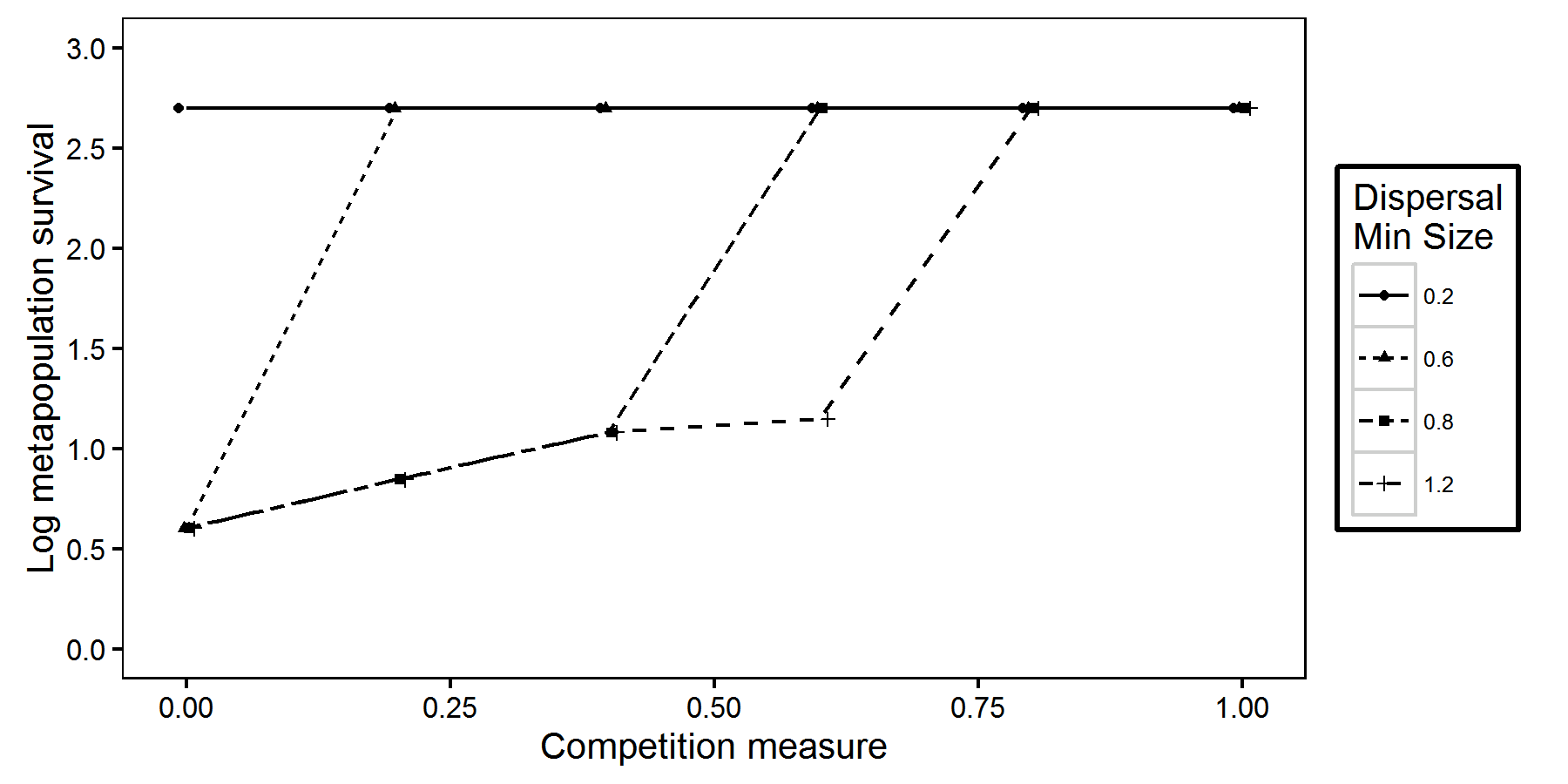
Dispersal Model Graphs

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# Metapopulation survival with no environmental variation

### Interaction between intraspecific competition type and dispersal constraint



1. *Figure :Metapopulation survival against competition type, where competition type ranges from 0 to 1, with 0 being full scramble competition and 1 is full contest competition. Environmental variance is 0 and number of offspring set to 6. No generations removed*

As competition changes from scramble to contest competition the metapopulation age increases, but this interacts with the body size needed to disperse, unless the populations survive to 500 generations, in which cases obviously.

**Both dipsersal and intraspecific compeition type affects metapopulation survival**

#### Why dispersal increases metapopulation survival?

The simulation only starts with x number of colonies, but there are ‘spaces’ for 200. More dispersal means that these spaces get filled up.

