

INTRODUCTION

- African Americans (AAs) experience increased rates of adverse posttraumatic neuropsychiatric sequelae (APNS) versus European Americans (EA)(e.g. ^{1,2}).
- Few prospective studies of APNS development have been performed in this understudied population.
- In this analysis, we evaluated the rates of two APNS, posttraumatic stress symptoms (PTSS) and posttraumatic depressive symptoms (PDS), in AAs and EAs experiencing motor vehicle collision (MVC) trauma. We also evaluated for differences in vulnerability to these outcomes based on participant sex.
- In secondary analyses, we used machine learning approaches to identify top predictors of post-MVC PTSS and PDS in women and men.

METHODS

AA and EA individuals presenting to the Emergency Department (ED) within 24 hours of MVC were enrolled. Six-week follow-up surveys included an evaluation of PTSS (IES-R) and PDS (CES-D). Validated cutoffs of 33 (IES-R) and 16 (CES-D) were used to distinguish those who developed PTSS and mild PDS versus those who recovered^{3,4}. Multivariate regression analyses adjusting for ED study site and participant age were used to assess the influence of sex on PTSS and PDS severity. In secondary analyses, Random Forest ensemble learning methods were used to identify the most influential predictors of PTSS and PDS following MVC in AA women and men. ED assessments included in this analysis consisted of participant sociodemographic characteristics, acute pain location and severity, and psychological and cognitive characteristics. Variables with >5% missing data were removed from further analyses and variables with ≤5% missing data were imputed using Multivariate Imputation by Chained Equations (MICE)⁵. A total of 295 variables were included in Random Forest models using the R package randomForest⁶. These most influential variables (determined based on a drop in accuracy with additional variables added as predictors) were then used to test the accuracy of predicting PTSS and PDS using 10-fold internal cross validation. All analyses were performed using SAS v9.4 or R Studio v3.3.3.

TABLE 1. Participant characteristics and study design.

Characteristic	African American	European American
Participants, n	907	948
Females, n (%)	570 (62%)	575 (61%)
Age, years, mean (SD)	35.1 (12.2)	36.0 (13)
Education, n (%)		
High school or less	366 (40%)	226 (23%)
Some college	374 (41%)	368 (39%)
College	134 (15%)	237 (25%)
Post-college	36 (4%)	113 (12%)
ED stress level, mean (SD)	22.3 (11.6)	19.2 (9.9)
BMI, mean (SD)	29.9 (7.6)	27.6 (6.4)

