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A behaviour sequence analysis of serial killers' lives: from childhood abuse to methods of murder

Marono, A.¹, Reid, S.², Yaksic, E³., Keatley, D. A.^{1*}

¹Researchers in Behaviour Sequence Analysis, Psychology Department, University of Lincoln, Lincoln, LN67TS

²Researchers in Behaviour Sequence Analysis. University of Toronto

³Researchers in Behaviour Sequence Analysis, Northeastern University.

*Correspondence Author: Dr David Keatley, ReBSA, Psychology Department, University of Lincoln, LN67TS, email: DKeatley@lincoln.ac.uk

Ethical standards

Declaration of conflicts of interest

Author A [Abbie Marono] has declared no conflicts of interest Author B [Sasha Reid] has declared no conflicts of interest Author C [Enzo Yaksic] has declared no conflicts of interest, Author D [David Keatley] has declared no conflicts of interest

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

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1 **Abstract**

2 The main aim of the current research was to provide a new method for mapping the
3 developmental sequences of serial killers' life histories. In particular, the role of early
4 childhood abuse, leading to types of serial murder and behaviours involved in the murders
5 was analysed using Behaviour Sequence Analysis. A large database (N=233) of male serial
6 killers with known childhood abuse (physical, sexual, or psychological) was analysed in
7 relation to their typologies and crime scene behaviours. Behaviour Sequence Analysis, was
8 used to show significant links between behaviours and events across their lifetime. Sexual,
9 physical, and psychological abuse led to distinct crime scene behaviours in some cases. For
10 instance, specifically violent methods of kill were shown in individuals who had experienced
11 sexual or psychological abuse, rather than physical. The results provide individual accounts
12 of abuse types and behaviours. The present research highlights the importance of childhood
13 abuse as a risk factor for serial killers' behaviours. The research also provides a novel and
14 important advancement in profiling serial killers and understanding the sequential
15 progression of their life histories.

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17 **Keywords:** serial killer; homicide; behaviour sequence analysis; profiling; crime

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1 **A behaviour sequence analysis of serial killers' lives: from childhood abuse to methods** 2 **of murder**

3 Homicide is legally defined as the killing of another person. Homicide is an all-
4 inclusive term, and there are different subcategories of homicide, for example; murder,
5 multicide, and manslaughter. Serial homicide, as defined by the Federal Bureau of
6 Investigation, is “the unlawful killing of two or more victims in separate events” (FBI, 2008,
7 p. 12). Serial homicide is an intentional, premeditated act, not a crime carried out on impulse
8 or in response to a perceived provocation or threat (Reid, 2016). While a form of multicide,
9 serial homicide is not to be confused with mass murder, which is defined as four or more
10 murders that occur in one event with no distinctive time lapse between them, or spree killing
11 which is any murder that occurs at two or more locations with no emotional cooling-off
12 period between (Douglas et al., 1992).

13 Advances in computational intelligence and the establishment of large datasets has
14 meant that researchers in serial homicide are moving toward predictive models and
15 understanding. In particular, researchers are now beginning to develop models to help predict
16 who is likely to commit serial homicide and how to interpret offending patterns as a way to
17 predict latter offending behavior (Ioana, 2013; Hewitt, Beauregard, & Martinaeau, 2016;
18 Miller, 2014). Regardless of the type of prediction, to develop any such model it is important
19 that researchers to understand the chain of events that proceeded the homicides. One way in
20 which researchers do this is by grouping related behaviours together, using a “thematic” or
21 offending style typology approach (Grubin et al., 1997).

22

23 **Typologies**

24 Since the 1970's, investigative profilers at the FBI's Behavioural Science Unit (BSU)
25 have been analysing crime scenes in the attempt to generate 'profiles' of violent offenders.

1 Profiles consist of aggregated data collected from several sources, which combine to indicate
2 specific characteristics relevant to the offender (Douglas, 1986). These profiles, in turn, are
3 meant to aide law enforcement officers in the detection and apprehension of violent
4 offenders, including serial killers. Originally, the analysis of crime scenes revealed a
5 dichotomized classification of a crime that was considered to be either *organized* or
6 *disorganized* (Hazelwood & Douglas, 1980). The organized typology being a form of murder
7 carried out by an individual who appeared to plan the crime, target the victims specifically,
8 and displayed control (Douglas, 1986). Disorganized scenes, in contrast, exhibited a form of
9 murder carried out by an offender who was less apt to plan the offence, who obtained victims
10 by chance, and who behaved haphazardly during the crime (Douglas, 1986).

