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Does intentional asphyxiation by strangulation have addictive properties?

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ABSTRACT

Background and aims Intentional asphyxiation leads to cerebral hypoxia, starving the brain of oxygen and inducing hypoxic euphoria, but carries a serious risk of accidental death, especially if practised alone. This article raises the question as to whether it could usefully be regarded as having addictive properties. **Methods and results** A review of the literature, together with eight case study vignettes, are presented. Intentional asphyxiation can occur with or without sexual activity. Initiation often occurs in adolescence, with development in some cases of an entrenched behaviour pattern, driven by a strong euphoriant effect, without adequate safeguarding from serious harm, and being undertaken by people with comorbidities. There does not appear to be strong evidence of seeking support for cessation of the practice. **Conclusions** Intentional asphyxiation behaviours may have addictive properties, and understanding this aspect of the problem may be fruitful in guiding research and interventions aimed at addressing it.

Keywords Accidental death, addiction, autoerotic, choking game, hanging, hypoxic euphoria, intentional asphyxiation, pleasure, strangulation.

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INTRODUCTION

Asphyxia occurs when the exchange of oxygen and carbon dioxide in the body is impaired [1]. There are four 'types': strangulation (ligature, hanging, manual), suffocation (smothering, choking, atmosphere), mechanical (trauma) and drowning [2]. Asphyxia leads to cerebral hypoxia (lack of oxygen to the brain), and prior to losing consciousness can induce a hypoxic euphoria (feeling 'high') [3]. This article focuses on intentional asphyxia by strangulation, highlighting both the pleasure and risk associated with the behaviour, and questions whether it could usefully be regarded as possessing addictive properties.

Asphyxiation, sexual pleasure and euphoria

Asphyxia by strangulation has historically been associated with a sexually aroused state, shown physically in those executed by hanging in the 17th century [4]. Intentional asphyxiation is a common practice in those engaging in consensual BDSM (bondage and discipline; dominance and submission; sadism and masochism), an abbreviation used to cover a wide range of sexual activities that are often concealed from the mainstream public [5]. 'Edge play' commonly involves consensual asphyxiation named 'breathplay' or asphyxiophilia (achieving sexual arousal related to restriction of breathing), and has been described as leading to 'transcendental experiences' that create a shift in consciousness [6]. Many of those engaging in BDSM report adhering to the code of 'safe, sane and consensual' practice, commonly using a 'safe word' or 'tapping' to signal the immediate halt of acts such as asphyxiation with their partners [7].

Changes to the most recent *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) [8] introduce a distinction between paraphilia (atypical sexual interests, but not necessarily disordered) and paraphilic disorders (sexual interests that cause distress or dysfunction) [9]. This change to previous editions is designed to de-medicalize and de-stigmatize paraphilias, providing they are not distressing or detrimental to self or others. Thus, previously perceived 'deviant' sexual behaviours such as BDSM are de-pathologized [10,11]. Within the DSM-5, 'asphyxiophilia' is used as a specifier under cases for

sexual masochism, which includes the activity when performed alone, commonly known as autoerotic asphyxiation [4,12,13].

However, intentional asphyxiation also occurs without connection to sexual activities [14], and thus would not be considered under the umbrella of paraphilias [4,15,16]. It could be argued that a drive for hedonism (the seeking of pleasure) is a better explanation of the route to intentional asphyxia, rather than a paraphilic drive. 'The choking game' illustrates this argument. Described as 'self-strangulation or strangulation by another person with the hands or a noose to achieve a brief euphoric state caused by cerebral hypoxia' [15], the choking game has become a concerning phenomenon among young people [15,17].

In mixed martial arts (MMA), particularly Brazilian jiu-jitsu (BJJ), a 'choke hold' is a common technique in which the dominating fighter will restrict blood flow to the brain via the carotid arteries, leading to the opponent either tapping out (submitting) or passing out (choke) [18]. Narratives from MMA and BJJ forums describe being 'choked out' as euphoric [19], yet there is no known scientific evidence on this to date.

