Proper and improper imputation

There is a distinction between "proper" and "improper" imputation as reported in the HLM output file. It is a rather technical difference. To get consistent asymptotically normal estimators, correct variance estimators and valid tests, the imputations must be proper. Imputation procedures, whether based on explicit or implicit models, or ignorable or nonignorable models, that incorporate appropriate variability among the repetitions within a model are called proper, which is defined precisely in Rubin (1987). However, if variables predictive of the missing values are left out of the imputation model it may not be possible to obtain "proper" results and the imputations will be "improper" – the imputed values will be incorrectly independent of the omitted variables, leading to bias over repeated imputations (violations of (3.5) or (3.6)) (Rubin, 1996).