

Background

- The addictive nature of tobacco makes smoking cessation a dynamic and challenging process ^{1,2}
- ‘Motivation to quit smoking’ (MQ)** is a critical factor in achieving complete cessation ^{3–10}
- Increase in **cessation fatigue (CF)**, decrease in **self-efficacy (SE)** and increase in **outcome expectancies (POE)** predict lapses and relapse ^{11–13}
- Existence of distinct profiles (‘subgroups’) among smokers based on their motivation to quit (MQ) is well documented in literature ^{3–10}
- Previous studies have focused on profiling smokers among ‘pre-contemplators’, and very few studies have profiled individuals who have decided to quit smoking and are in a cessation program ¹⁴
- Profiling individuals in smoking cessation programs** and tracking their profile memberships over time reflects quitting behavior which elucidates the cessation process, **helps understand the key predictors of relapse likelihood and improve future interventions**

Objectives

- Identify underlying profiles (or subgroups) among smokers participating in a pharmacotherapy cessation program based on SE, POE, MQ, and CF
- Examine changes in profile membership over 4 weeks since the target quit day (TQD) and its association with long-term abstinence outcome

Data

- Data includes responses on SE, POE, MQ, and CF from 1086 smokers during the first 4 weeks post-TQD of the Wisconsin Smokers Health Study 2 (WSHS2) ¹⁵ collected via Ecological Momentary Assessment (EMA) ¹⁶ prompts administered multiple times a day
- Baseline covariates include socio-demographic variables, treatment arms subjects were randomly assigned to, average cigarettes smoked per day, years of smoking, and nicotine dependence score
- The outcome of interest is CO-confirmed 7-day point-prevalence abstinence at week 4 post-TQD

Results

Figure 1a: The estimated means and class proportions of the identified four profiles via LPA (BIC: 14026.890, VLMR LRT p-value < 0.01, entropy = 0.90)