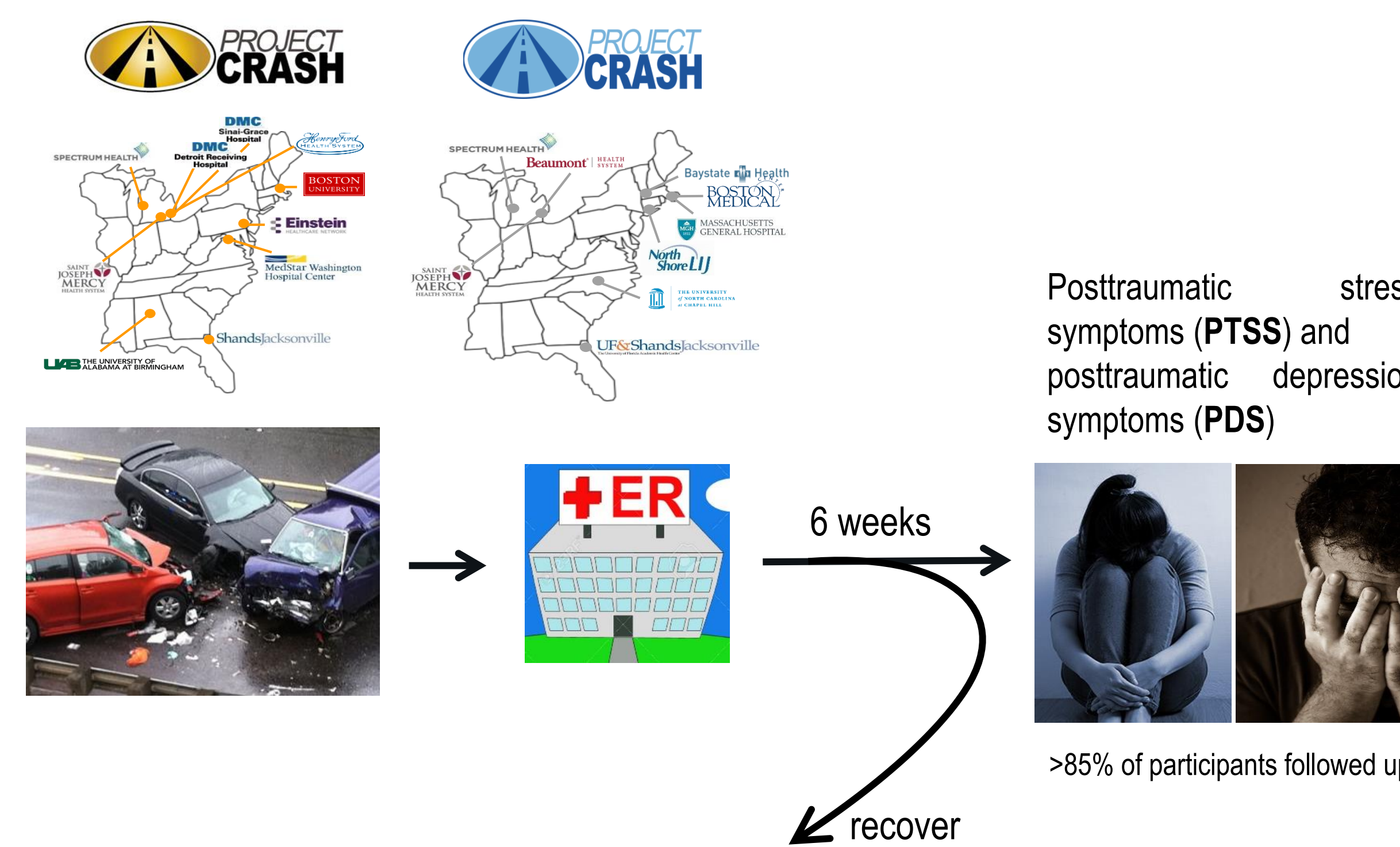


FIGURE 1. PTSS and PDS are more prevalent in AA than EA six weeks following MVC.

