SARA: Quality of Randomization

Jamie Yap

September 05, 2019

This document provides details on quality of randomization of the SARA micro-randomized trial and is divided into three sections.
Section 1: plots of availability over time.
Section 2: plots of covariates across time using available participant days.
Section 3: checks on the quality of randomization and balance in control covariates among available participant days.

Other material relevant to curation and analysis of the SARA MRT data are provided at https://github.com/jamieyap/SARA

1 Plots of Availability over Time

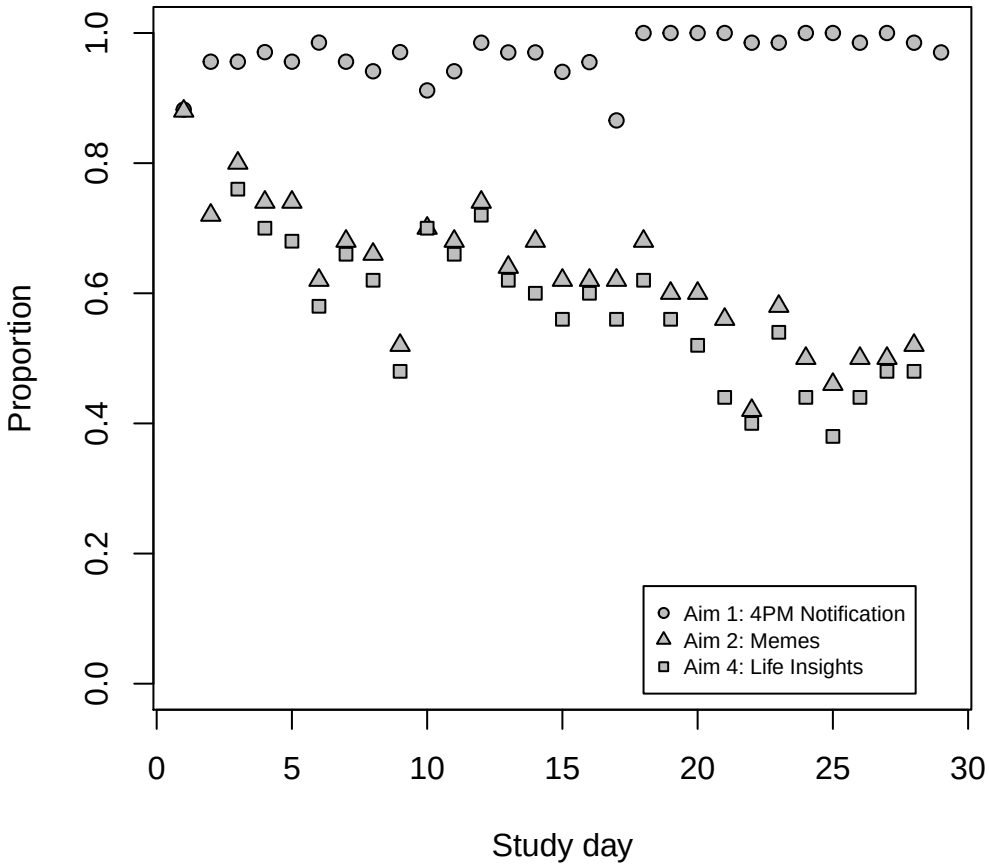

Figure 1: Proportion of participants available for intervention per study day

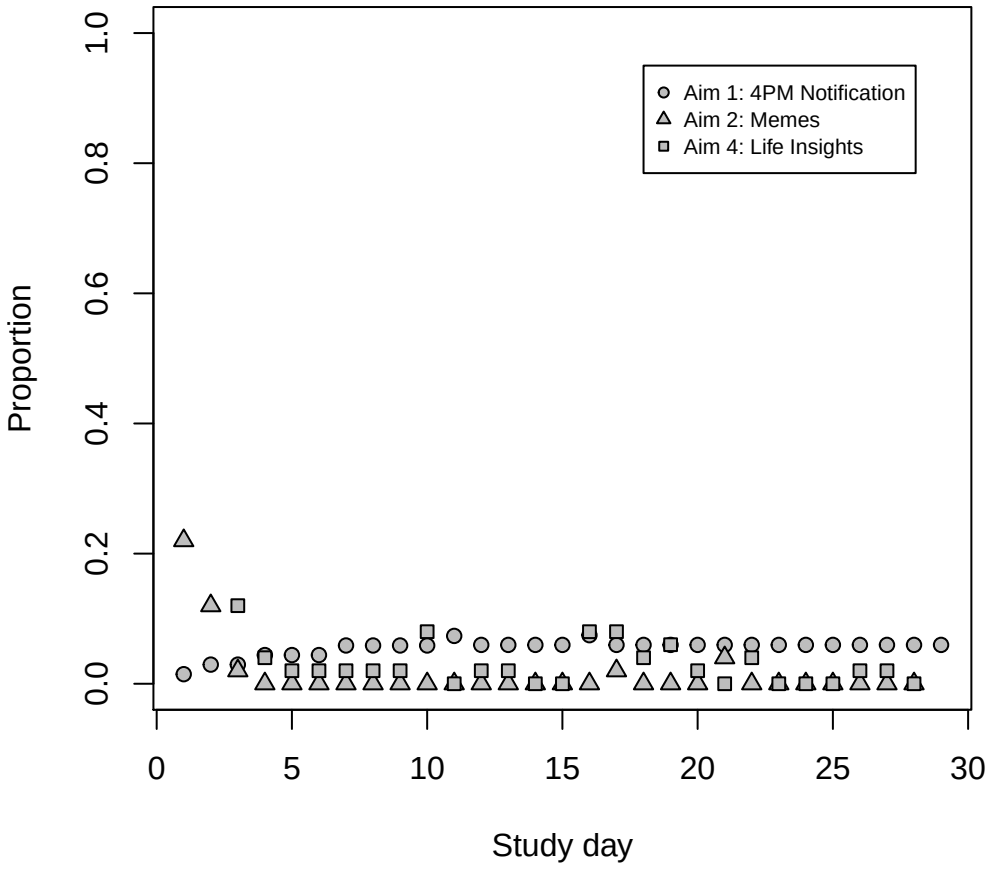

Figure 2: Proportion of participants with no intervention assignment among available participants per study day

