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The Children of Spring Street: The Remains of Childhood in a Nineteenth Century Abolitionist Congregation

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Abstract

This dissertation examines the skeletal remains of 75 children interred the burial vaults (1820-1846) of the 19th century Spring Street Presbyterian Church in lower Manhattan. New York City and the 8th Ward neighborhood of the church were rapidly urbanizing and diversifying in the early 19th century. These changes affected how children lived and grew. Family life, institutional involvement, and the city itself are considered as structuring forces that helped shape the skeletal remains of the children that did not survive. This dissertation combines historical data, theoretical models of embodiment and agency, and skeletal data to reconstruct their experiences of growing up in a rapidly changing cityscape. In particular, trends in health, diet, and trauma are noted. These trends are established first for sub-groupings of children based on cultural defined age stages, and then combined to examine the life course. This project is therefore a theoretical microhistory of childhood, a novel approach to discussing the bodies of children in the past.

THE CHILDREN OF SPRING STREET: THE REMAINS OF CHILDHOOD IN A NINETEENTH CENTURY ABOLITIONIST CONGREGATION

by

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To Eliza Crowley Jackson (2006-2008), my beautiful niece,
whose brief life is the inspiration for this project.

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Chapter 1: Introduction

Hark! A voice, the darkness choosing,
Calls my new born soul away.
Lately, launched, a trembling stranger,
On the worlds wild boisterous flood,
Pierc'd with sorrows, tossed with danger,
Gladly I return to God.

--From *Lines on the Death of a Child*,
by a member of the Frey/Ludlow Family, 1829[1]

Introduction

A few days after her birth, a family member penned the lines above from the perspective of Anna Frey, a deceased infant. The author paints her short life as one of fear, and her death as a return to God. The poem was found in the papers of the Reverend Henry G. Ludlow, one of the pastors of the Spring Street Presbyterian Church in New York City. During the time the Rev. Ludlow presided over the church (1825-1837), he also presided over the funerals of some of the approximately 75 children buried within the church's vaults. In his letters to family members, he mentions burying children at least twice, and he writes about the death of his own child a few days after birth. He was clearly affected by the loss of young lives, as was the unnamed relative who wrote the poem above.

Yet "Lines from the Death of a Child" takes the point of view of the dying, and then deceased, newborn. While that imaginative leap attempts to capture what it was like for the child to leave the world, few historical sources adequately address the experience of *living* as a child in the first half of the 19th century. Much of what survives today describing childhood comes from the hands of adults—parenting manuals, letters, church sermons—and less comes directly from

[1] This poem was written to commemorate the death of Anna Frey, niece of Rev. Henry G. Ludlow, a few days after her birth.

the children themselves. As these documents attest to an ideal childhood, or provide instructions to parents, they do not necessarily record the lived experience of the children. However, that lived experience is, to a certain extent, recorded in the bones of the dead. By exploring the remains of children, we can access some of that lived experience.

Between 1820 and 1846, the Spring Street Presbyterian Church buried some 197 individuals in its vaults. The congregants were people from the local neighborhood, the 8th Ward of New York City (see Figure 2.2). They attended the Spring Street Presbyterian Church perhaps because of its proximity to their homes, perhaps because of family and friends, or perhaps because the pastors espoused a radical abolitionist ideology. We know the congregation was mixed class and included individuals of both European and African ancestry. We know that the fiery pastors who led the congregation made themselves and the church the target of race riots in 1834. Less is known about who the people were that came to their final resting place in the brick and limestone vaults alongside the church. They were largely forgotten, and, as the church fell into disrepair in the late 19th century and eventually closed and burned down, the vaults were lost beneath the blacktop of a car park.

The long forgotten early uses and social contexts associated with this site were rediscovered in the winter of 2006, when construction at the corner of Spring Street and Varick Street turned up skeletal remains. The car park was being torn up for a new glass condominium and hotel, Trump SoHo. When the bones were discovered in the backhoe fill, construction was halted, and the medical examiner was called in. On December 12th, 2006, the New York City Medical Examiner declared that the remains were not a forensic but rather an archaeological case, and so began the process of excavating and analyzing the bodies from the 19th century Spring Street Presbyterian Church (Morin 2010:1).

The remains that emerged from the vaults were highly commingled; during the nearly 200 years that had passed since the vaults were used, the stacked wood coffins had rotted and collapsed, leaving behind piles of bones. The nature of the excavation—rushed, politically charged, and in winter months—further complicated the excavation, and in the end only 62 individuals were removed and designated as complete burials. In addition, soils and fill containing minimally 100 or more individuals were removed as commingled remains for sorting and/or ossuary analysis (Morin 2010).[2] As that material was analyzed, the fact that at least 75 of the burials were from children (subadults) stood out. The more examination there was of the children's remains, the more fascinating the story became. Many of the children were sick, far sicker than many of the adults. And many of the children were very young. Their stories were, and still are, compelling.

Bioarchaeology is in a good position to tell those stories. Bioarchaeologist Mary Lewis notes that, despite problems of preservation of subadult bone, years of researchers ignoring the subject, and even to this day an under-theorized model of childhood, the primary sources for examining childhood in the past "…are the children themselves," (Lewis 2007:1). And for this particular moment in time in New York City, the children buried at Spring Street are our best, and perhaps only, direct source. There are no other collections from the city from this time period; the closest comparison in the area comes from the African Burial Ground, which was active nearly a century earlier than the Spring Street Presbyterian Church and closed by 1794. This dissertation explores the lives of the children buried at the Spring Street Presbyterian Church, focusing on understanding what life was like for those children and how childhood changed for the children as they grew older. In order to do this, the dissertation combines skeletal

[2] For more on this, see Chapter 3.

analysis, with a particular focus on health and diet, alongside historic records and documents from the people and places of the time. By incorporating these multiple lines of evidence, the dissertation presents a very specific, local, and contextual story of what it may have been like for some children growing up in the 1820s, 1830s, and 1840s, in the 8th Ward of New York City.

This methodology, as will be discussed throughout the dissertation, reveals that childhood at the Spring Street Presbyterian Church was in part a product of the wider forces with which families and children were interacting. The resulting childhood experiences included unusually high rates of rickets and cribra orbitalia, skeletal conditions of deficiency; diets with both early and late weaning and access to sugars and carbohydrates; changing patterns of health challenges associated with stress and infectious disease as children aged; and few but consistent cases of trauma related to activity in life and manipulation after death. These skeletal findings will be explored as they relate to the unique social structures with which the children were engaged and to understand lived experience of childhood.

Such a study of childhood has few precedents in bioarchaeology. Most work done on childhood comes from history or archaeology, which itself has only seen a focus on the topic develop in the last thirty years. Bioarchaeology tends to be more concerned with using the analysis of subadult remains to understand how a society grew, changed, or dealt with hardship. A highly contextual analysis of children, specifically addressing the *cultural* topic of *childhood* as done here is less common. In order to understand the value of exploring the life histories of children, Chapter 1 discusses the theoretical models used to extrapolate lived experience from subadult bone. Also importantly, this chapter will discuss the rationale for the layout of this dissertation, which, while it is a bit unorthodox, does allow for a more interdisciplinary and detailed approach to a discussion of childhood.

Researching Childhood

In the past 30 years, the study of childhood in the past has become an accepted area of scholarship. When Grete Lillehammer wrote “A Child is Born: The Child’s World in an Archaeological Perspective” in 1989, the first piece calling for an archaeological approach to childhood, she called for researchers to recognize that, far from the invisible inhabitants that they had been portrayed as, children could be found in the archaeological record through their interactions with peers, parents, and their environment (Lillehammer 1989). Methodological advances in archaeology since then have focused on this problem, and have helped us better understand how to see children in the archaeological record (Wilson 1999; Park 2006; Baxter 2005; Camp 2008), how to interpret their contributions to society (Finlay 1997; Kamp et al 1999; Grimm 2000; Kamp 2010; Levy 2007), and how to think about their use of space (Wilkie 2000; Baxter 2005; Baxter 2006).

As archaeologist Jane Eva Baxter writes, “Children…are active participants in economic, social, political, and religious systems. Far from peripheral, their activities are essential to the success of these systems and the societies in which they operate,” (Baxter 2005: 11). And so an understanding of the Spring Street Presbyterian Church, a religious and political institution; of its congregants and their social and economic situations; and of New York City in the transitional first half of the 19th century, simply *cannot* ignore the activities and daily lives of children. Again, turning to Baxter, we must remember that “Children are both literally and figuratively the future of every community,” (2005: 10). And so it is a great advancement that archaeological studies now include or focus on childhood as a topic worth understanding on its own merits. As archaeologist Helen Schwartzman notes, it is important that children are no longer understood as “tools” of analysis but rather as the topics of analysis themselves (2006: 124)

Bioarchaeological approaches to subadult remains, however, still often only focus on children as a barometer for society or only report on diseases and anomalies. In-depth understandings of children's life histories in the past are fewer and further between (however, see Thomson et al 2014 for examples of attempts to do this), and a fully integrated approach to understanding *childhood* from skeletal remains is perhaps still in its infancy. And so looking at the remains of children to understand their individual life histories is an important endeavor to undertake, one that recognizes that they were once living individuals with a range of agency and affect on their families, homes, and societies.

Additionally, the bones of children act as an excellent record of the world around them. As children's bone is constantly growing and turning over, it records the past year of life for the child, unlike adult remains that record the past seven to ten years (Lewis 2007). As archaeologist Kathryn Kamp writes, "Discovering a pattern of disease, physical child abuse, or toys leads to more general statements about the experiences of children in a particular time and place," (Kamp 2006"117). Focusing on children's remains, then, offers not only a chance to understand that child's life, but also a window into the larger socioeconomic landscape of the time, laying the ground work for future analyses of the Spring Street Presbyterian Church and the city.

Skeletal and archival research on the collection as a whole has thus far revealed a population that is both working and middle class. Some of what we know comes from those who led the church; during the time of the burial vaults, the church had two abolitionist pastors for whom historical documentation still exists. The Reverend Samuel Hansen Cox (1793-1880), the second pastor of the church, led the congregation between 1820 and 1825. He was followed by the Reverend Henry G. Ludlow (1797-1867), who led the church between 1825 and 1837. Other information comes from historical archives and accounts of life in the city.

Documentary evidence suggests that the adults of the congregation were migrants and immigrants, having grown up and experienced childhood elsewhere, including upstate New York, New Jersey, and even Ireland (Spring Street Presbyterian Church). The children buried in the vaults of the Spring Street Presbyterian Church, however, are much more likely to have been raised in the neighborhood of the church. Thus, their remains have the potential to reflect the socioeconomic circumstances of the church parishioners more accurately, including telling us about what life was like for an infant, a toddler, a child, or a teenager growing up in the rapidly urbanizing and changing New York City of the first half of the 19th century. The children's remains reflect the city because the human body, as it grows, adapts, changes, and dies, is in constant interaction with the world that surrounds it. Human bodies both influence the world around them and are molded by that world. And so the frame of the body, the skeleton, contains a record of that interaction. How we understand that interaction requires us to approach the body both as a biological entity and also as an embodied social product. A discussion of how the skeletal body is understood follows.

Social Bioarchaeology, Embodiment, and Agency

Social bioarchaeology, a contextual, historical analysis, is the foundation for the research in this dissertation. This approach developed from previous iterations of skeletal research that emphasized simple data collection. Yet much of the work done on skeletal remains is still a-theoretical. The study of the body has become a specialized endeavor, increasingly separated from the material culture remains studied by archaeologists and from the theoretical perspectives used by anthropologists (Sofaer 2006:8). Osteological analysis has privileged a scientific approach and left the theorizing, the interpreting, and the synthesizing up to the archaeologists (Sofaer 2006). This naturalization of the body as scientific evidence rather than as a cultural product has artificially separated the physical bodies themselves from the societies in which they live. As osteoarchaeologist Joanna Sofaer puts it, "This is something of a paradox given that the power and value of the body to the investigation of human history is precisely *because* it is the nexus between biology and culture," (Sofaer 2006: 9). And yet, much of what is published on skeletal remains focuses on methods and findings rather than interpretation. We know, however, that the body and culture cannot be separated. Instead, the body and culture are in a dialectical relationship, both constraining and influencing each other. One way of addressing this relationship is to shift the focus onto the lived experiences of individuals and address questions of the life course rather than simply collecting data on static dead bodies.

A social bioarchaeology like Sofaer has called for must incorporate the body and the social, the physical and the material, and the biological and the cultural. Sofaer emphasizes examining an individual's life history with an understanding of the plasticity of the skeleton, the materiality of the body, and the sociocultural realities of age and sex (Sofaer 2006; Sofaer 2011).[3] A theoretical osteoarchaeology of this type that focuses on the life course was first advocated by Frank and Julie Saul. Writing in the 1970s and 1980s, Saul and Saul advocated analyses that looked at life histories from individuals and extrapolated out (Saul and Saul 1989). They use the term osteobiography to categorize the aims of their work: "…to further emphasize that skeletons record the life history of their occupants in various ways and that we should be extracting these life histories from their bones instead of making lists of often uninterpreted

[3] Plasticity refers to the idea that the human body, hard and soft tissue both, is moldable and adapts and reacts to the environment (Sofaer 2006:71). This begins in utero and continues throughout life with growth and degeneration, adaptation to stress, disease, labor, and trauma (Sofaer 2006: 71).

measurements," (Saul and Saul 1989: 288). These individual life histories then paint a picture for a whole population life history (Saul and Saul 1989: 300).