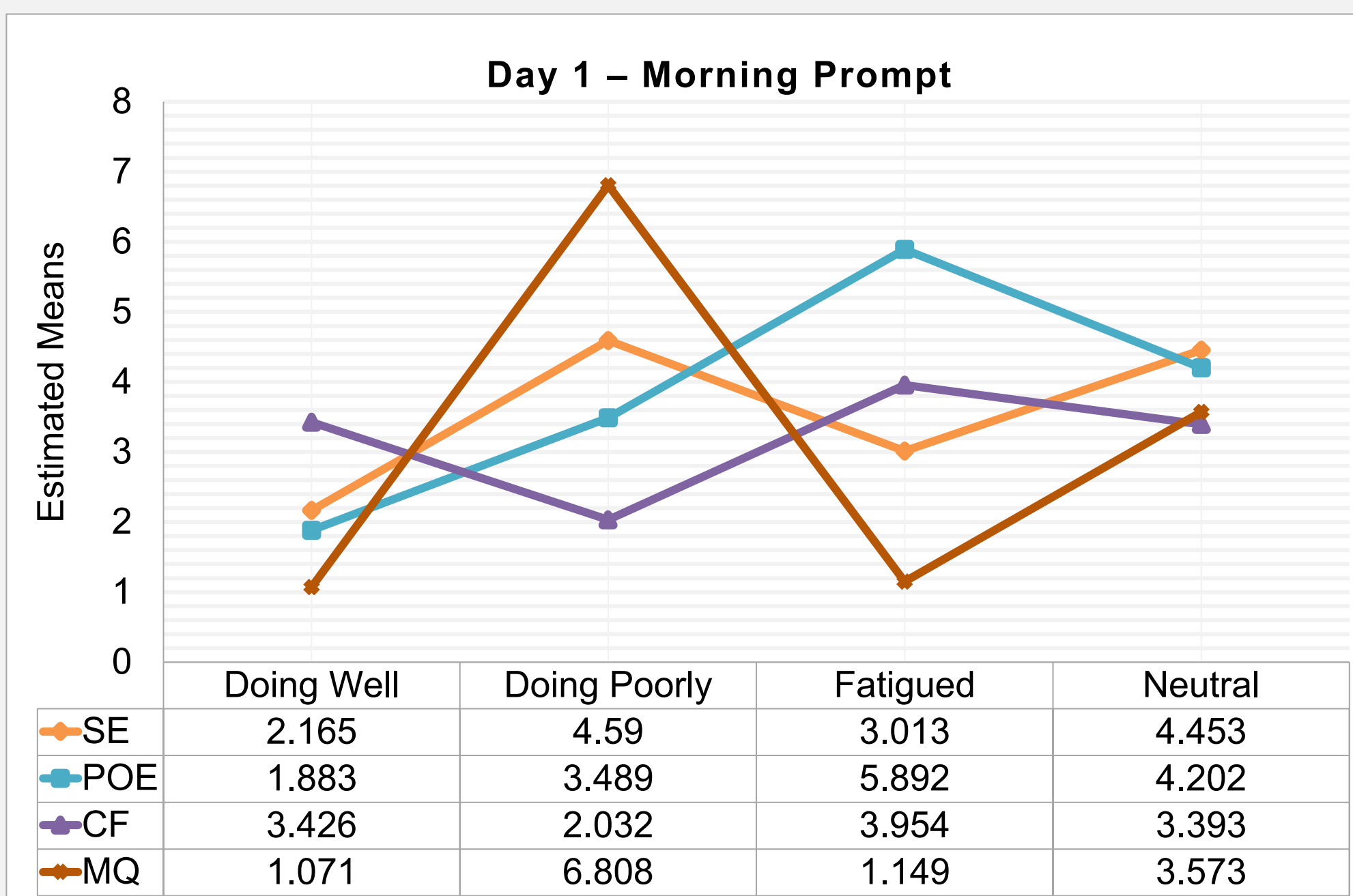


Figure 1c: Transition probabilities between Day 7 (T2) and Day 14 (T3) post-TQD morning prompts based on the LTA model

