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RESEARCH ARTICLE

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Delayed physical development in a first generation enslaved African woman from Pietermaai, Curaçao

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Abstract
There is still much to be learned about enslavement in Curaçao, where little archaeological investigation into the historical era has been carried out. This article contributes to our knowledge on this subject through the analysis of a female individual buried in Pietermaai, an 18th century suburb of Willemstad. Excavated in the 1980s by the Archaeological-Anthropological Institute of the Netherlands Antilles, the remains are only now attracting osteological attention. Isotopic analysis has shown that this individual spent her childhood in West Africa, supporting morphological and metric analyses identifying her African ancestry. At the time of death, she had an adult chronological age (over 18 years), but her physical development indicated a non-adult biological age (possibly between 12 and 15 years). Such delayed development can occur due to many factors, including hard labour and disease. In the case of this individual, evidence such as enamel hypoplasia, osteochondritis dissecans, and periostitis may indicate stressful episodes throughout the life course. Clearly defined entheses and entheseal changes at muscle attachment sites on the arms and legs may indicate a physically demanding occupation. A variety of factors could therefore have contributed to her developmental delay. In the future, further analysis of buried populations in Curaçao will help to increase our understanding of the lifeways of enslaved people here. Meanwhile, the analysis of this isolated individual is important because it situates enslavement in a real body and indicates the value of reanalysis of human remains from existing archaeological collections in the Caribbean.

KEYWORDS
Caribbean, delayed puberty, isotopic analysis, slavery

1 | INTRODUCTION

1.1 | Aim of the research

The historical narrative of the Caribbean island of Curaçao is dominated by documentary sources written by members of the elite, which may be biased, inaccurate, or even fabricated (Koslofsky & Zaugg, 2016; Spivak, 2012; Gilmore, 2006; Cohen, Manion, & Morrison, 2000, p. 147; Thornton, 1998, p. 4; Guha, 1997). Historical comparisons with other regions such as Suriname present Curaçaoan slavery in a favourable light, describing it as "mild" and "tranquil" (Oostindie, 2005, pp. 13, 38–39; Oostindie, 1995, pp. 161–163; de Palm, 1985, pp. 444–445; Hoetink, 1972). However, there is a lot of evidence to the contrary. Enslaved people in Curaçao risked their lives escaping to Venezuela (Rupert, 2012, p. 197), and around 200 rebels died during and immediately after the 1795 Tula revolt (do Rego & Janga, 2009, p. 62). It is therefore necessary to examine slavery in Curaçao from the viewpoint of the enslaved individual. Fortunately, osteoarchaeology is a discipline that can provide direct evidence for what their lives were like by allowing us to explore the effects of enslavement upon the body. The aim of this research, therefore, was to increase our understanding of slavery in Curaçao through the analysis of an individual buried in Pietermaai during the slaving era. It indicates the value of reanalysing human skeletal remains from established collections, as well as the importance of individual analyses for the development of Caribbean osteology, which is still an understudied area.

1.2 | Historical context

Curaçao was first occupied by indigenous groups from South America and then by the Spanish in 1499 (Wright, 1934), and in A.D. 1634, it was colonized by the Dutch West India Company. The West India Company settled first in what is known today as Punda, the historic centre of Willemstad (Hartog, 1961). The individual discussed here was found in the Pietermaai neighbourhood to the east of Punda, on the *Kamer van Koophandel* (Chamber of Commerce) property (Figure 1). Development here started in the 17th century on both sides of a single road, with plots of land reaching the sea to the south and the inland bay (Waaigat) to the north (Teenstra, 1977 [1836], pp. 43, 61). Pietermaai became a very popular district for wealthy merchants who built elegant mansions, which can still be seen today (Rupert, 2012, p. 129). During this time period, Curaçao had an enslaved population and a large free African-ancestry population, partially due to increased rates of manumission during times of drought when owners could no longer afford to feed their enslaved people (Oostindie, 2011). The free African-descendant population of Willemstad was concentrated in the neighbourhood of Otrobanda, which is to the west of Punda (Rupert, 2012, p. 3). African-ancestry people buried in the area of study are therefore likely to have been enslaved in the households of these wealthy merchants, rather than members of the free population. Figure 2

