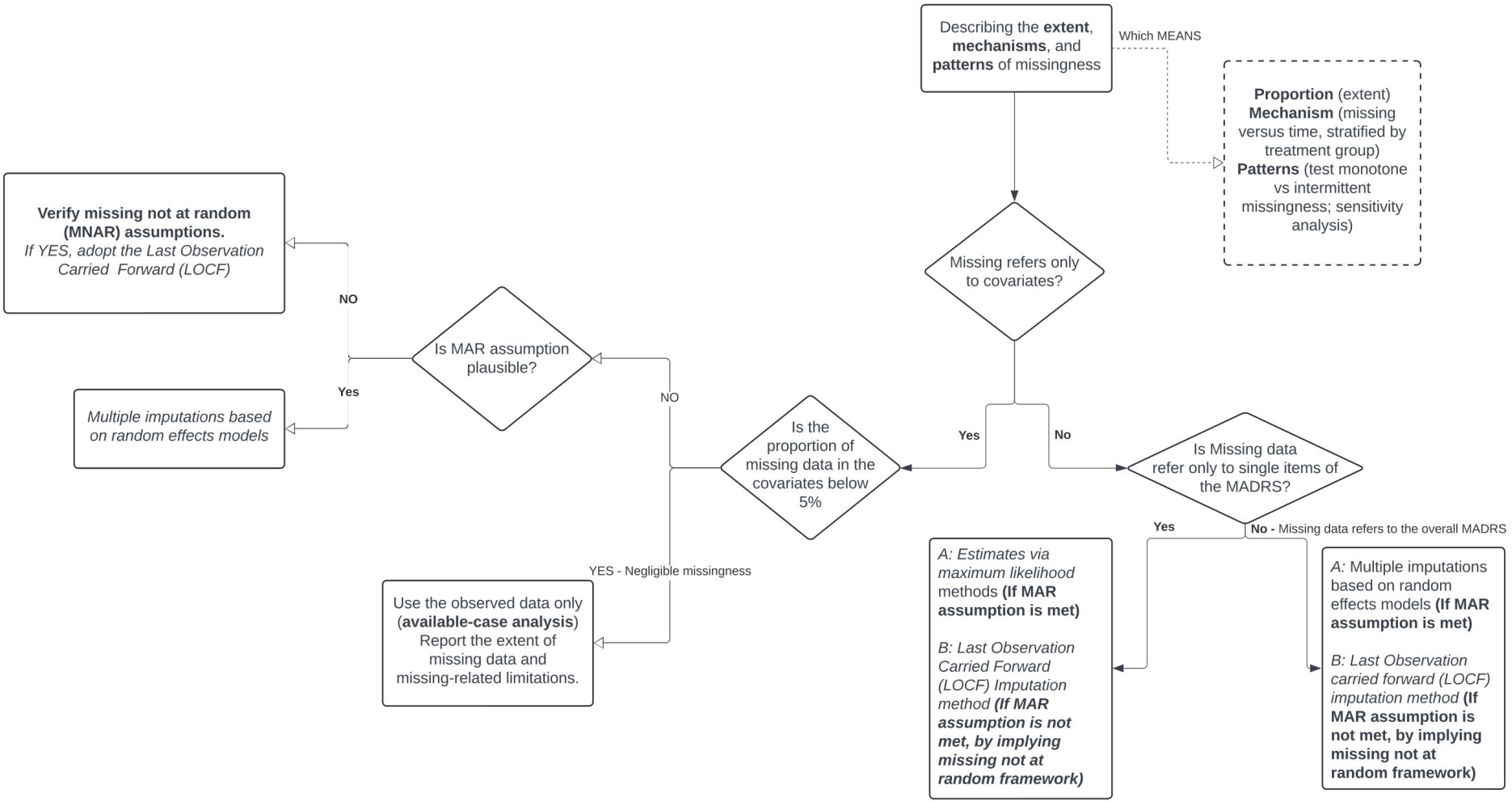

NOTE

This evidence and algorithm-based strategy is consistent with the recommendations of the National Research Council 2010. The prevention and Treatment of Missing Data in Clinical Trial. Washington, DC: The National Academies Press. https://doi.org/10.17226/12955.

Legend: MAR= Missing at Random; MNAR= Missing not at Random; LOCF = Last Observation Carried Forward; MADRS = Montgomery-Asberg Depression Rating Scale

Table S1. Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
● MADRS ≥ 6 and/or clinical diagnosis of MDD based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) and stable treatment (no dose change for ≥12 weeks) with SSRI;	● Active suicidality, psychosis, or dysthymia;
● Confirmed diagnosis of PD based on the Queen Square Brain Bank criteria and mild to moderate PD with a Hoehn and Yahr stage between 1-3 in the "ON" state treated with levodopa at a stable dose (no changes for ≥12 weeks);	● Atypical parkinsonism;
● Age 60 to 90 years old; and	● Atypical depression;
● Ability to read and understand the written participant study information kit and give informed consent.	● Cognitive impairment or neurological disease other than PD;
	● Recent (≤12 weeks) change in levodopa dose;
	● Recent (≤12 weeks) change in SSRI dose;
	● Recent (≤12 weeks) use of probiotics or antibiotics;
	● Medical conditions such as primary gastrointestinal diseases, acute infectious diseases, immunosuppression, or
	● History of alcohol or drug abuse.

Table S2. Timeline

Visit number & time-point	Remote/on-site	Visit agenda
Visit 1	Remote	· Study introduction · Information package about trial provided, participant will be encouraged to ask questions · Appointment time/date and platform for next visit determined
Visit 2	On-site/remote	· Screening - inclusion and exclusion criteria assessed · Participants will be encouraged to ask questions · Informed consent signed · Participant supplied with treatment for 14-day run-in period · Appointment time/date and platform for next visit determined
Visit 3 Last day of run-in period	On-site	· Adherence to the study protocol during run-in period assessed · Baseline assessment using the MADRS and BDI-II · Adverse events diary provided and explained · Probiotics/placebo (three months' worth) supplied · Appointment time/date and platform for next visit determined
Visit 4 Day 30 ± 3-day, 6-day window	On-site	· 1-month safety assessment · Changes in levodopa dose assessed · Adverse events assessed · Returned pills counted and adherence assessed · Appointment time/date and platform for next visit determined
Visit 5 Day 90 ± 7-day, 14-day window	On-site	· 3-month assessment using the MADRS and BDI-II · Changes in levodopa dose assessed · Adverse events assessed · Returned pills counted and adherence assessed · Probiotics/placebo (three months' worth) supplied · Appointment time/date and platform for next visit determined