Supplementary Table 1. Stop codes and procedure codes used to identify visits for complementary and integrative health (CIH) approaches

CIH Approach*	STOP CODE	PROCEDURE CODE
Chiropractor care	436	98940, 98941, 98942, 98943
Acupuncture	N/A	97810, 97811, 97813, 97814
Massage	N/A	97124

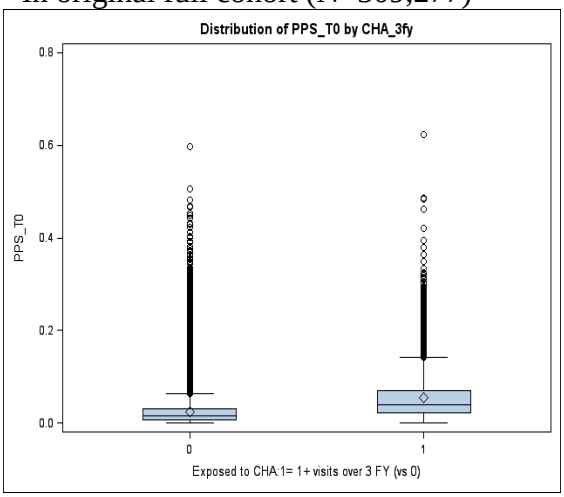
* Identified by one or more encounters with the specified stop codes or procedure codes during Fiscal year 2011, 2012 or 2013.

N/A, not applicable.

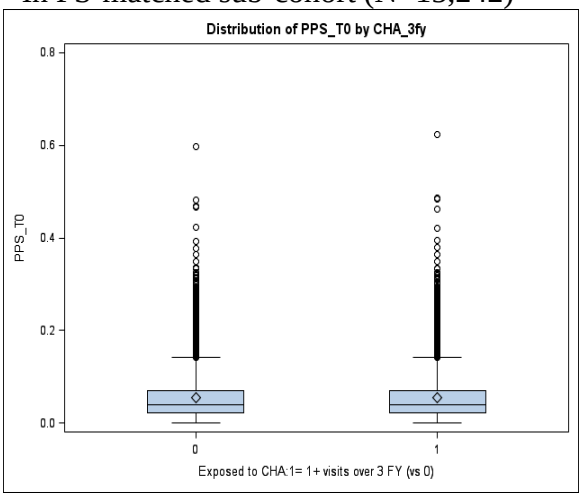
Supplementary Figure 1. Distribution of estimated propensity score (PS) for receiving complementary and integrative health approaches (CIH) among 309,277 US veterans with musculoskeletal pain

1A. Box plot

- In original full cohort (N=309,277)

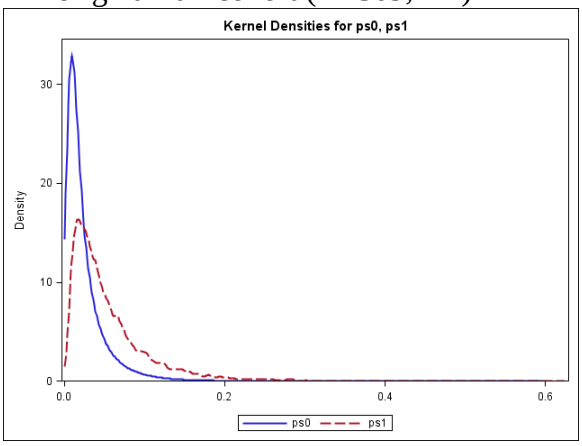


- In PS-matched sub-cohort (N=15,242)

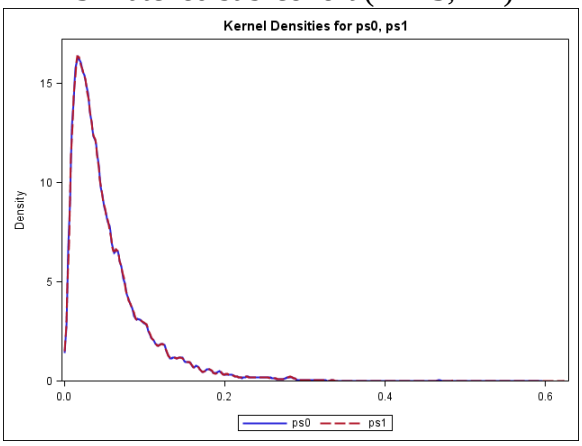


1B. Kernel density plot

- In original full cohort (N=309,277)