11 This original typology, that of the organized or the disorganized offender, was
12 deemed overly simplistic and has since broadly expanded (Canter et al., 1994; Rossmo et al.,
13 1996; Turco et al., 1990). Recently, researchers have developed more sophisticated
14 typologies including (1) visionary, mission-oriented, hedonistic, and power-control oriented
15 killers (Holmes & DeBurger, 1988); (2) thrill motivated killers, murders for profit, and family
16 slayings (Levin & Fox, 1985) and; (4) travelling serial killers, local serial killers, and place
17 specific serial killers (Hickey, 1986). Despite the development of refined typologies, research
18 has found that there is no such thing as a prototypical serial killer, consequently limiting the
19 usefulness of the typologies developed so far (Walters & Hickey, 2015).

20 Profiles are created retroactively, that is, after a crime had been committed. They are
21 developed by a thorough observation of the crime scene, interviews with surviving victims,
22 and even wiretappings of taunts made by the subject to the victims' families (Douglas, 1986).
23 However, one limitation to this is that the profiles generated rely, to a large extent, on the use
24 of educated guesses developed on the foundation of data which may be unreliable. While

1 profiles are undoubtedly a useful investigative tool that should not be overlooked, the
2 accuracy of profiling could still be developed.

3 Studies have suggested that it is important to include personal histories and
4 personality factors when proposing an ‘offender profile’ (Hazelwood & Warren, 2000). The
5 FBI’s BSU also noted the value of this when they conducted a series of extensive interviews
6 with several violent sexual offenders, including 25 serial killers in the 1980’s (Ressler et al.,
7 1988). The results from those interviews have helped to inform the development of criminal
8 profiles today. The present study uses a broader categorization, such as those designed by
9 Holmes and Holmes (1998). The present study includes influencing factors before the kill,
10 such as personal histories and serial killers’ experiences of abuse.

11 **Abuse**

12 The World Health Organization (WHO) defines child abuse as “all forms of physical
13 and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or
14 other exploitation, resulting in actual or potential harm to the child” (WHO, 1999, p.80).

15 Although this definition covers a spectrum of abuse, the three main types of abuse defined in
16 the present study are: physical, sexual, and psychological. Physical child abuse relates to acts
17 that cause actual physical harm or have the potential for harm. Sexual abuse is defined as
18 those acts in which a child is used for sexual gratification. Psychological abuse includes the
19 lack of an appropriate and supportive environment or acts that have an adverse effect on the
20 emotional health and development of a child.

21 Research has suggested that the ‘profile’ of a serial murderer typically includes abuse
22 during childhood (Ressler et al., 1985). It is possible that this is due to habituation and
23 tolerance of pain, depending on the extent to which the abuse is experienced as violent or
24 painful (Joiner et al., 2007). Childhood abuse has also been associated with later cognitive
25 processing problems, which may lead to an aggressive thought pattern, for example, encoding

1 errors, hostile attributional biases, accessing of aggressive responses, and positive evaluations
2 of aggression (Dodge et al., 1995).

3 Furthermore, research has shown that there would be a very strong link between
4 early childhood abuse and individuals who kill for sexual gratification (Lust/ rape typology),
5 as previous research has found that all types of abuse, excluding neglect, was significantly
6 higher in the lust typology serial killer population than in a controlled sample (Mitchell &
7 Aamodt, 2005). On average, 50% of serial killers suggest they experienced psychological
8 abuse, 36% have experienced physical abuse, and 26% have experienced sexual abuse
9 (Mitchell & Aamodt, 2005). Therefore, abuse in childhood is linked to serial killers' later
10 behaviours; however, what is not known is the sequential pathways between childhood abuse
11 and different types of serial killer. A method is needed that can systematically link and
12 sequence childhood abuse with typology of the criminal, and crime scene behaviours. The
13 present study provides this novel methodological approach to understanding the link between
14 childhood abuse, and later serial killer behaviour.

15

16 **Behaviour Sequence Analysis (BSA)**

17 A useful method for understanding the dynamic relationship between progressions
18 of behaviours and social interactions occurring over time is Behaviour Sequence Analysis
19 (BSA; Beune, Giebels, & Taylor, 2010; Marono et al., 2017; Taylor, Keatley, Clarke, 2017;
20 Keatley et al., 2017). BSA, also referred to as lag sequence analysis, is a method for
21 investigating how chains of behaviours and events are linked over time.