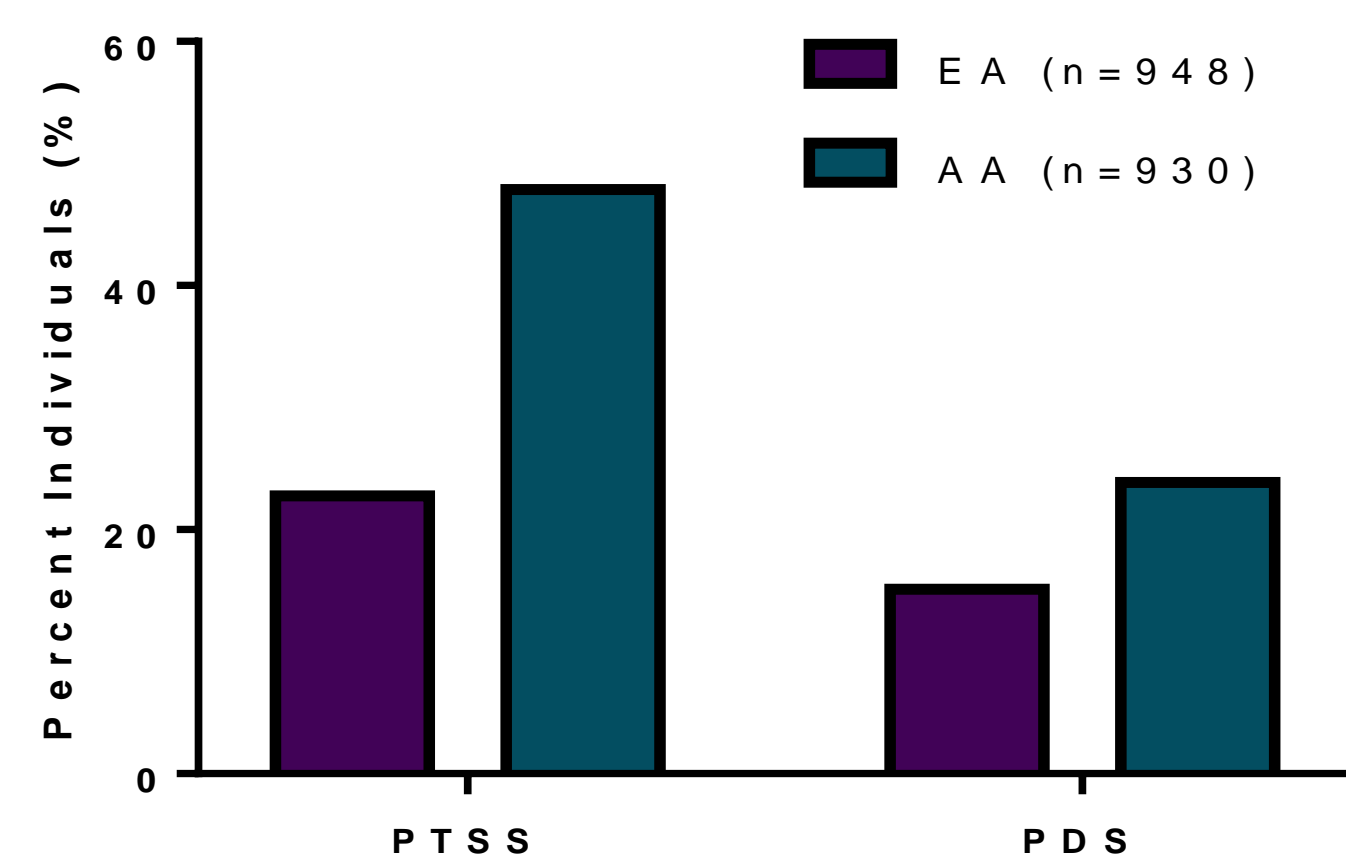


FIGURE 2. Both EA and AA women report higher levels of PTSS than men six weeks following MVC.