Saul and Saul brought the focus of bioarchaeological studies back to individuals and examining how life histories can create population histories. John Robb has proposed taking osteobiography a step further. His definition of osteobiography not only recognizes that culture plays a role in the osteobiography that emerges, but recognizes osteobiographies as "cultural narratives" themselves (Robb 2002: 160). He writes, "This sense builds upon Saul and Saul's osteobiography, but expands it to focus on the cultural understanding of life events and to encompass the history of human remains after death," (Robb 2002: 160). An individual's biological profile is understood here as a socially constructed phenomenon, situated in both the moment in which the individual lived and also in age structures that defined those moments (Robb 2002: 153). Biological profiles are not understood as static definitions of age, sex, and ancestry, but rather as biological narratives that illustrate the life course of the individual, recognizing the culturally constructed "…succession of stages an individual passes through during his or her lifetime," (Robb 2002: 155). Cultural change and cultural age is recorded in bodily change and recognizable in an individual's life course as well as a population's life course (Robb 2002). Robb writes that this approach means to contribute "…to our cultural understanding of the past as well as to biological knowledge," (Robb 2002: 168). This approach encourages bioarchaeologists to examine the experience of disease and trauma as well as focus the experience of age and the life course (Robb 2002: 168).

More work has focused on individual stories set in the wider narrative of the time and site (see Novak 2008, Agarwal and Glencross 2011, Baadsgaard et al 2011, for instance). In a 2012 volume, *The Bioarchaeology of Individuals*, the editors Stoddard and Palkovitch write, "We see the study of individuals as a complementary domain to the populational framework of bioarchaeology," (2012: 2). Each article in this collection takes a single individual's life history and expands out. Each of these osteobiographies emphasizes the social context and interaction of the individual. Some present findings in a traditional, albeit narrow, fashion (see, for instance, Katzenberg and Saunders 2012), and some extend the osteobiography considerably further, even into fictive narrative (see, for instance, Boutin 2012). What is crucial about all of these is that the focus is on not just an individual, but on the social relationships that make up an individual's life, and the structures, behaviors, and cultural factors that influence biology. This dissertation draws from this type of analysis, and privileges the connection between social relationships, for instance the family and the church, in understanding and interpreting biological phenomenon.

Embodiment

In order to advance this social bioarchaeology paradigm and this emphasizing of social relationships, the body and society need to be reconciled. One important element of this type of analysis is recognition of the embodiment of the *social into the biological*. To understand how the children buried at the Spring Street Presbyterian Church lived and not just how they died, their remains must be reconciled with the social reality of their bodies in life. Embodiment offers a way of understanding how the social *becomes* the biological, and provides a way to bridge archaeological and bioarchaeological analyses. Bodies are "…object[s] ordered by society," (Shilling 2008:2) and since embodiment recognizes that "…bodies…are social, political, subjective, objective, discursive, narrative, and material all at once," (Farquhar and Lock 2007: 9), the artificial divide between body and society is bridged. The plasticity of the skeleton, its ability to adapt, react, and develop according to the external forces acting on it, means that "…the pasts of people are 'sedimented' in their bodies," (Sofaer 2006: 77). The embodiment approach asks researchers to collapse the duality of mind and body, of physical and cultural, and to recognize that they cannot and do not exist independently from each other but rather are a part of the same processes. How this topic is approached has varied considerably, and an array of theorists including Foucault and Bourdieu, Douglas and Marx, and Merlaue-Ponty and Durkheim all have contributed to the body of knowledge lumped under the term "embodiment."

One theorist who picked up on this idea of habits of the body and the system in which behaviors come into being and are transferred was Pierre Bourdieu. Although the term *habitu*s was coined by Mauss, Bourdieu took the idea further, and discussed the *habitus* as more than just a collection of practices; rather, he addressed it as a way of living and being that structures society. For Bourdieu, the *habitus* is both the collection of practices that exists for individuals and groups and the way in which these practices are created, modified, and passed down (1977:78-83). These practices of the *habitus* for those within the structure are, "…understood as a system of lasting, transposable dispositions which, integrating past experiences, functions at every moment as a *matrix of perceptions, appreciations, and actions*," (italics in the original; Bourdieu 1977: 82-83). He writes that the *habitus* is both a "product of history," and creates individual and group actions (Bourdieu 1977: 82). The *habitus* is learned through observation and imitation, through practices rather than discourses (Bourdieu 1977: 87).

The vehicle of this learning, this imitation, is the body (Bourdieu 1977:87). Bourdieu terms this the "body hexis" and writes that it is the functionality of the body that is tied to a "system of techniques involving body and tools, and charged with a host of social meanings and values," (Bourdieu 1977:87). It is in discussing how the *habitus* is transferred, how practices are learned by action, that Bourdieu raises the idea that this system leads to "…the em-bodying of the structures of the world," (Bourdieu 1977: 89). The "perceptions, appreciations, and actions"

(Bourdieu 1977:89) take on physical form; the "social meanings and values" of techniques of the body represent this collapse of mind and body. For Bourdieu, social reality is physical reality and physical reality is social reality. Bourdieu terms this "the *socially informed body*," a body that senses physically, mentally, and emotionally all within the structures of the *habitus* (Bourdieu 1977:124).

The collapsing of the Cartesian mind/body divide has opened up new ways of understanding the body in society, including examinations of agency, diet, religion, education, modernity, and death, many of the same topics examined herein (Shilling 1993). Sociologist Christopher Shilling argues that the utility of this is that "…the body is most profitably conceptualized as an unfinished biological and social phenomenon which is transformed, within certain limits, as a result of its entry into, and participation in, society," (Shilling 1993: 12). Importantly, Shilling also notes that the body is both the recipient of social relations and the basis for social relations: "Social relations may take up and transform our embodied capacities in all manner of ways, but they still have a basis in human bodies," (Shilling 1993: 13). Shilling defines embodiment such:

1) The human body at birth is itself the product of evolutionary processes which are affected by social as well as biological processes.
2) As the body develops it is taken up and transformed, within limits, by social factors.
3) The body is not only affected by social relations but forms a basis for and enters into the construction of social relationships. (Shilling 1993: 199)

Of particular interest for this project is the application of embodiment by Mellor and Shilling in *Reforming the Body: Religion, Community, and Modernity* (1997). In their introductory framing, the authors note that all information, all experience, and all knowledge comes to us through the physical body, through our senses (Mellor and Shilling 1997: 5). In particular, religion (following a Durkheimian perspective) has capitalized on this, using both practice and discourse to create a religious experience and a religious body (Mellor and Shilling 1997). This intersection of ideology and behavior is influenced by the state of the body, judged to be imperfect in Christianity, and also influences the body, as it changes the biology of the individual. By restricting diets, for instance, religion influences health, potentially positively or negatively. It has both spawned the Christian diet movement in the 19th, 20th, and 21st centuries and created health risks associated with deficiency (Griffith 2004). The proscription of certain behavioral practices, such as the rules surrounding sex or the moral prerogatives associated with appropriate child rearing, have created a societal morality that extends far beyond a single religion. These behaviors also clearly extend into biology as they regulate marriages and births, understandings of physical and emotional maturity, and labor practices, punishments, and social relationships. The idea that religion, an ideological and social endeavor, can regulate and modify the body has important implications for research on the ideological population that is the Spring Street Presbyterian Church congregation, and discussions of the role of ideology appear throughout this dissertation.

Agency

While embodiment offers a way to reconcile the physical and the cultural, osteological analysis also must deal with how these bodies acted and interacted in their worlds. In particular, children are a special subset of society and are subject to specific rules and institutions, practices and disciplines, that mold how environments affect them and how they, in turn, affect their environments. Traditional analyses of subadult remains have primarily focused on children as a litmus test of a failing or compromised society (see, for instance, case studies in Steckel and Rose 2002). Subadult remains are not usually valued for their interpretative potential, and especially for life history analyses, which sees their lives as truncated or failed. And yet, as Baxter wrote, we know that children are often highly valued in society, even if they do not live to become adults (2005). And so we must reconcile the short lives represented by subadult remains with the important roles they were likely to play in their societies. In particular, we must consider how these children interacted with and influenced society around them.

The question of how much we are able to influence our worlds and our sociality has been raised by a handful of theorists. In discussing the *habitus*, Bourdieu by necessity discusses the structures of society and our ability to affect them. He argues that neither should we assume that practice is a “mechanical reaction,” nor should we accept that we are entirely conscious and deliberate in our actions (Bourdieu 1972: 73). Bourdieu instead notes that there may indeed be moments when, perhaps semi-consciously, actors can chose to change the nature of the *habitus*, but that even those choices are “defined first in relation to a system of objective potentialities,” (Bourdieu 1972: 76). The relationships that we have are, at every level, determined by the *habitus*, which brings to bear the full history and cultural language in interactions (Bourdieu 1972: 81).

Giddens writes about the realities for actors within these structures. He argues that “…actors…maintain a continuing ‘theoretical understanding’ of the grounds of their activity,” (Giddens 1979: 5). He writes that actors can be reflexive and explain their actions, though they may not be able to explain their motivations (Giddens 1979: 5-7). Giddens (1979:9) defines agency this way: “Agency refers not to the intentions people have in doing things but to their capability of doing those things in the first place….Agency concerns events of which an individual is the perpetrator, in the sense that the individual could, at any phase in a given sequence of conduct, have acted differently.” The structures, the social rules of society, Giddens reminds us, are not to be seen as purely constraining but also *enabling* (Giddens 1979:25). The body is physically affected by structures and the self exists within these structures (Giddens 1979: 36). I argue that the physical remains of individuals can only be understood within the structures of their lived social contexts. Agency lies within the choices the individuals make given their contextual structures. The physical bodies of individuals reflect these choices.

This world into which children are born is a social world, composed of webs of social relationships that both constrain children and permit them a certain amount of agency (Ortner 2006: 151). Bourdieu's *habitus* and Giddens's structuration allow us to understand how these social relations are created, reproduced, acknowledged, and even transgressed. Ortner adds to this a discussion of power within social relations. She writes that "Whatever 'agency' they seem to 'have' as individuals is in reality something that is always in fact interactively negotiated," through webs of social relations and power (Ortner 2006: 151). The companion to power is resistance, and Ortner (2006: 7) writes that "…social reproduction is never total, always imperfect, and vulnerable to the pressures and instabilities inherent in any situation of unequal power." While this concept has been applied to specific social classes and other groups, I argue that it is also a useful framework for understanding children as a special subset of individuals who are wholly enmeshed in power relations. As the recipients of those social structures, children have the potential to affect social reproduction. Bourdieu (1972) and Giddens (1979) acknowledge that children's learning, their mimicry and education, is one of the important sites where the *habitus* is passed down and also holds the potential for modification.

The archaeological record does provide evidence that children, consciously or not, affected social reproduction of the *habitus* within these types of structures. The archaeology of childhood makes clear how we can recognize some of this evidence of agency. By focusing on what children produce and consume, how they interact with sites and structures, and with whom they engage, the archaeology of childhood focuses in on children's agency within their structuring societies.

The archaeology of childhood recognizes children as actors and producers and as gendered individuals. Few attempts, however, have been made to combine this theoretical and methodological project with bioarchaeological analysis (Perry 2006; Halcrow and Tayles 2008; see also Thomson et al 2014). This is unfortunate, as Kamp writes, because "…any description of a society that excludes children will not just be inadequate, but fundamentally flawed,' (Kamp 2010:1). It is my argument that biological analyses are a key component of this description of society, and particularly for understanding the world of the Spring Street Presbyterian Church and its congregants. What were the roles of children, of mothers, of families? Were children blank slates to be molded or spirits to be tamed? Were they laborers and/or missionaries? Did they determine the shape of their childhoods or were they constrained by ideology into set roles? While skeletal remains cannot address all of these questions, they can provide information for many of them.

One way of addressing those questions is examining the children in relationship to the structures with which they interacted. The world of the children of the Spring Street Presbyterian Church congregation can be conceptualized as rings of structures, specifically relationships with different environments and individuals. These rings include mothers and caregivers; institutions, including the church; and the larger city (Figure 1.1).

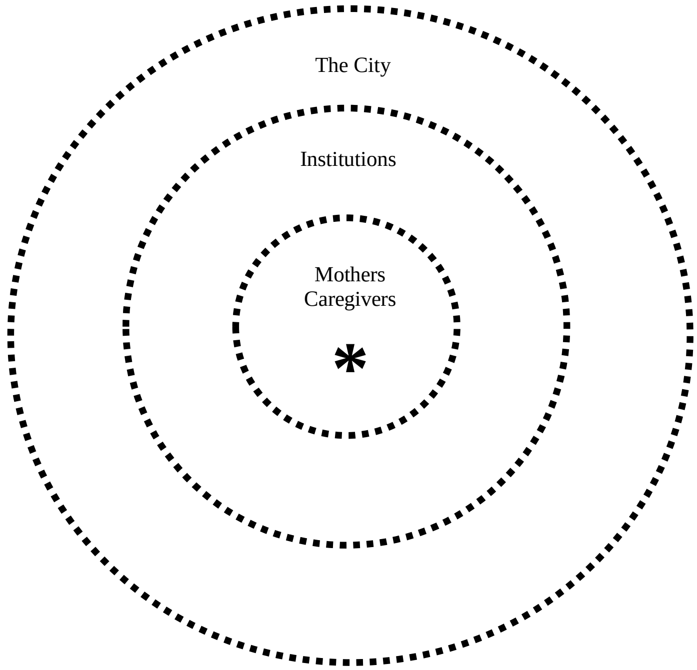

Figure 1.1: Rings of Structure in Children's lives

Such a model is of course an imperfect representation of the world of the children buried at the Spring Street Presbyterian Church. Yet it offers one way for us to understand major influences in the lives of the children. The porous borders in this model represent the fact that many of the interactions with which children were engaged were fluid and related to more than one structuring force. By using this model, this dissertation is able to examine three central questions:

1) What was the experience of life for the children buried in the vaults at Spring Street?