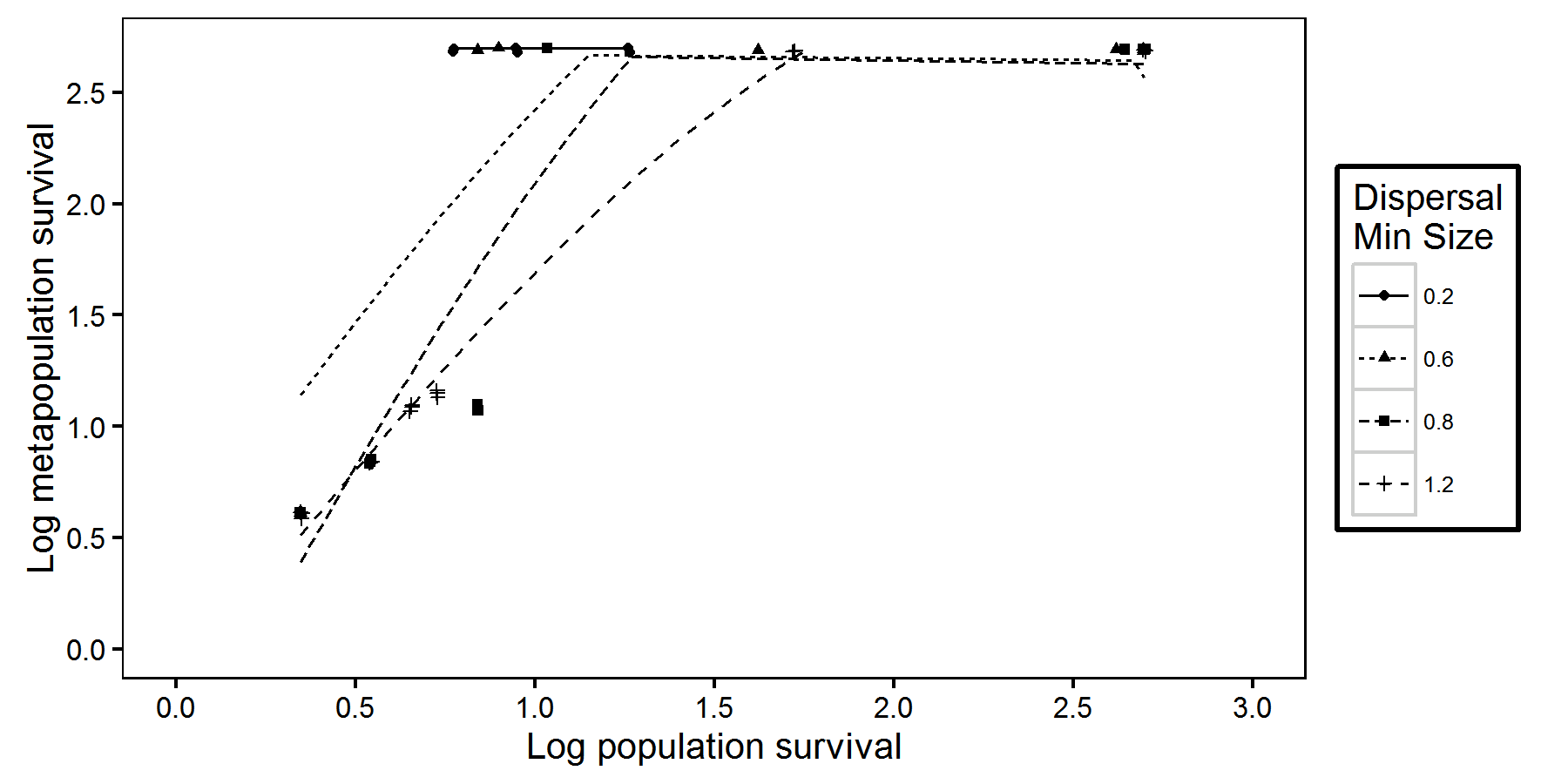
#### How does this interact with competition?

If food is shared via contest competition then normally some individuals will get enough food to disperse, even if individuals have to be large to disperse. However if food is shared via contest competition then this is not the case.

## Metapopulation survival against population survival

Warning: Removed 129 rows containing missing values (geom\_smooth).