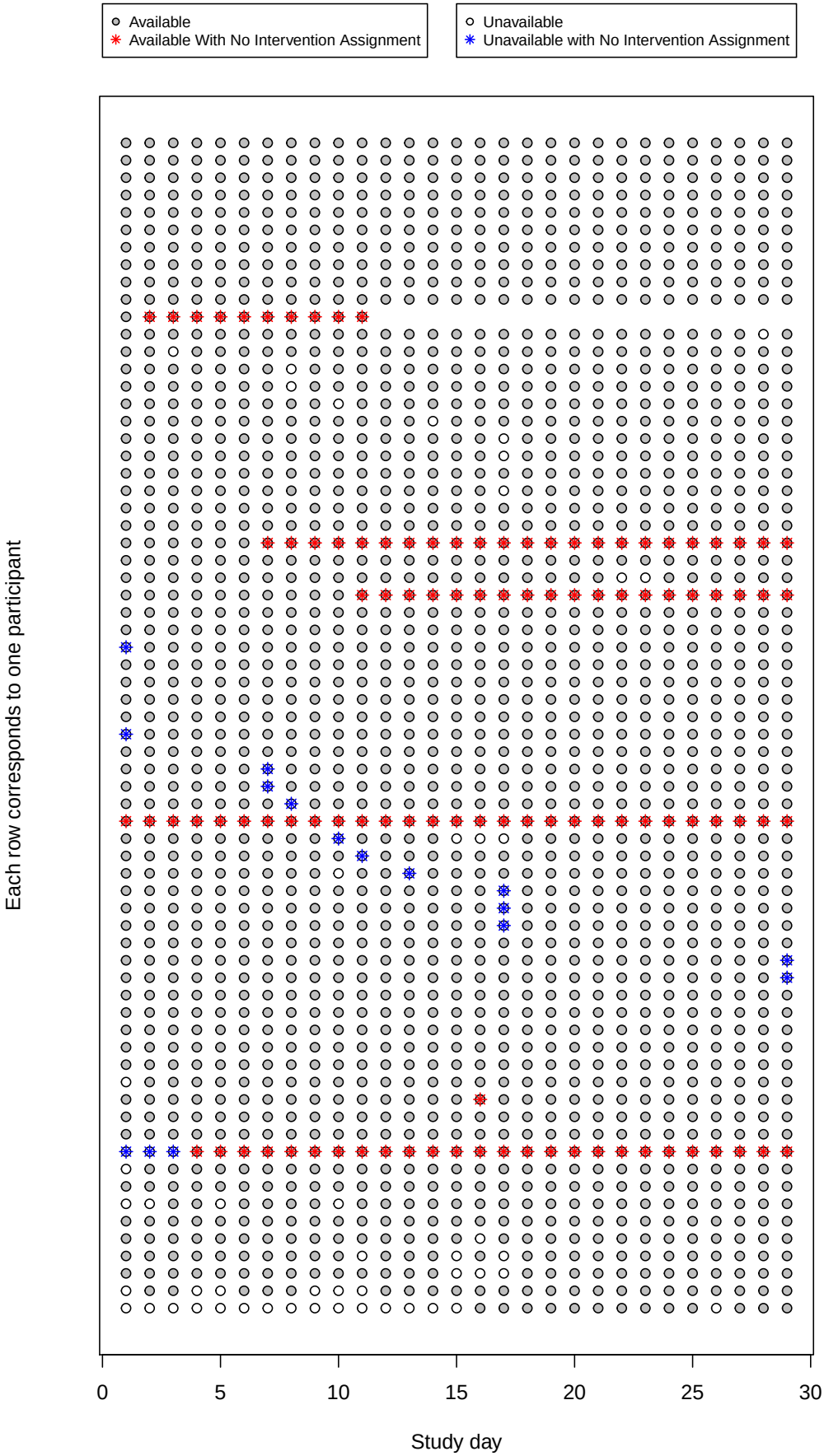

Figure 3: Aim 1: Participant days available for intervention but having no intervention assignment

