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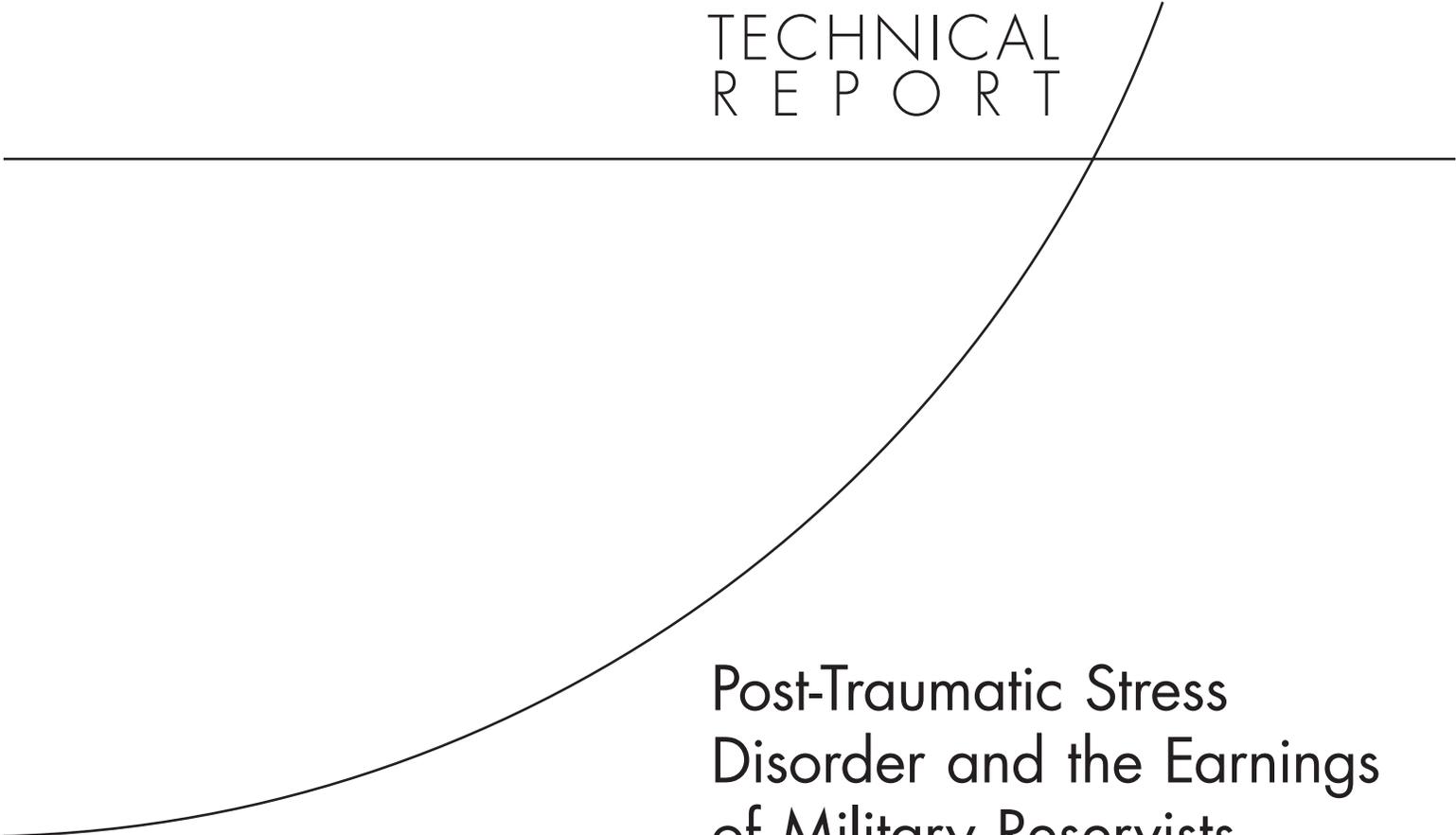
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# Post-Traumatic Stress Disorder and the Earnings of Military Reservists

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Prepared for the Office of the Secretary of Defense

