td>0.489</td>
<td>08</td>
</tr>
</tbody>
</table>

**Tests of multivariate normality**

- Doornik-Hansen multivariate test $= 10.772, p < .001$
- Mardia multivariate skewness $= 6.78, p < .001$
- Mardia multivariate kurtosis $= 204.20, p < .001$
Table 2. Descriptive statistics and tests of multivariate normality for military children

<table>
<thead>
<tr>
<th>Construct/Item</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>% Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic Ability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standardized test composite at 10th grade (bytxcst)</td>
<td>50.0</td>
<td>9.307</td>
<td>0</td>
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<tr>
<td><strong>Socioeconomic Status (SES)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s highest education (MOED)</td>
<td>1.87</td>
<td>0.824</td>
<td>19</td>
</tr>
<tr>
<td>Father’s highest education (FAED)</td>
<td>2.03</td>
<td>0.859</td>
<td>28</td>
</tr>
<tr>
<td>Family income (BYINCOME)</td>
<td>9.11</td>
<td>2.114</td>
<td>0</td>
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<tr>
<td><strong>Parental Involvement at the 10th grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussed School Courses (BYS86A)</td>
<td>2.20</td>
<td>0.725</td>
<td>22</td>
</tr>
<tr>
<td>Discussed school Activities (BYS86B)</td>
<td>2.23</td>
<td>0.759</td>
<td>22</td>
</tr>
<tr>
<td>Discussed Items Studied in Class (BYS86C)</td>
<td>2.18</td>
<td>0.674</td>
<td>22</td>
</tr>
<tr>
<td>Discussed Grades (BYS86D)</td>
<td>2.48</td>
<td>0.659</td>
<td>22</td>
</tr>
<tr>
<td>Discussed SAT/ACT Prep (BYS86F)</td>
<td>1.83</td>
<td>0.761</td>
<td>23</td>
</tr>
<tr>
<td>Discussed Going to College (BYS86G)</td>
<td>2.42</td>
<td>0.638</td>
<td>23</td>
</tr>
<tr>
<td><strong>Attainment of Milestones towards College (Milestones)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Taking or planning to take admission tests by 12th grade (TESTED)</td>
<td>0.650</td>
<td>0.478</td>
<td>0</td>
</tr>
<tr>
<td>Cumulative GPA in academic subjects by 12th grade (GPA)</td>
<td>2.40</td>
<td>0.829</td>
<td>08</td>
</tr>
<tr>
<td>Planning or having applied to a 4-year institution (PLAN4YR)</td>
<td>0.545</td>
<td>0.499</td>
<td>11</td>
</tr>
</tbody>
</table>

**Tests of multivariate normality**
- Doornik-Hansen multivariate test = 181.96, \( p < .001 \)
- Mardia multivariate skewness = 35.66, \( p < .001 \)
- Mardia multivariate kurtosis = 207.19, \( p < .001 \)
Table 3. Tests of invariance for the Milestones towards College Model

