Supplemental Materials

Discussion on PROMIS T Scores:

In the main paper we have presented a total of the raw PROMIS scores. We elected to present the raw scores because we administered the 16-item version of the PROMIS-SRI at all assessments using the fixed-format administration (i.e., we did not use the computerized adaptive test or CAT version). A T score conversion is not readily available for this version, therefore we used raw scores for the main paper analyses. We administered the 16-item version (vs. the 8-item version) of the PROMIS-SRI to capture sleep-related impairment with more precision. Further, given that a primary aim of the present study was to test the impact of TranS-C on sleep-related impairment, the more precise measure was warranted.

Below we present the T scores for the 8-item versions because we also acknowledge that there are disadvantages to using raw versus T scores, including the ability to interpret the scores relative to the general population (mean T-score 50, SD = 10). As evident, the TranS-C treatment effects from Pre to 6FU for the 8-item version are *no longer significant*, although the p value is 0.089 and the effect size is still in the medium range. We suggest that this discrepancy is likely due to losing information inherent to downsizing from 16 to 8 items.

Of note, the 27-item and 4-item versions of the PROMIS-SD were considered. However, but we chose to administer the 8-item version in order to maximize precision without placing too much burden on participants.

For Tables 1 and 2 below, the raw score totals are converted to T scores that are calibrated to have a population mean of 50 and standard deviation of 10. The conversion tables were taken from the scoring manuals obtained from healthmeasures.net.

Actigraphy scoring:

We used the ActiGraph GT9X Link (Philips Respironics), a small, wrist-worn device containing a 3-axis accelerometer to sample physical motion. Actigraphy is a widely used objective method for estimating sleep/wake patterns using algorithms to quantify activity and has been validated against the gold standard objective measure, polysomnography, in adults with SMI (Baandrup & Jennum, 2015).

Activity data were logged in 30 second epochs and analyzed using the Actiware software (Philips Respironics, Bend, OR, USA). The Cole-Kripke algorithm was applied to the raw data (Cole, Kripke, Gruen, Mullaney, & Gillin, 1992). The main sleep window was the longest period of inactivity identified by the scoring algorithm within a 24-hour window. The sleep window was adjusted using visual inspection and a concurrently collected sleep diary. Next, the sleep windows were visually inspected and adjusted to begin with a visible decrease in activity and to end with a visible increase in activity. Next, when available, data from a concurrently collected sleep diary was used to confirm and adjust the sleep window (Boyne, Sherry, Gallagher, Olsen, & Brooks, 2013; Matthews et al., 2018). The sleep window was adjusted to match the sleep diary when bedtime and waketime values fell within 30 minutes of the onset/offset time set by the algorithm and visual inspection of the sleep window. If the sleep diary values were greater than 30 minutes or the sleep diary was unavailable, only the scoring algorithm and visual inspection were used to confirm the sleep window. Sometimes the scoring software will divide the night of sleep into multiple sleep windows. If two or more sleep windows fell during the main sleep window reported on sleep diary, the windows were combined to create one sleep window.

The actigraphy data was scored by several of the authors (SHY, IAM, ACM, CEG). All datafiles were visually inspected by a minimum of two scorers and when questions or disagreements in the visual inspection emerged, all scorers met to review the file in question. Due to the structure of the study, individuals assigned to the UC-DT condition had several extra timepoints of data relative to individuals assigned to the TranS-C condition, so while all attempts were made to remove information about condition and timepoint from the datafiles as they were being scored, the scorers were not fully blind to condition. This is a limitation.