In general, the enslaved population of Curaçao was different to that of many other Caribbean islands. The arid environment made large-scale sugar production impossible, so most of the plantations produced only subsistence crops and did not therefore require a large workforce (Haviser, 2001; Hoetink, 1972, p. 79). The economy of the island revolved around commerce, and enslaved people were involved in activities such as shipbuilding and fishing as well as agriculture (Rupert, 2012, p. 167; Oostindie, 2005, pp. 13, 38–39). In Willemstad, women were often purchased for either domestic labour or prostitution (Jordaan, 2003), and there was a greater percentage of enslaved women here than on other islands, where enslaved men were often preferred for the cultivation of sugar (Schiltkamp, Smit, & Wachlin, 2000, p. 21; Thomas, 1997, p. 401). It is therefore important that we investigate the lives of these women, whose voices are not heard in documentary sources.

2 | MATERIALS AND METHODS

2.1 | Archaeological context and preservation

On December 12, 1985, the Curaçao police contacted the Archaeological-Anthropological Institute of the Netherlands Antilles (AAINA) requesting an archaeologist for the recovery and identification of human remains found during construction at the Chamber of Commerce property. Since then, the human remains and documentation have been curated by the AAINA, now known as National Archaeological-Anthropological Memory Management.

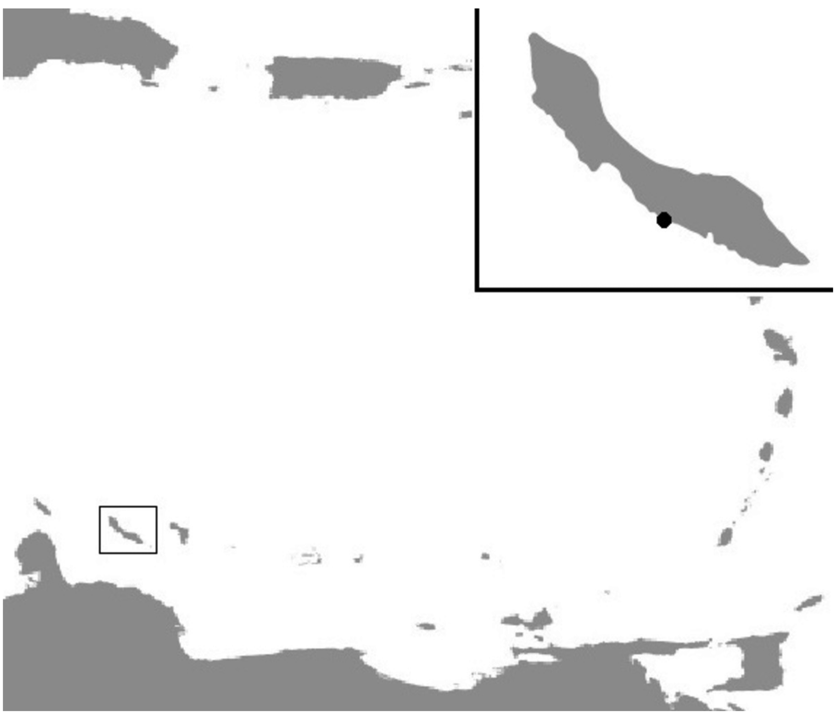

FIGURE 1 Map of the Caribbean showing the location of Curaçao and the location of the burial site on the south coast of the island

FIGURE 2 Skeleton 1 in anatomical position

Upon arrival at the construction site, the archaeologist found that most of the human remains had already been disinterred by the construction workers, causing disturbance which limited the contextual information available. The remaining skeletal elements were recovered by the archaeologist at a depth of 1.2 m below the ground surface (see AAINA report by Dr. Jay Haviser entitled "Human skeletal remains at the Kamer van Koophandel"). Although there were no associated artefacts that could provide dating evidence, physical and archival evidence can narrow the probable date range. We know that the burial probably took place after the initial development of Pietermaai in the 17th century (Teenstra, 1977 [1836], pp. 43, 61). In A.D. 1821, the island governor forbade burials outside official graveyards, and although this was not strictly enforced, it may make it more likely that this isolated backyard burial occurred before that date (Langenfeld, 2007, pp. 129–130). The burial therefore probably took place between the 17th century and the early 19th century.