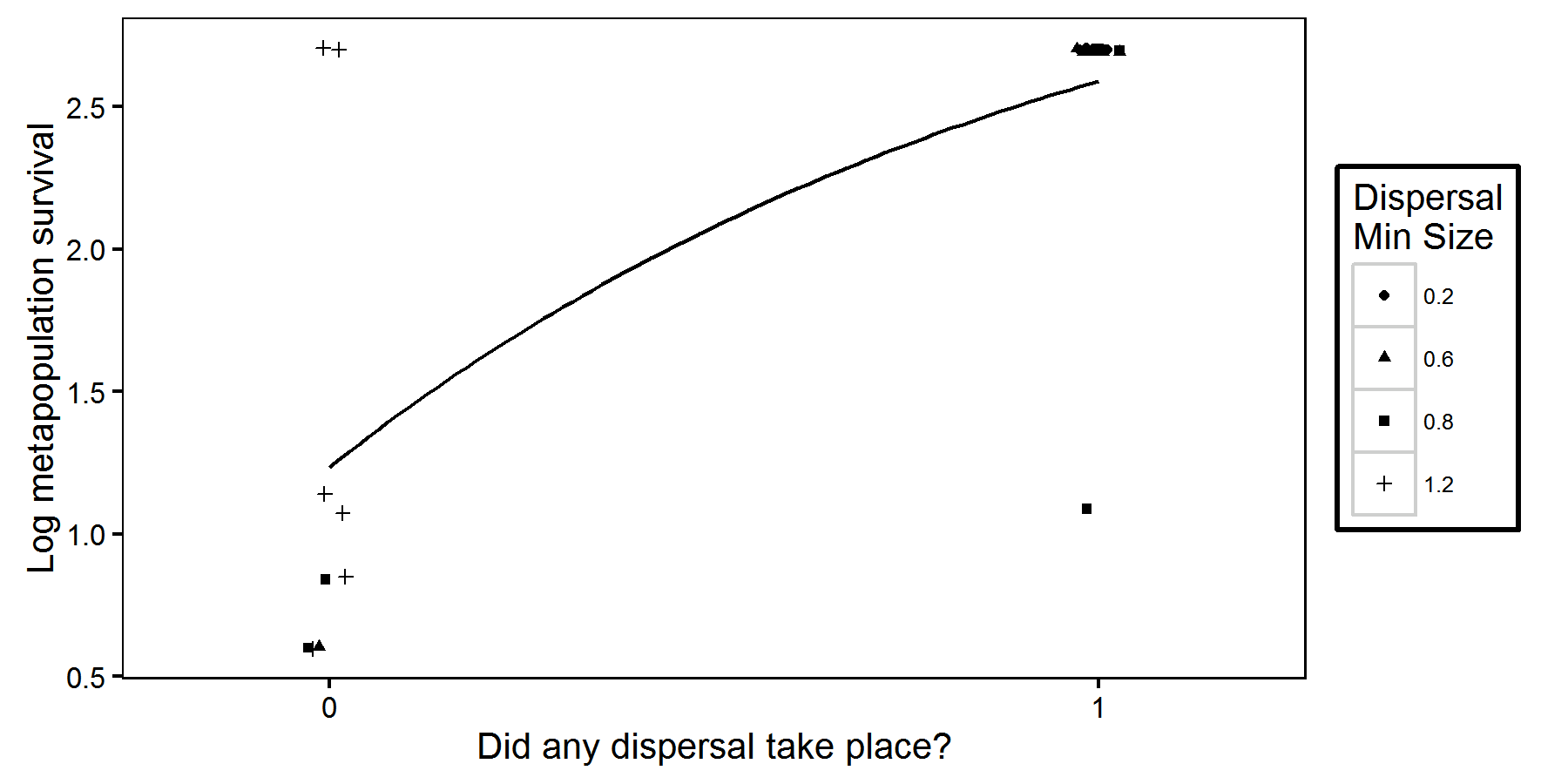
Warning: Removed 27 rows containing missing values (geom\_point).



1. *Figure :Metapopulation against population survival. Environmental variance is 0 and number of offspring set to 6. All generations included. Survival calculated from survival function*

From this graph we can see that dispersal affects whether populations survival affects metapopulation survival. When the size needed to disperse is 0.2 (i.e. low) then the metapopulation survives to 500 generations regardless of the survival of the populations. The higher the disperal size is, the more the population survival affects the metapopulation survival.