22 Behaviour Sequence Analysis involves the study of transitions between behaviour
23 pairs (Marono et al., 2017). Sequences can be on large (lifetime) or small (millisecond)
24 scales. In lag-one BSA, which the present study uses, the antecedent behaviour (e.g. type of
25 abuse) is the first event in a pairing and the sequitur (e.g., first murder behaviour) is the

1 second behaviour in the pair. Obviously, there are intervening behaviours and events through
2 the lifetime; however, the purpose of the present study is to highlight BSA as a method for
3 understanding homicide, and connecting established risk factors and behaviours. This
4 provides a simplified model of types of abuse linked to type of murders. Put simply, a BSA
5 will determine how likely it is, compared to chance, that a sequitur occurs following an
6 antecedent. The analysis indicates which pairings of behaviours occur above the expected
7 level of chance. For instance, if an individual suffers ‘abuse type A’ how likely is ‘Behaviour
8 B’ or ‘Behaviour C’ to follow. Sequence Analysis is not limited to only two behaviours, it is
9 possible to analyse the pattern between potentially unlimited numbers of behaviours (from
10 the start to end of a sequence). This technique has been applied to a variety of behaviours
11 and social interactions, and is commonly applied to forensic contexts, such as rape cases
12 (Fossi et al., 2005; Lawrence et al., 2010), violent episodes between people (Beale, Cox,
13 Clarke, Lawrence, & Leather, 1998; Taylor et al., 2017) and marital conflict (Gottman et al.,
14 1979).

15

16 **Present study**

17 The present study uses a BSA approach to investigate the effects of different types of
18 early childhood abuse (physical, psychological, and sexual abuse) on later serial killings. The
19 pattern of actions explored begins with this early abuse, leading on to the typology of the
20 serial killer. This is included in the analysis to indicate links between abuse and typology,
21 rather than direct sequential effects¹. The effect of experiencing multiple types of abuse at the
22 same time was also investigated. Typologies were classified into four groups dependent on
23 the serial killer’s motivation; lust, anger, power, and financial gain. The next behaviour

¹ It is possible that other, unmeasured variables play an important role in the sequence; however, the current research is presented as a framework foundation on which more complex sequences can be built in the future. The methods and statistics are open to additions being imputed into the sequences at later times, to develop more complex sequential chains.

1 explored was the crime scene behaviour, such as; how the victim was killed and what was
2 done with the body. Thus, the sequence from early childhood abuse, typology of the killer,
3 and crime scene behaviours was analysed. While formal hypotheses are not made, owing to
4 the novel nature of the research, several expected links can be outlined. First, it is likely that
5 childhood sexual abuse will lead predominantly to sexual typologies. Considering previous
6 literature highlighting that violent upbringings influences later delinquency, adult criminality
7 and violence (Maxfield & Widom, 1996). It is also likely that individuals who have
8 experience early physical abuse will show a greater amount of violence, for example signs of
9 torture and overkill.

10 **Methods**

11 **Sample**

12 An all-male sample of 233 serial killers with a documented history of childhood
13 abuse was collected. Numbers experiencing each type of abuse were as follows:
14 Psychological abuse ($n = 35$), Physical abuse ($n = 36$), Sexual abuse ($n = 21$), Psychological
15 and physical abuse ($n = 88$), Physical and sexual abuse ($n = 7$) and Physical, sexual and
16 psychological abuse ($n = 46$). The dates of first kill ranged from 1850- 2014. The age of last
17 kill ranged from 1893-2014. The ages of the sample at the time of their first kill ranged from
18 6-60 ($M = 28$, $SD = 8.96$), and their last kill ranged from 16-68 ($M = 34$, $SD = 10$). Although,
19 exact age of childhood when abuse occurred is unknown. Number of kills ranged from 3 to
20 138 within several countries: Brazil ($n = 3$), Canada ($n = 6$), Australia ($n = 6$), USA ($n =$
21 176), Argentina ($n = 1$), Columbia ($n = 4$), Ecquador ($n = 1$), England ($n = 8$), France ($n = 4$),
22 Germany ($n = 4$), Italy ($n = 1$), Mexico ($n = 2$) Ireland ($n = 1$), Scotland ($n = 1$), Pakistan ($n =$
23 1), Russia ($n = 5$), South Africa ($n = 7$), and Spain ($n = 2$). As the sample was obtained from
24 secondary sources and so does not contain any studies with human participants, ethics was
25 not needed.

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3 **Coding Procedure**

4 The sample was split according to the type of abuse experienced in childhood. The
5 typology of the serial killer in each group was then coded (Lust/rape, power, financial gain or
6 anger) into the BSA. Lust/rape killers were those whose murders involved sexual elements
7 including rape, sexual assault without penetration, or symbolic sexual assault such as the
8 insertion of a foreign object into body orifices (Douglas et al., 1992). Power killers were
9 those who derived pleasure from having complete control over their victims. Financial gain
10 killers were those who killed for motivations based on the accumulation of goods or finances.
11 And anger killers were those who killed for motivations which stemmed from feelings of
12 anger, frustration, or betrayal whether real or imagined. The overall methods used across kills
13 was also recorded for everyone². The final factor that was looked at for each of the
14 individuals was what they did with their victim's body(s) after the murder (e.g. moved the
15 body to a different location and buried it, hid the body at the crime scene, etc.). Percentages
16 of participants for each individual were calculated at each stage.