The context of this burial is more in keeping with Afro-Caribbean belief systems than with Christianity. The house-yard had a great deal of importance in African American enslaved communities, not only as a space where the social life of the household was carried out but also as a space of safety, creativity, relaxation, and spirituality (Battle-Baptiste, 2007). A good example of burials in this important space can be found in the 18th century enslaved village at Seville Plantation in Jamaica, where four individuals were buried in the yard area. Evidence from the burial context, associated artefacts, and osteological analyses indicated that they were probably buried in this location due to their importance for the enslaved community. A teenaged girl buried there may have been a healer or diviner (Armstrong & Fleischman, 2003). Other examples of yard burials from within the Dutch Caribbean include those at the late 19th century leprosarium on St. Eustatius (Gilmore, 2008).

The individual (Skeleton 1) was approximately 75% complete, and cortical preservation was excellent.

2.2 | Osteological analysis

The skeleton was analysed for age, sex, ancestry, and pathology using guidelines set out by Brickley and McKinley (2004) and Mitchell and Brickley (2017) for the British Association for Biological Anthropology and Osteoarchaeology. Additional methods were used where necessary. These are described below.

2.3 | Isotopic analysis

Analyses of strontium ($^{87}Sr/^{86}Sr$), oxygen ($\delta^{18}O$), and carbon ($\delta^{13}C$) isotopes were conducted on the dental enamel of two permanent (premolar) teeth. Isotopic analyses were performed to determine the childhood dietary patterns and geographic origins of this individual. Sample processing and analyses were conducted at the Faculty of Science, Free University Amsterdam, using standard procedures for the isotopic analyses of archaeological skeletal materials (Laffoon, Davies, Hoogland, & Hofman, 2012; Laffoon, Rojas, & Hofman, 2013).

3 | RESULTS

3.1 | Assessment of chronological age

Chronological age is the length of life of an individual (Cameron, 2015; Gowland, 2007). Stage of dental eruption is commonly used as a proxy for chronological age in osteoarchaeology because it is thought to be less affected by environmental factors such as malnutrition and disease than other skeletal developments used for assessing age (Brickley, 2004; Liversidge, 2008). Potential population differences in third molar eruption were not thought to be large enough to affect the outcome of the current analysis (see Harris, 2007; Liversidge, 2008; Ramirez, 2016; Reid & Dean, 2006), and in this case, full eruption of all third molars probably indicates a chronologically adult age (over 18 years) at the time of death (Ubelaker, 1989). Additionally, root development of the maxillary third molars (observable due to fragmentation of the maxilla) is almost complete (stage Rc to A½). According to AlQahtani, Hector, and Liversidge (2010), this probably indicates an age of greater than 18.5 years at death.

3.2 | Assessment of biological age

Biological or developmental age is the stage of physical development that an individual has reached (see Cameron, 2015; Gowland, 2007). Epiphyseal fusion can be used to assess biological age (see Schaefer, Black, & Scheuer, 2009, pp. 354–355). In this case, incomplete epiphyseal fusion at the proximal ulna, sacral neural arches and alae (Figure 3), and femoral trochanters showed that Skeletal 1 had a biological age at death of between 12 and 15 years (Schaefer et al., 2009, p. 355). This demonstrates a difference of at least 3 years between the chronological and biological ages of Skeleton 1.

Shapland and Lewis (2013) have described the link between skeletal development and pubertal stage. It was therefore important to consider pubertal stage in relation to biological age. Unfortunately, some of the elements involved in the criteria for pubertal stage (such as ossification of the wrist and hand, ossification of the iliac crest epiphysis, and cervical development) were missing (Shapland & Lewis, 2013; Shapland & Lewis, 2014). However, the fact that the distal radial epiphyses were still fully unfused at the time of death may indicate that Skeleton 1 had not yet finished the peak height velocity (PHV) stage of puberty that usually precedes menarche (Shapland & Lewis, 2013).

