Reviewer comments:   
  
Reviewer #2 (Comments for the Authors (Required)):   
  
Revisions made by authors are acceptable. No further changes needed   
  
  
  
Reviewer #3 (Comments for the Authors (Required)):   
  
I think the revisions have clarified the scope of the study and addressed some methodological concerns.

Line 47 - "which increased our power". This idea of a power increase is mentioned a few times in the manuscript, but I can't see what analysis this based on. Please clarify in the discussion what evidence this conclusion is based on.

*This wording was taken directly from the mash paper (Urbut et al., 2019), where the theory behind this was elaborated on and then demonstrated on both simulated and real data. In addition, the fact that independent GWAS found significant associations for eight phenotypes, and mash found significant associations for 20 phenotypes, supports this claim. We now are more explicit about this in the Methods (line 349) and in the Discussion (lines 657 – 661).*

Line 454 - The study by Morris et al. 2013 was just descriptive and didn't use environmental associations. You may be thinking of the study of Lasky et al. 2015 by the same group.

*True. We change this citation.*

Line 865 - In Fig 3B its not really possible to see the chromosome boundaries or which chromosome many of the QTL are on.

*We used different point shapes to distinguish between even and odd chromosomes – squares and circles, respectively. This allowed us to distinguish chromosome boundaries. We now add this information to the figure caption. (line 843).*