2) How did those experiences change as the children grew older?

3) How were those experiences formed by the structures with which the children interacted?

These questions are explored through the intersection of skeletal analysis and archival analysis, and are set against the backdrop of the dramatic change taking place in the first half of the 19th century in New York City.

The Dissertation Structure

In order to address these questions and begin to develop a social bioarchaeology of the children's remains, this dissertation takes a somewhat unusual approach to the data. Unlike a traditional dissertation layout, this project does not separate the history and the results of the skeletal analysis. Instead, it combines skeletal data, historical and archival research, as well as theory and presents a narrative of life for *each age group*, inspired by the work of Roberta Gilchrist on the medieval body (2012). One thing missing from many analyses of childhood is an understanding that "childhood" is not a monolithic period of time. A one year old, a five year old, and a thirteen year old are all at very different stages of life, with different agencies, behaviors, and expectations. And yet still bioarchaeologists often present data on childhood as if it represents a single grouping, or present data on only a single age group and not the range encompassed by childhood.

In *The Bioarchaeology of Childhood*, Lewis offers a standard way of discussing age groupings for researchers. She proposes a series of age designations, breaking down neonates and infants into specific categories, for instance. However, child is defined as 1-14.5 years and subadult as up to 17 years (Lewis 2007: 2). Lewis writes that further defining stages in childhood based on biology is a problem: "No matter what period we are examining, childhood is more than a biological age, but a series of social and cultural events that make up a child's life," (Lewis 2007: 4). She cautions against assuming, for instance, that a period of infancy was universal in the past and instead employs the broad terms above.

Lewis is right to urge caution and provide standard terminology that allows for comparisons across sites. However, her broad categories are also limiting. The analysis of subadult bone provides fairly narrow age ranges, sometimes within a single year, other times within a span of a few years. And so it is possible to talk about groups of children within that 1-17 year range meaningfully. But that does not resolve the issue of recognizing that biological age is not equivalent necessarily to a social construct of age. Joanna Sofaer discusses this and offers three distinct types of ages: biological, or physiological, age, which refers to the physical changes of the body from growth through senescence; chronological age, which refers to time passed in years, days, months, etc.; and social or cultural age, which refers to an culturally constructed expectations of behavior and relationships (Sofaer 2006: 119; Sofaer 2011: 286-287). Sofaer then argues that "…age cannot be understood as entirely culturally constructed since it is expressed through the physical changes of the body. Nor can it be entirely biologically understood since it has social meaning and is a basic structure of society," (Sofaer 2006: 121). Age, in other words, is an embodied experience, drawing from our biology, cultural practices, and social relationships. From there, Sofaer, as Lewis does, points out that any attempt to categorize "children" or subsets of children using social terms but based on biological aging is artificial, as age represents a process rather than fixed moments of time on a measurable scale (Sofaer 2011: 127).

Archaeologists Mike Lally and Traci Ardren also caution that osteoarchaeology in particular runs the danger of privileging biological data to determine age categories. They note that "Arbitrary definitions of infancy, particular those that rely on *biological* language and justifications, severely limit the progress of the archaeology of death, which must instead look to the social sciences, to anthropology and ethnography, to rethink infancy and local definitions of the infant," (2009: 74). I would argue that in bioarchaeological cases, we can also turn to history. Historical cases hold the potential to go beyond broad groupings, and documentary evidence can aid in understanding the "social and cultural events that make up a child's life" in a particular time and place. As Lally and Ardren emphasize, a local and contextual understanding is the key to this kind of analysis. In an in-depth, highly contextual study such as this one, it is possible to group children meaningfully if information about social age is available. I argue that while Lewis's point that standard terminology for the field based in biological age is indeed important, equally important is understanding the life histories of the individuals at the church, and understanding what age meant for this particular community. Fortunately, the church created categories for different ages and charged different burial prices for them. These groupings very closely align with the clustering of the skeletal data. The following table shows the church's categorization of age as compared to the skeletal data. The age ranges from the skeletal data very closely align, and those ranges and the category titles I have assigned them are what are used in this dissertation.

Table 1.1: Age Designations

Age and Price, Spring Street Presbyterian Church May 25th, 1831	**Age from Skeletal Data**	**Group Titles in this Dissertation**
Adults ($10)	15 and above	Adults
Children under 1 ($2.00)	Birth-1.5 years of age	Infants
Children ages 1-2 ($3.00)	1.5-2.5 years of age	Toddlers
Children ages 2-5 ($3.50)	2.5-4.5 years of age	Younger Children
Children ages 5-10 ($5.00)	4.5-9.5 years of age	Older Children
Children ages 10-15 ($7.00)	9.5-14.5 years of age	----

Adapted from Meade 2007: 11-9 and Urcid and Byrd 1995

These categories represent not just price designations for burials from the church, but socially recognized groups in historic documents, as evidenced from historic records discussed in this dissertation. Because of that, the final group, what we might typically today refer to as teenagers, has no designation, as there was no term for this transitional group, some of whom were still within the realm of childhood, and others of whom were leading adult lives.

Figure 1.2: Seriated Frontals of Subadults from Vault IV

Given this division of the data, the dissertation proceeds from here to examine a series of skeletal markers across all of these age groups, comparing and highlighting continuities, changes, and trends, and comparing that information against available historical documentation. The chapters in this dissertation first layout the background for this analysis. Chapter 2 sets the scene for the church by examining the historical setting of the congregation. New York City was in a transitional phase at the beginning of the 19th century, with rapid urbanization affecting both the environment of the city and the people who inhabited it. This chapter examines the economy, the physical landscape, and the people of the city. It then discusses the neighborhood of the church and the ideology and practices of the church itself.

Chapter 3 discusses the methodological approach to the skeletal analysis. The process of creating biological profiles from both complete individuals and commingled remains is discussed. Then, each of the health conditions explored in this dissertation are explained. Chapter 3 also discusses the historical and archival sources for this project. Finally, information on a few comparative sites for the Spring Street Presbyterian Church are presented.

Chapter 4 examines the subadult population as a whole. This includes examining the historical data for childhood mortality, the census data for the neighborhood, and the information recorded on the coffin plates found in the vaults. The skeletal data is then presented by find location. Finally, the skeletal data is broken down into age distributions, which is utilized throughout the rest of the dissertation.

Chapter 5 examines the data from the infants, the largest grouping of subadult bone. It does this set against the backdrop of historical information about the home and family. These are the institutions to which infants were most likely connected. The historical data and skeletal data are then combined to discuss what life was like for this group of infants that did not survive.

Chapter 6 discusses the second largest grouping of subadults, the toddlers and younger children. The data from these remains is situated in the growing exposure of those bodies through infant schools and other educational practices. Changing health patterns are documented, and a discussion of life for toddlers and younger children is presented.

Chapter 7 examines the data from the older children. The skeletal data is presented alongside a discussion of labor and health in the historical record. The growing diversity in bodies is noted to illustrate how conditions change as children age and their types of exposure diversify.

Chapter 8 discusses the last age group, those between 9.5 and 14.5, the smallest grouping. These individuals are also the most diverse historically, with evidence suggesting that at the time some would have been treated as adults and others as children. This historical discussion is incorporated into the analysis of the few skeletal elements present in the collection.

Chapter 9 then concludes the dissertation by re-integrating this data to identify trends between age groups and compare out to other sites. It also raises new questions for future research as they have emerged from the data, including what we can perhaps learn about incipient class development in the city at this time.

The chapters flesh out the lived experiences of childhood for these 75 children that did not survive by combing all of the evidence from the skeletal remains and the historical record. In doing so, we learn not only what it might have been like to grow up in this congregation, but also about how specific forces in one place and time mold human experience. In what follows, this dissertation attempts to honor the agency and life histories of the children who died and were interred in the vaults of the Spring Street Presbyterian Church. The approach taken here is not perfect; among other things, it privileges skeletal elements that provide age designations over those that cannot be assigned a precise age; it only focuses on the children who died rather than more broadly on the whole collection; and it does not fully engage with comparative sites and collections. As a microhistory of a group of a small group of people, it runs the risk of having a very narrow focus. Yet as Clifford Geertz reminds us, good anthropology, while addressing large and broad questions, is by necessity “microscopic,” (2000:21). And so this analysis, beyond introducing children and childhood in the congregation, also lays a foundation for future, broader projects, which first require a detailed understanding of the population and of the historic factors related to this group.

In choosing to focus on a social bioarchaeology of childhood that recognizes the embodied nature of social experience, this dissertation asks that we consider childhood to be understandable through biological processes, and recognize that skeletal analysis can contribute to historical understandings of lived experience. By weaving together historical records and the skeletons themselves, the dissertation argues that a microhistory of one group of people—75 children buried in church vaults—can tell us much about the world in which they lived.

Chapter 2: A Sketch of a City

Rest assured that you are in a far more comfortable spot among the mountains than you would be in the sultry heat of this City.

--Rev. Ludlow to his mother, August 30, 1828

Introduction

The narrative that will unfold in this dissertation is intricately connected to the history of the church and the city of New York. Historical detail will be woven throughout the text, but some broad background for the development of the church and the city is presented here. Primary sources, including information from the Rev. Ludlow, are included to help ground the historical data in lived experiences. In order to understand how the bodies of the children interacted with their sociocultural environment, that environment must be understood.

At the turn of the 19^{th} century, New York City had changed from a one mile by one and a half mile walking city to an industrial and residential complex. The population tripled in size twice in the first half of the 19^{th} century and expanded out into what had previously been the countryside (Wall 1994: 42-49; Cantwell and Wall 2001:188). This change was mirrored on the human scale, with immigrants, freed African Americans, and native New Yorkers working, competing, and living side by side in what was no longer farmland but an urban port complex on the brink of industrialization.

New York City during this time became an important site for what has been called "the market revolution" by historian Charles Sellers (1994). This revolution saw older systems of farming, apprenticeships, family and household labor, and community organization give way to a market-driven system focused on cheap labor and unskilled workers (Sellers 1994). With the changing market economy, homes and workplaces became increasingly separated. The separation of those who could afford to live away from work from those who could not contributed to the development of recognizable differences in neighborhoods, households, and the built environment within which people negotiated their daily lives (Wall 1994: 42-51).

These remarkable changes in the size of the city, the economy, and even the people living in the city filtered down into every aspect of life: what food was available for purchase and from where it could be purchased; who shared a home and constituted a family; how people were drawn together into communities; and how individuals perceived the world around them and made sense of their lives. In order to understand these affects on the people of the city, and particularly the congregation at the Spring Street Presbyterian Church, we turn first to the city itself, the overarching structuring institution of the lives of those within it.

A Sketch of the City

The Economy

The economy of New York City grew with the market revolution, and fed off of a network of importing and exporting. Part of this growth was driven by the southern cotton boom. That business helped to position New York as a major port city. As manufacturing grew and the ports expanded, workers moved in from the hinterland to New York and other port cities, taking both production and port jobs in the emerging labor economy. Between 1794 and 1795 alone, an estimated 20,000 people migrated south through Albany towards the city (Burrows and Wallace 1999: 334). Initially, Philadelphia and Baltimore had an advantage over New York City, as they were closer to transportation routes to the growing West (Sellers 1991: 42). But New York responded to such competition by making use of its waterways and, in 1825, constructing the Erie Canal (Sellers 1991: 40-43). The canal system expanded New York City's potential for importing goods and then redistributing them across the state and country.

This advantage allowed the state to develop a monopoly on the importing and exporting market: "In 1830, 36 percent of the import/export trade of the U.S. passed through the port of New York, and by 1850 the percentage almost doubled to 71 percent," (Domosh 1990: 270). These numbers were due, at least in part, to the city's control of the cotton market, and hence ties to Britain as a source of capital (Domosh 1990: 270). Previously, the British had built a strong relationship with the city when it was selected as the site for British surplus goods to enter the United States after the 1812 embargos (Domosh 1990: 269). The dependence on the southern cotton economy, however, would contribute to abolition and anti-abolition tensions in the early 19th century, as the city's merchants would be challenged by a radical racial ideology and activist communities. In fact, some abolition groups even went so far as to boycott products, including cotton, which were produced using slave labor (Faulkner 2007).

The city emerged as a business center, with a growing population of dry goods and specialty stores, a new restaurant industry, retail outlets, and investment firms and banks (Burrows and Wallace 1999:437). These businesses created a demand for more "early white-collar workers," including clerks, bookkeepers, copiers, and salesmen (Burrows and Wallace 1999:437). Industries relied heavily on importing goods or exporting raw materials, and Pearl Street became the hub of this commercial enterprise. Hand in hand with this type of business was the boom in industrial work, including ship building facilities in the lower East River, and smaller goods production, such as furniture, apparel, and shoes, all of which helped supply the commercial stores (Burrows and Wallace 1999: 441-443). The credit and banking industries flourished and by 1825 there were 23 banks in the city (Burrows and Wallace 1999:444). Finally, the market revolution also expanded the interest in real estate, and the wealthy populations and organizations began to rent out parcels and sell them for large profits (Burrows and Wallace

1999: 447). One such corporation was the Trinity Church Corporation, which sold land to the Spring Street Presbyterian Church.

The People

New York City in the early 19th century was a burgeoning market economy tied to the South via cotton, to England and Europe via imports and exports, and to upstate New York via farm goods. Because of this, the city attracted workers from the rural countryside, the south, and overseas. “After the completion of the Erie Canal in 1825, Europeans began to realize America’s need of labor for its public works and industrial plants. Ship captains brought glowing chances of advancement….Contractors sent their agents to Europe to recruit cheap labor,” (Ernst 1994: 1-2). Although the numbers of foreigners entering New York City are unreliable up until the founding of the immigration commission in 1847 (Duffy 1968: 515), historians Burrows and Wallace estimate that between 1820 and 1832, at least 32,000 immigrants came through New York City, with that number doubling five years later (Burrows and Wallace 1999: 434). Historian and public health expert John Duffy places that number even higher, estimating that between 1820 and 1830, around 92,884 immigrants came through New York, and that between 1830 and 1840 that number jumped to 407,716 (Duffy 1968: 273). Whichever set of numbers is more accurate, the reality is that a great number of people, as well as a great number of goods, were passing through the port city of New York. The primary immigrants in the first half of the 19th century were Irish and German natives, and they would become a true immigrant force in the city by the late 1840s (Duffy 1968; Ernst 1994).