## Metapopulation survival and dispersal

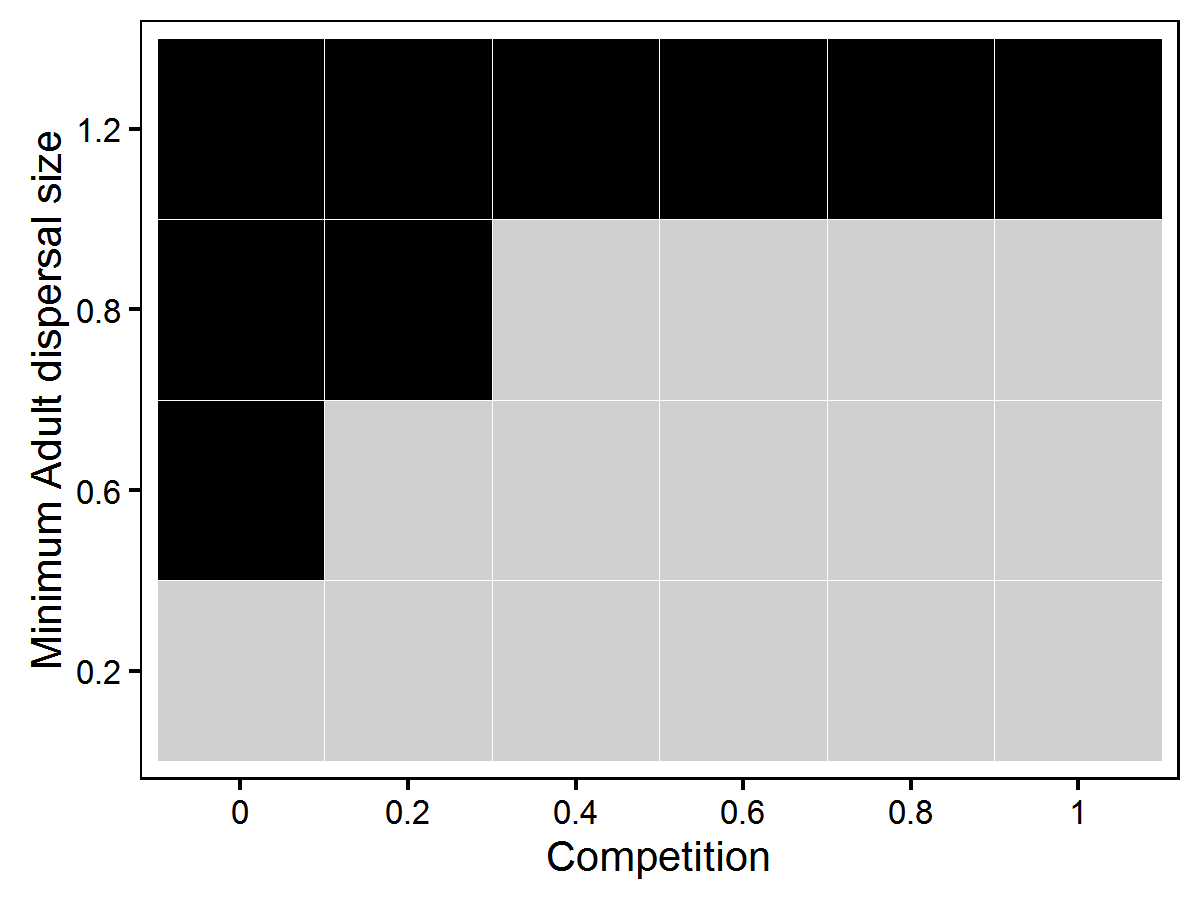


1. *Figure : Comparing metapopulation survival to whether any populations produced dispersers*

This shows how metapopulations have short survival if dispersal is restricted, but that metapopulations can survive no dispersal if competition within populations is contest like.

x2 outliners

## What affects dispersal?



1. *Figure : Comparing metapopulation survival to whether any populations produced dispersers*

This shows how metapopulations have short survival if dispersal is restricted, but that metapopulations can survive no dispersal if competition within populations is contest like.