Intentional asphyxiation and risk to life

Intentional asphyxia, particularly performed alone, can be fatal [20]. The starvation of oxygen through hypoxia can lead to reduced blood flow to the arms, legs and hands, making it difficult to undo a restraint or stand [3]. This, alongside losing consciousness, are possible reasons for death occurring, even when those performing the behaviour are standing, kneeling or sitting. While consensual social-asphyxiation is performed with others, solo-asphyxiation is often concealed and only uncovered after a fatality; therefore, there are no routine public health statistics on its epidemiology [21].

A review of recorded deaths and news reports in the United States concluded that of 70 deaths of young people aged 6–19 years that were likely to be attributed to the choking game, 95.7% occurred while alone [15]. Confirming the secretive nature of the behaviour, 92.9% of parents were unaware of the choking game until after their child's death [15]. It is unclear whether these cases were fatal at the first practice of solo-asphyxiation or whether there had been a history of repeated behaviour prior to death.

In a review of 118 deaths, comparing intentional solo-asphyxia with suicidal asphyxia, it was concluded that there are often features that can differentiate the two, most notably mechanisms to prevent fatality, such as a 'quick escape mechanism' (e.g. being able to stand or cut/undo a ligature) [22]. Death may occur due to the individual believing that they can control the act of asphyxia and stop before losing consciousness. This, however, often happens quicker than expected and the risk is underestimated [23]. A survey with 115 living individuals who engage in solo-asphyxia supports this view, with more than half acknowledging the danger of the behaviour, yet 27% felt they had a 'fail-safe' method to avoid death [4].

When deaths occur, if solo-sexual activity is present at the time of fatality, the coroner is more likely to determine accidental death rather than suicide [12,22]. However, without prior knowledge of solo-asphyxiation, coroners may be led to reach an open verdict or that of suicide. This view appears to be supported in a recent report [24], which shows that deaths by hanging in England were most likely (80.1%) to be given a suicide verdict. However, the majority of deaths deemed accidental via solo-asphyxiation [23] showed no evidence of solo-sexual activity or an escape mechanism (e.g. the ability to stand) used, and so others may have been missed.

Hanging was reported as the most common suicide method in the United Kingdom in 2018, with a higher prevalence among men (59.4%; 2912 deaths) than women (45%; 722 deaths) as in previous years, with an upward trend [25,26]. Deaths by hanging and accidental hanging have also been found to be significantly higher in males than females during adolescence (aged 10–19 years) [27]. During the last decade, where intent is undetermined, the number of coroners' 'hard-to-code' narrative conclusions have fluctuated [26]. This may be a sign of unknown or misunderstood solo-asphyxia accidental deaths, otherwise attributed to suicide.

Initiation and maintenance of intentional asphyxia

There is evidence that the practice of intentional asphyxia is initiated from an early age, and that a large proportion of young people are aware of asphyxia-related techniques (e.g. a ligature or manual asphyxia) [28]. In a US study, 68% of 9–18-year-olds (n = 2504) had heard of the choking game, 45% knew someone who had tried it, while 40% felt it held no risk [28]. In a sample of 3408 US 12–18-year-olds, 9% admitted to playing the choking game [17]. This was higher in males (11%) than females (7%) [17].

In Oregon, a survey of 12–15-year-olds (n = 5348) found that 22% had heard of the choking game, with 6.1% admitting to participation, but with no evidence for a gender difference [29]. Of those who had participated, 26.6% had done so more than five times in their life-time. Furthermore, there was a significant relationship with other risk categories, including poor mental health, substance use, poor nutrition, exposure to violence, sexual activity and gambling [29]. In a larger study (n = 4022), a high prevalence (16.5%) of solo-asphyxia behaviour was found [30]. In merged data (n = 19418) of the Oregon

Healthy Teen survey, 17.6% of young people who stated they had performed the choking game were alone the last time they engaged in it [31]. Furthermore, they had a significantly higher rate of suicide contemplation and poor mental health compared with those who played in groups [31].

