Supplement to:

Individual and Community Social Determinants of Health and Recovery from Alcohol Use Disorder Three Years Following Treatment

This supplementary appendix provides more details about the multilevel latent profile analysis (LPA) model reported in the present paper and outlines the criteria for selecting a 4-profile multilevel latent profile analysis (LPA) solution. LPA is a mixture model in which responses to each indicator variable by each participant are used to identify individual and common patterns of responses. Individual-level indicators for the LPA included percent drinking days (PDD), percent heavy drinking days (PHDD), and drinks per drinking (DDD), the WHOQOL-BREF quality of life subscales (physical, psychological, social, and environmental), the SF-12 subscales (physical and mental health), and three binary variables (employment status, cannabis use, and other drug use). Missing data on the indicators were accommodated via a robust maximum likelihood estimator, and a small number of individuals (n = 30; 4.3% of the total sample) with missing data on covariates were not included in the final analyses. Previous sensitivity analyses using multiple imputation of covariates did not reveal substantively different findings using multiple imputation instead of maximum likelihood (Witkiewitz et al. 2020). Thus, all models were estimated with robust maximum likelihood estimation, and data were assumed to be missing at random (Hallgren and Witkiewitz 2013).

Models were estimated with and without covariates (level 1: individual-level variables; level 2: community-level variables) as predictors of profile membership, and profile solutions were compared to determine whether covariates influenced profile solutions. Results indicated that inclusion of covariates did not substantively alter the latent profile solutions.

In deciding on the number of profiles, we started with a 4-profile solution in order to test for replication of Witkiewitz et al. (2019, 2020). The 4-profile model was compared to 2-, 3-, and 5-profile models using the Bayesian Information Criterion (BIC) and sample-size-adjusted BIC (aBIC), where a lower BIC and aBIC indicate a better fitting model. The Lo Mendell Rubin

Likelihood Ratio Test (LRT) and Bootstrapped Likelihood Ratio Test (BLRT) are also often used to determine the number of classes (Nylund, Asparouhov, and Muthén 2007), but these tests were not developed for complex sampling designs (Muthén 2016) and, given clustering by site in the current study, we did not use the LRT and BLRT to compare latent profile solutions. The fit of each alternative profile solutions is provided in Supplementary Table 1. The BIC and aBIC decreased with each additional profile, and entropy was excellent across all models. The 5-profile solution fit better than the 4-profile solution based on BIC and aBIC, although the decrease in both BIC and aBIC from 3- to 4-profiles was slightly larger than the decrease from 4- to 5-profiles.

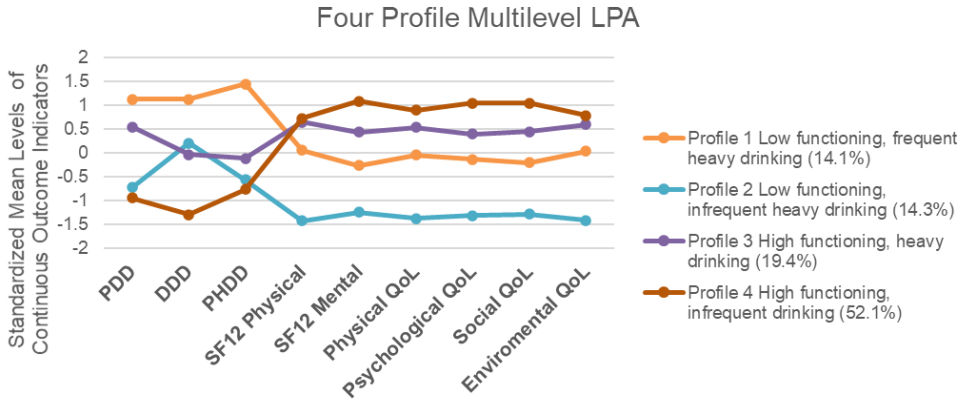
Supplementary Table 1. ***Fit Indices for Alternative Profile Solutions***

	Unadjusted models without covariates (*n*=694)			Adjusted models with covariates (*n*=664, note n=30 were missing data on covariates)		
	BIC	aBIC	Entropy	BIC	aBIC	Entropy
2-profile	39473.09	39365.14	0.830	38287.59	38141.53	0.851
3-profile	38730.75	38581.52	0.896	37600.28	37374.85	0.910
4-profile	38287.17	38096.66	0.928	37228.35	36923.55	0.966
5-profile	37861.51	37629.72	0.940	36828.96	36444.78	0.951

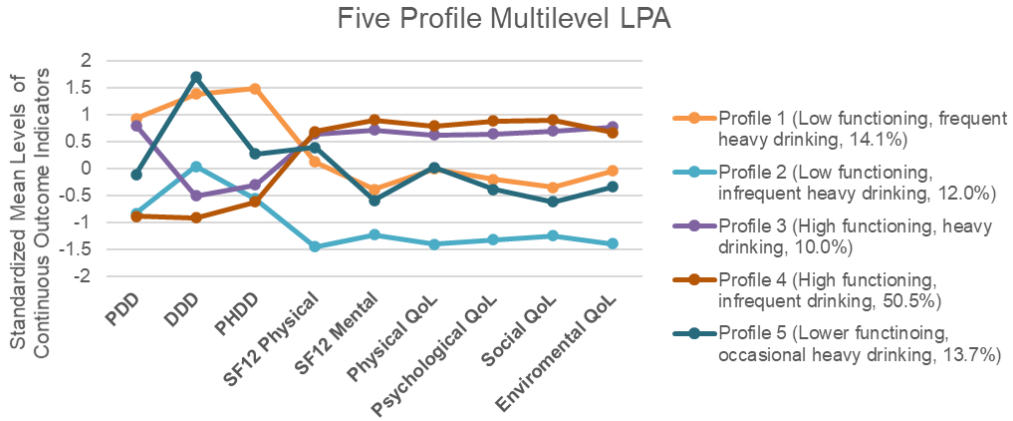
An inspection of the 4- and 5-profile solutions indicated that profiles one and four were virtually identical with respect to class prevalence and responses to the indicators in both the 4-profile and the 5-profile solution; however, profiles two and three seemed to split into three profiles in the 5-profile solution. As seen in Supplementary Figures 1 and 2 below, approximately 4% of those in profile two of the 4-profile solution and approximately 9% of those in profile three of the 4-profile solution appear to be represented by profile five in the 5-

profile solution, which could be described as low functioning heavy drinkers. We next examined the covariate effects for this new profile five from the 5-profile solution and compared covariate effects with profiles of the other low functioning profiles (profiles 1 and 2), and results were substantively similar to the results from the 4-profile solution. Given concerns about overextraction of latent profiles/classes in finite mixture models (Bauer and Curran 2003) and the similar substantive findings across the 4- and 5-profile models, we ultimately decided the 4-profile solution provided the best balance of parsimony and model fit.

Supplementary Figure 1. *Standardized Mean Levels of Outcomes in the 4-Profile Multilevel LPA Model*



Supplementary Figure 2. *Standardized Mean Levels of the Continuous Outcome Indicators in the 5-Profile Multilevel LPA Model*



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