3.3 | Sex assessment

In adult individuals, the pelvis is a more reliable indicator of sex than the cranium because of its role in childbirth (Bruzek, 2002; Kjellström, 2004; Murail, Bruzek, & Braga, 1999). Brickley and Buckberry (2017) do not have confidence in any reported methods for morphological sex assessment in non-adults because sexual dimorphism is not pronounced. In this case, the biological age of Skeleton 1 therefore prevented the application of sex assessment methods using the pelvis.

However, morphological sex assessment of the adult cranium was applied in this region according to Buikstra and Ubelaker (1994, pp. 16–21) and Herrmann, Grupe, Hummel, Piepenbrink, and Schutkowski (1990) for adults and Molleson, Cruse, and Mays (1998) for non-adults. All observed morphological traits indicated that Skeleton 1 was female, with the exception of the mastoid processes, which are large (Figure 4).

Additionally, the Vance, Steyn, and L'Abbé (2011) method for sex assessment from the morphology of the distal humerus (which can achieve up to 75.5% accuracy) also indicated that Skeleton 1 may have been female.

3.4 | Ancestry assessment

Geographical ancestry assessment is very relevant in the Caribbean because of its association with social race and enslavement during the 17th to 19th centuries (Knight, 2012, p. 87; MacEachern, 2011; Lucas, 2010; Schwartz, 2003). In this case, anatomical maturation of the skull did allow ancestry assessment methods to be used: first, morphological traits according to Byers (2011, p. 131) allowed a quick examination in the field, and second, metric analysis using the FORDISC 3.0 program by Ousley and Jantz (2005) supplied supporting evidence. This program compares measurements to three data groups: a 19th century population from the U.S. Forensic Data Bank containing both European and African ancestry individuals; the Howell's database containing archaeological populations from around the world; and a 20th century collection. It can tell the researcher which of the database populations the individual in question is most similar to and can therefore indicate a broad geographical origin (Ousley & Jantz, 1998; Ousley & Jantz, 2005). It was used in preference to the similar program CRANID because it compensates for missing data (Wright, 2008, pp. 113, 117; Ousley & Jantz, 1998).

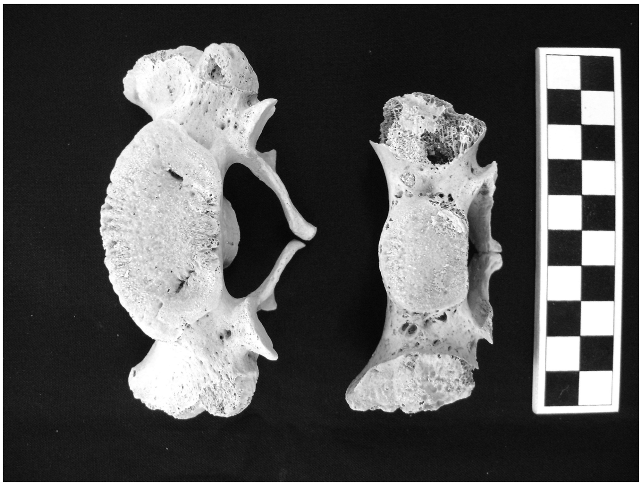

FIGURE 3 Sacral elements showing unfused neural arches, alae, and bodies

FIGURE 4 Lateral view of cranium showing large mastoid process

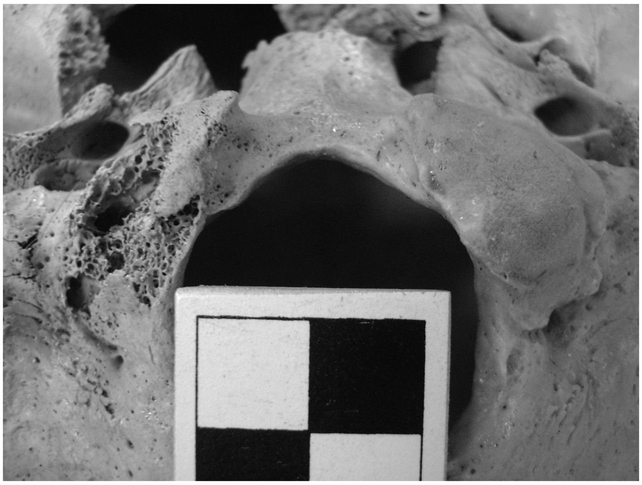

FIGURE 5 Contour change at the left occipital condyle

FIGURE 6 New bone formation on the anterio-lateral portion of the left iliac bone

In this case, ancestry assessment carried out both morphologically and metrically indicated that Skeleton 1 was of African ancestry, with FORDISC 3.0 indicating similarity with 19th century black females (posterior p = .831) and 20th century black females (posterior p = .368; see Ousley & Jantz, 2005).