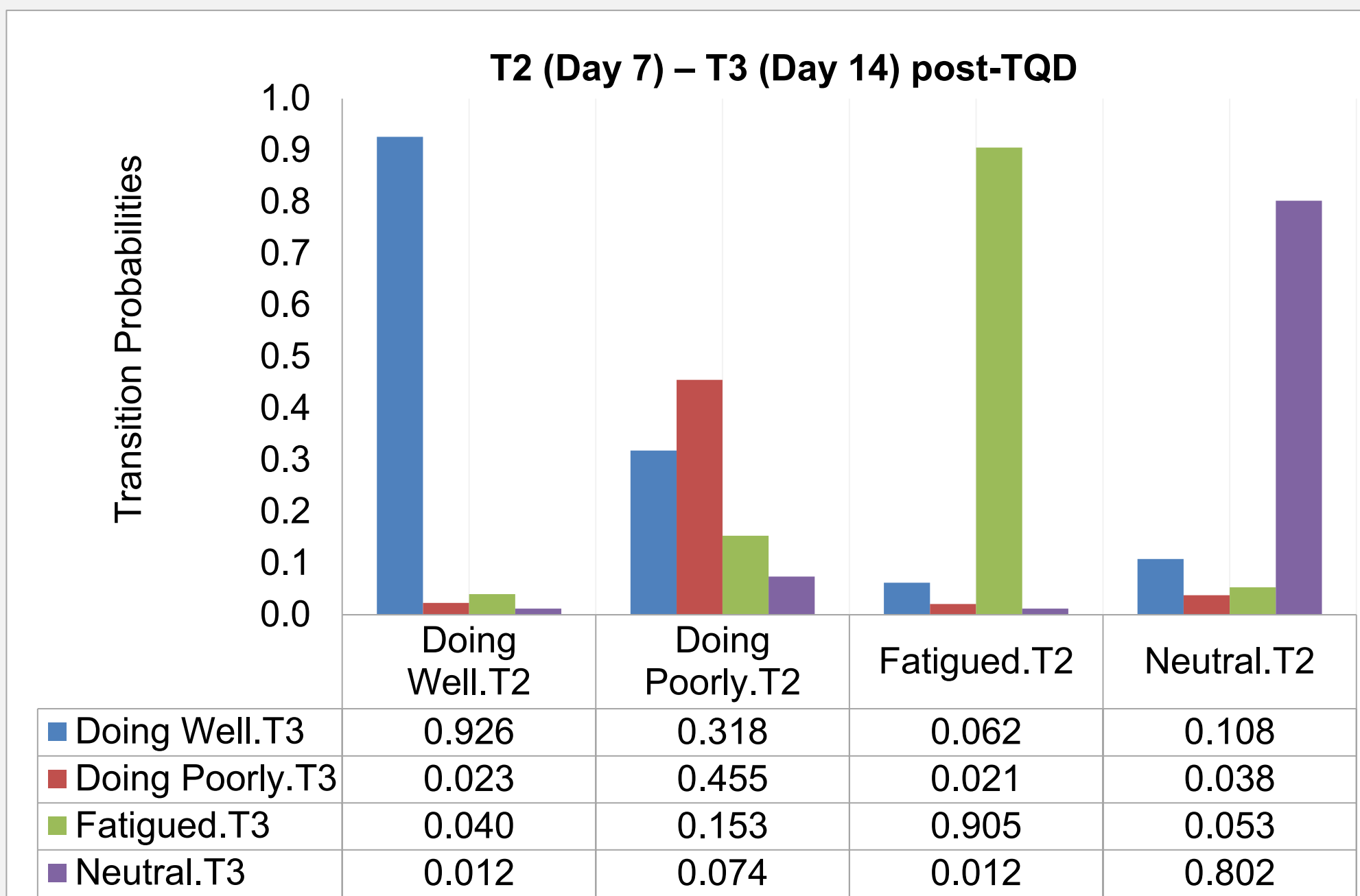


Figure 1b: Transition probabilities between Day 1 (T1) and Day 7 (T2) post-TQD morning prompts based on the LTA model