For immigrants coming into the city from abroad, arrival in New York meant being held at the Quarantine Station (located at various places over the years), and, if the immigrants were sick, possible forced hospitalization at a pest house, hospital, or private almshouse, with little food or water and poor care (Duffy 1968: 337). Since immigrants often came to the city already poor and ill and then found themselves in a corrupt care system, it is not surprising that many succumbed early on. “In 1843 City Inspector William A. Walters estimated that although the foreign-born constituted only about 20 to 30 per cent of the population, they accounted for more than 50 per cent of the adult deaths,” (Duffy 1968: 516).

Despite this high mortality rate, the lure of work and opportunity as well as political instability at home kept immigrants coming to the US, and primarily to New York City. There they mingled with a native population that was increasingly diversifying; rural migrants, free African Americans, and an emerging middle class all intersected around the ports and industry of the city. When times were hard, such as during the panic of 1819, this meant jobs disappeared and the numbers of poor multiplied. In 1820, New York City had almost 30,000 public paupers as the economy struggled to recover from the bank failure (Sellers 1991: 137). Labor groups organized, and strike actions became common. Between 1820 and 1830, stonecutters, dock workers, tailoresses, millers, ship carpenters, tailors, and weavers went on strike (Sellers 1991: 285; Reitano 2006). Historian Reitano argues that this tumult was to be expected because, during the first forty years of the 19th century, too much change was happening too quickly (Reitano 2006: 32).

Besides immigrants, African Americans made up a large portion of the working class and poor population of the city. The end to slavery and the beginning of the free African American population in New York started in the 1790s, and the pace of emancipation picked up in the early 1800s. An 1807 law passed by the United States banned the slave trade between the United States and Africa, making this an optimistic time for African Americans in New York City (Harris 2003: 89, 92). In New York emancipation was happening in stages, and free African

Americans even had the right to vote (Harris 2003: 92-93). Yet Alexander notes that this was a time of struggle as well: poverty rates were high and the War of 1812 put the entire city's populace under stress (Alexander 2008: 8-11; Janowitz and Dallal 2013:206). Many of the jobs previously available to African American workers began to disappear. While most free African Americans before emancipation in 1827 worked low paying jobs, those slaves that were skilled artisans and craftsmen were unable to find work after emancipation (Harris 2003: 80). African American women found themselves working most often as domestic servants, and African American men found themselves, among other places, working the docks and on the ships (Harris 2003: 80). Even the large immigrant population did not support the African American community; "rather, they viewed blacks as unfair competition working for lower wages," (Gronowicz 1998: 18).

Also in the city was the growing middle class, those who benefited from the emerging market economy and could afford to move away from the sites of labor and into the edges of the sprawling city. This was the time when traditional divides between elite and poor were being bridged. The new middle class was attempting to straddle this divide. Burrows and Wallace refer to this as the "embryonic middle class" that included "shopkeepers, small master craftsmen, clerks, salesmen, bookkeepers, and bank tellers—who embraced evangelicalism as a way to dissociate themselves from both the dissolute poor and the idle rich," (1999: 530). Sellers refers to this as the "middle class revolution," pinpointing the market and changes in family structure as the origins of a new class designation (1994: 242). Just behind them were the working class, the laborers who were slowly banning together to fight the realities of a market system that no longer privileged apprenticeships and skilled labor (Sellers 1994; Gronowicz 1998). By the 1850s, unskilled and semiskilled, often uneducated, and in many cases foreign-born workers comprised the majority of the workforce of the city (Gronowicz 1998: 93).

The Physical Environment

With these movements of people, the physical landscape of the city itself was changing. The city government worked to plan expansion, and what had once been a city of artisans and craftsmen living above their shops became a city that divided residence and work. This change in living and working structure affected all aspects of the city, including family life, neighborhood composition, and the layout of the city as a whole. New wharves were built to accommodate the increasing dock traffic, 13 markets flourished, and expansion northward pushed the Common Council to plan new streets and waterways (Sellers 1991: 447; Duffy 1968: 420). In the poorer wards such as the Sixth Ward, this time period saw the advent of tenement housing, with its characteristic cramped quarters, poor ventilation and sanitation, and disease epidemics.

In the city proper, butchers, fishmongers, tanneries, hatters, and dyers were constantly challenged by the middling class for their habits of dumping waste from their work in open sewers and canals and fouling the streets (Common Council 1931). The streets themselves were contentious: the city or various private firms were contracted to sweep the streets regularly—around twice a week—collect manure and trash, and flush the sewers and drains. Corruption in the street cleaning business kept this from happening as promised, as the collection and sale of manure was profitable, while the hard work of cleaning the streets and collecting the trash was not. Main streets were more often cleaned once every other week and side streets not at all; this means that left behind were dead animals, human waste, and trash from both businesses and homes. In addition, there were huge numbers of live pigs—an estimated 10,000 in 1842— that roamed the streets eating refuse (Duffy 1968: 191, 385). In a similar vein, despite attempts by the city to keep the wharves and slips clean, they became dumping grounds for waste and the bodies of animals, including large numbers of horse carcasses (Duffy 1968: 379). Visitors and residents alike noted the smell of the streets was overwhelming, and citizens were, unsurprisingly, not pleased.

As the gap between the rich and the poor grew, so too did the gap between those who could afford to speak out about such issues. It is worth noting that some in the Spring Street Presbyterian Church neighborhood complained in 1828 about the lack of availability of fresh water and petitioned for a new well; the complaint was passed off to the Street Commissioner and it is unclear if it was actually addressed (Common Council 1931: 233). Fresh water was a constant issue, as the dumping of waste polluted underground sources and canals, and the effort to bring clean water into the city was derailed by corrupt corporations more interested in banking and profits than potable water (Duffy 1968).

Major sanitation issues cropped up with the increasing population, and disease epidemics became a familiar part of life. Outbreaks of yellow fever confronted the city in 1805, 1819, and 1822, followed by cholera outbreaks in 1832 and 1834 (Duffy 1968: 101, 283; Werner and Novak 2010: 102). In addition, smallpox outbreaks occurred in 1824, 1834, and 1835, taking significant numbers of lives (Werner and Novak 2010: 102). Scarlet fever was rampant too, and increased between the years of 1840 and 1870 (Codran 1995: 34-35). The city dealt with these epidemics by enforcing wide scale evacuations, cleaning and sanitation measures, and quarantines (Duffy 1968). The Rev. Ludlow writes about one of these outbreaks on January 18th, 1832. To his mother Phoebe he writes about the latest scarlet fever outbreak:

> Our city is still [word unclear] with scarlet fever. Our dear friend Rev Dr Cox buried in our graves four coffins.[4] Alexander Jackson (Mr. Dr. Ward's brother) and 3 children died in about 3 weeks. This influence has been very general + very fatal (Ludlow 1832a).

Medicine at the time was still in its early professional stages in New York City, although the profession was growing. In 1825 there were some 430 physicians in the city of various standards of training (Duffy 1968: 257). Doctors were present, but only the middling and upper classes could afford regular medical care, and even then people often preferred home care to the hospital. Hospitals tended to be places where individuals went when they were contagious, poor, or beyond help; they were seen as a place to die (Duffy 1968).

Given the state of medicine in the city, home remedies and treatment by lay persons were common. The ministers seemed to share a general concern for the health of their congregants, and the continuing blending of morality and medicine are evidenced in their activities. On March 6th of 1833, the Rev. Ludlow wrote to his mother of visiting Mrs. Linderman, who the Rev. Ludlow notes had been bed-ridden for three weeks with a broken leg. He traveled to see her with a Dr. Cox (it is unclear if this is the Reverend Samuel Cox, although the Rev. Ludlow usually refers to him in his letters as the Rev. Dr. Cox), who went to set her leg. He described the procedure as thus:

> The modern method is to make a frame to put under the leg, from the heel to the hip, with a joint at the knee. This is stuffed with cotton upon which her limb reposes. Two pieces are then applied, shaped to the leg, one on each side from the knee to the heel. The foot is supported by a small board attached to the first piece. Around the board bandages are tied. The thing marked a [in an accompanying sketch of the leg] is a hook which of course is unhooked when she wishes to straighten her limb. (Ludlow 1833 2-3).

[4] By this time, the Rev. Cox had left to run the Laight Street Church. However, his mother-in-law was buried in the Spring Street vaults, and there are no records of the Laight Street Church having burial vaults or a cemetery, so it is not surprising that he would bury other family members back at Spring Street.

The pastor who followed the Rev. Ludlow was the Rev. William Patton, from whom little documentation remains. However, he noted at one point in *Old Diary, 1843,* which was written in the back of the *Records of the Pastoral Library*, that in 1843 he "visited Mr. Dervetts family – gave medicine to all of the children," (Jan 20th, 1844).

A Sketch of the Corner of Spring and Varick Streets

So many of the people of this city remain unknown to us. They were not wealthy enough or influential enough to be included in the public histories of the city, nor were they poor enough to be recorded by reform groups who set out to save them. Instead, they were the ephemeral building blocks of the city. The people whose bodies were buried in the vaults of the Spring Street Presbyterian Church are just a few with "hidden histories," and their study offers us an opportunity to correct and amend some of the historical narrative. Yet to understand these individuals and their corporeal remains, it is important to be aware of the basic structure of their world, especially the immediate environment within which they conducted daily life.

The Eighth Ward

At the end of the Revolutionary war in 1783, the Eighth Ward was still farm land (Homberger 2005: 60). North of what was known at the time as the West Ward, it held freshwater ponds, rivers, and only a few main thoroughfares (Homberger 2005: 60). "When they started the little church at Spring and Varick Streets, the place was in leafy isolation from the city, population 90,000 to the south," (1963). But the city was expanding rapidly, and in the next 20 years the ward became much more urban. Neighborhoods were quite variable during this time, and evidence from archival records suggests that the congregation of the Spring Street Presbyterian Church was local to the Eighth Ward with little movement of people between wards for worship.

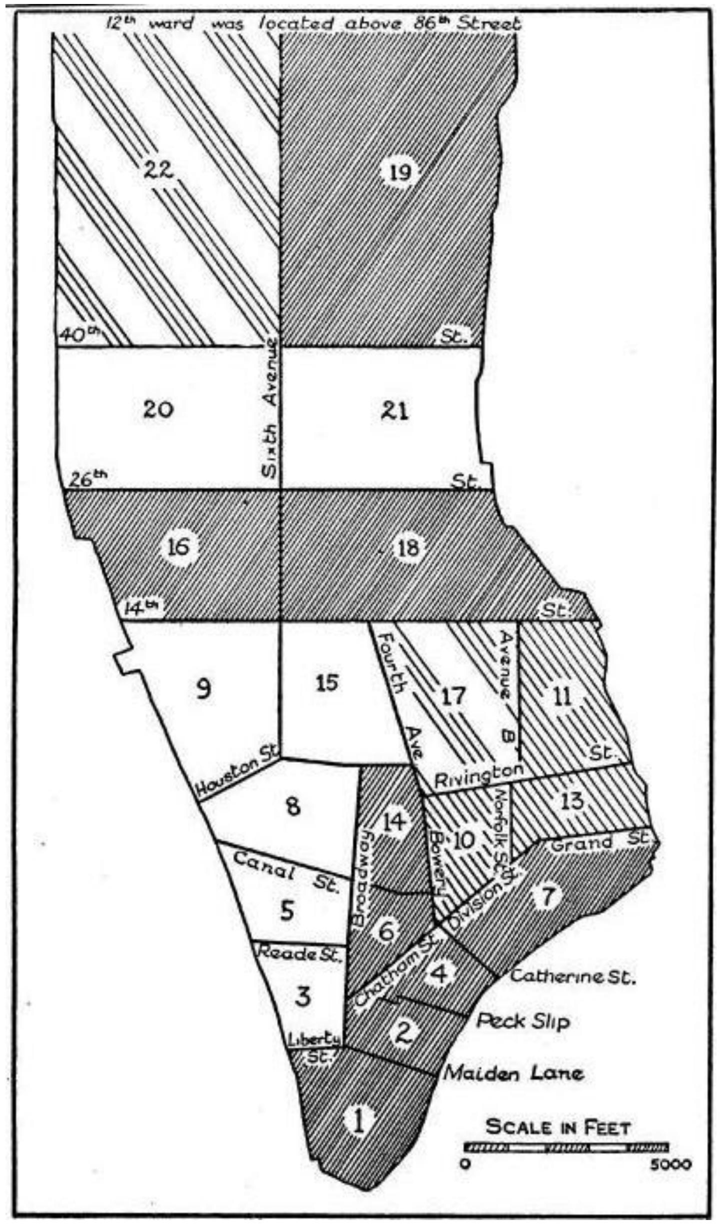

Figure 2.1: Population Density of the Wards
of New York City in the 19th Century.
Used with permission from Wendell Cox Consultancy

A real estate assessment from 1833 put the ward in the working and middle class range, with wealth for the Eighth Ward set at $6,918,676. In comparison, the First Ward at the tip of the island had an assessment of $22, 531, 600, the Sixth Ward, the location of Five Points, had an estimated value of $5,613,250, and the 13th Ward along East River had an assessment of $2, 315, 300 (Homberger 2005: 81). In 1834, moreover, the Eighth Ward voted Whig in the Mayoral elections, which was consistent with middle class values at the time (Homberger 2005: 80). On the southern border of the Eighth Ward was the Fifth Ward, an area that was slightly poorer than the Eighth and saw higher rates of prostitution (Homberger 2005:85). As the city gentrified and middle class families moved further north, the Fifth Ward, Sixth Ward, and the Eighth Wards became home to the largest of African American populations. In turn, these wards became more urban (Ernst 1994: 41).