Supporting a comorbidity link with the choking game, a survey of 1771 9–16-year-olds from France revealed that 9.7% had participated, and had higher rates of substance use and depressive symptoms than those who did not [32]. This research concluded that those engaging in the practice may be doing so to regulate negative mood stemming from depression [32]. This research is, however, limited, as it does not specify frequency of participation or distinguish social- and solo-asphyxiation behaviour.

While there seems to be a link with other problems such as substance use [17] and mental health [32], a study in Saudi Arabia [33] suggests that young people are engaging in the behaviour to achieve the same sort of 'high' (from cerebral hypoxia) without substances, instead using ligatures such as scarfs, curtain ropes and garden hoses, with siblings and alone. In contrast to earlier reports, asphyxia performance has been described as more common in 'athletic, average to above-average students, who would ordinarily shun alcohol and drugs', providing a possible false sense of security as a substance-free 'high' [34].

Peer pressure has also been suggested as a route to initiation [33], and there is a wide range of such 'thrill-seeking games'; namely, 'suffocation roulette', 'space monkey', 'gasp', 'knock out', 'blackout', 'minutes in heaven' and 'flat-lining' [32,34]. Of additional concern is the use of YouTube to broadcast these asphyxiation games, with evidence of access to 65 videos (90% male performers); 55% showed hypoxic seizures and were collectively viewed 173 550 times [35]. The use of ligatures (rather than hands in manual asphyxia) and solo-play increases the risk to life and, sadly, awareness of this behaviour is most often uncovered after death.

Case studies of solo-asphyxia

The following extract of a 15-year-old boy who died of autoerotic asphyxiation [36] provides a common description of this style of death.

> **Case A:** 'Lance's lifeless, semi-nude, bluish-white body hangs by the neck from the closet rod. The floor is littered with pornographic magazines, a bottle of hand lotion, and several articles of women's underclothing. Though he hangs from a bar that would only meet him at eye level, his knees are bent and his full weight hangs from the Disney necktie he wore to his eighth-grade graduation. The knot cinched up to his larynx resembles the bow that one typically uses to tie one's shoes. The first two fingers of his lifeless right hand still grip one bow of the knot' ([36], p. 208).

Cases B–F highlight the performance of solo-asphyxiation behaviour, without sexual activity.

> **Case B:** 'In February 2006, an adolescent boy aged 13 years came home from school in a good mood and had dinner with his family. He then went to his bedroom to do his homework. Approximately 1 hour later, his mother went to check on him and discovered him slumped in a corner with a belt around his neck… No suicide note was found. The county medical examiner ruled that the death resulted from accidental asphyxiation by hanging. In the weeks following his death, multiple teens told the director of a local counseling agency that the choking game had been played at local parties' ([15],p. 446).

> **Case C:** 'In April 2005, an adolescent girl aged 13 years was found dead, hanging from a belt and shoelace made into a noose on the door of her bedroom closet, after her brother went to her room to see why she had not come down for breakfast. No suicide note was found. The medical examiner determined that the teen had died at 9.30 p.m. the previous night. After the teen's death, the family learned that the girl had confided in a cousin that she recently had played the choking game in the locker room at school and that a group of girls at her school had been suspended for playing the choking game' ([15], p. 446).

> **Case D:** 'A 9-year-old boy survived near-strangulation while playing a 'game' with two friends in the school washroom. They had played the game before, wrapping the towel around the neck and hanging from the dispenser. The dizzy feeling was described as 'cool'. Estimated time of hanging was five minutes. Initial Glasgow coma score was 6 and pH was 7.32. He had a petechial rash on his face and a linear abrasion around the neck. He received assisted ventilation for one day and had no neurological deficits on discharge' ([37], p. 231).

> **Case E:** 'A previously healthy 12-year-old boy with no apparent medical or psychological problems and no known history of drug or alcohol abuse, suicidal ideation, or suicide attempts. Fifteen to 20 minutes after asking to be excused from class, he was found in the wash-room with a towel from a towel dispenser wrapped around his neck. Initial Glasgow coma score

was 3 with pH 6.69. He was supported in the intensive care unit but there was no neurologic improvement over 48 hours. After discussion with the parents, the decision was made to withdraw life support. Death was attributed to self-inflicted accidental hanging secondary to a "game" played at school' ([37], pp. 231–232).

