**Codebook**

*Study\_ID*

Unique identifier for each study

*First\_author*

First author of study

*Year\_published*

Year study was published

*Experiment\_ID*

Unique identifier for each individual experiment (i.e., if multiple experiments within the same study)

*ES\_ID*

Unique identifier for dat\_effect2$Type\_EE\_exposure each effect size

*Common\_species*

Common species name

*Strain*

Strain of study species

*Sex*

1 = female, 2 = males, 3 = mixed, 4 = not clear

*Housing*

1 = single housed, 2 = paired, 3 = group housed single sex, 4 = group housed mixed sex, 5 = other (e.g., when isolation is used as a form of stress), 6 = not clear

*Notes\_housing*

Any notes regarding the housing

*Age\_EE\_exposure*

The age at which the individuals were exposed to environmental enrichment. Age categories were based on (**refs**).

1 = prenatal, 2 = early postnatal (PND < 21), 3 = adolescent (PND 21 – 60), 4 = adult (PND > 60), 5 = unclear

Note: if the age covered two categories, we recorded the category that animals were exposed in the longest

*Notes\_age\_EE\_exposure*

Any notes regarding the age animals were during environmental enrichment

*Age\_stress\_exposure*

The age at which the individuals were exposed to stress. Age categories were based on (**refs**).

1 = prenatal, 2 = early postnatal (PND < 21), 3 = adolescent (PND 21 – 60), 4 = adult (PND > 60), 5 = unclear

Note: if the age covered two categories, we recorded the category that animals were exposed in the longest

*Notes\_age\_stress\_exposure*

Any notes regarding the age animals were during stress

*Age\_assay*

The age at which the individuals were assayed for learning or memory. Age categories were based on (**refs**).

1= early postnatal (PND < 21), 2 = adolescent (PND 21 – 60), 3 = adult (PND > 60), 4 = unclear

Note: if the age covered two categories, we recorded the most common category

*Notes\_age\_assay*

Any notes regarding how old the animals were when assayed

*Type\_EE\_exposure*

The type of environmental enrichment manipulation (not including social/biotic forms of enrichment). Note that we did not include this as a moderator in the meta-regression analyses as a large majority of studies used a combination (5) of enrichment types which means that we did not have enough moderator categories to perform a meaningful meta-regression. Rather, we used *EE\_exercise* (if enrichment included a running wheel or treadmill) and *EE\_social* (if enrichment included a manipulation of the number of conspecifics) to potential differences in responses mediated by exercise and social connections. Manipulations of these two moderators varied between studies and were predicted to be important components of the EE manipulation (**refs**).

1 = nesting material, 2 = objects, 3 = complexity of cage (i.e., multilevel cages), 4 = wheel/treadmill, 5 = combination, 6 = other, 7 = unclear

*Type\_EE\_details*

Details/notes regarding the EE manipulation

*EE\_exercise*

Does the form of enrichment include exercise through adding a running wheel or treadmill?

1 = yes, 2 = no, 3 =unclear

*EE\_social*

Does EE also include a manipulation of social environment (i.e., inceased number of individuals in EE relative to control)?

1 = yes, 2 = no, 3= unclear

*Type\_stress\_exposure*

The type of stress manipulation

1 = density, 2 = scent cues (i.e., from predators or competitors), 3 = shock, 4 = exertion (i.e., forces swim, forced exercise), 5 = restraint, 6 = maternal separation, 7 = circadian rhythm disruptions, 8 = noise, 9 = other, 10 = combination, 11 = unclear

*Type\_stress\_details*

Details/ notes regarding the stress manipulation

*Stress\_duration*

If the stress occurred over a short period of time (acute) or over a long period of time (chronic). The definition of chronic stress (≥ 7 days) was selected based on a conservative cut-off point based on Ottenweller et al. (1992).

1 = acute (short term stress, one-off or <7 days), 2 = chronic (long term/exposure every day for ≥ 7 days with only short intervals between/if any), 3 = intermittent (i.e., on alternating days so there is time for recovery), 4 = unclear/other

*Notes\_stress\_duration*

Any notes regarding the duration of stress

*Exposure\_order*

The order in which individuals were exposed to stress and environmental enrichment

1 = stress followed by enrichment, 2 = enrichment followed by stress, 3 = concurrently, 4 = unclear/other

*Learning\_vs\_memory*

Is the assay broadly measuring learning or memory?

1 = learning (i.e., conditioning etc), 2 = memory (i.e., is learning stable after a period of time such as when measuring ‘extinction’), 3 = other (i.e., habituation)

*Type\_assay*

The type of learning/memory response . These broad categories were based on (**ref**).

1 = habituation, 2 = conditioning, 3 = recognition, 4 = unclear

*Type\_reinforcement*

The type of reinforcement used in conditioning

1 = appetitive (i.e., a reward), 2 = aversive (punishment – this includes Morris water maze and shocks), 3 = not applicable (i.e., no reward or aversive context was used – this includes novel object/location recognition and habituation), 4 = unclear

*Response\_assay\_name*

Name of assay

*Response\_details*

Details of what data was collected from the assay such as latency to perform tasks, the number of arm branches entered etc.

*Response\_unit*

The unit the response was measured in

*Response\_notes*

Any notes regarding the response such as if the response was an average across multiple measures or if it was the last day of habituation etc

*Response\_direction*

Does a higher response mean that the individuals are better at learning or memory?

1 = yes, 2 = no, 3 = unclear

*Data\_location*

Where was the data (i.e., mean, SD) found in the paper

*Original\_names*

List what the original treatment names used in the manuscript were

*CC\_n*

Sample size of EE and stress control (i.e., unmanipulated individuals)

*CC\_mean*

Mean of EE and stress control (i.e., unmanipulated individuals)

*CC\_SD*

Standard deviation of EE and stress control (i.e., unmanipulated individuals)

*CC\_SE*

Standard error of EE and stress control (i.e., unmanipulated individuals)

*EC\_n*

Sample size of EE and stress control

*EC\_mean*

Mean of EE and stress control

*EC\_SD*

Standard deviation of EE and stress control

*EC\_SE*

Standard error of EE and stress control

*CS\_n*

Sample size of EE control and stress

*CS\_mean*

Mean of EE control and stress

*CS\_SD*

Standard deviation of EE control and stress

*CS\_SE*

Standard error of EE control and stress

*ES\_n*

Sample size of EE and stress

*ES\_mean*

Mean of EE and stress

*ES\_SD*

Standard deviation of EE and stress

*ES\_SE*

Standard error of EE and stress

*Original\_names*

What were the original names of the treatments used in the study

*ROB\_blinding*

Risk of bias assessment: were the authors blind to the treatments during the learning/memory assays?

1 = yes, 2 = no, 3 = unclear/does not state

*ROB\_randomisation*

Were individual animals randomly allocated to treatments?

1 = yes, 2 = no, 3 = unclear/does not state

*Analysis\_unit*

If the analysis was conducted with individuals as the replicate or cage as the replicate.

1 = individuals, 2 = cage, 3 = unclear/does not state

*Contact­\_author*

Do we need to contact the author for missing data?

*General\_comments*

Any general comments regarding the study/data including what to contact authors about