What this means is that the Eighth Ward, during the time of the vaults, went from farm land slowly being incorporated into urban street planning, to a middle-class neighborhood, to a more urban, mixed-class neighborhood (see Figure 2.2). The northern parts of the Eighth Ward incorporated Greenwich Village, known as a quiet residential area at the time and a location to which individuals fled during the disease epidemic evacuations during the first part of the 19th century (Homberger 2005: 134). And yet, the eastern portions of the ward had several blocks of known prostitution, and the southern and eastern edges bordered those communities that had lower incomes and higher rates of tenements (Homberger 2005: 85). The Eighth Ward, then, was at the cross section of middle-class and working-class realities, incorporating elements of wealth and poverty and individuals from diverse aspects of New York City life.

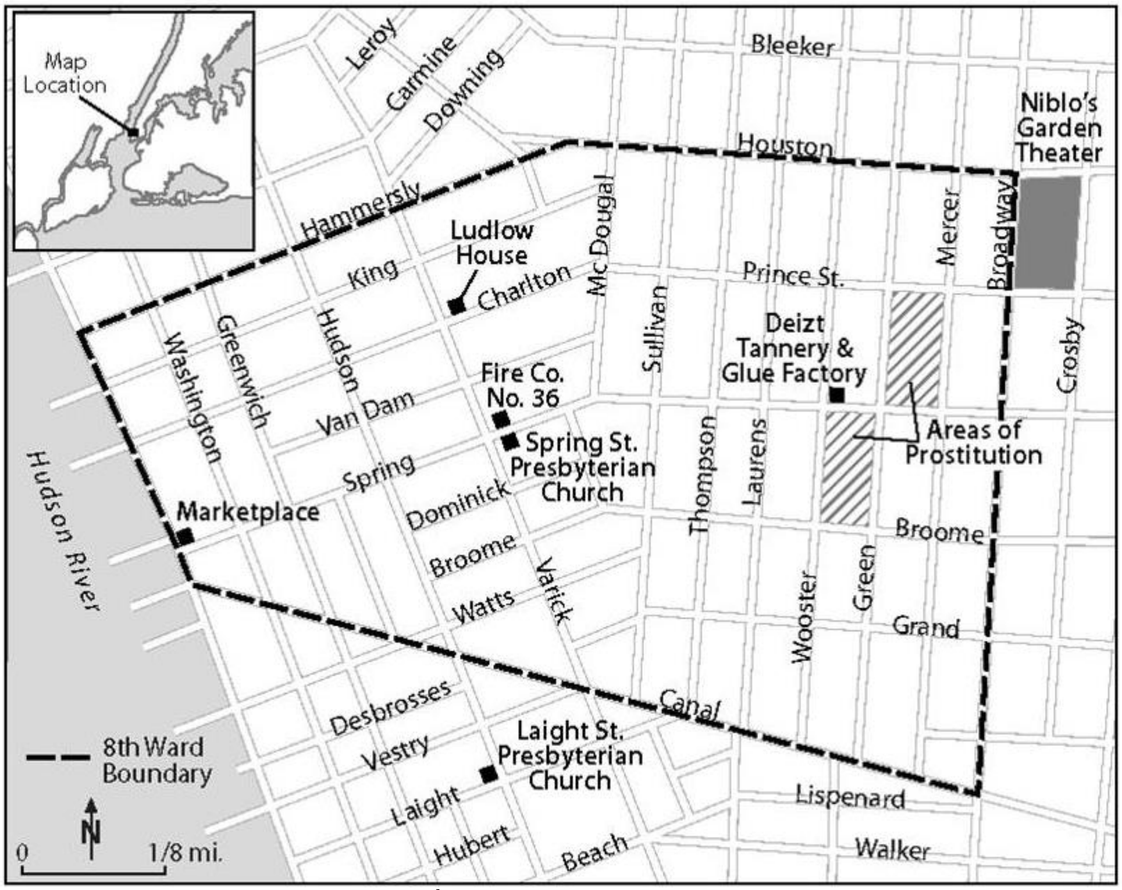

Figure 2.2: The 8th Ward of New York City, 1811-1846
Image courtesy of Joseph Stoll

Starting at the west end of Spring Street were the docks. The docks factor in three ways to the environment of the church: first, as a site of potential transportation and employment. In the Minutes of the Meetings of the Common Council of New York City 1783-1831 (Common Council 1931), residents of Spring Street were asking to have the ferry that docked a few blocks north moved to the slips at Spring Street. Whether that issue was ever resolved is not clear, but the docks would have offered water access to other parts of the city as well as employment unloading goods. We know that one member of the congregation, buried in the vaults, was Mary Sturges, the mother-in-law of Captain Nathaniel Jarvis, a shipmaster (White and Mooney 2010:51). Also buried in the vaults is J.W. Root, the son of James Root, a fur merchant (White and Mooney 2010: 50). This movement also would have allowed for proselytizing, something with which we know the church was involved. The Reverends were among those distributing pamphlets and Bibles to "save" the poor. Among those buried in the vaults is Sarah Ogden Hubbard, whose husband, Luther Hubbard, was an agent of the New York Marine Bible Society (White and Mooney 2010: 50-52).

The docks also contributed to the presence of a market. The Spring Street market was in existence from at least 1810 (Common Council 1931) until it was closed and sold off in 1829 (Common Council 1931). The market, at a minimum, contained butchers and fishmongers, and likely had other food sellers present (Common Council 1931). The docks and the market were just three blocks west of the church. We know from the Rev. Ludlow's papers that at times he purchased food in the city and sent it to family members who lived elsewhere, perhaps because, as a port city, some goods were less expensive. For instance, on June 25th, 1825, he writes to his sister Caroline that he has sent to her and their mother, at this point a widow,

> …50lbs of Coffee and 50lbs of Sugar both good on [word illegible]. For the Coffee I pay on 14 cents—for the sugar 10—both of which please to Credit on my acct for interest due on the great loan never to be paid (1).

The low cost of the coffee and sugar is particularly interesting, given a travel log from 1830 that lists oranges at $0.50 and a cigar as $0.37 ½.[5] And so the presence of a dock close by, and the fact that New York was a port city, means that residents had inexpensive access to goods that others did not.[6]

Finally, the market and docks also played a role in the health and sanitation of the area. As mentioned earlier, the docks were dumping locations for trash, animal carcasses, and waste.

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[5] This travel log is discussed further in Chapter 5.

[6] It is also curious to note that the Rev. Ludlow writes specifically about sugar, as this was often a product of slave labor and is a good that was sometimes boycotted by abolitionists.

Given the church's proximity to the docks on Spring Street, it is likely that the smell of the docks would have been noticeable. Additionally, the presence of a market at the docks with fishmongers and butchers as well as other venders and traders would have contributed to the accumulation of waste and the smell, or "miasmas." At the time, these smells were believed to be the origin of disease and epidemics. The docks played a role in the health of the community, as it has been recognized by economic historians that access to transportation and proximity to waterways increased disease and mortality rates (Haines et al 2003: 408). Economic historians argue that those who were able to remain in a single location and work in a rural environment fared better in the new capitalist economy, while those who migrated, traveled, and lived in urban environments, particularly around water, failed to achieve full stature, were more vulnerable to disease, and had higher rates of infant mortality (Haines et al 2003). This speaks to the area and population of the Eighth Ward.

Directly across the street from the church was Fire Company Number 36, founded in 1810 (Common Council 1931; see also Werner and Novak, 2010). An engine house was built at the site and at least one year during the time of the burial vaults the room over the engine house was rented as a school (Common Council 1931). Two blocks north on Varick was the Richmond Hill Garden (Burrows and Wallace 1999; Homberger 2005: 65). Approximately five blocks east along Spring Street were two blocks of "known continuous prostitution" (Homberger 2005: 85). One block further east and one block north of that was Niblo's Garden Theater, an opera house in operation from 1834 through 1896 (Homberger 2005: 87). In 1810, the Meeting Minutes of the Common Council also record a glue factory and tannery as present on Spring Street (Common Council 1931).

Also in the area was, at least for a time, one of the Rev. Ludlow's residences. In an April 1828 letter to his mother, he tries to convince her to come live with him. He notes that he thinks she will like the location of the house he has picked, and draws a little map illustrating its location two blocks from the church on Charlton Street off of Varick (see Figure 2.3).

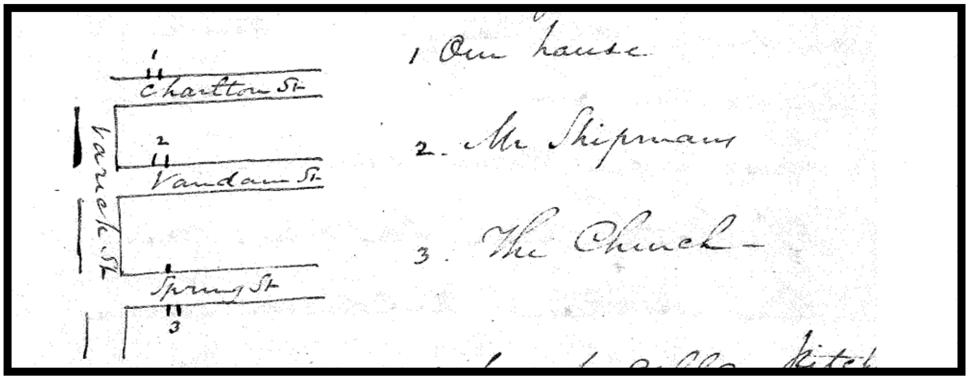

Figure 2.3: Ludlow's Drawing of his Neighborhood, April 21st, 1828

There is an expectation to a certain extent that the church would reflect the demographics of the city. At the same time, neither the city nor the church represents stable biological populations given the constant influx of rural and foreign-born immigrants. Thus the demographics of the church congregation and of those who would be buried in the vaults below are important variables to consider. The initial church, built in 1811, fit 126 pews with 50 additional pews in an upstairs gallery (Meade 2010: 9). All indications are that the congregants of the church lived on Spring Street or in the few blocks surrounding the street and most of them lived within the Eighth Ward or bordering wards. Census data has identified 35 families who attended the church and who lived in the Eighth Ward within a five block radius of the church (Meade 2007: D1-D8). By contrast, only four households have been identified in other wards (Meade 2007: D1-D8). Political factors also indicate the close relationship between neighborhood and church membership. When the Reverend Cox left the church in 1825 to found the new Laight Street Presbyterian Church, the congregation split. The move appears to have happened because the younger part of the congregation wanted to be further downtown (Moment 1886); however, at least part of the reason individuals stayed behind, waiting almost a year for a new pastor and three years for a permanent pastor, was because they did not want to travel five blocks south to the new church located in the Fifth Ward (Moment 1896).[7] This suggests that those who attended the Spring Street Presbyterian Church lived locally within the surrounding neighborhood.

The Meeting Minutes from the Common Council record the names, addresses, and occupations of those who volunteered to be firefighters in the city, and because of that we can see what some of the men who lived on Spring Street did for a living. During the time of the burial vaults, the occupations include butchers, blacksmiths, carpenters, cartmen, grocers, masons, cabinet makers, and accountants (Common Council 1931). These types of occupations put the congregants of the church squarely in the new middling class and the new working class.

Census data can also direct us to the specific parishioners of the Spring Street Presbyterian Church and show us what their households were like. In 1820, Peter Simmons, for example, was a member of the congregation and his home was located on Spring Street. Those cohabitating in the Simmons's household include one free white male under the age of 10, one free white male between the ages of 26 and 45, one free white female between the ages of 10 and 16, and one free white male between the ages of 16 and 26 (Meade 2007: D-1)[8]. The census shows that ten years later, the household would accumulate seven more individuals: a free white male under the age of five, a free white male between 5 and 10 years of age, a free white male

[7] Sources indicate that the Rev. Cox left as congregants wanted to be closer to the downtown area, but the move may have resulted from some ideological differences as well. The Reverends Cox and Ludlow, however, maintained a good relationship.

[8] It is interesting that this household has no adult female present.

between 60 and 70 years, and three free white females between 30 and 40 years of age. While there are multiple possibilities for who these new people could be, the younger individuals could appear to be new births to the family, and the older individuals could be extended family members, or the house could include boarders (Meade 2007: D-1).

On Sullivan Street, two blocks away from the church, was the household of parishioner Jane Simmons. In the 1830 census, her house was occupied by one free colored male between 5 and 10 years of age, a free colored male between 36 and 55 years of age, a free colored female less than 10 years old, and a free colored female between 24 and 36 years of age (Meade 2007: D-1). This nuclear, free African American family attended the same church as Peter Simmons's family. These households illustrate how integrated the neighborhood and the church was in the early part of the century.

A third type of household appears in the census for another parishioner of the Spring Street Presbyterian Church. In the 1820 census, Catharine Arnett is listed as living in the Eighth Ward, although with no exact street address. In her household are two free white males under the age of 10, a free white female between 16 and 26 years of age, a free white female under the age of 10, a free white female between 26 and 45, and a colored individual (no sex or age designation listed) (Meade 2007: D-1). This household is both remarkable for its lack of adult males and for the presence of an African American individual, likely either a servant or a boarder. Two other households have similar patterns of mixed residency: Thomas J. Woodruff's household included a free colored female under the age of 14 living with white individuals, and Daniel H. Wickham's household included a free colored female between 14 and 26 years of age (Meade 2007: D-3 – D-8). The gender and age of these two females suggest they were hired help.