Case F: 'A 12-year-old girl was brought to the pediatric emergency department by ambulance after her mother found her hanging from her bunk bed. The patient was resuscitated initially but died 5 days later after support was withdrawn. A sexual assault examination was performed, and the finding was negative. The case was investigated as a possible homicide or suicide. Upon questioning relatives, it was disclosed that the deceased had played the choking game. No one knew she had been playing the game alone… Her mother found her in a partial suspension, hanging from the top bunk bed with 2 shoelaces tied end-to-end and around her neck. According to the paramedic report, the girl could have stood up as her feet were resting on the floor, and she was slumped forward suspended by a loop that could easily go over her head' ([38], p. 206).

There is evidence that if individuals do not become the victims of solo-asphyxiation in childhood, the behaviour follows through to adulthood. Below is a case study of a living individual, taken as an inpatient in an addiction ward in France.

Case G: 'Mr B is a 25-year-old student with a Master's Degree, living with his father… His father reported that Mr B had a history of cannabis addiction and other substance use (cocaine, heroin, and alcohol). At the age of 14 years, he experienced first strangulation activity with friends at school using a scarf to induce the hypoxia. After a short period of time experimenting with friends, he started strangulating himself, by using both fists to apply pressure to his carotid arteries. He described pleasant feeling of narcosis and transient amnesia at the beginning of this behavior, as well as transient hypoacousia and distortion of vision. These phenomena tended to decrease with time, with only the relaxing effect of self-strangulation remaining. Mr B started smoking marijuana occasionally at the age of 14 y.o., and developed a daily use with dependence DSM-5 criteria from 18 to 23 y.o. He also fulfilled criteria for ketamine use disorder, with a debut at 17 y.o. and light addiction of ketamine (according to DSM-5). At the time of clinical evaluation, Mr B was self-strangulating up to 40 times a day, only when alone, and describes no sexual arousal. He described frequent urges to self-strangulate, sometimes specifically avoiding contact with friends in order to engage in this behavior. He reported that he never made a significant attempt stop this behavior before his hospital admission. A clinical examination did not find any paraphilic disorder associated with this behavior, or any Axis I disorder. Mr B has no sexual impairment and was involved in a heterosexual relationship of 3 years duration. MRI scanner and usual blood tests were normal' ([14], p. 017).

Case H presents a previously unpublished adult example using excerpts from reports presented at the coroner's court hearing (with permission of the family).

Case H: 'On [date] emergency services were called to a wooded area of a park by a member of public where a 35-year-old male's body was found. The attending detective's witness statement states: "The deceased was slumped, although leaning slightly forward pulling away from the tree, he had a belt around his neck and this had been tightened to the last notch, he had used this as a ligature. He was fully clothed and appeared to have no obvious injuries. The deceased was cold and rigor-mortis had set in, I would estimate that the male had been dead overnight". There was no evidence of sexual activity and weather conditions were described as inclement. A mobile fingerprint machine was brought to the scene to assist in identification. His fingers showed evidence of cyanosis and he was believed to have been dead for approximately fifteen hours before discovery. The police visited the deceased's family at their home and initially informed them of death by suicide (hanging). He had planned a trip to the cinema with them that day and the family were in disbelief that the death was intentional. At this visit, explicit details of the scene were not given to the family and a coroner's inquest was opened, to be held three months later. Presented at the inquest, a witness statement from the ambulance service described difficulty in the GPS tracking of the location of the deceased. The technician stated that: "I could see a male approximately in his 30s with his back to the tree, a belt tied around his neck and around the tree with his knees bent and his full body weight supported by the belt." This information was given to the family a few days after discovery, clarifying that his feet were touching the ground. A post mortem revealed he had consumed alcohol, but blood levels were below that of the UK drink drive limit. Traces of cocaine were also found; however, it was noted that: "the concentrations measured would be consistent with 'recreational' use