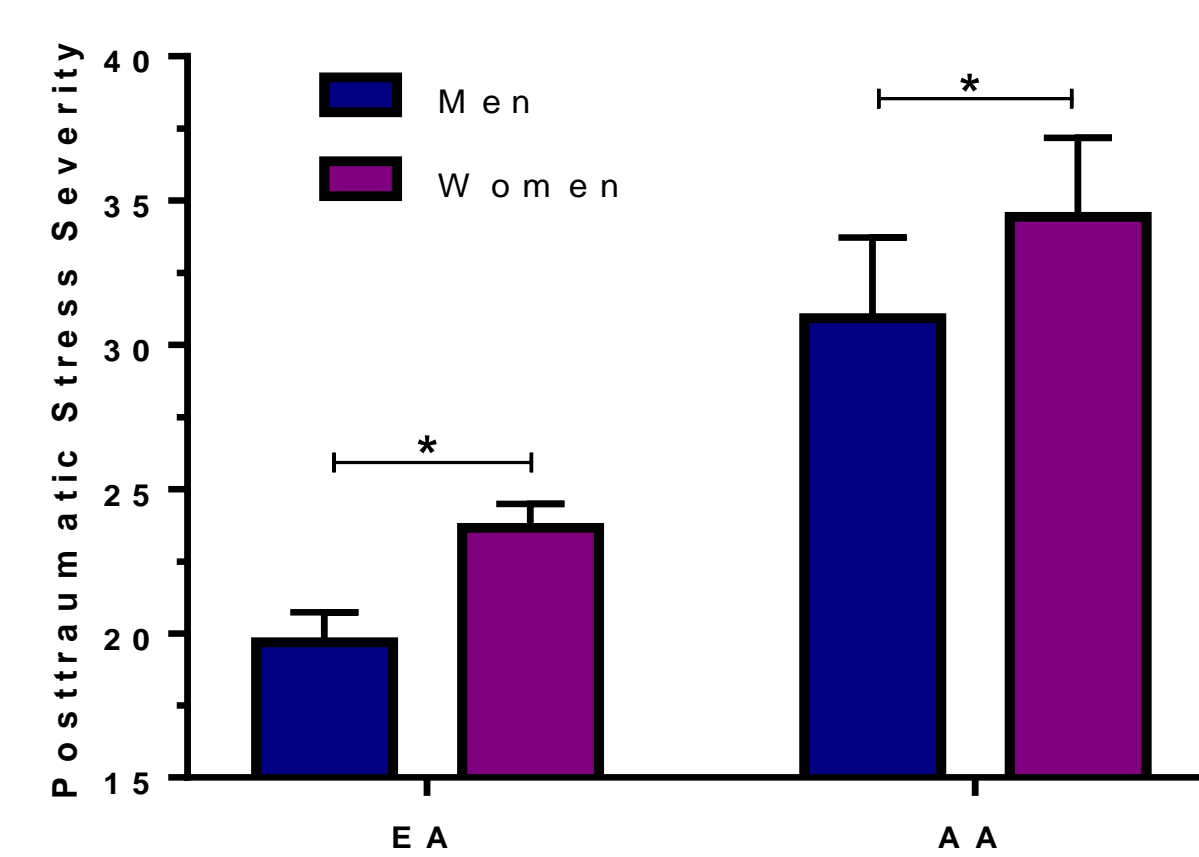


FIGURE 3. Both EA and AA women report higher levels of PDS than men six weeks following MVC.