17 A coding scheme was developed based on every recorded outcome/ behaviour
18 reported in the current dataset. Given the straightforward nature of the task, there was no
19 ambiguity over responses or coding. The typology of serial killers was assessed by trained
20 forensic psychologists.

21 **Statistical Analysis**

22 After data were coded into chains of discrete behaviours and categories, data were
23 input into the statistical software R (R Core Team, 2013), and analysed using a behaviour

² Owing to limitations of the dataset, behaviours for each sequential murder are not known. Therefore, overall behaviours across murders are presented in the current dataset. While we acknowledge this is a limitation of the study, it still indicates typical crime scene behaviours for each individual killer.

1 sequence analysis programme developed by the researchers. The programme calculated
2 frequencies of individual behaviours, transitional frequencies, Chi-square (χ^2) statistics, and
3 standardised residuals.

4

5 **Results**

6 The main stage of BSA is to focus on the transitions between pairs of behaviours.
7 Transition frequencies between antecedents and sequiturs are calculated, and chi-square
8 analyses indicated if these transitions occur above the level of chance. State transition
9 diagrams can then be drawn, which indicate pairs of behaviours with high standardised
10 residuals (SR). It is important to note that while pairs of behaviours can be connected to form
11 longer chains, the analyses are only on pairs of behaviours. Longer chains, though intuitively
12 appealing are actually limited in terms of generalizability, owing to over-fitting of data. All of
13 the transition lines in the diagram are significant ($p < .05$).

14

15 --FIGURE 1 ABOUT HERE, PLEASE --

16

17 Importantly, this diagram shows that there is a clear distinction between type of abuse
18 experienced and later typology of the serial killer. For example, experiences of sexual abuse
19 most likely to lead to the power typology ($n = 6$, $SR = 9.21$), compared to other typologies.
20 Rape/lust typology was the most common typology in the current dataset ($n = 152$).
21 However, it followed more frequently from psychological abuse ($n = 10$, $SR = 7.06$) and the
22 combination of all three types of abuse ($n = 12$; $SR = 7.04$). There did not appear to be a
23 strong connection between financial gain and any type of abuse, or combination of abuse, as
24 it was infrequent in all cases, particularly the experience of all three combined. There was no
25 strong pattern between any single type of abuse and anger typology and only 23 subjects

1 classified as this typology. There was a clear pattern between rape/lust typology and torture
2 of the victim ($n = 16$, $SR = 9.59$). There was a clear pattern between financial gain and the
3 murder being carried out quickly ($n = 12$, $SR = 8.33$). An additional benefit of the BSA
4 approach is that particular cases can be highlighted and analyses individually. For instance,
5 the following analyses focused on each type of abuse sequence, alone. This allows
6 researchers and investigators to refine their search parameters and begin narrowing in on
7 particular sequences based on evidence or interests.

8

9 **Physical Abuse**

10

11 --FIGURE 2 ABOUT HERE, PLEASE --

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13 For physical abuse (Figure 2), there was a distinct sequence between the experience of
14 physical abuse and rape/lust typology ($n = 6$, $SR = 4.80$) and anger typology ($n = 2$, $SR =$
15 2.77). Rape/lust typologies were more likely to carry out the murder quickly ($n = 5$, $SR =$
16 5.75) and crime scenes exhibited signs of the victim being bound ($n = 3$, $SR = 4.64$). There
17 was also evidence of overkill and in all cases where overkill occurred, the body was left at the
18 crime scene.

19

20 --FIGURE 3 ABOUT HERE, PLEASE --

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22 **Psychological Abuse**

23 For psychological abuse (Figure 3), there was a distinct sequence between the
24 experience of psychological abuse and rape/lust typology ($n = 10$, $SR = 6.50$) and financial
25 gain ($n = 5$, $SR = 4.60$). Murders were carried out quickly in all cases where the motivation

1 was financial gain; however, if the typology was rape/lust, then fewer were carried out
2 quickly ($n = 5$, $SR = 3.63$). There was also a strong link between torture and evidence of
3 overkill ($n = 5$, $SR = 6.25$), and evidence of overkill and mutilation of the body ($n = 6$, $SR =$
4 6.84).

5
6 --FIGURE 4 ABOUT HERE, PLEASE --
7

8 **Physical Abuse**

9 Unlike the other types of abuse, sexual abuse was linked to all four typologies (see
10 Figure 4). The rape/lust typology was slightly more likely to torture their victims ($n = 4$, $SR =$
11 5.92) compared to showing signs of overkill ($n = 4$, $SR = 4.27$). The power typology was
12 more strongly related to carrying out the murder quickly ($n = 4$, $SR = 5.23$) than mutilating
13 the victim ($n = 2$, $SR = 3.16$). The anger typology showed a link to carrying out the murder
14 quickly ($n = 2$, $SR = 2.16$, and financial gain was linked to carrying out the murder quickly (n
15 $= 4$, $SR = 5.85$). Finally, there were strong links between torturing and binding the victim (n
16 $= 4$, $SR = 9.39$), and the victim being bound and mutilation ($n = 4$, $SR = 8.63$).