3.5 | Stature

Formulae for adult stature (e.g., Wilson, Herrmann, & Jantz, 2010) cannot be applied to biologically non-adult individuals (Willey, 2009), and formulae for non-adults (e.g., Telkkä, Palkama, & Virtama, 1962) have mainly been developed using European populations (Lewis, 2006, pp. 77–78). African populations have high levels of genetic diversity, and stature varies widely across the continent (Carson, 2008; Tishkoff et al., 2009), so there is no appropriate formula available for Skeleton 1. This highlights the need for further research in this area.

3.6 | Pathological changes

Skeleton 1 exhibited several pathologies. Dental pathologies included linear enamel hypoplasias in the same location on all four third molars. Other cranial pathology included contour change at the left occipital condyle (Figure 5) and healed porotic hyperostosis (smooth porous lesions) on the superior part of the frontal bone and the anterior part of the left parietal bone.

Postcranially, bilateral active periostitic lesions were visible at the anterio-lateral margin of the left iliac bone (Figure 6) and on the femora at the attachment sites of the vastus medialis muscles (Figure 7). Entheseal changes in the form of porosity and granular new bone were observed on the radii at the attachment sites of the biceps brachii (Figure 8) and on the femora at the attachment sites of the vastus intermedius and gluteus maximus (Figure 9; Stone & Stone, 2009, pp. 114, 132, 180; Abrahams, Boon, & Spratt, 2008, pp. 129, 298). Other entheses, including the attachment sites of the pronator teres on the radii, were clearly demarcated but not severely affected. There is currently no biologically appropriate method for recording these changes in growing individuals.

Lastly, osteochondritis dissecans was present on the lateral condyle of the left femoral distal articular surface, in the form of a smooth (healed) joint surface irregularity.

3.7 | Isotopic results

This individual has enamel $^{87}Sr/^{86}Sr$ ratios of 0.71384 and 0.71386, $\delta^{18}O$ values of −5.1‰ and −5.2‰, and $\delta^{13}C$ values of −14.7‰ and −15.1‰. The $^{87}Sr/^{86}Sr$ ratios fall outside of the range of bioavailable $^{87}Sr/^{86}Sr$ for both the island of Curaçao and the Antilles more generally (Laffoon et al., 2012; Laffoon et al., 2017), clearly indicating non-local origins. These moderately elevated $^{87}Sr/^{86}Sr$ values are, however, consistent with origins in West Africa. Very similar strontium isotope ratios have been reported for various African-born individuals from other enslaved African archaeological contexts on Barbados and St. Maarten (Schroeder, Haviser, & Price, 2014; Schroeder, O'Connell, Evans, Shuler, & Hedges, 2009) as well as for contemporary cemeteries in Brazil (Bastos et al., 2016) and New York (Goodman et al., 2009). The $\delta^{18}O$ values fall within the range of variation for enamel oxygen isotopes in the Caribbean (Laffoon et al., 2013), but the ranges of human $\delta^{18}O$ variation in the Caribbean and West Africa are expected to overlap considerably because of broad similarities in

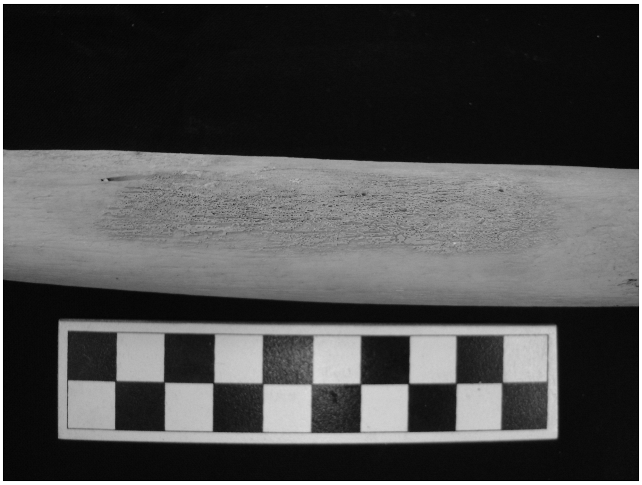

FIGURE 7 New bone formation on the right femur at the attachment site of the vastus medialis