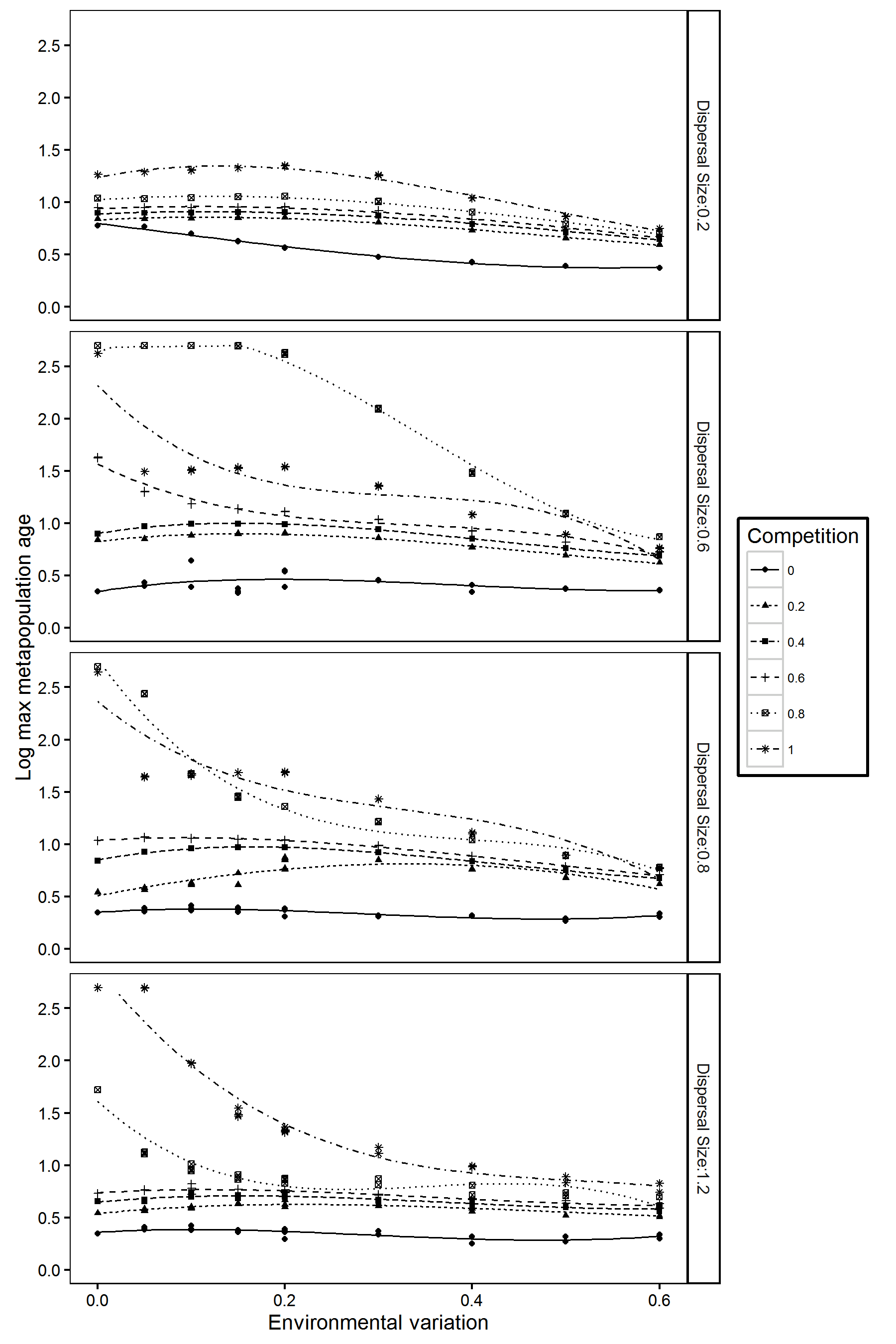
## Conclusion

Competition affects population survival and therefore metapopulation survival, but low population survival is off-set by disperal to increase metapopulation survival.

# Metapopulation and population survival and environmental variance

## Population Survival against environmental variation

Warning: Removed 21 rows containing missing values (geom\_smooth).

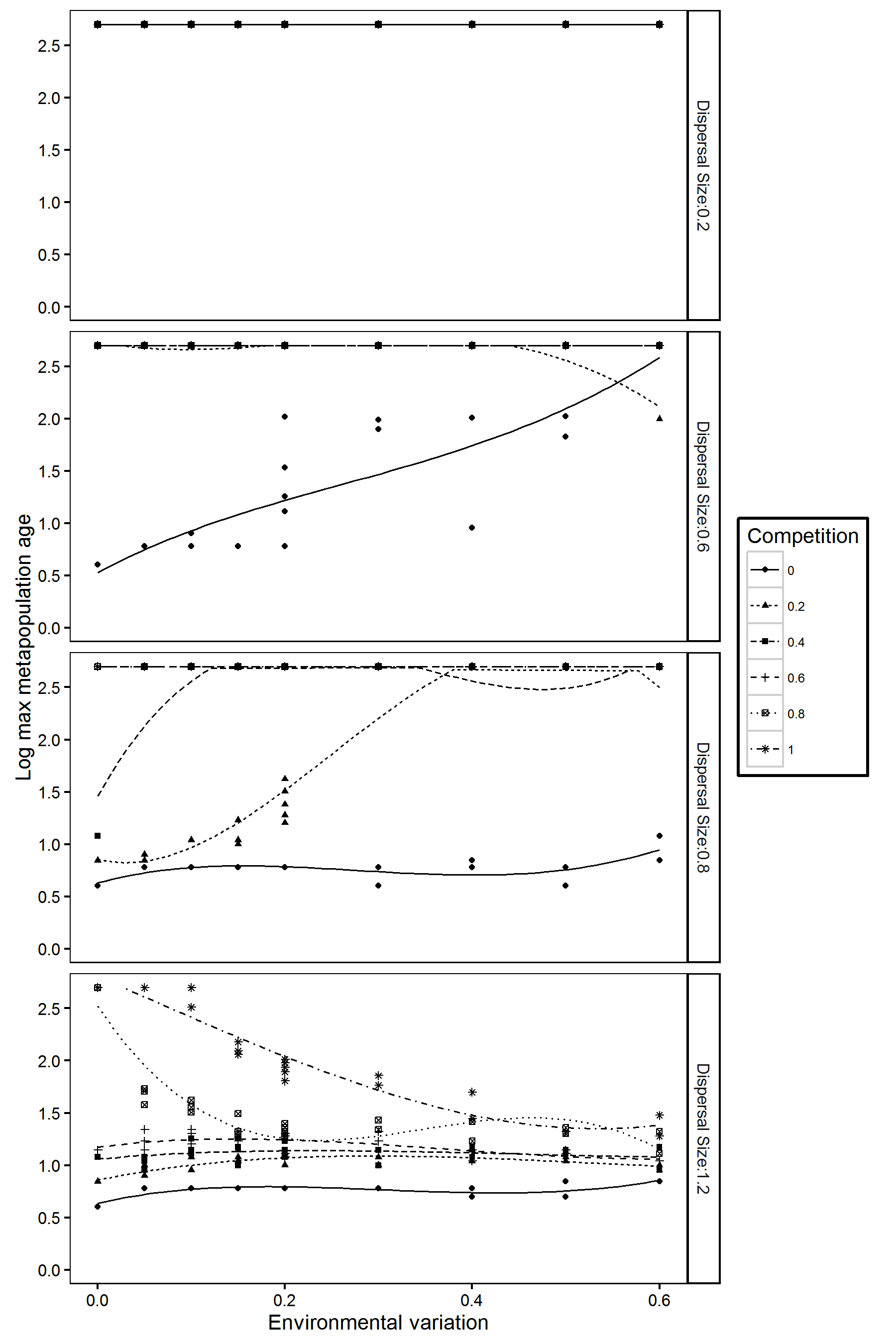


1. *Figure :Metapopulation survival environmental variance. Number of offspring set to 6. All generations included*