17
18 --FIGURE 5 ABOUT HERE, PLEASE --
19

20 **All types of abuse**

21 When a combination of sexual, physical and psychological abuse was experienced
22 (Figure 5), the rape/lust typology for killing was most likely to follow ($n = 12$, $SR = 6.76$).
23 Rape/lust was more likely to lead to the victims being bound ($n = 6$, $SR = 7.11$) than killers
24 carrying out their murders quickly ($n = 4$, $SR = 2.63$). Subjects who killed for anger were
25 more likely to carry out the murder quickly ($n = 4$, $SR = 4.49$) than show evidence of overkill

1 (n = 2, SR = 1.61). Those who killed for financial gain carried out the murder quickly (n = 3,
2 SR = 5.03).

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Discussion

6 The main aim of the present study was to examine whether there were distinguishable
7 sequences that occur after experiencing different types of abuse in childhood, leading to
8 different typologies/ motivations for killing victims, and how murders were carried out. The
9 outcome is an insight into the sequential chains that different types of abuse have on an
10 individual. Within the current dataset, results indicate that different types of abuse affect later
11 typologies and murder behaviours.

12 Previous literature suggests that early physical abuse leads to later aggression and
13 violence (Widom et al., 1989). Current results partially supported this. Although those who
14 were physically abused were more likely to demonstrate 'overkill' of their victim, the most
15 specifically violent methods of kill were practiced by those who had been sexually or
16 psychologically abused in early life. For example, mutilation, torture and binding the victim
17 occurred more for serial killers who experienced sexual abuse. Furthermore, those who had
18 been sexually abused showed no evidence of overkill in many cases, and the murders tended
19 to be carried out quickly. This was not the case for both physical and psychological abuse, as
20 both showed evidence of overkill. The exact reason for this cannot be clarified from this
21 sequence chain, although based on previous research (Briere & Elliott, 1994; Wyatt &
22 Newcomb, 1990) it may be that these patterns emerge because those who have experienced
23 sexual abuse suffer from a deep-seated anger and self-blame leading them to lash out and kill
24 their victims quickly, and are more likely to feel guilt or remorse afterwards, thus are unlikely
25 to show evidence of overkill.

1 Furthermore, of those who were classified as motivated by power, all recorded
2 murders were carried out quickly. There was also no evidence of any torture, mutilation, or
3 overkill. Although again, the sequence chain cannot direct determine the reason as to why
4 this is, based on previous research (Canter & Wentink, 2004; Holmes & Holmes, 1998), a
5 reason could be that this stems from a need to control the victim and assert dominance.
6 Therefore, killers see the act of killing as a necessity rather than to obtain any enjoyment out
7 of the kill, per se. Therefore, in these killings, there is no unnecessary means of kill, infliction
8 of unnecessary pain, or evidence of enjoyment.

9 Those who were classified as rape/lust typology commonly engaged in post mortem
10 sex, regardless of the type of abuse experienced as a child. There was also no evidence of
11 overkill in any of the cases, although torture was commonly used. A possible explanation for
12 this is the presence of abnormal paraphilia's or sexual sadism, which supports Dietz,
13 Hazelwood, and Warren, (1990), who argued that psychopathic sexual sadists kill for the
14 sheer pleasure of torturing and murdering their victims in a sexual way. Importantly, the
15 experience of sexual abuse, whether isolated or experienced alongside physical and/or
16 psychological abuse, led to the mutilation or torture of the victim. Similarly, individuals who
17 classified as lust/rape typology were more likely to torture or mutilate their victims. This
18 suggests a correlation with sexual behaviour and a need to inflict pain.

19 Additionally, results are incongruent with previous literature on typologies, as there
20 was no consistent pattern for method of kill and disposal of the body within each typology.
21 This supports Canter and Wentink (2004) who suggested that features of power/control
22 typologies were consistent to serial killers rather than forming a distinct type. Thus, the
23 reliability of isolated typologies is less mutually exclusive than previously believed, and more
24 attention should be paid to what factors influence specific methods of kill, rather the
25 motivations of individual offenders. Indeed, it may be that the cross-sectional approach to

1 typology defining could be developed to include temporal dimensions. The current analytical
2 method can be used to show linkages between behaviours and events, over time, which may
3 provide investigators with a clearer understand and method for developing typologies.