<table>
<thead>
<tr>
<th>Groups</th>
<th>χ²</th>
<th>df</th>
<th>Δχ²</th>
<th>Δdf</th>
<th>p-value</th>
<th>RMSEA (CI_{90%})</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single group solutions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Civilian</td>
<td>640.56</td>
<td>51</td>
<td>-</td>
<td>-</td>
<td>0.000</td>
<td>0.028 (0.026,0.030)</td>
<td>0.969</td>
<td>0.960</td>
</tr>
<tr>
<td>2. Military</td>
<td>50.03</td>
<td>51</td>
<td>-</td>
<td>-</td>
<td>0.512</td>
<td>0.000 (0.000,0.041)</td>
<td>1.000</td>
<td>1.004</td>
</tr>
<tr>
<td><strong>Measurement invariance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Configural</td>
<td>545.84</td>
<td>104</td>
<td>-</td>
<td>-</td>
<td>0.000</td>
<td>0.024 (0.022,0.026)</td>
<td>0.977</td>
<td>0.971</td>
</tr>
<tr>
<td>4. Invariance of marker item factor loadings</td>
<td>513.68</td>
<td>107</td>
<td>2.1</td>
<td>3</td>
<td>0.551</td>
<td>0.022 (0.020,0.024)</td>
<td>0.979</td>
<td>0.974</td>
</tr>
<tr>
<td>5. Weak measurement invariance</td>
<td>440.07</td>
<td>113</td>
<td>7.2</td>
<td>9</td>
<td>0.619</td>
<td>0.019 (0.018,0.021)</td>
<td>0.983</td>
<td>0.980</td>
</tr>
<tr>
<td>6. Strong measurement invariance</td>
<td>418.49</td>
<td>121</td>
<td>18.8</td>
<td>17</td>
<td>0.340</td>
<td>0.018 (0.016,0.020)</td>
<td>0.985</td>
<td>0.983</td>
</tr>
<tr>
<td><strong>Structural invariance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latent factor invariance</td>
<td>349.63</td>
<td>124</td>
<td>1.7</td>
<td>3</td>
<td>0.635</td>
<td>0.015 (0.014,0.017)</td>
<td>0.988</td>
<td>0.988</td>
</tr>
<tr>
<td>Latent covariances &amp; variances invariance</td>
<td>314.68</td>
<td>127</td>
<td>3.4</td>
<td>6</td>
<td>0.755</td>
<td>0.014 (0.012,0.016)</td>
<td>0.990</td>
<td>0.990</td>
</tr>
</tbody>
</table>
Table 4. Direct, indirect and total effects on milestones towards college among civilian children

<table>
<thead>
<tr>
<th>From SES to Milestones</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SES → Ability</td>
<td>SES → Parental Involvement</td>
<td>SES → Ability → Parental Involvement</td>
<td></td>
</tr>
<tr>
<td>0.285*</td>
<td>0.218*</td>
<td>0.053*</td>
<td>0.016*</td>
<td>0.287*</td>
</tr>
</tbody>
</table>

From Academic Ability to Milestones

<table>
<thead>
<tr>
<th>From SES to Milestones</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ability → Parental Involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.452*</td>
<td>0.034*</td>
<td></td>
<td>0.034*</td>
<td>0.485*</td>
</tr>
</tbody>
</table>

Table 5. Direct, indirect and total effect on milestones towards college among military children

<table>
<thead>
<tr>
<th>From SES to Milestones</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SES → Ability</td>
<td>SES → Parental Involvement</td>
<td>SES → Ability → Parental Involvement</td>
<td></td>
</tr>
<tr>
<td>0.388*</td>
<td>0.141*</td>
<td>0.072</td>
<td>0.019</td>
<td>0.232*</td>
</tr>
</tbody>
</table>

From Academic Ability to Milestones

<table>
<thead>
<tr>
<th>Direct</th>
<th>Indirect</th>
<th>Total Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability → Parental Involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.339*</td>
<td>0.047</td>
<td>0.047</td>
<td>0.385*</td>
</tr>
</tbody>
</table>
Figure 1. Attainment of Milestones Model

Figure 1. Attainment of Milestones Model

Figure 1. Attainment of Milestones Model

Figure 1. Attainment of Milestones Model
Figure 2. Attainment of Milestones for Civilian Children (standardized results)

\[
\chi^2 (61) = 862.7 \ p < 0.001 \\
\text{RMESA} = 0.030; \text{CI} \ 90\% = [0.028,0.031] \\
\text{CFI} = 0.962 ; \text{TLI} = 0.952
\]
Figure 3. Attainment of Milestones among Children of the Military (standardized results)

χ² (61) = 62.3; p = 0.438
RMESA = 0.009 CI 90% = [0.000,0.042]
CFI = 0.997 ; Mean TLI = 0.996
Figure 4. Attainment of Milestones among Children of the Military
References