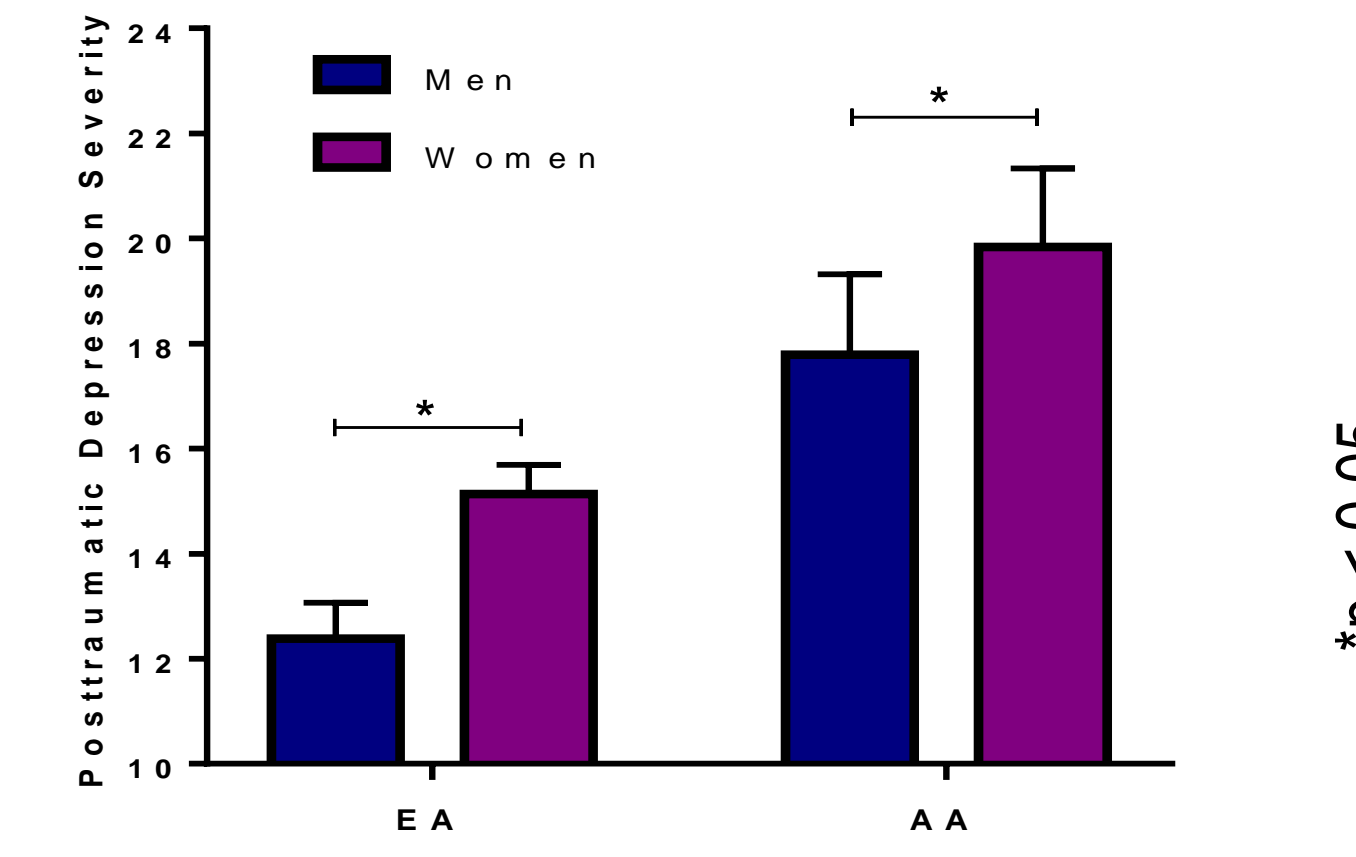


FIGURE 4. Random Forest Analysis to identify top predictors of posttraumatic stress symptom development in AA individuals six weeks following MVC