and did not indicate a recent excessive use of the drug". Medical reports and family statements revealed his struggles and desire to reduce a long-term battle with cocaine addiction. The family also revealed a preference for asphyxiation and hypoxic euphoria in a consensual relationship from an early age and experimentation of solo-asphyxiation as a child. Mental health services and the family were unaware he was asphyxiating alone. The coroner concluded: "I have to make a finding as to fact as to what happened. It's clear that [the deceased] tied the ligature himself and attached it to a tree and intended to, I would say, lose consciousness—but lose partial consciousness. That's the act of euphoria. For a verdict of suicide I have to accept beyond all reasonable doubt. If there's any element of doubt, it can't be suicide. I note there's no suicide note, there's no text or electronic communication, which we normally experience in this court. I understand the ligature was at a height he could stand up if he wanted to and I have heard this is something he practised. As a result I feel that the only legal conclusion I can come to is it was an accidental death." '

Treatment and cessation of intentional asphyxiation

Better awareness of intentional asphyxiation is needed in both clinical and emergency settings. A survey of physicians showed that more than a third were unaware of the choking game and therefore may miss presenting symptoms [39]. In 2019, a health professional posted in a nursing forum for advice after a visit from a mother and adolescent son with ligature marks on his neck [40]. The mother had concerns of a suicide attempt, yet the male confided to the nurse that the marks were a result of solo-asphyxiation [40]. Better awareness of warning signs such as bloodshot eyes, headaches, marks on neck, petechiae on face, ligatures tied to bedroom furniture, disorientation and mood swings is needed [40].

While there is research that suggests that mental health support services may be aware of some individuals who practise solo-asphyxiation, many are unknown until after a fatality [4]. As the practice of asphyxiation is rarely spoken of to family members of the deceased [4], there may be many accidental deaths mistaken for suicide in this way. Furthermore, family members may clean away paraphernalia from the scene of death to avoid perceived embarrassment [36], or emergency services may reach an incorrect conclusion at the scene of death, rendering a verdict of accidental death less probable.

While there is a dearth of research in this area, researchers presenting Case G concluded that solo-asphyxiation had the appearance of being highly addictive, with the individual performing solo-asphyxiation up to 40 times a day since adolescence [14]. Reasons were described as an 'escape from reality'. Cognitive therapy treatment was delivered through an addiction ward, focusing on identification, exposure and ability to control high-risk situations, cognitive restructuring and restoring depleted self-esteem that led to cessation of the behaviour [14].

Addictive characteristics of intentional asphyxiation

It could be argued that intentional asphyxiation has properties seen in addictive behaviours. Initiation often occurs with others, and the behaviour can provide an intense euphoriant effect. Indeed, in some cases it may be the earliest stimulating behaviour encountered (before alcohol, drugs and sexual pleasure), with multiple reports of its initiation in childhood and adolescence [14,15,17,28,33]. This euphoriant effect may lead to establishment of an entrenched pattern of behaviour despite the risk of death. Arguably, it could be that the level of risk associated with the behaviour may play a role in the experience, manifesting as 'thrill seeking' [17,37]. There are also reports that tolerance to the psychological effects of asphyxia can develop [14,34].

The insula, a region in the brain that has been linked to decision-making in relation to risk and reward, is thought to have an important role in addiction [41,42]. This part of the brain is also involved in processes that control breathing, and could provide some explanation to the potential addictive qualities of asphyxia.

Future research

Research is needed with living performers of intentional asphyxiation. The dearth of research to date may be due to its secretive nature and associated stigma. It would be worth examining how far those who practice the behaviour experience a sense of loss of control over the behaviour, and their interest in receiving treatment to address this. Research is also needed into public health advice and support for those practising this behaviour and their families. As with recognized addictive disorders, a harm reduction approach may be worth investigating, including guidance for the safer practice of intentional asphyxiation, such as use of fail-safe mechanisms.

CONCLUSIONS

Intentional self-asphyxiation may have addictive properties. There is evidence of early initiation, the development of an entrenched behaviour pattern driven by strong euphoriant effects, often linked to mental health problems without adequate regard for risk of death. With this in mind, it would be worth examining how far prevention,

treatment approaches and harm reduction used for addictive disorders could be used to address this problem.

Declaration of interests

None.

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