How much environmental variation affects population survival depends on intraspecific competition form

## Metapopulation Survival

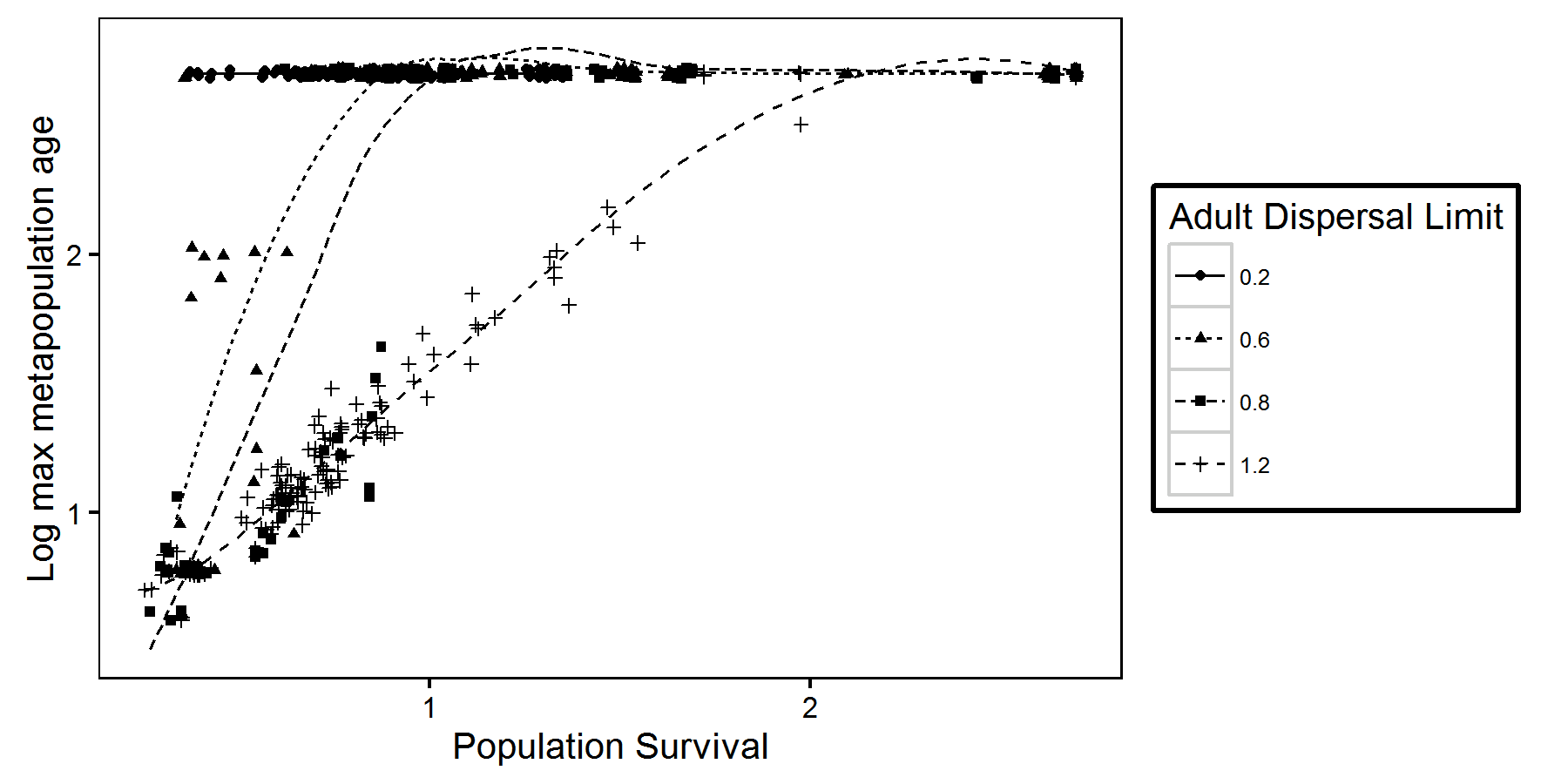
Warning: Removed 98 rows containing missing values (geom\_smooth).



1. *Figure :Metapopulation survival environmental variance. Number of offspring set to 6. All generations included*