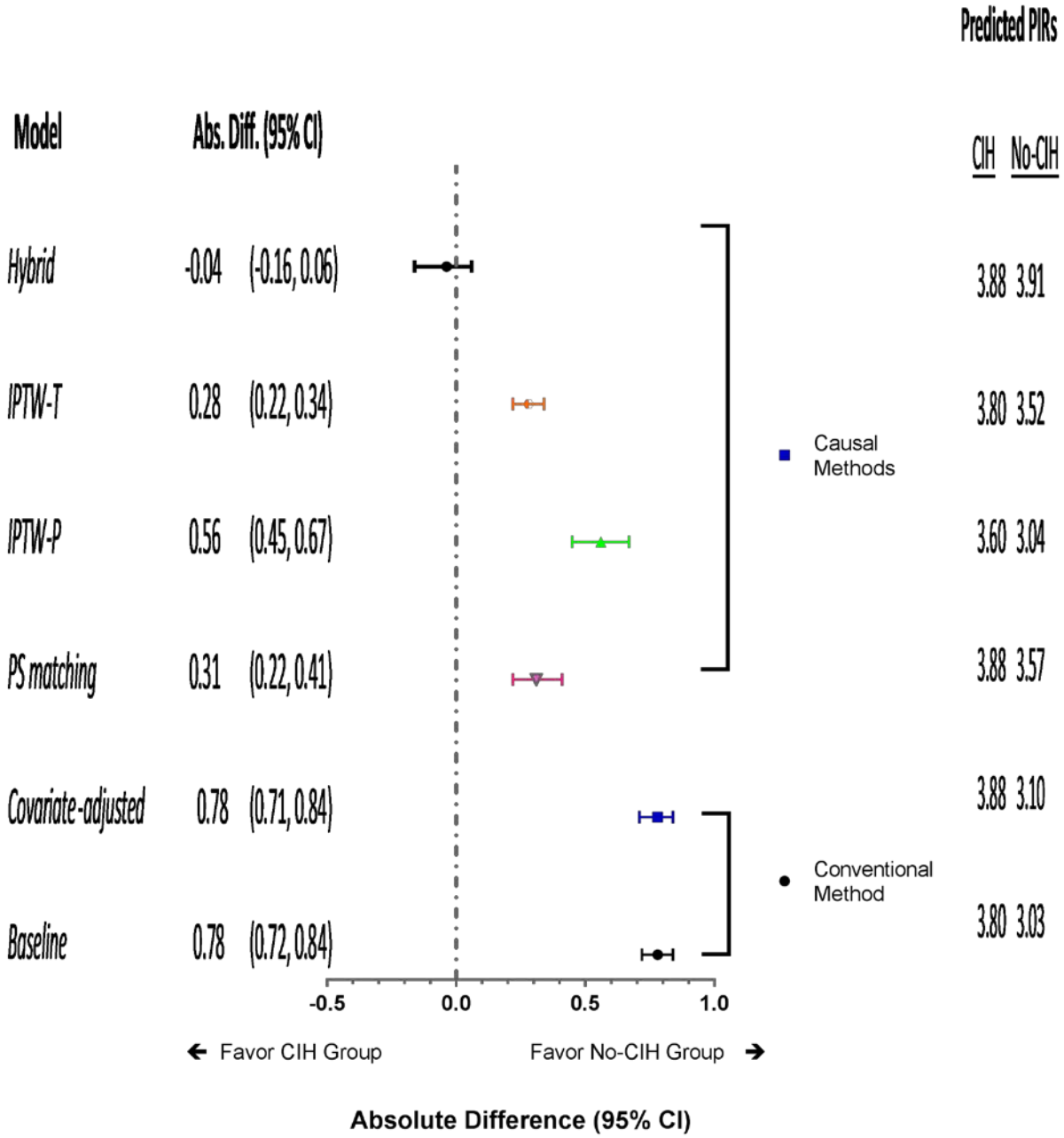
- In PS-matched sub-cohort (N=15,242)



Footnotes to Supplementary Figure 1: The two left-hand panels of Figures 1A and 1B show propensity score (PS) distribution in the original cohort. The two right-hand panels show the PS-matched sub-cohort.

The PS was estimated using a logistic regression model of receiving complementary and integrative health (CIH) approaches with 35 baseline covariates and 6 interactions. The overall mean PS (±standard deviation) was 0.025±0.027 in the original cohort, with 0.024±0.026 (range: 0.000-0.597) among CIH non-recipients (N=301,656) and 0.054±0.049 (range: 0.001-0.624] among CIH recipients (N=7,621).