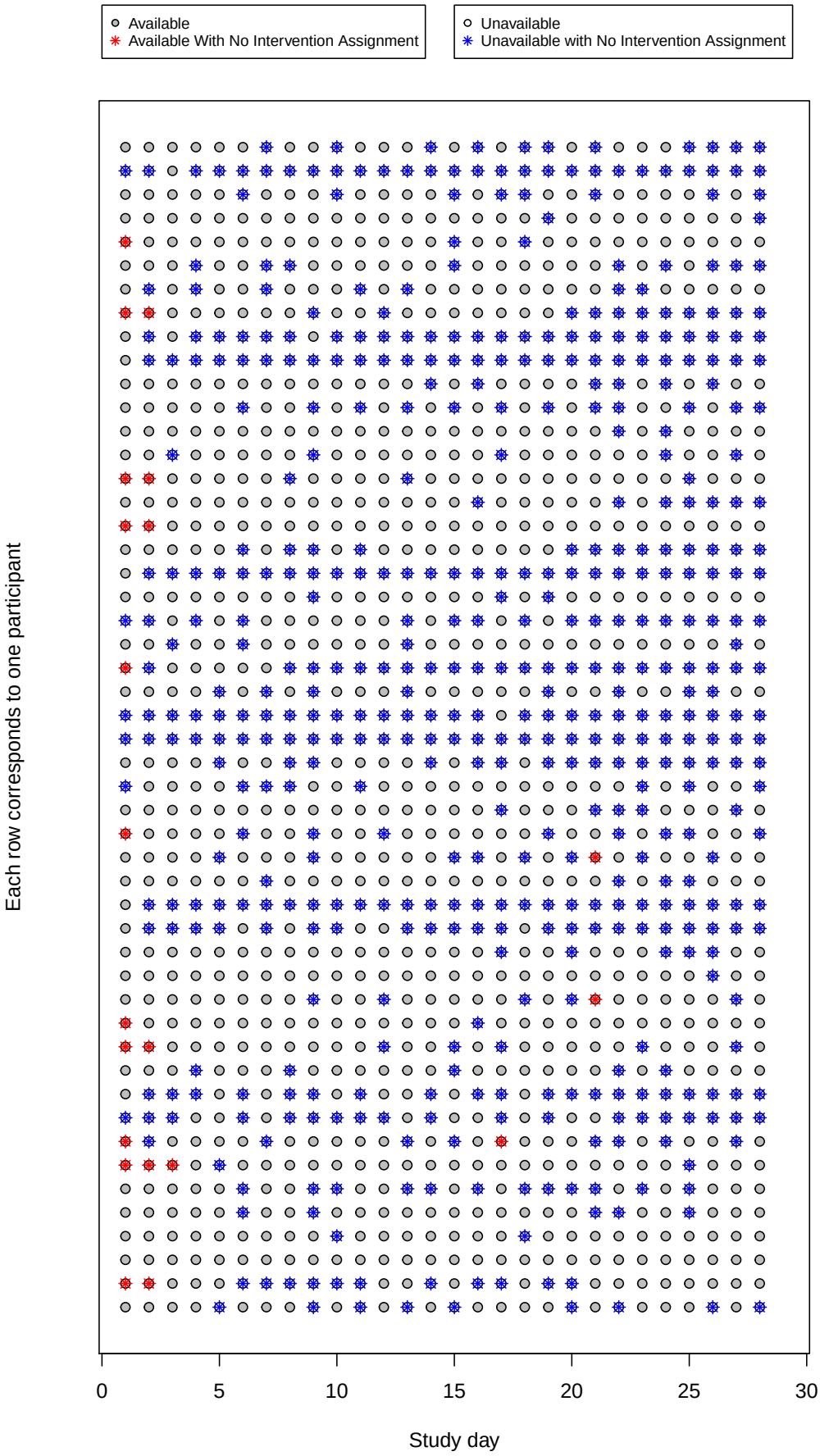

Figure 4: Aim 2: Participant days available for intervention but having no intervention assignment