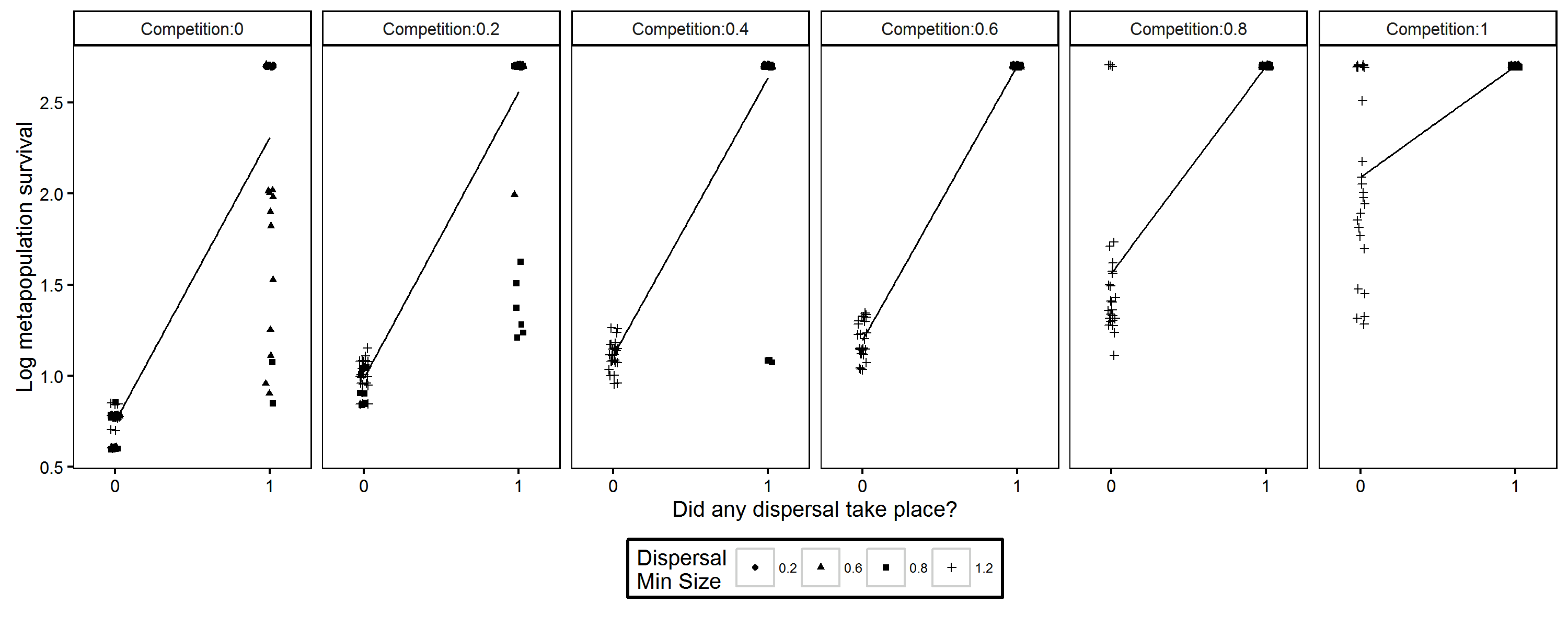
Intermediate environmental variance increases metapopulation survival for some competition measures when dispersal is restricted.

## Population Survival vs Metapopulation survival by Adult Dispersal Size

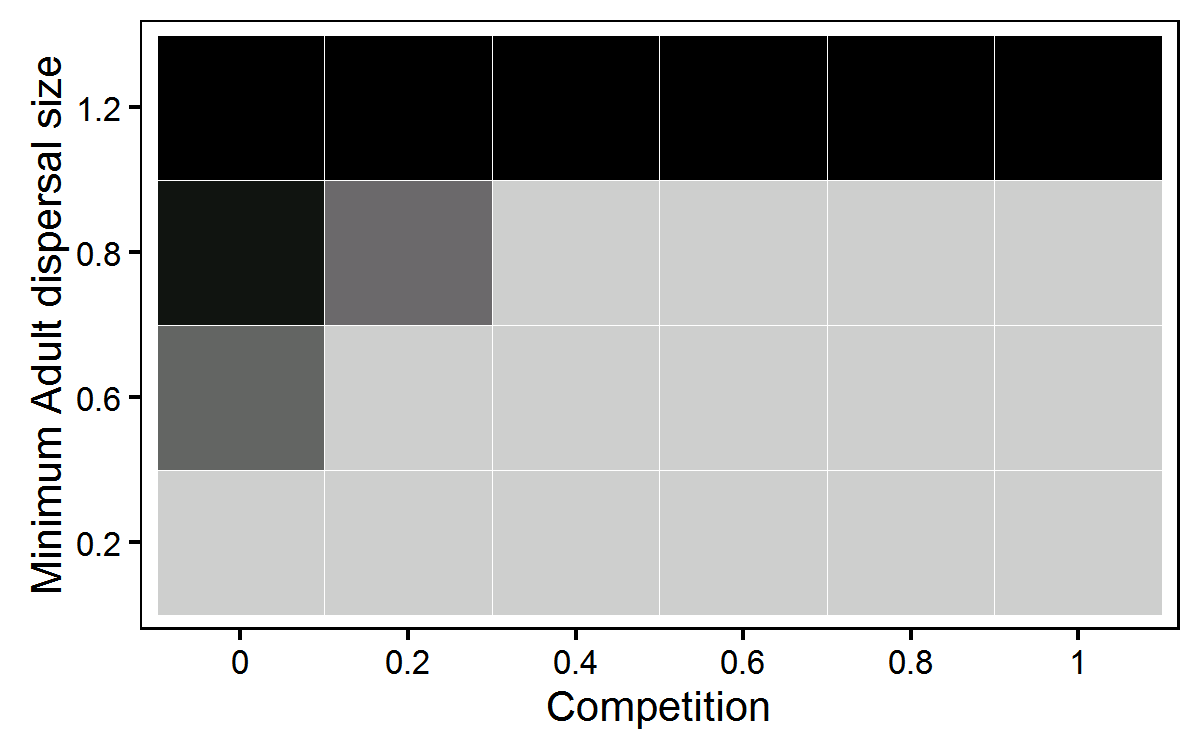


# Binary dispersal faceted by competition

Warning in loop\_apply(n, do.ply): prediction from a rank-deficient fit may  
be misleading  
  
