

A short summary using quotes

Quotes from the Introduction

This review highlights the most important studies investigating pedophilia, with a strong emphasis on (neuro-) biological studies, combined with a brief explanation of research into normal human sexuality.

Concerning sexual offending against children, two groups can be distinguished: **First**, those who show no sexual preference disorder, but whom, for various reasons, sexually abuse children. These individuals are most likely diagnosed with various impulse-control disorders.

Second, there are those who do display a sexual preference disorder, namely pedophilia and/or hebephilia.

Only about 50% of all individuals who do sexually abuse children are pedophilic (Blanchard et al., 2001; Schaefer et al., 2010) and not every pedophilic individual actually has abused children. The other 50% of individuals that have abused children are those who do so *without* a sexual attraction to children.

Pedophilia is defined as an ongoing sexual attraction toward pre-pubertal children. In the new DSM-5, pedophilia is de-pathologized by differentiating between the sexual *preference* for prepubescent children and the *disorder* in case of additional factors.

In this article, we discuss pedophilia with a focus on recent findings of the definition, neuropsychology, and neurobiology of pedophilia as a specific phenotype within the spectrum of human sexual *preference*.

From a clinical perspective, it is necessary to stress that there are
[a] pedophilic men who restrict their desire for sexual contact with children to fantasies only, and
[b] other men who are at risk to commit an offense because fantasy alone does not satisfy their sexual desire.

This underlines that *pedophilia as a sexual preference must be seen independently from sexual offending against children* – otherwise there would be only offending pedophiles.

Consequently, *the sexual preference itself cannot be considered a mental disorder* similar to how a homosexual orientation was considered in the 1970s in the United States of America.

The authors follow with a list of neuropsychological findings associate with pedophilia.

The majority of studies in the following paragraphs were conducted as
uncontrolled studies,
mostly using incarcerated CSO,

which were not carefully screened for incarceration stress or for pedophilic sexual preference.

Therefore, the results are not generalizable and need careful consideration.

They summarize the findings in Figure 2:

Neuropsychology of Pedophilia and Child Sexual Offending: Effects on Intelligence, Handedness, and Prefrontal Function

General Dysfunction: In pedophilic and non-pedophilic child molesters:

Overall IQ is lower

Higher frequency of left-handedness

Lower levels of academic achievement

Lower job capacity

Specific Accentuated Cognitive Deficits: Additionally noticed in pedophilic child molesters

Verbal Word Fluency

Verbal and Spatial Working Memory

Emotion Recognition and Empathy

Attention

Executive Functioning

Despite these results, further research has indicated contradictory results regarding executive functioning impairments.

These results suggest that *disturbed and prosecuted* pedophiles do show deficits in executive functioning, *which might be due rather to mental disturbances and not to the sexual preference.*

Previous studies examining pedophilia may have been measuring ASPD [Anti-Social Personality Disorders] or simply an incarceration *stress* effect in their incarcerated samples *rather than pedophilia.*

Recent studies have found ... impairments in pedophiles, but ... other deficits suggestive more of *offense status* effects than *sexual preference* effects.

No research to date has examined neuropsychological deficits in potential offenders or non-offending pedophiles.

Neurobiology and Neurodevelopment of Pedophilia

Introduction and conceptual framework

Research regarding the etiology of pedophilia suggests the view of a complex and multifactorial phenomenon in which

the influences of genetics,

stressful life events,

specific learning processes, as well as

perturbations in the structural integrity of 'pedophilic' brains may generate this specific phenotype of a sexual preference.

Initial theories relied mainly upon psychological mechanisms to account for a pedophilic preference, including classical and operant conditioning, as the behavioral mechanism through which the 'abused-abuser' theory could be explained as well as attachment style in childhood as a marker for dysfunctional cognitive sexual schemas in adulthood.

However, as Seto purports, due to lack of stringent methodology that includes proper control groups, small experimental or treatment effect sizes, and lacking knowledge of effect duration, these theories are not well supported.

There are **three major neurobiological theories**, which have come to be connected to pedophilia but all have the same shortcoming that they rely on data based on cases of pedophiles who have other psychological disorder diagnoses, are incarcerated or otherwise legally sanctioned, or are not sufficiently diagnostically classified.

The first is the "frontal lobe" theory that refers to orbitofrontal and left and right dorsolateral prefrontal cortex differences that are often seen in pedophilic men. Volume differences or dysfunction in this area may explain the sexual behavior *disorder* associated with pedophilia, although not pedophilic sexual *preference*.

The second major theory is the "temporal lobe" theory, referring to reports of *hypersexuality* accompanying pedophilia. That is often seen with sexual *behavior disorders*. However, this theory also does not fully explain the etiology of the *preference*.

The third major neurobiological theory holds that differences in the sex dimorphic brain structures affected by the masculinization of the male brain would more strongly affect pedophilia development. but *the hypothesis failed to state in what direction these changes occur, ... [and] research has not supported the hypothesis*.

Furthermore, there is an additional theory that combines the frontal and temporal lobe theories. It states that the frontal and temporal lobes affect pedophilic sexual *preference* expression and its associated behaviors differently, with the frontal lobe accounting for committing the sexual *offenses* against children and the temporal lobe (amygdala and hippocampus) accounting for the sexual *preoccupation* with children often seen in pedophilic men.