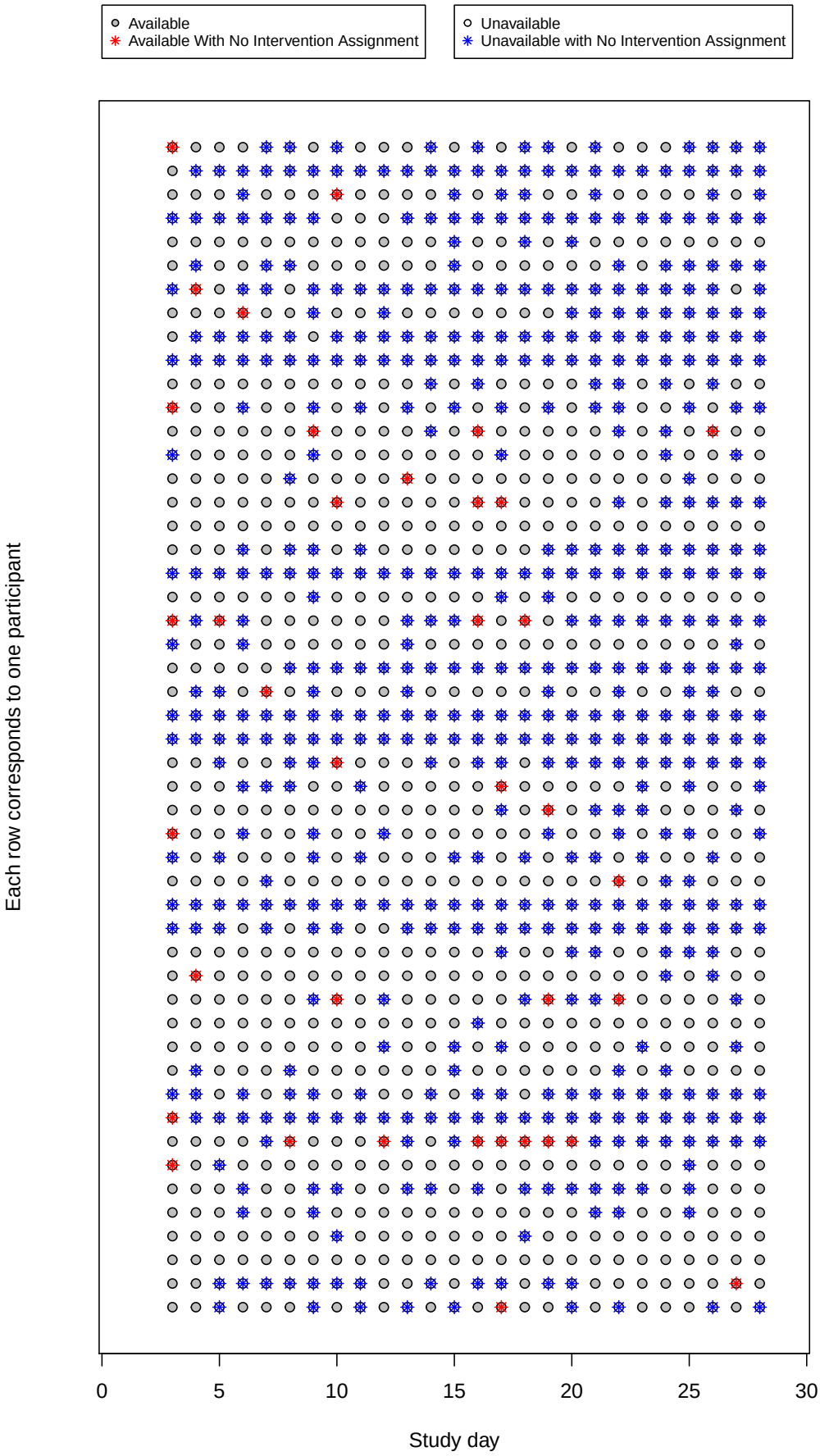

Figure 5: Aim 4: Participant days available for intervention but having no intervention assignment