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Warning in loop\_apply(n, do.ply): prediction from a rank-deficient fit may  
be misleading



## What restricts dispersal?



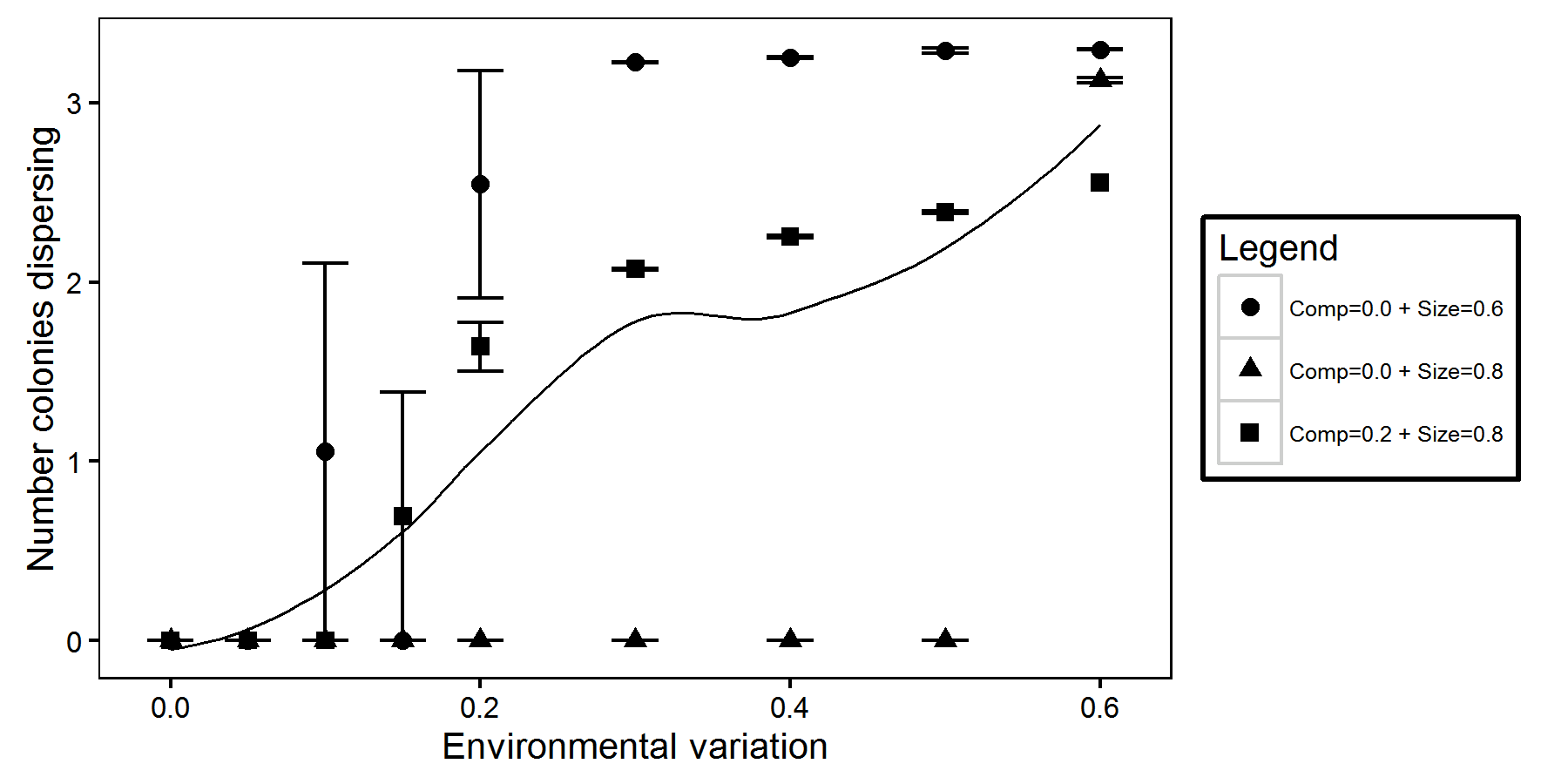
1. *Figure : Comparing metapopulation survival to whether any populations produced dispersers*

From comparing figure (above) to figure (other), we can see that disperal has gone from zero to some dispersal when size is 0.6 and competition is 0, size is 0.8, comp is zero, and when size os 0.8 and comp is 0.2.

## Disperal amount and environmental variation

Warning in qt(conf.interval/2 + 0.5, datac$N - 1): NaNs produced

Warning: Removed 1 rows containing missing values (geom\_errorbar).

 (@) *Figure : Average of log10 number of dispersers per time step*