Significant metadata correlation heatmap FDR-values: < 0.001 = ***, < 0.01 = **, < 0.1 = * Erysipelatoclostridiaceae -Frisingicoccus -Bifidobacterium -Butyricicoccus -Ruminococcus -Clostridia vadinBB60 group -Defluviitaleaceae UCG-011 -Ruminococcaceae -[Eubacterium] coprostanoligenes group -Muribaculaceae -Erysipelatoclostridium -Lachnoclostridium -Lachnospiraceae UCG-006 -UBA1819 - • Effect size Pygmaiobacter -Dorea -00 0.5 Marvinbryantia -Bacteroides -0.0 Feature Value Anaerostipes - • NK4A214 group --0.5 Anaerofustis -Paludicola -Parasutterella -Parabacteroides status Lachnospiraceae A2 -Confounded Erysipelotrichaceae -Deconfounded Christensenellaceae R-7 group -Enterococcus -۰ Gastranaerophilales - • [Eubacterium] siraeum group -Roseburia -Lachnospiraceae NK4A136 group -Candidatus Saccharimonas -Clostridium sensu stricto 1 - • Clostridia UCG-014 - • Escherichia-Shigella - • Monoglobus - • Romboutsia -Clostridia - • Jeotgalicoccus - • Oscillibacter -Family **Treatments SCFAs** Memb. receptors Cytokines Cognition Family NR2B. CCL20 SCFA_BA TNFR1 NR2A SCFA_CA Learning_index_Rmaze Treated_CCL SCFA_AA NR1 Variables Family [Eubacterium] coprostanoligenes group Erysipelatoclostridiaceae Sutterellaceae Christensenellaceae Oscillospiraceae Erysipelotrichaceae Anaerofustaceae Clostridiaceae Peptostreptococcaceae Tannerellaceae Bacteroidaceae Defluviitaleaceae Lachnospiraceae Ruminococcaceae NA Bifidobacteriaceae Enterobacteriaceae Monoglobaceae Saccharimonadaceae

Enterococcaceae

Muribaculaceae

Staphylococcaceae

Butyricicoccaceae