2 Plots of Variables using Available Participant Days

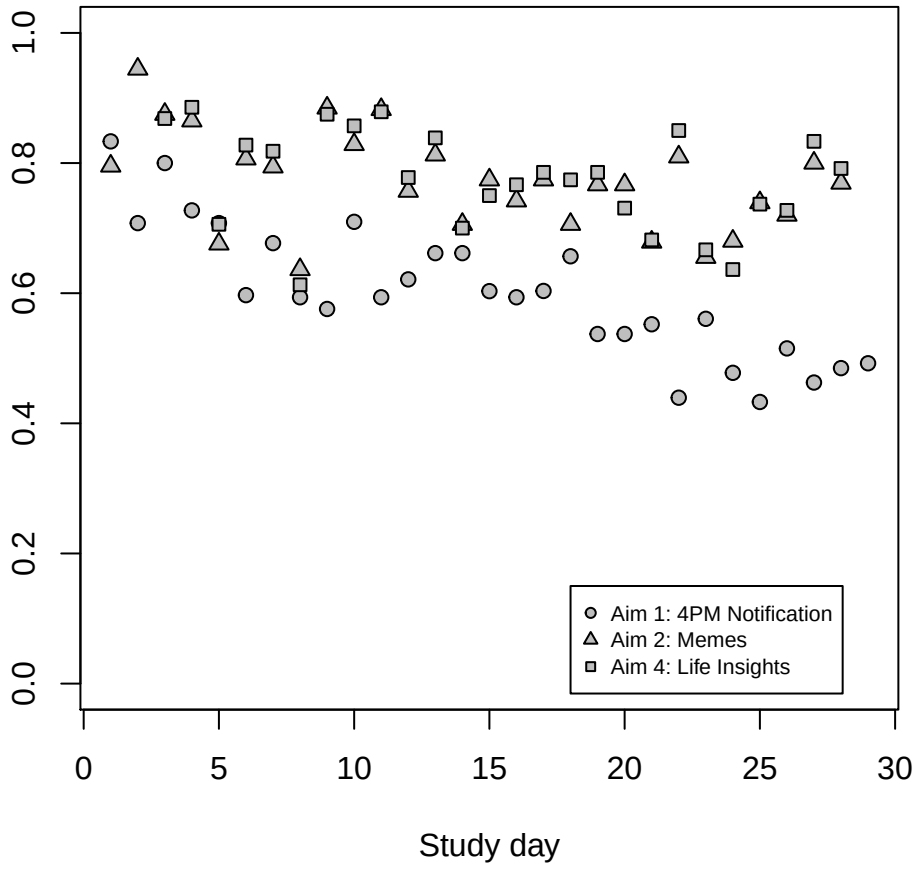

Figure 6: Aim 1: Proportion of participants who completed survey/active tasks in the evening of the same day among available participants per study day, Aim 2: Proportion of participants who completed survey/active tasks the following day among available participants per study day, Aim 4: Proportion of participants who completed survey/active tasks the following day among available participants per study day

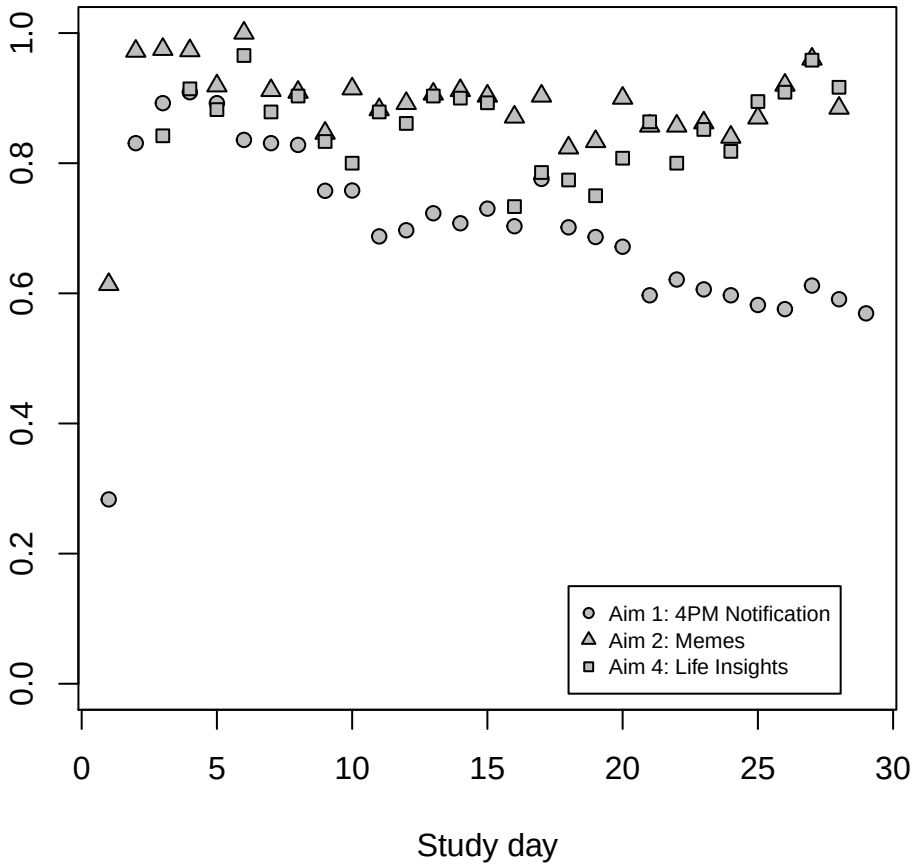

Figure 7: Aim 1: Proportion of participants who opened the app in the prior 72 hours since time T outside of survey/task completion among available participants per study day, Aim 2: Proportion of participants who opened the app in the prior 80 hours since time T outside of survey/task completion among available participants per study day, Aim 4: Proportion of participants who opened the app in the prior 80 hours since time T outside of survey/task completion among available participants per study day