Supplementary Figure 2. Sensitivity analyses of average treatment effect for Complementary and Integrative Health approaches (CIH) on Pain Intensity Ratings (PIRs) over 1 year



Footnote to Supplementary Figure 2: AD (95% CI) represents Absolute Difference (95% Confidence Intervals) in predicted pain intensity ratings between the two CIH exposure groups, estimated using a generalized estimating equation (GEE) normal model. Bars represent upper and lower boundaries of 95% CI of AD. An AD> 0 indicates *unfavorable* CIH effect (i.e., increasing pain intensity); whereas an AD< 0 indicates a *favorable or beneficial* CIH effect (i.e., decreasing pain intensity).

This set of sensitivity analyses refit all the primary GEE models (conventional and causal methods, as shown in **Figure 3** of the manuscript) by restricting the follow-up period to a maximum 1 year after the defined time zero. veterans who did not have a PIR during the first 365 days after initial CIH visit (218 CIH recipients) or the index MSD date (2,546 non-recipients) were excluded, resulting in a 1-year follow-up sample of 6,673 CIH recipients and 297,283 non-recipients. See **Statistical Analyses** for details.

The conventional method was applied to the whole 1-year sample (N=303,956) and included a *baseline* model (with CIH exposure as sole predictor) and a *covariate adjusted* model (for an array of selected covariates as described in **Methods**). For causal method, the PS matching analysis fit the *baseline* model among the PS-matched sub-cohort, which consisted of 4,665 complete matched pairs (total N=9,330), while accounting each matched pair as a cluster. The two inverse probability of treatment weighting (IPTW) analysis fit a weighted *baseline* model in the whole 1-year sample (N=303,956), with IPTW-P or IPTW-T as a weight, respectively. The *hybrid* analysis fit an IPTW-T weighted *baseline* model in the PS matched 1-year sample (N=9,330 or 4,665 pairs), while accounting for matching.

Supplementary Table 2. Sensitivity analyses on average treatment effects of complementary and integrative health (CIH) approaches on Pain Intensity Ratings (PIRs) over 1 year according to number of modalities received

Number of CIH modalities received*	Baseline Model†			Hybrid Causal Model‡		
	N	Obs. PIRs (Mean±SD)	AD§ (95% CI)	N	Obs. PIRs (Mean±SD)	AD§ (95% CI)
0 (reference)	297,283	2.98±3.30	-	4,665	3.68±3.33	-
1	5,976	3.79±3.27	0.75 (0.69,0.82)	4,127	4.02±3.27	-0.06 (-0.18,0.07)
2	669	4.14±3.26	0.99 (0.81,1.18)	513	4.28±3.25	0.11 (-0.12,0.34)
3	28	4.59±3.06	1.39 (0.61,2.18)	25	4.32±3.97	0.44 (0.61,1.25)

Abbreviations: AD, Absolute Difference; CIH, Complementary and Integrative Health Approaches; CI, Confidence Intervals; GEE, Generalized Estimating Equation; IPTW-T, Inverse Probability of Treatment Weighting on the Treated; PIR. Pain Intensity Ratings.

*Defined as cumulative number of the 3 CIH modalities (acupuncture, massage and chiropractic care) each veteran received during the follow-up period (range: 0-3).

†Estimated using a compound symmetry GEE normal model of monthly PIRs (range: 0-10) over 1-year after the defined zero time, with the 4-category CIH exposure as dummy predictors. Veterans who did not have a PIR during the first 365

days after time zero (218 CIH recipients and 2,546 non-recipients) were excluded, resulting in an analytic sample of 6,673 CIH recipients and 297,283 non-recipients.

According to study hypothesis, this model represented potentially the most biased model. See **Statistical Analyses** for details.

‡Estimated using an IPTW-T weighted GEE normal model of monthly PIR among a subset of the baseline 1-year sample (N=6,673), which consisted of 4,665 complete matched pairs (N=9,330). The model simultaneously accounted for a compound symmetry correlation structure among repeated PIRs, as well as each matched pair as a cluster.

According to our study hypothesis, this model represented an optimal and potentially the least biased model. See **Statistical Analyses** for details.

§ AD was the effect estimate derived from corresponding GEE model. An AD < 0 denotes a beneficial effect for a specific CIH exposure category (i.e., 1, 2 or 3 modalities) versus the non-exposed category (i.e., 0 CIH modality), and vice versa.