4 A limitation of the current research is the potential influence of additional life events
5 that may intervene in the current diagrams, which were not available to be analysed. These
6 other variables and events may have effects on later behaviours; however, the present
7 research outlines a new approach to understanding serial killers' life histories, rather than a
8 complete timeline. Given the nature of the coding and behaviour sequence analysis, future
9 research can be directly added to the current data to extend the sequence pattern, and other
10 influential factors can be added. Indeed, this research marks the beginning of a new
11 framework for understanding life histories and behaviours of serial killers, which can
12 continually be developed and expanded. This research underlines the important impact of
13 childhood abuse on serial killers motivations and behaviours. Future research should aim to
14 fill in the gaps between childhood abuse and other life events leading up to the first murder,
15 and then further murders.

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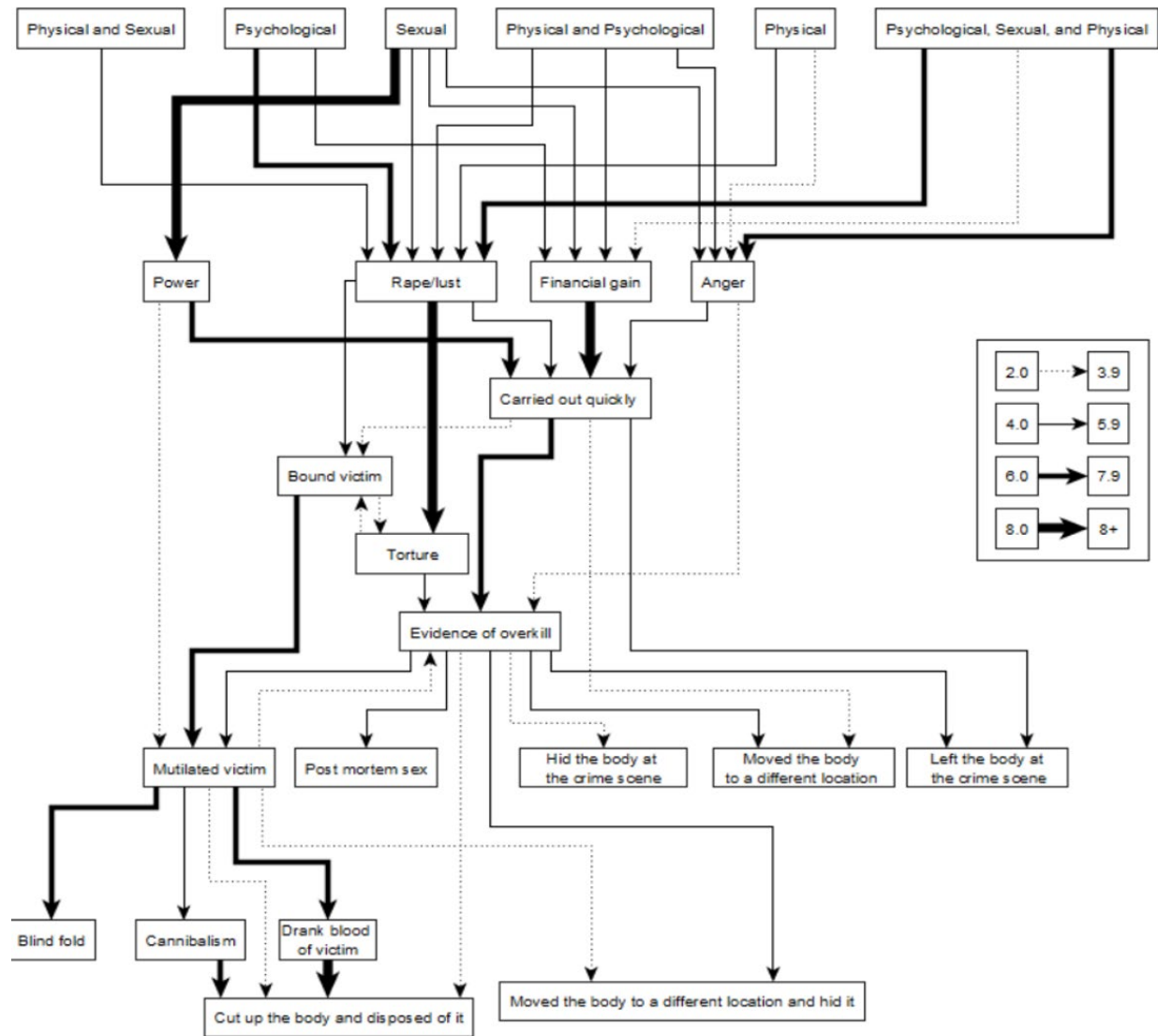
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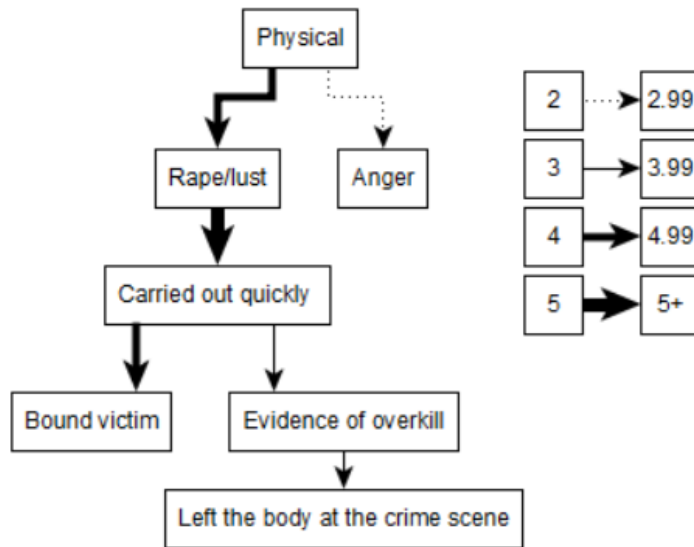
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Figure 1: State transition diagram for type of abuse experienced, typology and crime scene behaviour.



