

# Longitudinal Cohort data II

Survival/time-to-event data

ERHS 732

# Longitudinal Cohort data - last week

- ▶ The survival (and Cox) models we were working on last week relied on one observation per participant

id	time	$X_1$	$X_2$	$Y$
1	1200	0	1	1
2	4434	1	1	1
3	8766	0	0	0
4	8766	1	0	0

# Longitudinal Cohort data - last week

- ▶ The survival (and Cox) models we were working on last week relied on one observation per participant
  - ▶ Essentially looking at values of covariates at baseline and hazard of mortality/MI by end of follow-up

id	time	$X_1$	$X_2$	$Y$
1	1200	0	1	1
2	4434	1	1	1
3	8766	0	0	0
4	8766	1	0	0

# The Framingham Study (FHS) timeline

- ▶ Each participant in FHS had multiple measurements (approximately one every two-years for the original FHS)

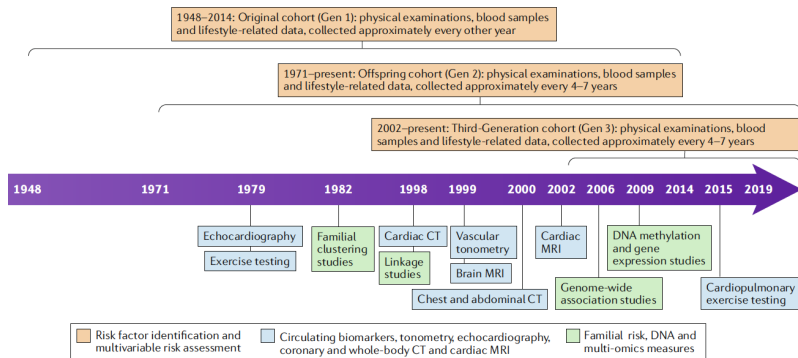


Figure: Figure 1, Anderson et al. 2019

# Longitudinal Cohort data - this week

- ▶ Today we will leverage all the available observations per participant

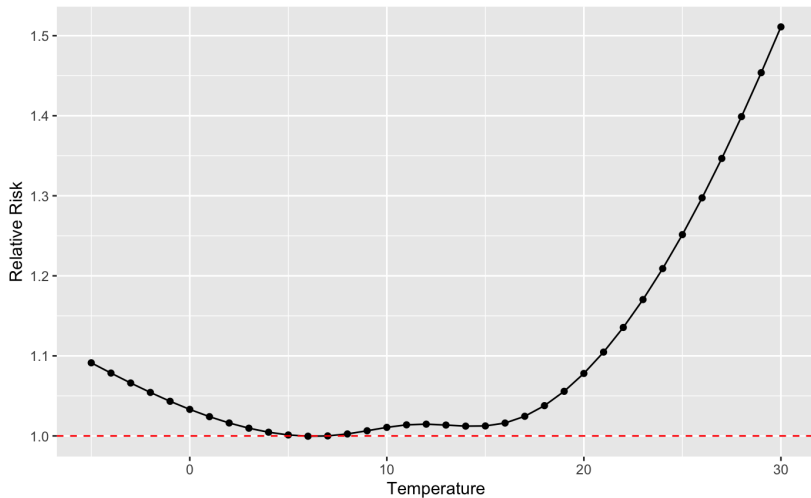
id	time	time2	$X_1$	$X_2$	$Y$
1	0	1200	0	1	1
2	0	1902	1	1	0
2	1903	3804	1	1	0
2	3804	4434	1	0	1
3	0	1902	0	0	0
3	1903	3804	0	0	0
3	3804	8766	0	0	0

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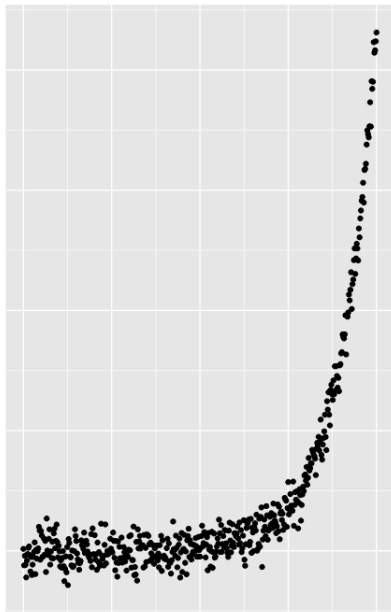
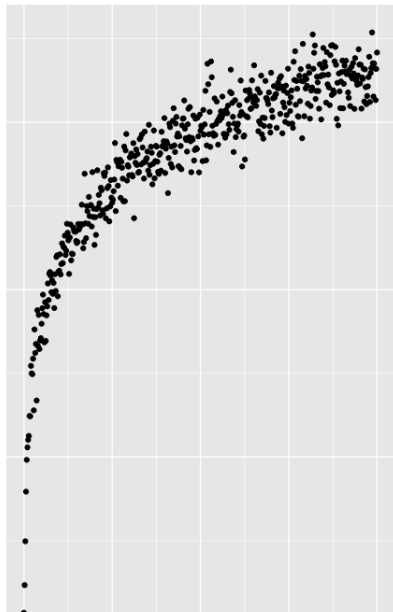
- ▶ Today we will leverage all the available observations per participant
  - ▶ Now we are looking at values of covariates and hazard of mortality/MI at each time interval