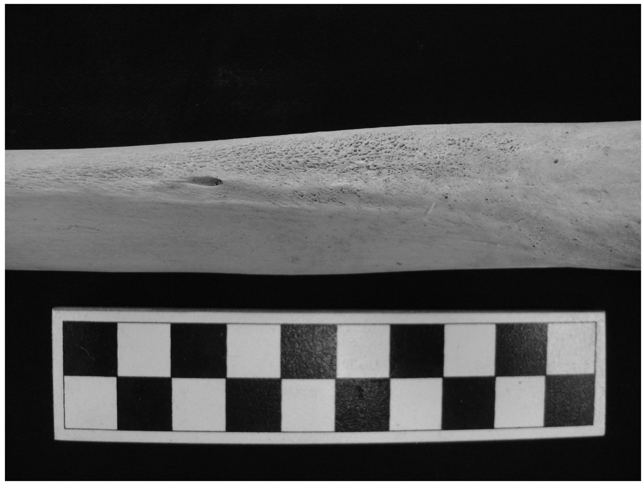

FIGURE 9 Porosity and granular new bone formation on the left femur at the attachment sites of the vastus intermedius and gluteus maximus

FIGURE 8 Porosity and granular new bone formation on the radii at the attachment sites of the biceps brachii (right above, left below)

climatic and geographic conditions influencing oxygen isotope values in both regions. The $\delta^{13}C$ values fall at the low end of the range of $\delta^{13}C$ variation and are consistent with a diet composed entirely or predominantly of terrestrial C_3 foods with little or no contributions from either seafood or C_4 crops (Ambrose & Norr, 1993). In summary, this individual possesses enamel strontium isotope values indicating non-local origins, and these values are consistent with West African childhood origins. Therefore, it is highly likely that this individual migrated (or was forcibly transported) from West Africa to the Caribbean. The oxygen isotope results are consistent with origins in low-latitude tropical climates but cannot be used to determine more specific geographic origins or distinguish between Antillean and West African origins. The carbon isotope results indicate that childhood diet was highly focussed on C_3 resources. In West Africa, such diets were traditionally more common in the more southerly regions of the rice and vegecultural (root and fruit crops) zones where all staples were C_3 crops, than in the more northerly sorghum-millet (C_4) zone (Harris, 1976; Schroeder et al., 2009).

4 | DISCUSSION

Skeleton 1 likely spent her childhood in West Africa. She was then forcibly transported across the Atlantic to Curaçao, where she probably became the property of an inhabitant of Pietermaai during the 17th, 18th, or early 19th century (see Rupert, 2012, pp. 129–130). In this context, she may have been a domestic or plantation worker, as wealthy individuals here often owned several properties and moved their enslaved people between town and country (Jordaan, 2003). Evidence from across the skeleton provides some indication of what her life may have been like.

First, the presence of single-linear hypoplastic lesions in the same location on all four third molars indicates that they may have developed due to a stressful event, such as malnutrition or disease, during late childhood or early adolescence (Hassett, 2012; Ogden, Pinhasi, & White, 2007). Enamel formation times differ slightly between populations (Reid & Dean, 2006), but it is probable that these crowns formed between the chronological ages of 8 and 15 years (Schaefer et al., 2009, p. 85). These lesions could, for example, have been the result of a highly physically and psychologically stressful event such as forced passage to the Americas (see Emmer, 2006, pp. 68–71). At the Rupert's Valley burial ground on St. Helena, victims of forced migration had the highest rate of enamel hypoplasia amongst adolescents like Skeleton 1 (Witkin, 2011).

