

**Supplemental Material for Tsai, Youngstrom et al. *Psychological Assessment*.
CC BY 4.0**

The supplemental material includes more details about a clinical vignette as well as additional technical details about the sample and analyses.

The clinical vignette is intended to illustrate the application of the method and results to an outpatient case to improve teaching and knowledge transfer.

Logistic regression analysis of SUD diagnosis including propensity scores

<i>Variable</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>Exp (B)</i>
<i>Model 1: Demographics & comorbidity</i>				
Age	.43	.12	<.001	1.54
Female sex	-.81	.48	.09	0.44
Race – White vs Others	-.82	.42	.05	0.44
Number of Axis I diagnoses	.75	.12	<.001	2.12
Propensity	.06	.07	.39	1.06
<i>Model 2A: Add Caregiver CASI Substance Use Score</i>				
2A: CASI-4R	3.38	0.63	<.0005	29.37
Age	0.23	0.14	.10	1.26
Female sex	-0.30	0.55	.59	0.74
Race – White vs Others	-1.07	0.51	.03	0.34
Number of Axis I diagnoses	0.44	0.15	.003	1.55
Propensity	0.13	.07	.06	1.13
<i>Model 2B: Add Youth YI Substance Use Score</i>				
2B: YI	5.54	1.24	<.0005	254.68
Age	1.04	0.49	.03	2.83
Female sex	-2.56	1.64	.11	0.08
Race – White vs Others	-1.52	0.86	.08	0.22
Number of Axis I diagnoses	0.76	0.26	.004	2.14
Propensity	0.16	0.12	0.18	1.17
<i>Full Model: Incremental Validity Across Informant</i>				
YI	4.86	1.32	<.0005	129.02
CASI-4R	1.10	1.00	.28	3.00
Age	1.02	0.49	.04	2.77
Female sex	-2.29	1.60	.15	.10
Race – White vs Others	-1.49	0.87	.09	.23
Number of Axis I diagnoses	0.69	0.27	.01	1.99
Propensity	0.16	0.12	1.33	1.17

* CASI-4R: Child and Adolescent Symptom Inventory, YI: Youth Inventory, OR: Odds Ratios, CI: Confidence Intervals, ΔR^2 : Change in Nagelkerke R^2

* For Model 2, the CASI-4R caregiver report scores and YI self-report scores were analyzed separately.

Summary Correlations among variables (N=479)

	Female	Age in Years	Race (White)	Total Axis 1 Diagnoses	CASI-4R Substance Use	YI Substance Use	Any Substance Use Diagnosis
<i>Female</i>	-	.15** ^b	-.06 ^a	.06 ^b	-.09 ^b	-.07 ^b	-.05 ^a
<i>Age in Years</i>	.15** ^b	-	.00 ^b	-.09	.26***	.18*	.14**
<i>Race (White)</i>	-.06 ^a	.00 ^b	-	.05 ^b	.01 ^b	.02 ^b	-.06
<i>Total Axis 1 Diagnoses</i>	.06 ^b	-.09	.05 ^b	-	.12**	.14*	.22***
<i>CASI-4R Substance Use</i>	-.09 ^b	.26***	.01 ^b	.12*	-	.60***	.54***
<i>YI Substance Use</i>	-.07 ^b	.18*	.02 ^b	.14*	.60***	-	.61***
<i>Any Substance Use Diagnosis</i>	-.05 ^a	.14** ^b	-.06 ^a	.22***	.54***	.61***	-

Note.

* Coding: 1=Female and 0 = others for sex variable; 1= White and 0 = others for race variable

* CASI-4R: Child and Adolescent Symptom Inventory, YI: Youth Inventory

^aphi coefficient; ^bpoint-biserial correlation; all others are Pearson *r* correlations.

p*<.05, *p*<.005, ****p*<.0005, two-tailed.

Clinical Vignette

Maya is a 17-year-old White adolescent, whose mother, Sharon, sought services for her daughter due to both a teacher's and her own concerns. Maya's teacher reported that Maya was previously an attentive, straight A student; but in recent marking periods, she has missed several assignments and seemed "spaced out" during class. At intake, Sharon reported that Maya has recently been complaining of severe headaches and difficulty falling and staying asleep.