id	time	time2	$X_1$	$X_2$	$Y$
1	0	1200	0	1	1
2	0	1902	1	1	0
2	1903	3804	1	1	0
2	3804	4434	1	0	1
3	0	1902	0	0	0
3	1903	3804	0	0	0
3	3804	8766	0	0	0

# Multilevel exposures

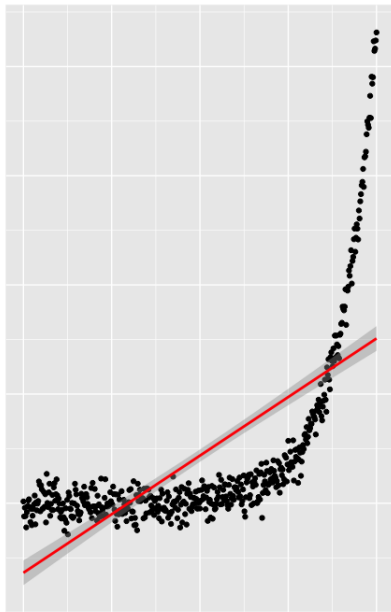
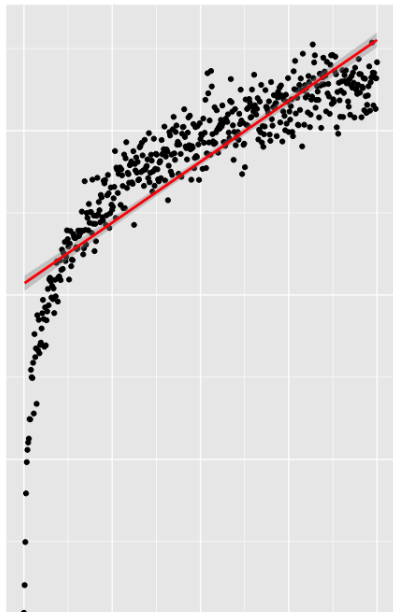


# Multilevel exposures - non-linearities

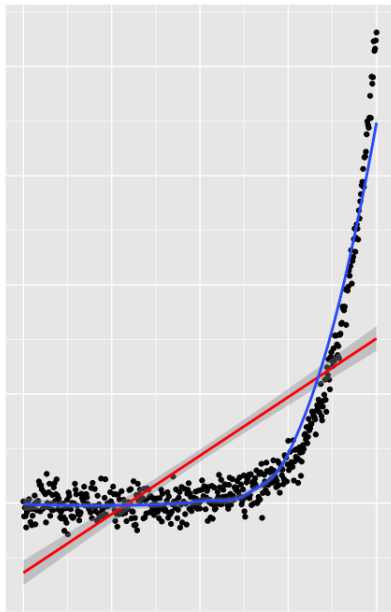
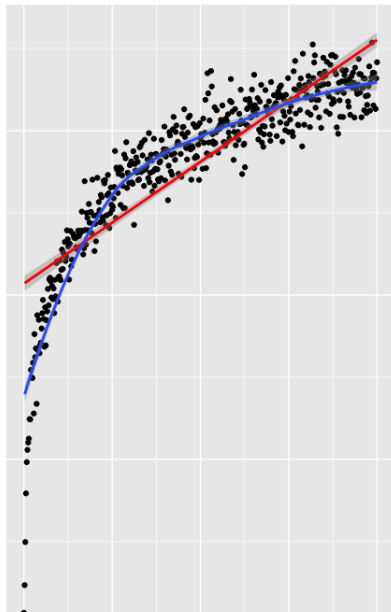




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# Confounding (10/30)

- ▶ The study has several predictors for CVD outcomes
- ▶ If we are interested in the potential effect of one of them rather than merely prediction, confounding becomes an issue
- ▶ What is a problem with including all of these predictors in a single model in this dataset
  - ▶ A DAG can be a useful tool in visualizing our assumptions about causal structure and what we need to adjust for (or not adjust for)