Appendix 1: What makes a criminal? (Biological)

**Key research:** Raine, Buchsbaum and LaCasse (1997) *Brain abnormalities in murderers indicated by positron emission tomography*

**Previous research and context to the study**
- Violent offenders have poor brain functioning in comparison to controls. However the brain areas implicated have not been identified.
- Earlier research is limited as it focuses on aggressive hospital patients and has small sample sizes.

**Aim**
- To see if violent offenders who commit murder and plead Not Guilty for Reasons of Insanity (NGRI) have localized brain dysfunction.

**Research Method/Design**
- A quasi-experiment
- Matched pairs design (age, sex and psychiatric condition).

**Participants**
- 41 ‘murderers’ (39 male, 2 female), mean age of 34.3 years, NGRI (e.g. history of head injury). Not receiving any psychoactive medication for two weeks preceding the brain scan.
- 41 controls (39 male, 2 female), mean age of 31.7 years.

**Procedure**
- Participants were injected with an FDG ‘tracer’ and asked to complete a complete a Continuous Performance Task. After 32 minutes of uptake of the tracer, each participant was transferred to the PET scanner. Two techniques were used to identify brain regions:
  1) Cortical Peel technique (lateral brain areas)
  2) Box technique (medial brain areas).

**Results**
- There was no difference in the behavioural performance on the CPT (control feature) between the two groups.
- The experimental group had lower levels of glucose metabolism in the lateral and medial pre-frontal cortical regions of the brain. In the subcortical regions the experimental group also had lower glucose metabolism in the corpus callosum and reduced activity in the amygdala (implicated in aggression and emotion regulation).

**Conclusions**
- The study provides evidence for ‘multi-site deficits’ in murderers pleading NGRI.
- These areas are characterized by reduced glucose metabolism.
- There is support for pre-existing biological factors for predisposition to violence.
- Violent behaviour is localized in the brain and may ‘translate’ into criminally violent behaviour through various pathways including social and cognitive.

**Evaluation Issues**
- Psychology as a science
- Reductionism
- Determinism
- Ethics
- Quantitative data