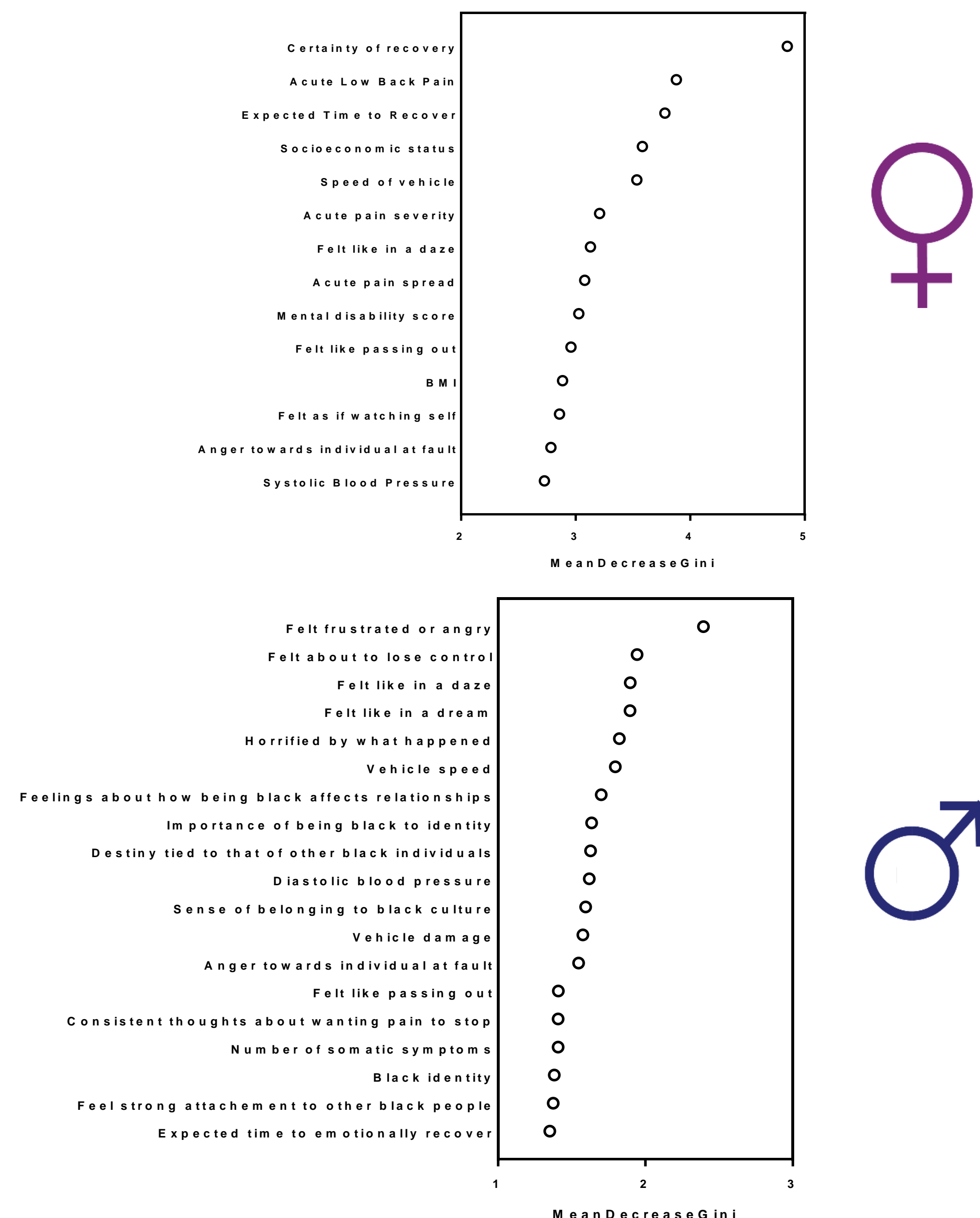
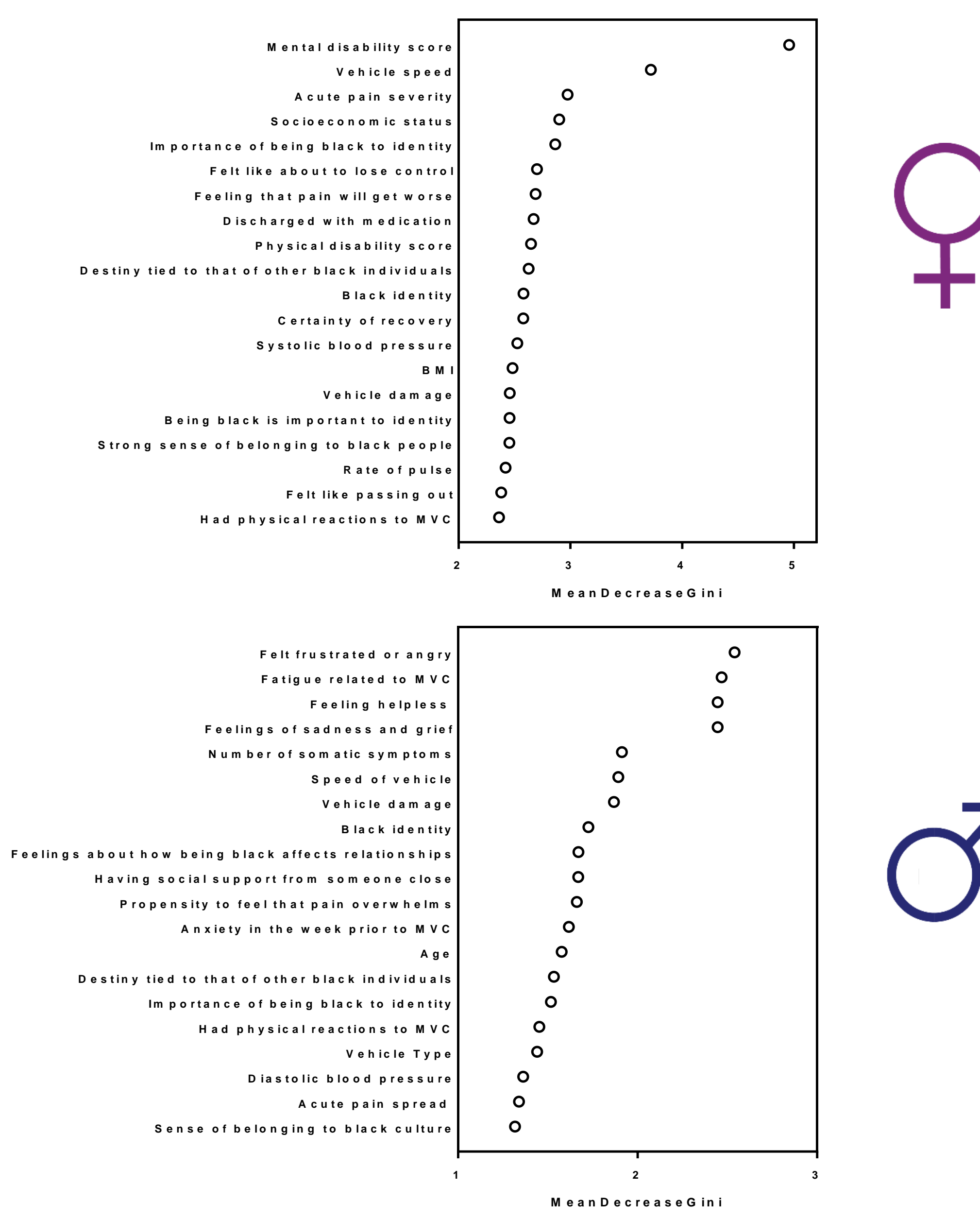