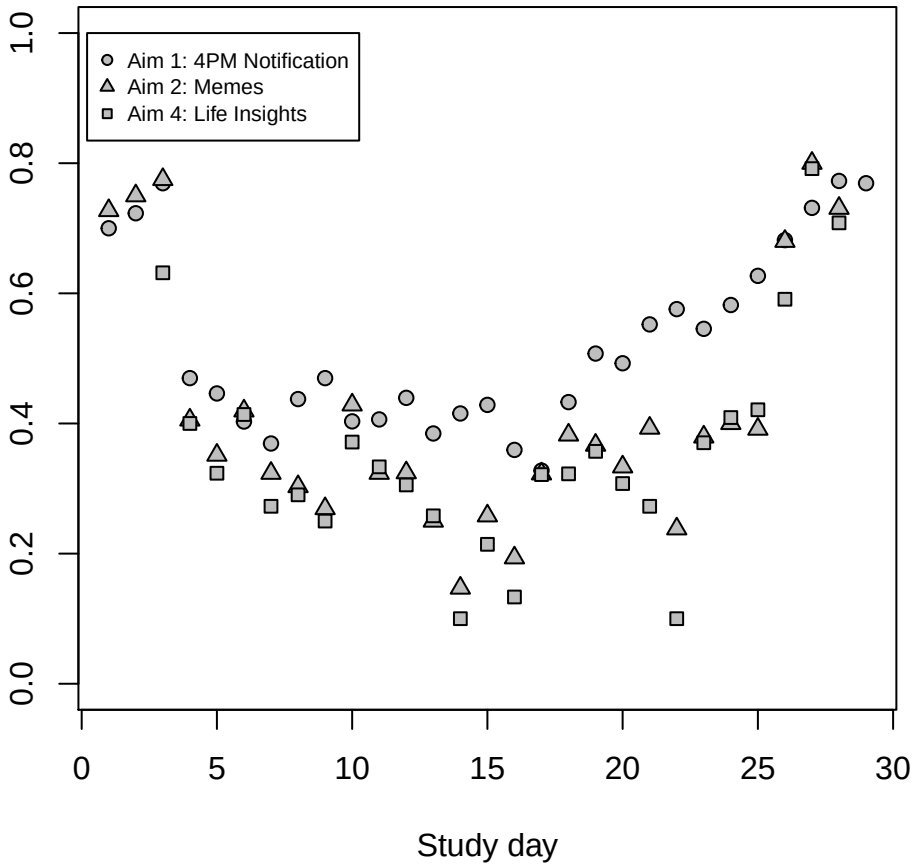

Figure 8: Aim 1: Proportion of participants to whom staff made text or phone calls in the last 24 hours since time T among available participants per study day, Aim 2: Proportion of participants to whom staff made text or phone calls in the last 30 hours since time T among available participants per study day, Aim 4: Proportion of participants to whom staff made text or phone calls in the last 30 hours since time T among available participants per study day

3 Checks on Quality of Randomization

3.1 Background

To check the quality of randomization:

1. We calculated the proportion of participants assigned to be offered an intervention for every given day using all participants available on that day. Further, we plotted this proportion across all study days. The randomization went as planned if this proportion is approximately equal to 0.50 on average across all days.
2. For each control covariate, we calculated a 'balance score' at each randomization point. Since all three control covariates are binary, the balance score was defined as the difference in probability of the control covariate being equal to 1 between those assigned to be offered an intervention and those assigned to be offered no intervention calculated using all participants available on that day. Further, we plotted this quantity across all study days. Balance is achieved if the balance score is approximately equal to zero on average across all days.

Checks on quality of randomization were performed before imputation of missing intervention assignment and after imputation of missing intervention assignment; similar results were obtained from both.