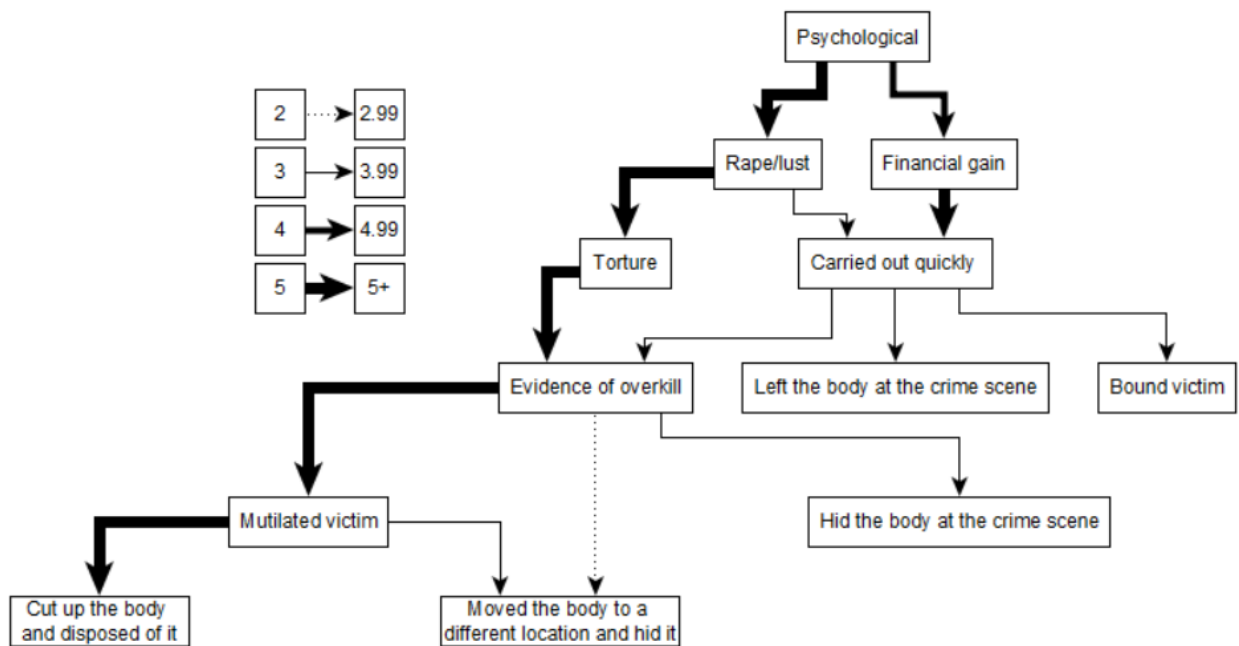
Note. Standardised residuals indicated by line thickness (see key in figure)

Figure 2: State transition diagram for physical abuse, typology, and crime scene behaviour.