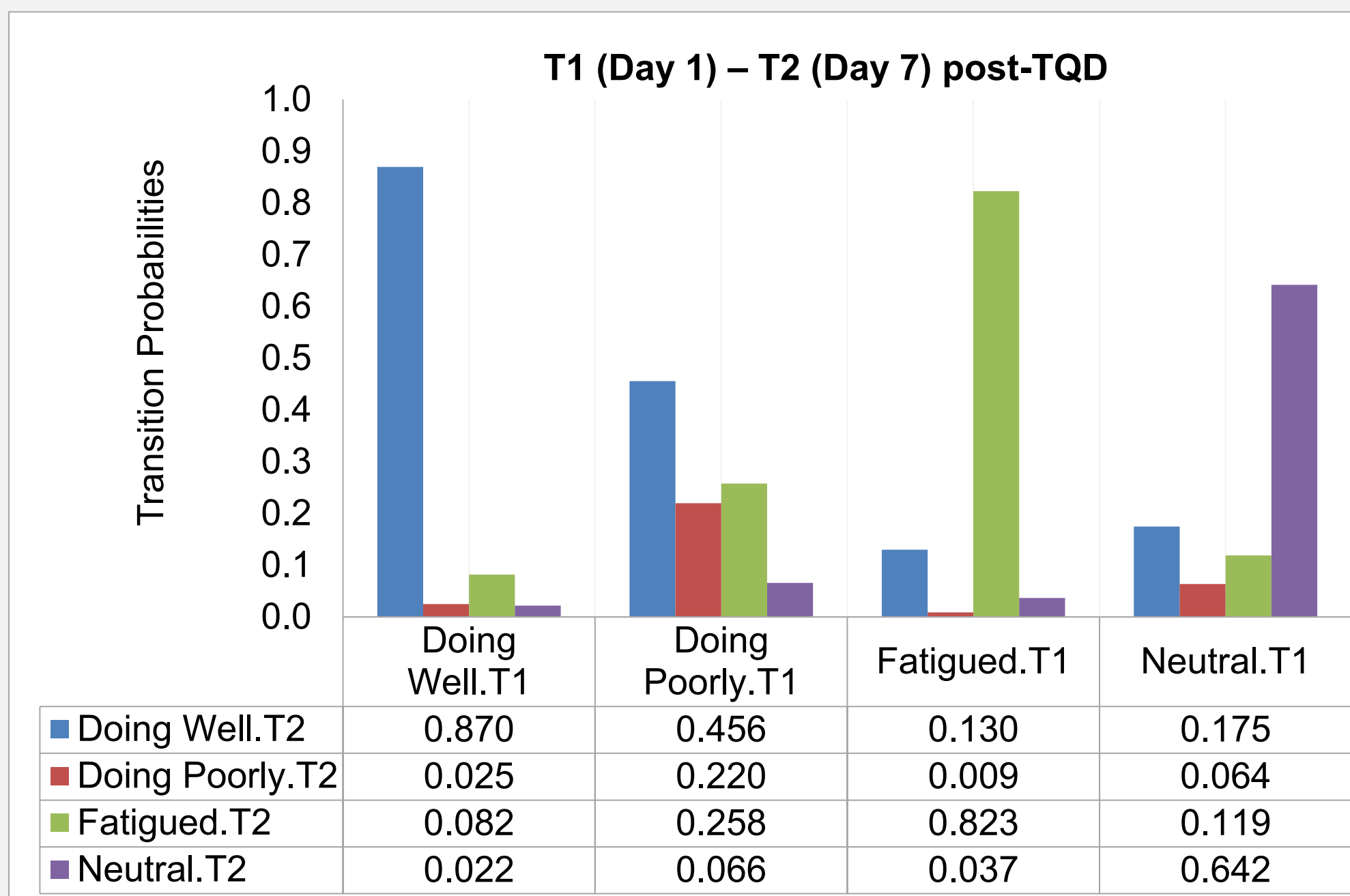
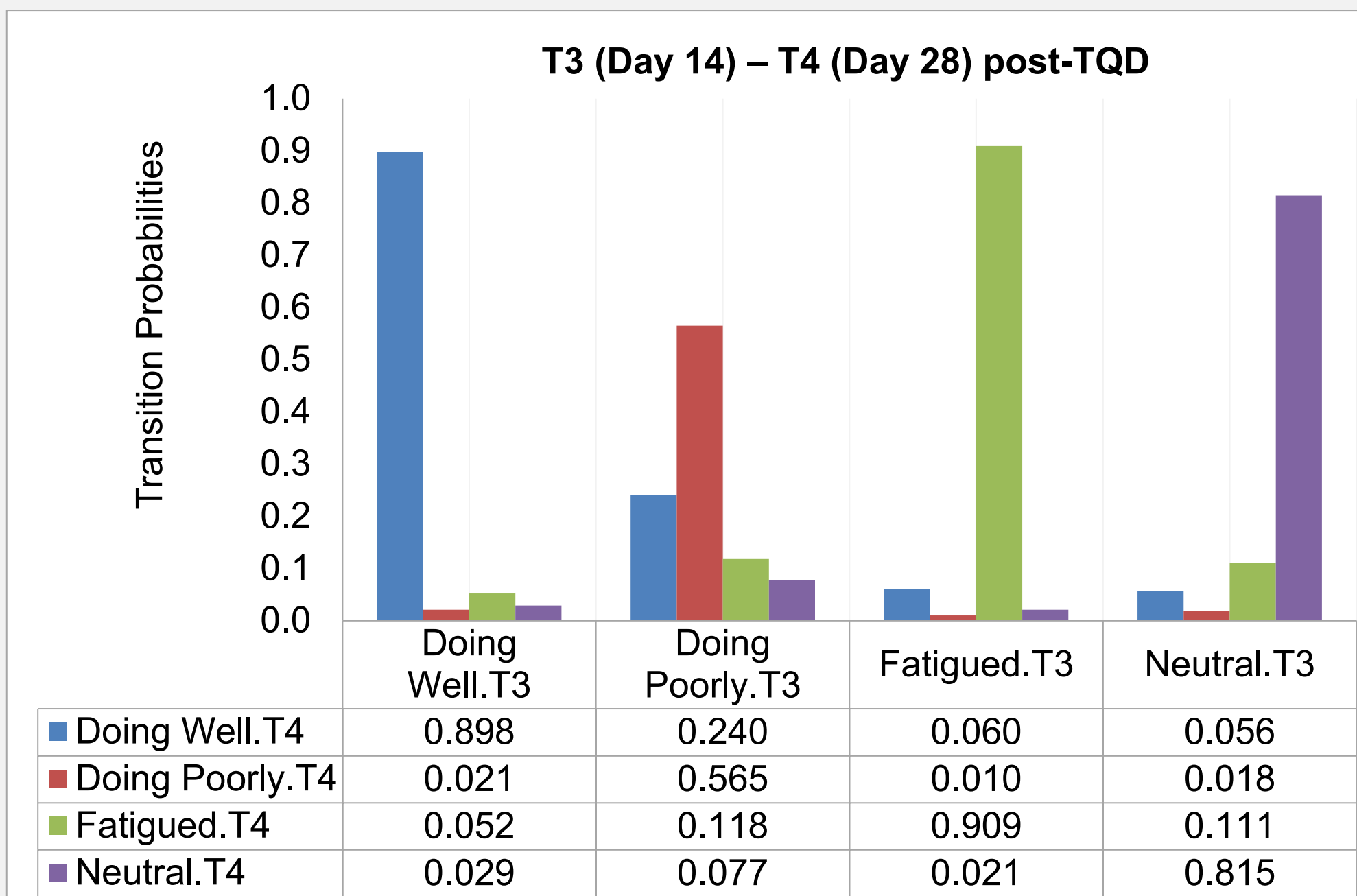