During the clinical interview, Sharon reported that Maya was in a near-death car accident two years ago. A car ran a red light and smashed into the driver seat of the car Maya was in. Maya's friend who drove the car died on the spot next to Maya. Since then, Maya has often become angry and tearful for no obvious reason. As her symptoms had not resolved by the following school year, Sharon followed the school counselor's suggestion and sought trauma-relevant services for Maya. Maya received a PTSD diagnosis and completed relevant treatment.

About one month ago, Sharon happened to enter Maya's room when Maya was out. Sharon was shocked to find two empty wine cooler bottles in the trash can. Sharon and Maya had a huge fight when she confronted her daughter. We asked Maya and Sharon to complete the respective versions of the CASI-4R. Maya refused, stating that she has no issues, and that her mother is being dramatic about what "normal teenagers do." Sharon completed the CASI-4R caregiver report; her average score on the substance use subscale was 0.67 on a zero to three scale.

Now we can use a probability nomogram (Straus et al., 2011) to integrate the above information (see Figure 1). First, we start with the base rate of SUD diagnosis in a general outpatient setting. Based on published benchmarks, we plot 4.5% (See Table 5.1 B, Substance Abuse and Mental Health Services Administration, 2019), on the first line as the pretest

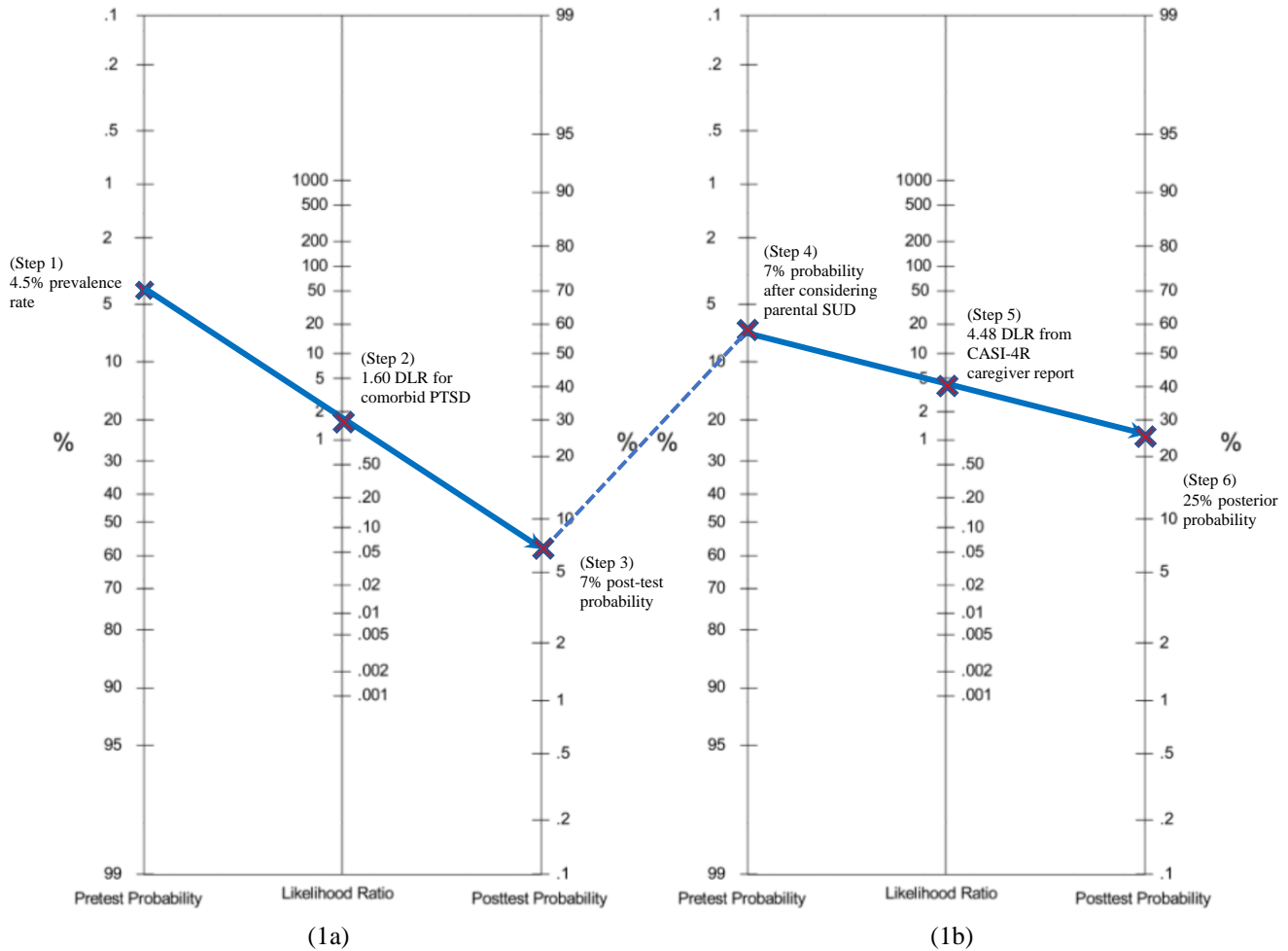
probability. Then, having learned that Maya has a PTSD diagnosis, which elevates risk 1.60 times (Arria et al., 2012)), we plot this value on the second line (DLR = 1.60) as the likelihood ratio. Next, we connect the value on the *pretest probability* and on the likelihood ratio and extend that line to the *post probability*, which is about 7% (See Figure 1a).