Approved for public release; distribution unlimited



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## Summary

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The Department of Defense (DoD) has relied heavily on members of the reserve components of the U.S. military (hereafter referred to as *reservists*) to fight the wars in Iraq and Afghanistan. Reservists have suffered a variety of injuries during their deployments, many of which could significantly impact their future well-being. Among those injuries is the condition known as post-traumatic stress disorder (PTSD), an anxiety disorder that is precipitated by the experience of a traumatic event. Recent evidence suggests a high prevalence of PTSD among returning active- and reserve-component service members (e.g., Tanielian and Jaycox, 2008), prompting significant interest in the long-term consequences of PTSD for a variety of health, family, and economic outcomes.

This report investigates the effects of being symptomatic of PTSD on the employment and earnings of reservists in the years following deployment. Only a handful of studies directly estimate the effect of PTSD on the labor market outcomes of veterans, and none include U.S. veterans of the wars in Iraq and Afghanistan. Moreover, although the existing studies control for some covariates that are related to both labor market outcomes and PTSD, most lack data on such critical factors as ability and other dimensions of health. Thus, it remains unclear whether the associations they document represent causal effects of PTSD on labor market outcomes or the confounding effect of omitted factors. This report demonstrates that, while reservists symptomatic of PTSD do in fact earn substantially less than those who are not symptomatic of PTSD, much of that gap was apparent prior to deployment and the onset of PTSD symptoms. This fact suggests that characteristics of reservists correlated with reporting symptoms of PTSD are responsible for much of the observed difference in earnings between reservists who ultimately report PTSD symptoms at the end of deployment and those who do not.

## Data and Methods

In this study, we combine administrative data on PTSD symptoms among more than 315,000 reservists returning from deployments between 2003 and 2006 with longitudinal labor market earnings data to estimate the effects on earnings of being symptomatic of PTSD. Our data on PTSD symptoms are drawn from the Post-Deployment Health Assessment (PDHA), a health screening questionnaire that has been mandatory for virtually all service members returning from deployment since April 2003. Although we do not have access to formal diagnostic information regarding PTSD, the questionnaire includes the Primary Care PTSD (PC-PTSD) screening instrument. Researchers have demonstrated that responses to this instrument, which asks whether respondents have experienced any of four symptoms of PTSD, are highly correlated with clinical diagnoses of PTSD. We link relevant information from military personnel

and pay files and annual earnings data obtained from the Social Security Administration to the PDHA sample to estimate a variety of earnings and employment models.

Ordinary least squares (OLS) models take advantage of the availability of measures in data on such factors as pre-deployment health and aptitude that are correlated with experiencing PTSD symptoms and labor market outcomes, while fixed-effect models allow us to control fully for time-invariant unobservable factors. We also estimate instrumental-variable (IV) regressions that isolate exogenous variation in PTSD symptoms attributable to deployment location.

Although our data are particularly well suited to studying the effect of being symptomatic of PTSD on labor market outcomes, we nevertheless acknowledge several potential limitations of our empirical approach. First, as was done in most previous studies of PTSD, we observe whether individuals in our sample are symptomatic of PTSD rather than formally diagnosed with PTSD. Thus, we interpret our estimates as the effect of being symptomatic of PTSD rather than of being diagnosed with PTSD. It is possible that being diagnosed with PTSD has larger effects on labor market outcomes than being merely symptomatic. Second, reservists in our data reported whether they experienced specific symptoms of PTSD near the end of the deployment period. Consequently, we do not know whether they experienced these symptoms at the time their earnings were measured one or more years later. All else being equal, this type of misclassification could cause us to underestimate the effect of contemporaneous PTSD symptoms on labor market outcomes. Third, as in other mental health research contexts, separating the effects of PTSD symptoms from other illnesses comorbid with PTSD symptoms, such as depression, remains a formidable challenge. In some models, we control directly for indicators of other psychological problems, but to the extent that PTSD causes these problems, including such controls may lead us to underestimate the true effect of being symptomatic of PTSD. However, failure to control for such comorbid conditions could cause us to overestimate the effect of being symptomatic of PTSD. Finally, we have no information on post-deployment mental health treatment received by individuals in our sample, so our estimates combine effects for reservists who do and do not receive treatment for PTSD. If treatment ameliorates some of the negative effects of PTSD symptoms, our estimates will be attenuated relative to the effects that would be expected in the absence of treatment.