Supplement Table 1. *Descriptive statistics of outcome variables for PROMIS T Scores*

	Pre				**Post**				**FU**					
	UC-DT		TranS-C+UC		UC-DT		TranS-C+UC		UC-DT		TranS-C+UC		$d_{\text{pre-post}}$	$d_{\text{pre-FU}}$
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*		
PROMIS-SD	59.80	8.29	58.99	6.94	57.86	8.74	11.20	28.90	56.73	9.64	50.23	10.51	-1.04	-0.89
PROMIS-SRI	60.43	9.24	58.57	7.50	57.81	9.34	10.58	30.00	55.51	11.40	50.54	10.27	-0.77	-0.54

Note. FU = 6-month follow-up. PROMIS-SD = Patient-Reported Outcomes Measurement Information System–Sleep Disturbance (T scores). PROMIS-SRI = Patient-Reported Outcomes Measurement Information System– Sleep-Related Impairment (T scores). $d_{\text{pre-post}}$ = effect size for treatment effects from pre to post; $d_{\text{pre-FU}}$ = effect size for treatment effects from pre to 6-month follow-up; both *d*s are calculated using mean change scores and pretreatment raw *SD*s from each treatment condition, based on Feingold equation 5.

Supplement Table 2. *Multilevel Modeling Results for PROMIS T Scores*

	Treatment Effect at Baseline			Treatment Effect on Change from Pre to Post			Treatment Effect on Change from Pre to FU6		
	Coef.	*SE*	*p*	*Coef.*	*SE*	*p*	*Coef.*	*SE*	*p*
PROMIS-SD	-0.92	1.62	0.57	-6.79	1.61	**<0.0001**	-5.91	1.60	**<0.0001**
PROMIS-SRI	-1.71	1.75	0.33	-5.43	1.74	**0.002**	-2.94	1.73	0.089

Note. PROMIS-SD = Patient-Reported Outcomes Measurement Information System–Sleep Disturbance (T-scores). PROMIS-SRI = Patient-Reported Outcomes Measurement Information System– Sleep-Related Impairment, 8-item version (T-scores). All the *p*-values in bold are the exact *p*-values and remained significant after applying the Benjamini-Hochberg procedure with a 5% false discovery rate assumed.

Supplement Table 3. Sleep Health Composite Score Cut-Off

Dimension	Measure	Definition/Cut-off
Regularity	Midpoint fluctuation across the 7-day sleep diary	Poor (coded 0) = *SD* of midpoint sleep >= 1 hour Good (coded 1) = *SD* of midpoint sleep < 1 hour
Satisfaction	Sleep quality question on PROMIS-SD: item 8 "My sleep quality was: very poor, poor, fair, good, very good"	Poor (coded 0) = "very poor" or "poor" or "fair" Good (coded 1) = "good" or "very good"
Alertness	Daytime sleepiness question on PROMIS-SRI: Item 13: "I was sleepy during the day time: not at all, a little bit, somewhat, quite a bit, very much"	Poor (coded 0) = "somewhat" or "quite a bit" or "very much" Good (coded 1) = "good" or "very good"
Timing	Mean midpoint across the 7-day sleep diary	Poor (coded 0) = Midpoint <= 2 am or >= 4 am Good (coded 1) = Midpoint between 2 am and 4 am
Efficiency	Sleep efficiency based on the 7-day sleep diary	Poor (coded 0) = SE < 85% Good (coded 1) = SE >= 85%
Duration	Total Sleep Time based on 7-day sleep diary	Poor (coded 0) = TST <7.0 or > 9.0 hours Good (coded 1) = TST between 7 and 9 hours

Supplement Table 4. Summary of TranS-C

Cross-Cutting Modules				Common Sleep-Circadian (S-C) Problems experienced by SMI Clients	Treatment Module
Functional Analysis	Education	Motivational Enhancement	Goal Setting	Irregular sleep-wake times	Core Module 1
				Difficulty winding down	Core Module 1
				Difficulty waking up	Core Module 1
				Daytime impairment	Core Module 2
				Unhelpful beliefs about sleep	Core Module 3
				Poor sleep-efficiency	Optional Module 1
				Too much time in bed	Optional Module 2
				Delayed or Advanced phase	Optional Module 3
				Sleep-related worry	Optional Module 4
				Promoting compliance with CPAP/ Exposure Therapy for claustrophobic reactions to CPAP	Optional Module 5
				Negotiating sleep in a complicated environment (e.g., group home)	Optional Module 6
				Nightmares	Optional Module 7
				Maintenance of behavior change	Core Module 4