And so this is the neighborhood and these are the congregants of the Spring Street Presbyterian Church. The market revolution and associated changes in labor, family, class, and ideology all shaped the congregants of the church and their activities. What makes the Spring Street Presbyterian Church particularly interesting during this period of time is how it responded to shifting economic and social realities: the church became a politically active abolitionist institution, joined a break-away sect of Presbyterianism, and opened its doors to individuals of multiple classes and races. This congregation seems to be drawing from families, the area, and also the particular mindset of a group of people who could have traveled elsewhere for worship, but chose to stay at this particular church. All of these factors would have influenced the life histories of the children being raised in the congregation. Additionally, the fact that the only burials at the church took place during a narrow window of time (a mere 26 years) allows us to examine a very particular moment in the history of the church and the city.

The Spring Street Presbyterian Church

The Spring Street Presbyterian Church opened its doors for worship in April 1811, four years after two downstate missionaries decided the hinterland of New York City needed its own Presbyterian Church (Moment 1886). This version of the founding of the church was written in *The New York Times* in 1874:

> [The founding of the church dates back to the time when] the present locality of the church was suburban to the City, which lay far to the southward, with not a few green slopes intervening. Hudson street was then the Bloomingdale road, and Canal street the site of a veritable canal and tow-path, crossed by Broadway by a wide bridge. The site of the “Tombs” was then a fish-pond…. [John Morris and John Millers, members of the Wall Street Presbyterian Church] found their way into the northwestern suburbs of the City and into the heart of the “village” as it was then called, at the corner of Spring and Varick streets. At that time there was no house of worship in the vicinity, those of the inhabitants who desired religious privileges being forced to walk a long distance to the eastward (1874).

The congregation first came together in rented rooms and then built a permanent structure that opened in 1811. Archival research indicates that the land for the church was bought from the Trinity Church corporation, and was somehow connected to a woman named Jane who lived on the property and grew and sold fruit from orchards on the land (Meade 2007: II-1). Interestingly, 1810 census data have located two possible candidates for Jane: a white widow, Jane Smith, or a free African-American listed only as Jane (Meade 2007: II-1 – II-2). An 1898 *New York Times* article states that the original congregation of the church was from “the North of Ireland,” but that may be a reference to the later Irish makeup of the neighborhood in the second half of the 19th century, as no other references to a Northern Irish population have been uncovered (1898).

The church’s first permanent pastor, the Rev. Matthew La Rue Perrine, was hired in 1811. While some of his sermons have survived, his impact on the trajectory of the church is not well recorded. It was under the very popular Reverends Samuel H. Cox and Henry G. Ludlow, the second and third permanent pastors of the church, that the congregation grew and adopted radical beliefs. The Rev. Cox was pastor of the Spring Street Church from 1820 until 1825, after which he left with some of the congregation and started the Laight Street Church (Moment 1886). He was a well-known abolitionist with ties to leaders like Arthur and Lewis Tappan and William Lloyd Garrison. After the Rev. Cox left, the Rev. Ludlow began preaching in the church. He officially took over in 1828 and stayed until 1837 (Alexander 1887: 43-46). In a letter to his sister Caroline, the Rev. Ludlow described his congregation as comprised of some 300 souls “most of whom belong to that class of person who cannot afford to purchase or hire a pew in our city churches,” (Frey Family Papers 1828).

During the Rev. Ludlow’s time the congregation grew, the Sunday school program flourished, and the congregation engaged with tract distribution and missionary societies

(Moment 1886). Additionally, along with the Rev. Cox and the Laight Street Church, the congregation joined the radical New School Third Presbytery Synod (Moment 1886: 12-13). It is during the time of the Rev. Cox, the Rev. Ludlow, and the fourth permanent pastor, the Rev. William Patton, that records indicate that the burial vaults were in use. As discussed in Chapter 1, the first mention of the vaults comes in 1820 and the last coffin plate is dated 1846 (Meade 2007; Mooney 2008; White and Mooney 2010: 46).

The church is perhaps best remembered for the damage done to it in the 1834 race riots. The race riots were part of what was called "The Year of Riots," with the city marked by unrest due to election riots, the Stonecutter's riot, and nation-wide rioting over political and economic stress (Reitano 2006: 42-43). The Rev. Ludlow's home was targeted, as was the Spring Street Presbyterian Church, on rumors that the Rev. Ludlow was performing interracial marriages

> …the mob proceeded to Spring street [sic] and attacked Rev. Mr. Ludlow's church, the doors and windows of which they began to batter in….They then recommenced the work of destruction, broke in the doors, shattered the windows to atoms, and entered the Church. In a short time they broke up the interior of it, destroying whatever they could (1834).

After the race riots, the Rev. Ludlow released a disclaimer that was published in multiple newspapers. In the disclaimer, he writes that he never performed or supported interracial marriages (Ludlow 1834a). Amalgamation was a commonly used slur by anti-abolitionists in order to stir up hostility.[9] While the Rev. Ludlow may not have performed interracial marriages, the church certainly welcomed a diverse population, and if he was ministering to interracial families, that may be reflected in the skeletal remains of the vaults. After the attack, a bigger,

[9] Interestingly, however, research by Thomas Hutchings, descendant of congregants of the church, has turned up an interracial marriage among his family members at this time (pers. comm.).

brick church was built, and opened again in 1836, although the debt from the reconstruction haunted the church in its future years (Meade 2007; Meade 2010).

The Ideology

During the first half of the 19th century, the church pushed the boundaries of racial politics by engaging with the major concerns of abolitionists, advocating for an end to segregated seating, offering services of all types to all congregants, and calling for racial equality. One historian of the church noted that "It has frequently been said of the Spring Street Church that it has lived dangerously. It has certainly lived strenuously and courageously. It has kept the faith," (Hintz 1951: 3). The church's politics during the 1820s and 1830s concur with such an assessment. Records indicate that "…African-Americans were admitted into the congregation as early as 1820. However, church seating was segregated by the 1830s," (Meade 2007: III-1). The issue of segregated seating remains outstanding, with other researchers writing that "Like Cox, Reverend Ludlow was also an ardent abolitionist who continued into the 1830s the work of preaching an end to slavery started by his predecessor. In the early years of that decade, Ludlow also joined with other progressive Presbyterian ministers in making efforts to put an end to the practice of segregated seating during Sunday services," (Mooney et al 2008: 2.3).

The abolitionist nature of the church placed it among a specific subset of the Presbyterian faith that was caught up in the movements of the Second Great Awakening (1790s to 1840s) (Hatch 1989: 220). Across the country, and particularly in New York State, religious leaders challenged what they saw as a declining moral ethic in the new market economy and harkened back to a purer time of Calvinist thought and practice, even though in reality many of the doctrines of Calvinism were modified in favor of greater free will.

Outward signs of the theological shift taking place across the country showed up late in the Presbyterianism; for them, it was first publically visible in 1801 with the Plan of Union with the Congregationalists. This plan recognized the widespread nature of the denominations, but also the limited number of ministers available to lead the growing churches. As both theologies were Calvinist in origin, the Plan of Union allowed for cooperation between the two churches, including letting ministers of either faith preside at services in each other's churches (Staiger 1949: 393).

However, the cooperation led to a split in the church. So-called Old School churches stuck to more traditional beliefs, whereas New School churches aligned themselves more closely with the theology of the Congregationalists (Staiger 1949:393). New School churches tended to be a) in the North, b) progressive, and c) abolitionist, while Old School churches tended to be a) in the South, b) traditional, and c) anti-abolitionist. New school churches and abolitionists believed slavery was evil, and it was therefore their moral obligation to work to end it (Wyatt-Brown 1969: 81). The church could not survive as a unified body when one half (the minority) believed the other to be living in and practicing the sin of slavery. At the 1837 convention, The Presbyterian Church ruled the Plan of Union from 1801 to be unconstitutional (Staiger 1949: 409) and the church split.

How this affected day to day life of Presbyterians is unclear (Staiger 1949; Abzug 1994). What is clear from these events, however, is that the politics of the Rev. Cox and the Rev. Ludlow place them squarely in the New School, despite the fact that New York City and the First Presbytery, with its ties to the south via cotton and therefore slavery, was firmly in the Old School (Fowler 1981). In fact, Lewis Tappan, the New York City businessman and abolition leader, recruited both men and their churches to his American Anti-Slavery Society (formed in

1833) sometime in 1833-1834. Additionally, the Spring Street Presbyterian Church was a founding member of the Third Presbytery when it was created on January 4th, 1831(Alexander 1887: 48; Wyatt-Brown 1969: 114). This new Synod further separated the radical New School churches from the largely Old School New York Synod (Fowler 1981).

Many who were connected to abolition were part of other reform movements, including temperance, Sabbatarianism, and body reform. Just as abolitionism advocated for the centrality of individual free will, a focus on the body and keeping it to the standards and care of the Bible was a rallying cry of this era. This meant avoiding alcohol, keeping the Sabbath, and keeping the body pure (Abzug 1994). The Tappans, as well as other leading reformers, were connected to Sylvester Graham, a body reformer who advocated a strict diet (Abzug 1994: 163). Some leading abolitionists followed this diet, sticking to vegetables, cold water, and Graham crackers (Abzug 1994: 177). Accounts of those who grew up on these diets talk about starvation and malnutrition (Griffith 2004: 75).

The Second Great Awakening also had a focus on evangelizing, particularly to the poor and to children. This was the era of pamphleteering, as religious organizations took to the streets to convert and "save" the souls of the poor, African Americans, and immigrants. These organizations distributed Bibles, pamphlets, and educational tracts. Their goal was to teach individuals how they too could lift themselves out of sin and poverty by becoming educated Christians. Between 1812 and 1825, the New York Religious Tract Society and its female wing distributed over 2,300,000 tracts (Mohl 1972: 119). In May 1834, the *American Tract Magazine* reported that the Rev. Ludlow spoke on the need to distribute tracts: "The work is highly responsible. Tract distributers are the most efficient coadjutors of faithful ministers, many of whom are sinking under the pressures of their labors. They not only bring in those wandering from God, and fill up the Sabbath and Infant Schools, but grow in grace themselves," (54). The Reverends Ludlow and Cox both worked to expand the outreach of Sunday schools in the wider community, and to evangelize their beliefs and ideologies beyond their church.[10]

The importance of these ideological stances is that, as an institution directed at giving moral guidance, it is likely that the pastors of the church were instructing their congregants in these ideological beliefs through their education programs and their outreach methods. These beliefs were fairly radical at the time, and as the race riots of 1834 indicate, many residents of New York City were not in support of the goals of the abolitionists and reformers. Records indicate that the congregants remained loyal to their pastors when they certainly could have moved to other churches: the split of the congregation in 1825, with half following the Rev. Cox to the new Laight Street Church and the other half staying behind and hiring the Rev. Ludlow, illustrates this loyalty to both the pastors and the ideological causes they espoused. Those who stayed behind could have hired a more mainstream pastor, but they chose to hire the Rev. Ludlow, who would become a close associate of the Rev. Cox. The congregation of the church thus appears more and more to be a local, ideological group of individuals and families coming together, rather than just the traditional biological, ethnic, or racial population often assumed to be represented by a cemetery. While biological families are definitely present, African American and Euro Americans, middle- and working-class, and those bound by blocks and by beliefs also appear to make up those who attended, and likely those who were buried, at the Spring Street Presbyterian Church. Many of these groups are often overlooked in history. And perhaps no group is more overlooked than the children of these families. And yet their bodies were preserved in the vaults, offering a window into their worlds.

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[10] More on Spring Street's Sunday school program is presented in Chapter 5.

Conclusion

The city that nurtured the Spring Street Presbyterian church was a dynamic place. People within the congregation and within the neighborhood mirrored the diverse and dynamic nature of the maturing city. Those from all walks of life were mingling and competing for jobs, housing, and resources. Segregated neighborhoods were in their infancies, and many neighborhoods were a mix of people from different classes, races, and places of origin. Dirty streets were lined with businesses and homes, churches and schools, and the bodies moving through this environment were intricately connected to it. The availability of food stuffs, the waves of disease epidemics, the dangers of urban living, the shifting labor patterns, and increasing migration all affected the biologies of those who lived therein. The growing bodies of the children, in particular, were being directly shaped by the shifting social and physical landscape. And yet history often leaves these individuals out of narratives. History is often about adults, written by and for them. As archaeologist Sarah Tarlow notes, many groups left out of traditional historical accounts are now being accounted for by archaeologists (1999: 4). So too can much be added to these new histories if we look to the bodies of the children. In this dissertation, we will learn about the vulnerability and resilience of these children in this new city environment and how their bodies interacted with the world around them. It is to these bodies that this dissertation turns next.

Chapter 3: Approaching Childhood

> *As Shilling (1993) suggests, bodies may be both biological and social and yet are never finished products; being always adaptive to inference and change. Accordingly, childhood constitutes one of the most intensive life periods in which the body becomes accomplished.*
>
> --Lally and Ardren, 2009: 65

Introduction

The Reverends Cox and Ludlow both considered children to be moldable beings, entities that are pure and awaiting instruction, cultivation, guidance, and punishment (1832 and Ludlow 1834b). During this transitional moment in history, great value was placed on these children. These pastors hoped that the children would live out the instructions of their faith and evangelize the message of the church. As the Rev. Ludlow wrote on the importance of Sunday schools, children were not yet worldly.[11] They therefore became both a target of reform movements and education, as well as a symbol for the ideological struggles of adults.