3.2 Results of Checks

Table 1: Checks on quality of randomization (After imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 1
Average: empirical probability of being offered an intervention	0.49
Average: balance score of appusage_yes	-0.05
Average: balance score of isCompleted_yesterday_yes	-0.02
Average: balance score of contact_yes	0.00

Table 2: Checks on quality of randomization (After imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 2
Average: empirical probability of being offered an intervention	0.48
Average: balance score of appusage_yes	0.00
Average: balance score of isCompleted_yesterday_yes	0.01
Average: balance score of contact_yes	-0.01

Table 3: Checks on quality of randomization (After imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 4
Average: empirical probability of being offered an intervention	0.49
Average: balance score of appusage_yes	-0.05
Average: balance score of isCompleted_yesterday_yes	-0.02
Average: balance score of contact_yes	0.02

Table 4: Checks on quality of randomization (No imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 1
Average: empirical probability of being offered an intervention	0.49
Average: balance score of appusage_yes	-0.04
Average: balance score of isCompleted_yesterday_yes	-0.03
Average: balance score of contact_yes	0.00

Table 5: Checks on quality of randomization (No imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 2
Average: empirical probability of being offered an intervention	0.48
Average: balance score of appusage_yes	0.00
Average: balance score of isCompleted_yesterday_yes	0.01
Average: balance score of contact_yes	-0.01

Table 6: Checks on quality of randomization (No imputation of missing intervention assignment on available participant days): Quantities below were calculated using all available participants for each study day and averages presented are taken across all study days

	Aim 4
Average: empirical probability of being offered an intervention	0.48
Average: balance score of appusage_yes	-0.02
Average: balance score of isCompleted_yesterday_yes	-0.04
Average: balance score of contact_yes	0.02

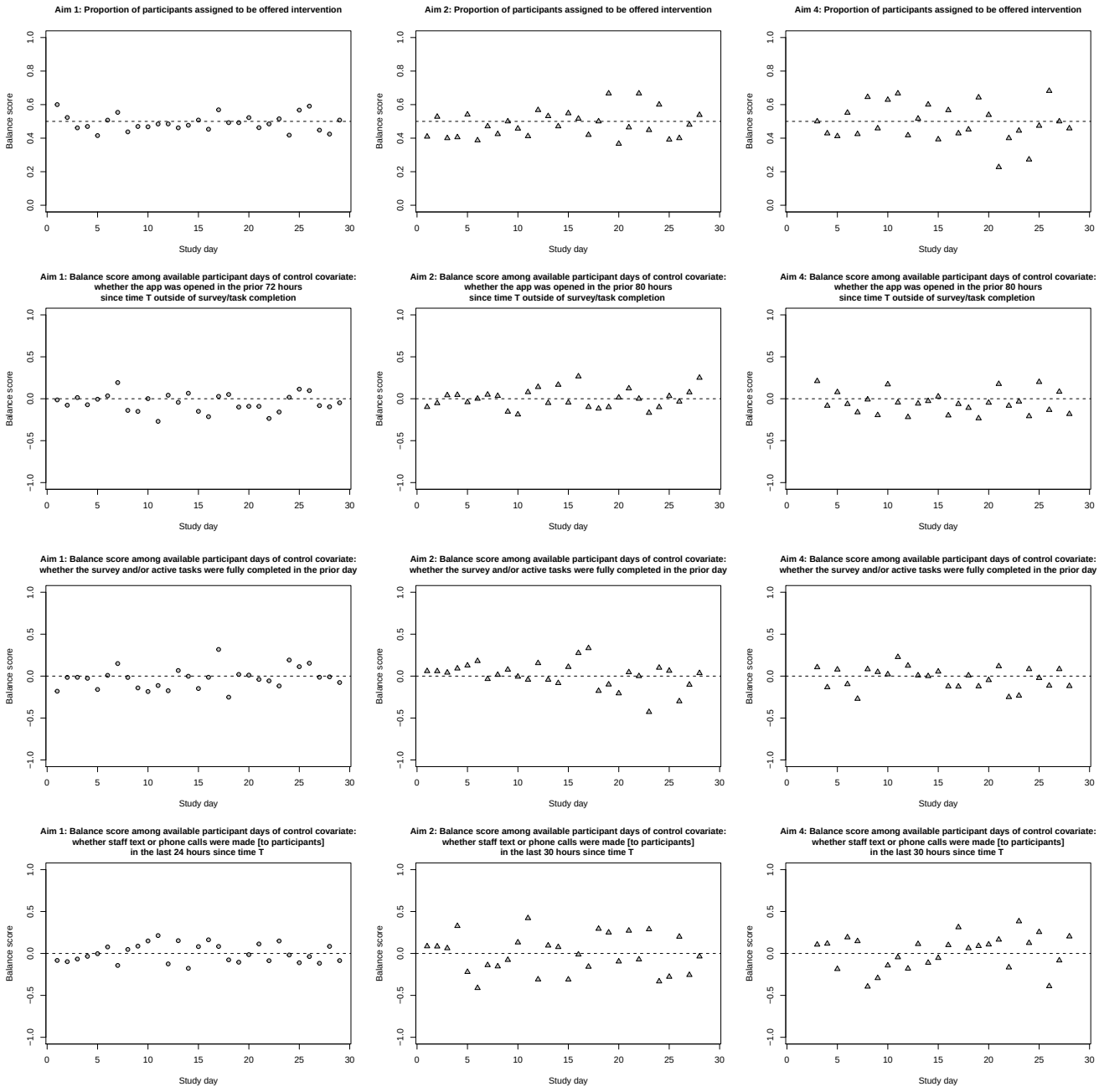

Figure 9: Plots to check on quality of randomization after imputation of missing intervention assignment on available participant days. Aim 1: Left column, Aim 2: Center column, Aim 4: Right Column