Osteochondritis dissecans at the left knee may indicate that Skeleton 1 subsequently endured high levels of physical activity during adolescence (Kessler et al., 2014; Thompson, Jones, Lavelle, & Williams, 2014; Wells, 1974). However, other joint changes are generally related to age and uncommon in younger individuals (Knüsel, Göggel, & Lucy, 1997; Zampetti, Mariotti, Radi, & Belcastro, 2016). Contour change observed at the left occipital condyle may therefore indicate frequent use of the neck (see Steckel, 2008; Larsen, 1997, pp. 162–167). Additionally, large mastoid processes are associated with increased muscle mass in the neck region and may therefore be explained by frequent use and development of the sternocleidomastoid muscle, which moves the neck and head (Saini et al., 2012; Stone & Stone, 2009, p. 62; Abrahams et al., 2008, p. 16). In other contexts, scholars have suggested that neck lesions such as cervical osteophytosis might be related to domestic activities including milking, fruit picking, and carrying loads on the head (Wilczak, Watkins, Null, & Blakey, 2009). The latter is a West African and Caribbean custom involving balance and the use of the arms and neck (Stahl, 2016; Momsen, 2010, p. 165). Indeed, entheseal changes in this individual occur in regions corresponding to muscles used for balance in the legs (see Stone & Stone, 2009, p. 180; Abrahams et al., 2008, p. 298) and for flexion and pronation of the arm (see Stone & Stone, 2009, pp. 114, 132; Abrahams et al., 2008, p. 129). However, entheseal changes are the subject of ongoing debate, and most recording methods, such as the Coimbra method (Henderson, Mariotti, Pany-Kucera, Villotte, & Wilczak, 2016), are tested on adults only. This means that there are few population-level studies appropriate for comparison with Skeleton 1.

The bilateral areas of new bone formation observed at muscle insertions on the arms, legs, and left ilium and the healed lesion on the cranium may also indicate non-specific infection irritating the periosteum or trauma or repeated microtrauma to these muscles (Jurmain, Cardoso, Henderson, & Villotte, 2012). Periosteal reactions like these are often used to indicate systemic stress in archaeological populations (DeWitte & Bekvalac, 2011; Larsen, 1997, p. 84). They can be associated with many different diseases, which are both described in historical documentation and observed in enslaved skeletal populations, for example, vitamin C deficiency (scurvy; Handler, 2009) and leprosy (Gilmore, 2008). Enslaved people were particularly vulnerable to infectious disease because conditions of poverty such as malnutrition and overcrowding depleted their immune systems and allowed diseases to spread through the community (Blakey, Rankin-Hill, Howson, Wilson, & Carrington, 2009; Gilmore, 2008).

Delayed puberty can itself be caused by various factors including chronic infection, environmental conditions, hard labour, and malnutrition (Lewis, Shapland, & Watts, 2016; Louis et al., 2008). Discrepancies between chronological and biological age have also been observed in other enslaved individuals, for example, in 15th to 17th century Portugal (Wasterlain, Costa, & Ferreira, 2018) and in 18th century New York (Goode-Null, Shujaa, & Rankin-Hill, 2009). In the case of Skeleton 1, there is evidence for systemic stress, probably including infection and hard labour, over a long time span, from kidnapping in Africa and transportation across the Atlantic to the activities of an enslaved adolescent and young woman in Curaçao. One should also bear in mind that the psychological conditions of enslavement were extremely adverse, perhaps particularly for women working in the domestic arena, who were more likely to encounter persistent psychological and sexual abuse through close contact with the slave owner (Guerreiro Ramos Bennett, 1999; Patterson, 1982, p. 175). There may therefore have been a variety of contributing factors to the poor health status of Skeleton 1.

5 | CONCLUSIONS

The hard life and early death of this young woman allow us to examine the potential impacts of high stress in the Caribbean environment. Enslavement is observed in a real body, demonstrating its profound negative effects through childhood and adolescence. The value of analysing human remains excavated over 30 years ago is demonstrated and, in this instance, provides an important case study, which can contribute to wider discussions on slavery. As the first example of an African-born enslaved woman excavated in Curaçao, Skeleton 1 reminds us that alternative data sources are vital in developing new historical narratives, which foreground marginalized groups.

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CONFLICT OF INTEREST

None.

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