Figure 1d: Transition probabilities between Day 14 (T3) and Day 28 (T4) post-TQD morning prompts based on the LTA model



Conclusions

- The profiles remain consistent across the time-points of interest (Day 1 shown in Figure 1a, Days 7, 14, 28 not shown), and similar transition patterns were observed for LTA with evening prompt data
- Smokers who are “Doing Well” and “Fatigued” initially, mostly stay in their respective profiles at follow-ups
- Smokers who are “Doing Poorly” initially tend to mostly move to “Doing Well” and some move to “Fatigued” and “Neutral” profiles**
- Movers from the “Neutral” profile move to “Fatigued” and “Doing Well” profiles**
- MSM results show **that the log-odds of CO-confirmed 7-day point-prevalence abstinence increases by ~ 3.6 (95% CI: 1.4, 5.9) for those who are “Doing Well” or “Fatigued” compared to those who are “Doing Poorly” on Day 28 post-TQD**

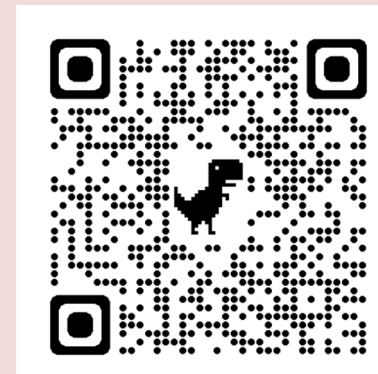
Methodology

- Apply **Latent Profile Analysis (LPA)**¹⁷ to estimate latent subgroups based on their responses to EMA prompts
 - Latent subgroups indicate latent quitting behavior reported during the morning and the evening prompts at four different time points (Days 1, 7, 14 and 28 post-TQD) **resulting in eight separate sets of LPA**
 - To accrue the optimal sample size, **we employed a flexible time-point approach** wherein we allow ±2 days around the targeted post-TQD day for our data
- We determined the changes in profile membership over time (separately for morning and evening prompts) using **Latent Transition Analysis (LTA)**¹⁸ **resulting in two separate sets of LTA with 4 time-points of interest for each set**
- Use **Marginal Structural Models (MSM)**^{19–21} to estimate the association between time-varying latent profile membership (**estimated via 8 LPA above**) and CO-confirmed 7-day point-prevalence abstinence at week 4 post-TQD
 - Estimate subject specific inverse probability of treatment weight (IPTW) given by $w_i = w_i^{LP}(1) \times \dots \times w_i^{LP}(t)$ where

$$w_i^{LP}(t) = \frac{P\{LP(t)=lp_i(t)|\bar{lp}_i(t-1)\}}{P\{LP(t)=lp_i(t)|\bar{lp}_i(t-1),c_i\}} \quad i = 1, \dots, 1086; t=1, \dots, 8$$
 c_i are baseline covariates
 - Fit an MSM using the regression model below, but weighting every individual in the regression by w_i

$$E(A|LP) = \gamma_0 + \sum_{j=1}^t \gamma_j LP_i \quad t=1, \dots, 8$$

Resources



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