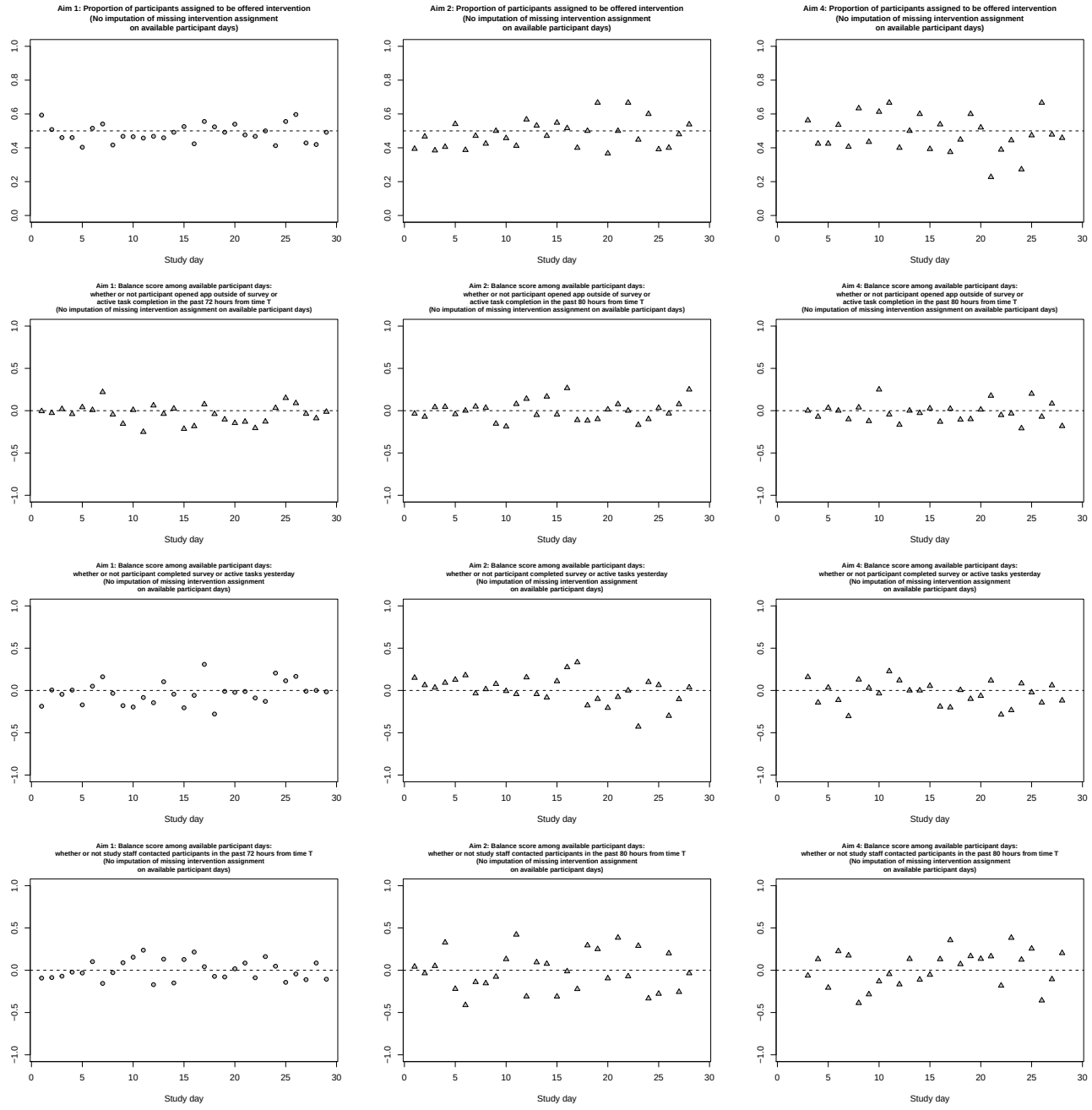

Figure 10: Plots to check on quality of randomization. No imputation of missing intervention assignment on available participant days. Aim 1: Left column, Aim 2: Center column, Aim 4: Right column