FIGURE 5. Random Forest Analysis to identify top predictors of posttraumatic depression symptom development in AA individuals six weeks following MVC



RESULTS

- Both PTSS and PDS were more prevalent in AA than EA six weeks following MVC trauma (Figure 1).
- In AA and EA, PTSS severity was higher following MVC in women than men ($p < 0.05$; Figure 2). Similar sex differences were observed for PDS following MVC ($p < 0.05$; Figure 3).
- Secondary analyses identified substantial sex differences in predictive factors. For example, among AA women the most strongly associated individual factors included both peritraumatic psychological factors (e.g., dissociation, loss of control) and pain severity, whereas in men such factors included psychological characteristics (e.g. distress, catastrophizing) and identity with being AA.
- Using the most predictive factors yielded 68% and 65% accuracy in predicting PTSS in women and men and 68% and 71% accuracy in predicting PDS in women and men, respectively.

CONCLUSIONS

Among AAs experiencing MVC, PTSS and PDS are more prevalent in women than men. Epidemiologic risk factors also differ in women and men, suggesting potential differences in underlying pathogenic mechanisms. These data also suggest that there is a need for increased predictive accuracy. Additional factors identified in the ED are needed to improve the accuracy of predicting PTSS and PDS following MVC in AA.

REFERENCES

- Roberts AL, Gilman SE, Breslau J, Breslau N, Koenen KC. Race/ethnic differences in exposure to traumatic events, development of post-traumatic stress disorder, and treatment-seeking for post-traumatic stress disorder in the United States. *Psychol Med*. 2011 Jan; 41(1): 71-83.
- Edwards RR, Doleys DM, Fillingim RB, et al. Ethnic differences in pain tolerance: clinical implications in a chronic pain population. *Psychosom Med* 2001; 63: 316-23.
- Weiss DS. The impact of event scale: revised. Cross-cultural assessment of psychological trauma and PTSD: Springer; 2007:219-38.
- Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied psychological measurement* 1977;1:385-401.
- Buuren SV, Groothuis-Oudshoorn K. MICE: Multivariate Imputation by Chained Equations in R. *Journal of statistical software* 2010; 1-68
- Liaw A, Wiener M. Classification and regression by randomForest. *R News*. 2002;2:18-22.

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