That children mattered to the leaders and reformers connected to the Spring Street Presbyterian Church should come as no surprise. From totally dependent infants to semi-autonomous youths, children were a part of everyday life for families and for the congregation. And yet it is easy to overlook children in past, as they often leave less visible markers on the material world and historical record. But we know that they not only were on the minds of the adults that surrounded them; they were active agents, symbols used in politics, and important shapers of religious agendas.

As archaeologist Jane Baxter points out, the fact that the relationship between children and what they left behind is ambiguous for researchers does not negate the fact that children do contribute to history, material culture, and life, even if we do not initially recognize the features

[11] See Chapter 6.

of their activities (2005: 2). She notes that there is a perception that "…children are unimportant or peripheral in relation to 'real' issues of archaeological interest," (2006: 2). In addition, Baxter writes that there are important considerations of childhood for all of historical research, including understanding the transmission of cultural processes, or socialization, and the learning of identity, such as gender roles (2005: 3). While this issues an apt challenge for archaeology, it is also important for bioarchaeological analyses. At the Spring Street Presbyterian Church, the most numerous artifacts found were the bodies themselves. The record of the past that the bodies contain can address "real issues of archaeological significance," including what the childhood experience was like.

This chapter details how the skeletal and archival analysis proceeded, and how the data from that analysis is presented in the upcoming chapters. The data collected from the skeletons discussed herein allows for an evaluation of population trends and individual case studies. As previously detailed, this structure adopts a particular theoretical approach, a social bioarchaeology that privileges the relationship between the social and the biological and the value of microhistories. This follows models employed by Leslie Rankin-Hill (1997) for the First African Baptist Church in Philadelphia, Shannon Novak (2008) for the Mountain Meadows massacre, and Tiffiny Tung (2008) for sites from the Wari Empire.

In addition, bioarchaeological analyses of childhood are well suited to investigating questions of health. However, this dissertation, though focusing on health, does not use the subadult data as a way to better understand adult behavior, or to rank this site in comparison to others, although both of these factors are considered. Instead, this dissertation takes an internal look at the children themselves, and highlights how health and life experience vary for children of different ages. What we find is that the children remain vulnerable to certain deficiencies and infectious diseases as they grow up, but that other factors, such as weaning, trauma, and certain lesions are age-dependent. This dissertation is privileging a highly contextual social bioarchaeology that first asks that we understand the population and individuals in detail, in their context and time, before we turn to wider, comparative questions. Even with limited comparisons, however, the unique factors at the Spring Street Presbyterian Church are highlighted in the skeletal findings. The fact that this is a mixed class, mixed race abolitionist congregation is of utmost importance in understanding the expressions of lived lives in the children's remains.

The Burial Vaults

In order to understand how analysis proceeded, it is important to discuss how the burial vaults were used and how such use contributed to their condition in 2006. The vaults at the Spring Street Presbyterian Church were four underground rooms, two made of limestone (Vaults III and IV) and two made of brick (Vaults I and II) (Morin 2010: 4). These four vaults were built alongside the church on the southeast edge of the property, and accessed at least between 1820 and 1846, indicating some desire to keep the remains of deceased congregants and loved ones close by (Mooney 2010: 24) (Figure 3.1). Research done by historian Elizabeth Meade has revealed that Vaults III and IV were used by 1820. In 1830, discussion among the minutes of the trustees of the church indicate that two more vaults were to be built, and that that project was completed by May of 1831 (Meade 2010: 10).

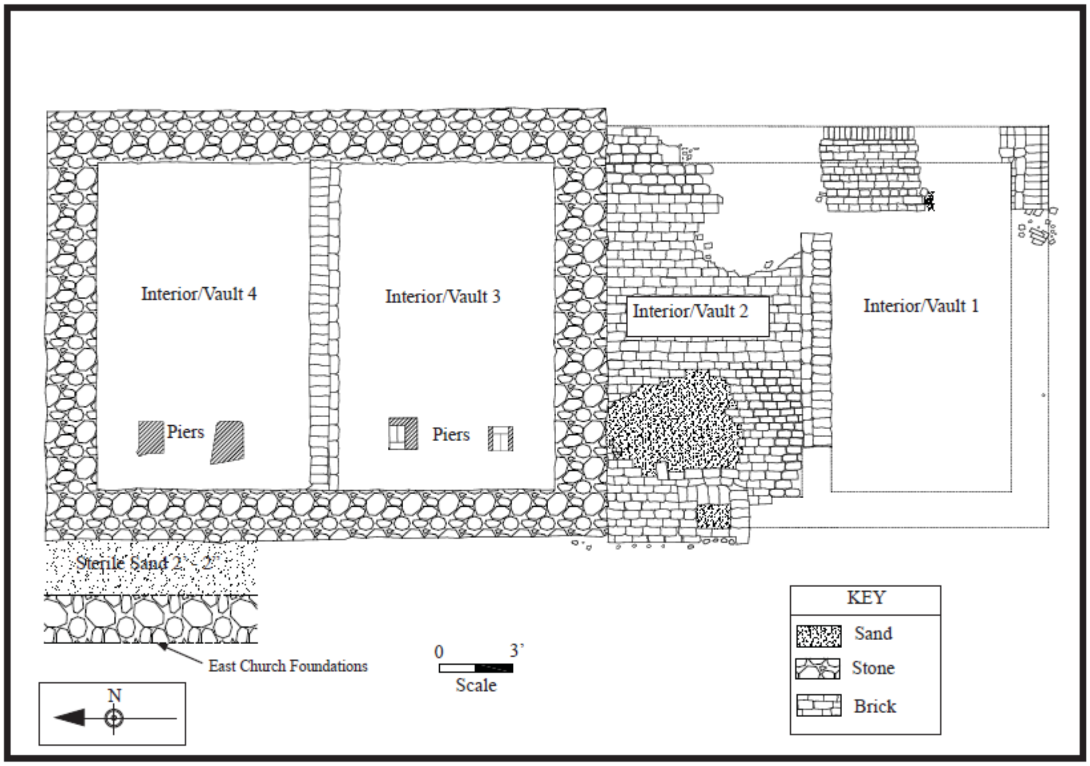

Figure 3.1: Plan View of the Burial Vaults
Image Courtesy of URS Corporation (Mooney et al 2008)

During this time, burials in the city were implicated in the growing health crises, and laws were passed banning burials in the heart of the city.[12] Laws continued to push burial locations further and further out of the city and into the rural landscape. Burials south of 14th street were banned as of 1832, a measure which could have impacted the use of the Spring Street Presbyterian Church vaults (Meade 2010: 11; Burrows and Wallace 1999). And yet coffin plates record dates of death as late as 1846, indicating that the vaults were still in use, perhaps illegally at that point (Meade 2010:11).

Part of the effect of this change in burial laws is that there are few burial sites contemporaneous with the Spring Street Presbyterian Church vaults in New York City. The narrow 26 year window of these four vaults was during a time when older cemeteries were no

[12] More discussion of epidemic disease outbreaks as well as the sanitation issues in the city are presented in Chapter 2.

longer being used because of these laws, and newer cemeteries began north of the city proper. And so the Spring Street Presbyterian Church burial vaults become a fascinating artifact of their location, as they were opened while the neighborhood of the church was rural but closed 26 years later when the church was engulfed by an urban landscape.[13] And while much archaeological work has been done in New York City (for example, Yamin's 2001 work in the Five Points district and Wall's 1995 work on households in the city; see also Cantwell and Wall 2001 for an excellent overview of archaeology in the city), no contemporaneous skeletal collections have been analyzed. There were other churches with burials at this time, as archaeologist Douglas Mooney notes, but burial vaults were a less desirable type of cemetery, and indicative of poorer congregations. Those congregations with means purchased parcels of land for more traditional cemeteries (Mooney 2010: 21). The vaults at Spring Street, then, suggest that the church was one such congregation with less means.

Within the vaults themselves, there does not appear to be any independent sections for family groups or demographic units (i.e. race or class) as is seen at contemporaneous sites in other cities, although Mooney notes this may be a product of the preservation of the vaults (2010: 26). Church records from 1827 do suggest, however, that coffins were moved to make space for new additions on a regular enough basis for a sexton to be hired to take care of the vaults. Church records also indicate that two additional individuals were designated to "regulate" the vaults in 1830 (Meade 2010: 10).

Unfortunately, very few records discussing the burial vaults exist. And so potential patterns in the vaults themselves are, at this time, still unresolved. One such curious finding is that Vault IV, one of the two older vaults, contains the majority of the human remains

[13] For more on this, see Chapter 2.

recovered.[14] Theories for this pattern include clustering of families, segregation of vaults by class or ancestry, or perhaps other designations based on demographic factors (Mooney 2010:37). As archaeologist Mooney notes, "The paucity of comparable sites in the northeastern United States makes it difficult to know if conditions found at Spring Street are representative of congregational vaults in general," (Mooney 2010: 37).

Artifacts were found in the vaults along with the remains, but many of the items are intrusive and are believed to have been introduced in part after the vaults collapsed in the 1960s when the church building, then vacant, was demolished (Mooney 2010: 27). Non-intrusive items include coffin wood and nails, shroud pins, 56 partial or complete coffin plates, some ceramics, coins, fabric, and a few personal items, including ribbons, buttons, hair combs, shoes, a whistle, and a gold wedding band (Mooney 2010: 33; White and Mooney 2010: 56-57).[15,16] The evidence from these artifacts that are original to the vaults provides a great deal of information; from the coffin remains, preservationist Rebecca White and archaeologist Mooney have determined that the coffins were hexagonal shaped, and likely had flat lids for stacking (although they note at least one fragment that indicated a gabled lid) (White and Mooney 2010: 53). They also observed fragments from one coffin that indicated a viewing window was present (White and Mooney 2010: 53). Such coffins were likely locally made or crafted by family members at the time, although some mass-production of coffins was beginning in the early 19th century (Laderman 1995; Hicks 2013). Coffin hardware was also found, including nails and screws, and White and Mooney note that, of the nails with adequate preservation, 181 appear to have been mass-produced and 11 hand-wrought, reflecting a shift at the time towards mass-production of

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[14] Distribution of the children's remains is discussed in Chapter 4.
[15] Coffin plates are discussed in later chapters.
[16] The disturbed nature of the site leads researchers to caution that the placement of these items is not necessarily indicative of their original locations and associations (White and Mooney 2010: 57).

mortuary hardware as well (White and Mooney 2010:54). This shift towards mass production and the so-called personalization, or "beautification" of death really picked up after 1860, but early signs can be seen in this period (Bell 1990). Coffin hardware is one such location for tracing changes in burial practices and mourner behavior, and so variation in the coffin and coffin hardware, little as it may be at the Spring Street Presbyterian Church, may reflect both socioeconomic differences as well as changing trends (Bell 1990; Woodley 1992; Hicks 2013).

A matted clump of the remains of feathers suggests that at least one of the coffins contained a pillows or a mattress pad (White and Mooney 2010: 55). The presence of numerous copper shroud pins indicates that at least some of the bodies were buried wrapped in shrouds. However, a number of buttons were also recovered, which indicates that other individuals were buried in clothing. Both of these practices were normal for the time period (White and Mooney 2010: 57).

Perhaps the most informative of the burial items for this dissertation are the 56 whole and partial coffin plates, discussed throughout. Archaeologist Katherine Hicks notes that they are fairly uniform, with some more obviously hand-wrought and others made by a press. One is pure silver; the rest are copper, copper alloy, or tin based (Hicks 2013: 6). It is likely that these coffin plates, given that there are only 56 for the 197 or more burials, reflect socioeconomic status to a certain extent as well as availability in general (Hicks 2013; Meade and White 2013). The fact that some children had these coffin plates, including the only pure silver coffin plate, may also reflect the growing association between children and purity and innocence. Such a valuing and display on children's headstones was beginning in this time period, and may be reflected at the Spring Street Presbyterian Church in the additional expense required to include a coffin plate on a burial (McKillop 1995: 80). This type of personalization is often associated in the later 19th century with the beautification and personalization of death, but Hicks also notes that coffin plates, unlike headstones, for instance, would not have been available for regular viewing (Hicks, pers. comm).

The best preserved and most numerous type of artifact in the vaults are the skeletal remains themselves. Estimates at this point are that some 197 individuals are present. It also makes the evidence preserved in these bodies very important; where historic records and artifacts are lacking, the remains can divulge a great deal of information about the lives of the congregants. Most bodies are commingled, making analysis of this site challenging, but not impossible. What information we can recover from the remains includes the children's experience of stress, disease, diet, and trauma, as well as how those biological expressions are related to social and environmental interactions. The approach taken in this dissertation is one designed to illuminate such lived experience.

Methods of Skeletal Analysis

After the discovery of the bodies in 2006, URS/AKRF contracted Dr. Thomas Crist of Utica College for the skeletal analysis, and given the size of the project, he contacted Dr. Shannon Novak at Syracuse University to assist. Analysis proceeded on the collection from summer 2006through spring 2013. During that time, many undergraduate and several graduate students had the opportunity to work on the collection and train in the techniques of skeletal analysis, including the author.[17] The collapse and commingling of the coffins made excavation of complete skeletons difficult. Because of this, Burials (discussed below) were designated in the field where possible, and all other remains were bagged as commingled. Soils were also collected. The CRM firm requested that all designated Burials be analyzed, and the state report

[17] A list of all who participated in the skeletal analysis can be found in the Acknowledgements.

filed in 2010 contains the results of that analysis. However, Shannon Novak, in contact with the Presbytery of New York City, made the decision that all skeletal elements should be analyzed and all soils screened. In 2010, the remains from Vaults I and III, which had been analyzed at Utica College, and the artifacts from the vaults, which had been analyzed by the CRM firm URS/AKRF, were transferred to Novak and Syracuse University for additional analysis. The commingled remains and soils contained most of the subadults that will be discussed in this dissertation.