Currently, pedophilia is often viewed as an interaction among neurodevelopmental factors based on genes and the (*in utero*-) environment. This theory holds that pedophilic sexual preference is a neurodevelopmental disorder corroborated by

increased rates of non-right-handedness,
 shorter stature,
 lower intelligence,
 head injury,
 prenatal androgen levels, and
 the associated neuronal structural and functional differences that are present since
 childhood and/or adolescence.

There is currently no causal evidence yet to support a role in pedophilic sexual preference development.

What follows is a list of research reports about the list given just here above.

One example for this summary:

Approximately 11% of the general *non-offender* population is non-right-handed, whereas pedophilic men with histories of sexually *offending* against children are approximately 15% non-right-handed, this difference being significant.

The reader will see that this difference may be significant, but still very small, and may know that a *correlation*, even if significant, is not the same as a *cause*.

As these results indicate, pedophiles do seem to differ from HC on neurodevelopmental measures. However, these results are varied and few strong conclusions can be drawn.

What follows is Table 2, Findings from previous neuroimaging studies in pedophilia, not repeated here; it is a list of seven pages research reports with lots of abbreviations.

The article continues with a list of six research reports about *Structural* brain alterations in pedophilia. The authors conclude:

Studies to date contain shortcomings either due to the sample sizes, to the configuration of the control group, or because the methodology ... was used in a restricted way by focusing on *a priori* regions of interest.

The take home message of the present structural imaging MRI [Magnetic Resonance Imaging] studies of pedophilia is that while there have been different results from different studies, *one finding has been replicated across studies*: reduced right amygdala volumes in pedophiles compared to teleiophilic controls.

This finding supports the temporal lobe theory of pedophilia (mentioned here above as # 2).

The article follows with a list of 14 research projects concerning *functional* brain alterations in pedophilia. The authors conclude:

Research found that the activations seen in heterosexual and homosexual pedophiles to child stimuli are nearly indistinguishable from those in heterosexual and homosexual healthy males to adult stimuli; this supports the assumption that pedophilia is primarily a sexual age preference similarly to teleiophilia.

As research shows, there are regions that differ in neural activation among heterosexual pedophiles, homosexual pedophiles, and matched healthy teleiophiles. However, limitations in these early studies included controlling neither for sexual preference nor orientation, using insufficiently differentiated inter-study paradigms such that all generalizations had to be limited to the exact study and paradigm utilized.

Furthermore, *pedophilic participants were all incarcerated or judicially involved ... underscoring the need for studies investigating non-incarcerated pedophilic participants.*

A criticism of previous functional neuroimaging studies in pedophilia relates to faking. Under the assumption that immediate processing of sexual stimuli is outside of conscious cognitive control (bottom-up influence), results were interpreted so that (de)-activations were true and not the result of faking.

However, studies of test-retest reliabilities and faking in [this kind of] research have shown that faking can and does occur and that findings are not always reliable across centers and studies. With the aforementioned limitations in mind, new research programs will help to differentiate the true differences from methodological artifacts.

The contribution of molecular genetics and epigenetics

Short explanation: genetics = DNA, copied by RNA, that does the work to be done. Epigenetics are the 'buttons' to activate the DNA, thus RNA, thus the work to be done. For example: epigenetics start the grow of adult tooth or sexual organs at a specific age by activating the already present parts of the DNA.

The article mentions two studies, one of them being a Finish twin study investigating pedophilia. It was shown that genetic influences contribute to sexual interest, fantasies, or activity pertaining to children under the age of 16 years.

However, the heritability estimated in the study explained

only 14.6% of the variance; in comparison, [thus low compared to:]

the heritability of almost all psychiatric disorders is estimated to be above 30%, with schizophrenia and bipolar disorder ranging as high as 70–80%.

Based on their findings, the authors concluded that future research should address the possible interplay of genetic with environmental risk factors.

Given *the weak heritability of pedophilia* together with the assumed large effects of early environment and early development, and possibly an interaction among these different factors, epigenetics might represent a promising way to disentangle the biological substrates and possible markers of sexual deviation.

Recent findings give rise to the view that epigenetic mechanisms are at the core of sexual differentiation and serve as the interface between hormonally transmitted changes and sex chromosome related effects. Its implication in both normal and

abnormal brain development, as well as its role in the etiology of psychiatric disorders, makes it likely *that epigenetic mechanisms widely contribute to the development of the human sexual preference structure including pedophilia*. However, to date, no investigations of epigenetics in this direction have been published.

Conclusion

Pedophilia seems to have a small hereditary component.

Sexually *offending and incarcerated* pedophilic men show ... [some] variables present in pedophilic men significantly more often than in healthy control [see the list here above], but it is not clear if the reason for this is the sexual *behavior* disorder, the pedophilic *preference*, or even another factor.

Future investigations in the neuroimaging of pedophilia should use stricter inclusion/exclusion criteria to better limit potential confounds and actively recruit *non-offending* pedophiles to close the gap in knowledge between offending and non-offending pedophiles.

What is ... needed in this research field are stricter participant inclusion criteria and studies utilizing *non-offending* pedophiles and non-pedophilic offenders in order to ascertain what differences are true to *pedophilia* and those that are true to sexual *offending* against children in general.

Now that pedophilia is an increasingly accepted research field and not only a side issue, scientists are more intensively investigating not only how it develops, but also how to treat, and ultimately, how to prevent offending against children. Ultimately, the success rests with researchers willing to investigate a topic that still carries a significant societal stigma load but promises to offer a significant improvement not only to patients but also to society in general.