## Results

We report first that reservists symptomatic of PTSD at the end of their deployment are disadvantaged across numerous domains, including factors determined prior to deployment. Reservists symptomatic of PTSD earn substantially less than average in both their military and civilian employment prior to deployment. These reservists also exhibit lower educational attainment and scores on the Armed Forces Qualification Test (AFQT). The average annual pre-deployment earnings of reservists symptomatic of PTSD are \$6,027 less than those of reservists not symptomatic of PTSD, a difference of 17 percent. Reservists symptomatic of PTSD also tend to reside in areas with slightly lower income and higher shares of single-parent families and are drawn disproportionately from the Army and from lower ranks. Prior to deployment, reservists who are ultimately symptomatic of PTSD report worse-than-average general health and are considerably more likely to have sought recent treatment for a mental health issue than reservists not symptomatic of PTSD. Following deployment, reservists symp-

tomatic of PTSD also exhibit a relatively high incidence of other health problems, particularly symptoms associated with depression. This evidence strongly suggests that the propensity to experience PTSD symptoms at the end of deployment is correlated with individual characteristics that are established prior to the experience of the trauma that leads to PTSD.

In the year following deployment, reservists symptomatic of PTSD earn 17 percent less than reservists who are not symptomatic of PTSD—the same gap that existed pre-deployment. However, this gap diminishes to 5 percent once we account for demographic differences between the two groups. The estimated gap in earnings in the first year following deployment diminishes even further when we estimate first-differenced and IV models, which are likely to provide superior controls for endogeneity and unobserved heterogeneity. First-differenced models imply that being symptomatic of PTSD lowers the earnings of reservists in the first year following deployment by about 1 to 2 percent, while IV models imply effects of about 4 percent. We find larger effects of being symptomatic of PTSD on underemployment, suggesting that the impact of PTSD symptoms might be more substantial for those in the lower tails of the earnings distribution.

Although some reservists doubtless experience substantial problems in the labor market stemming from combat-related psychological trauma, our analysis indicates that the average short-run effects of being symptomatic of PTSD are small. Over time, however, the effect on earnings of being symptomatic of PTSD appears to increase in our first-differenced model, growing to about 6 percent of total earnings by the fourth year following deployment. These longer-term negative effects on earnings are attributable entirely to higher military separation rates among those symptomatic of PTSD, a concomitant decline in military earnings, and no compensating increase in civilian labor market earnings.

## Implications

Our empirical results have several implications. First, while it is clear that reservists who are symptomatic of PTSD earn less than those who are not, it would appear that a large portion of the correlation is attributable to fixed characteristics of individuals correlated with reporting symptoms of PTSD rather than to the effect of being symptomatic of PTSD per se. Our data demonstrate that symptoms of PTSD occur nonrandomly, underscoring the necessity of carefully isolating the effects of mental health problems from other factors that may contribute to adverse labor market and other outcomes.

Second, while PTSD symptoms appear to have little effect on civilian earnings, they have large effects on longer-run military earnings. Reservists symptomatic of PTSD at the end of deployment leave the military at much higher rates than other deployed reservists, but why this happens is unclear. It is possible that individuals begin with similar tastes for military service but that traumatic experiences while deployed engender negative perceptions of military service in general and perhaps fear of being deployed in the future. This seems like a particularly relevant possibility given that continuing to serve in the military might exacerbate PTSD symptoms for some individuals by exposing them to circumstances that remind them of prior traumatic events. Alternatively, it is possible that being symptomatic of PTSD makes reservists less productive in their military careers or carries a stigma that compromises their ability to advance. Given the large number of veterans exposed to traumatic events in Iraq and Afghanistan, further research to better understand how PTSD and the factors that make individuals susceptible to it affect military careers is warranted.