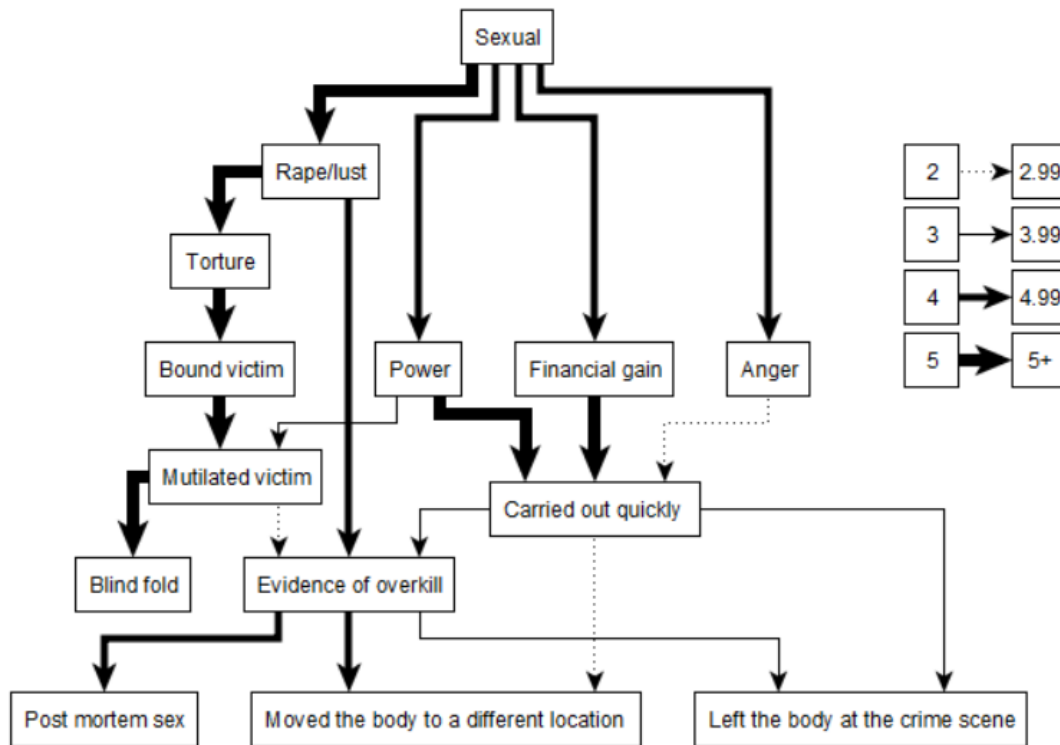
Note. Standardised residuals indicated by line thickness (see key in figure)

Figure 3: State transition diagram for psychological abuse, typology and crime scene behaviour.



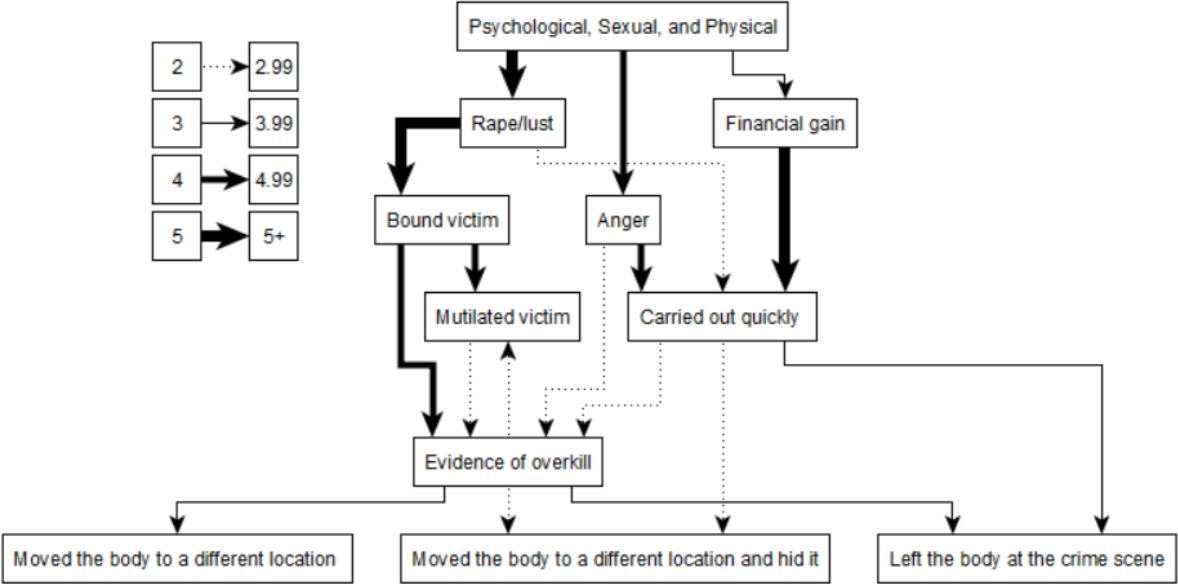
Note. Standardised residuals indicated by line thickness (see key in figure)

Figure 4: State transition diagram for sexual abuse, typology and crime scene behaviour.



Note. Standardised residuals indicated by line thickness (see key in figure)

Figure 5: State transition diagram for typology and crime scene behaviour when experienced psychological, physical and sexual abuse.



Note. Standardised residuals indicated by line thickness (see key in figure)