From here, we can incorporate Sharon's CASI-4R caregiver scores. First, we plot the value of the *post-probability* from the first piece of information on the left-hand line as the *pre-test probability* in the second nomogram (See Figure 1b). Similarly, we plot the DLR of CASI-4R caregiver score as the likelihood ratio (from Table 3c, the DLR is 4.48), and extend the line to find post-test probability, which is about 25% (See Figure 1b). We could continue to integrate other information obtained via clinical interviews and measures by further adjusting pre-test probabilities in the same manner as illustrated here.

Note that the results of post-test probability are meant to *guide* the next course of action rather than deciding a diagnosis (Jenkins et al., 2011). If the post-test probability is high, we might want to conduct a semi-structured interview to confirm a diagnosis and other comorbidities and establish a treatment plan immediately. If the post-test probability is low (which should be determined based on not just the estimate but also the danger or severity of the issue; e.g., a 10% probability of alcohol misuse warrants a different formulation than a 10% probability of suicide or homicide would; Youngstrom & Van Meter, 2016), other differential diagnoses should be considered for the client's symptom presentation.

Supplemental Figure 1.

Nomogram with worked vignette using the CASI-4R substance use subscales



Note. Maya is a 17-year-old White female whose mother, Sharon, sought services after finding her daughter’s potential alcohol use. Maya has received a PTSD diagnosis before. Sharon completed CASI-4R with an average score on substance use subscale 0.67 (Gadow & Sprafkin, 2005). Steps in using the nomogram (adapted from Strauss et al., 2011):

- (1) Select the pre-test probability and plot it on the first line from the left. In this example, we use published benchmarks 4.5% as the base rate of SUDs in adolescents between age 12 and 17.
- (2) Identify the diagnostic likelihood ratio (DLR) associated with the risk factor and plot on the second line. In this example, the comorbid PTSD is associated with a DLR of 1.60 (Arria et al., 2012; Sledjeski et al., 2008)
- (3) Connect the dots from (1) and (2), and extend to the third line to determine a post-test probability estimate of 7%.
- (4) To incorporate another information, repeat the process by using information from step (3) as the new pretest probability estimate in the second nomogram (shown via dotted lines).
- (5) Plot the DLR 4.48 associated with an average CASI-4R caregiver score on substance use subscale of 0.67 (see Table 4).

Connect the dots from (4) and (5) to determine an integrated post-test probability of 25%.

Supplemental Reference

Arria, A. M., Mericle, A. A., Meyers, K., & Winters, K. C. (2012). Parental Substance Use impairment, Parenting and Substance Use Disorder Risk. *Journal of Substance Abuse Treatment*, 43(1), 114-122. <https://doi.org/10.1016/j.jsat.2011.10.001>

Sledjeski, E. M., Speisman, B., & Dierker, L. C. (2008). Does number of lifetime traumas explain the relationship between PTSD and chronic medical conditions? Answers from the national comorbidity survey-replication (NCS-R). *Journal of Behavioral Medicine*, 31(4), 341-349. <https://doi.org/10.1007/s10865-008-9158-3>