The skeletal elements that have been analyzed for this dissertation have thus been designated and analyzed according to the following three categories:

- Burials: In the field, archaeologists excavated and designated 17 sets of children's remains as burials.[18] These were identified based on the vault from which they were excavated (I, II, III, and IV) and assigned a number in the field (e.g. Vault II, Burial 7). Upon further sorting in the laboratory at Syracuse University, Burials 1-4 from Vault IV were found to represent 15 individuals. Of those, 14 are from non-fetal subadults. Those elements have had a letter attached to their initial number designation (e.g. Vault IV, Burial 1-4I). The total number of Burials is 17.
- Individuals: In the laboratory, an additional 57 sets of children's remains were identified as Individuals. The completeness of these individuals varies from a matched set of arms and legs or a complete cranium, to a nearly complete subadult skeleton. Matches between elements were made based joint articulation, color staining, size, pathology, and postmortem alteration (Byrd and Adams 2009). These subadults were identified by the

[18] In the official report to the State of New York, 2008, these are the only subadults discussed. And yet, we know that the actual number of subadults is at least 75.

vault from which they were excavated and designated a letter in the laboratory (e.g. Vault IV, Individual A).[19] This system was used for both adults and subadults, and the alphabet was quickly used up. We then designated individuals with double, triple, and even quadruple letters (e.g. Vault IV, Individual OOOO).

- Commingled elements: Despite the identification of some 74 partial and complete sets of children's skeletons as Burials and Individuals, hundreds of bones were left unassociated. These bones, however, are extremely important, and were analyzed with the same care as the Burials and Individuals. Like the Burials and Individuals, they were identified by the find location, including the vault number, but in this case further specified by the Field Specimen Number, or FS number, assigned by archaeologists in the field. These FS numbers indicate the specific feature and excavation level of the elements.[20] Bones from a given FS number were sorted out by element (femur, tibia, occipital, etc.) and then by side. The elements were then seriated, or arranged by size, from largest to smallest. Individual elements were then labeled by the first few letters of their element names, and assigned a number, starting with 01. Finally, to keep numerical sequences of the subadult elements separate from those of adults, the elements were assigned a sub- prefix (e.g., Vault IV, FS 22, SUBFEM 01R).

The end result of this process of identification is that data was preserved on the population level (for instance, all femurs were recorded, whether as stand-alone elements, or as part of a Burial or

[19] A letter was used, rather than a number, to differentiate between those identified in the field in situ and those identified from a sort in the laboratory.

[20] Unfortunately, no map was made in the field of the FS locations, and while we suspect very strongly from sorting in the lab that individuals are spread across FS designations, we have preserved the separation of the FS numbers in the analysis of the commingled remains.

Individual). In addition, Burials, Individuals, and ossuary elements allow for life histories of specific children.

From here, skeletal analysis proceeded with the creation of biological profiles. A biological profile, as discussed below, presents information on age, sex, ancestry, dentition, pathology, trauma, and osteometrics for the person from which the skeletal elements came. For burials and individuals, this data was collected using the standards developed by Dr. Douglas Owsley (1995) at the Smithsonian Institution's Natural History Museum. For the commingled elements, the data was collected using Owsley's (1995) System for Massacred and Cannibalized Remains. This methodology collects all of the same demographic and description information, but does so for each individual bone rather than for each individual person.

For the subadults in this collection, the biological profiles have been recorded both in hard copy and in Microsoft Excel. For the purposes of this dissertation, not all of the data is usable. This dissertation is organized around age, and so the elements that provide the best indication of age—long bones, the crania, and the mouths—are the primary sources of information employed. Analyses of these elements and the patterns discussed herein were done using IBMSPSS Statistics 20.

The Biological Profile

The creation of a biological profile attempts to answer a series of questions about the life of the person whose body is being examined. These questions can be addressed from a complete skeleton, an incomplete skeleton, and even a single skeletal element. And so this same methodology is used for Burials, Individuals, and commingled elements. The questions asked are as follows:

First, is it bone? Other types of material can be mixed in with human remains, including cultural material, such as pottery, bricks, nails, and mortuary artifacts. Other natural material may also be present, including sticks, coffin wood, rocks, and animal bone. Such materials have been encountered in the Spring Street Presbyterian Church series and separated out.

Second, how many individuals are present? In the laboratory setting, identifying how many individuals are represented involves sorting individuals based preservation, articulation, age and sex data, and, where available, DNA matching (Ubelaker 2008; Byrd and Adams 2009). In some cases, however, clear individuals cannot be sorted out from the remains, particularly in instances of ossuaries, mass disasters, disrupted burials, or poorly excavated sites (Byrd and Adams 2009). As discussed above, the Spring Street Presbyterian Church is such a case, with a combination of identified Burials and Individuals and commingled elements. In this case, an MNI is calculated, or minimum number of individuals. This is done by counting the most numerous single element from one side, which thus represents the minimum number of people that could be present. For the subadults of the Spring Street Presbyterian Church, the MNI is 75 based on left femorae.[21]

Third, what was the age at death for each individual or individual element? This is determined by addressing the individual's biological age (that is, stage of growth, maturation, or senescence) and correlating it with a chronological age (that is, number of years of life) (Sofaer 2006). Age represents a continuum of change, from early fetal development where age can be established based on the presence or absence of elements and the size of those elements; to young individuals whose ages can be determined based on their degree of growth and skeletal maturation; and finally to older individuals whose ages can be determined based on how much

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[21] For more on this, see Chapter 4: Vital Statistics

the skeleton has degenerated. How these biological changes correspond to chronological age categories is based on comparing particular elements or features to individuals of known age from reference populations.

The youngest individuals are often considered “easier” to examine for age because growth can be measured and interpreted, unlike degeneration which is more challenging to quantify. Problems with interpretation do exist, however. The methods are metric analyses, followed by observation of degree of fusion and seriation. The most reliable element for providing subadult ages is the dentition. Tooth development (but not necessarily eruption) is fairly tightly genetically controlled (Lewis 2007: 38). Assessing age from teeth involves observing the stage of development of deciduous or permanent teeth (Moorees et al 1963a, b). This is done by examining the tooth growth from the tip, or crown, down to the completion of the root. This development is then compared to standards developed by Moorrees, Fanning, and Hunt (1963a, b). They utilized radiographs from two separate studies from a total of 380 children and assessed development against the known ages for 10 permanent teeth (Moorrees et al 1963b: 1491) and performed a similar study for three deciduous teeth (Moorrees et al 1963a). While other studies have assessed dental age, Moorrees et al. remains the standard in the field.

The next most reliable elements for metric analysis are long bone diaphyses (i.e., humerii, radii, ulnae, femora, tibiae, and fibulae). Each element is measured on a standard osteometric board to determine the maximum length of the element. Given similar conditions, subadult bone can be expected to grow at a predictable rate, and length measurements can be compared against a known population to determine an age range (Kosa 1989; Ubelaker 1989: 69-71). While the specific reference populations do have growth rates that vary by cultural and environmental context as well as ancestry, the reference populations utilized in this work remain the standards in the field and hold up well against other populations of known age (Kosa 1989; Ubelaker 1989).

Where metric analysis is not available, two additional techniques are used to determine age from subadult bone. The first of these is examining epiphyseal and element union. The epiphyses, or joint surfaces, of bones join to the metaphyses, or bodies, of bones at a predictable time and rate. By recognizing if an epiphysis is not fused to the metaphysis, or if it is in the process of fusing, or if it has completely fused, age ranges can be narrowed down for many elements, including long bones (Ubelaker 1989:75; Schaefer 2008; McKern and Stewart 1957; and Coqueugniot and Weaver 2007). When metric analysis and degree of fusion are unavailable, seriation is used to estimate an age range. This involves recognizing, based on size, that an element is larger than, smaller than, or the same size as an element of a known age range and basing an age estimate off of that. This can at the very least provide some indication of age range, especially if there are complete elements within the seriation with good age estimates from analysis of metrics or fusion. Age has primarily been estimated in this collection from long bone length and dental development. Dental development is the most reliable method of determining age, but the commingled nature of this collection has not allowed for consistent age techniques to be used.[22]

Fourth, can the sexes of the individuals be determined? From the perspective of skeletal analysis, the most important definition of sex difference between males and females is the difference between skeletal structures for reproductive purposes. Assessment of sex from the skeleton requires observing morphological features of particular elements and understanding

[22] And yet, the data suggest that the various aging techniques are producing consistent age estimations for this collection. For an evaluation of long bone length aging and dental aging, see Chapter 4: Vital Statistics.

what their expression means within the context of the specific population. These secondary sex characteristics are controlled by hormones. Because of this, the most obvious expressions of sex difference in skeletal remains do not appear until puberty (Lewis 2007: 47). Therefore, distinguishing sex in subadult remains is not possible at this time without DNA or burial records.

Fifth, what is the ancestry of the individuals in this collection? While clear biological patterns of *race* are not consistent in the skeleton, population-based analyses of geographic origins in deep time can be assessed. As to what culture defines as race—traits of skin color, hair color, and general body and facial shapes—is based on clinal variation in relationship to sunlight exposure, elevation, as well as based on sexual preference in populations, it reflects very little other than where individuals' ancestors lived back in deep time (Gill 1998). Along with these skin-deep variations are some biological skeletal markers that can offer information about geographic origins. Osteological analyses examine these markers to offer best estimates in the range of variation that is human appearance.

These skeletal markers can be assessed two ways: through observation of macroscopic morphology or through metric analysis. For macroscopic analysis, the most commonly observed element is the cranium, followed by observations of long bone shape and density (Gill 1998). Additionally, variation in dentition can be useful for determining ancestry; shovel-shaped incisors can indicate Native American ancestry, crenulated molars can indicate African ancestry, and Carabelli's cusps can indicate European ancestry (Hillson 1996).

Beyond macroscopic assessment of ancestral markers, metric analysis can also be used. A suite of measurements can be compared against the data from the Forensic Anthropology Databank. This database has over 1800 individuals of known sex and race for comparison. This data is compared in the program known as FORDISC. Measurements used in this analysis primarily utilize cranial metrics, but the new version of FORDISC also includes some post-cranial metrics (see Ousley and Jantz 2005; Forensic Anthropology Databank).

Unfortunately, traits that can be linked to ancestry, such as the craniofacial traits mentioned above, are controlled by hormones and thus are not usually visible in pre-pubescent subadult remains. FORDISC does not deal with subadult cases, and metric analyses of subadult ancestry are not available. And while researchers continue to explore potential methodologies for determining subadult ancestry, none have proved widely applicable at this time (see Schultz 1923; Steyn and Henneberg 1997, and Lewis 2007). For example, Steyn and Henneberg examined a sample of 16 subadult skulls for ancestral markers, but although they found differences, their small sample size precludes extrapolating out to other collections without further testing (Steyn and Henneberg 1997: 68-69). At this time, the only reliable way to determine subadult ancestry is through DNA analysis.

Sixth, what was the health of the individual? In order for pathological conditions to appear in bone, they must be conditions that an individual can live with for some period of time. A fast moving disease, such as cholera, kills individuals too quickly for the bones to record the health disruption. This is part of what is known as the "osteological paradox": remains with high levels of skeletal pathology are indicative of individuals with better health, as they represent those who survived longer with diseases than those who died quickly, before disease could affect the skeleton (Wood et al 1992). While we know that several waves of infectious disease swept through New York City during the time when the burial vaults were in use (Burrows and Wallace 1998), identifying these conditions in the remains is not possible. [23] Conditions and stresses that do record in the bone include infectious diseases that are slow moving or non-fatal.

[23] See Chapter 2 and Chapter 4.

Additionally, conditions that are inherited—congenital conditions and defects—can be observed. Diseases directly related to bone can also be observed. These include joint disease and dental disease. Finally, neoplastic disorders, such as cancer, and metabolic conditions, like rickets and scurvy, can affect bone and therefore be observed in some circumstances. Health is one of the key topics of this dissertation, and the specific conditions examined are explained next.

Health and Diet

One focus of this dissertation to explore childhood experience is markers of health and diet. The health conditions discussed in this dissertation are about more than just the health status of the individual at the time of death. What these conditions offer us is a way to see the life course of the child, perhaps all the way back to the health of the mother, and understand a little bit about the relationship between biology and culture. This next section discusses the conditions observed in the skeletal remains of the subadults.

Health is an important question in developing a biological profile, and can provide a great deal of insight into not only the moment in life in which the individual died, but into the cumulative experiences up until that point. The osteological paradox discussed earlier reminds us that when a skeleton has many markers of disease or stress, the individual was healthy enough to survive that many challenges. In addition, research in the past few decades has begun to focus on how stresses early in life—starting even in utero—can negatively affect the lifespan and health of the individual, all the way into adulthood (Armelagos et al. 2009; Gravlee 2009). Armelagos et al., for instance, report what is known as the Barker Hypothesis: research has found children in utero whose mothers experience stresses like starvation or respiratory infections have increased risks of everything from cardiovascular disease and asthma to schizophrenia later in life (2009: 263). Gravlee presents research showing that stress from racial discrimination, which adversely affects the health of the mother, can be passed from mother to fetus (2009:52). Examples include the development of diabetes and heart disease in the next generation, which can be linked to stress experienced in the womb (Gravlee 2009: 52). And so the sociality of an adult can affect the health of multiple generations of children to follow (Gravelee 2009:52).

Specifically, this dissertation examines metabolic conditions, particularly rickets and scurvy. These result from a lack of necessary vitamins that regulate bodily processes. Also examined are nondescript stress markers, including cribra orbitalia, cranial lesions, and periostitis. These conditions indicate that a health challenge is present, but are not linked to a specific etiology. Dental disease is also examined, particularly carious lesions, attrition, and anomalies. These diseases not only tell us about health but also offer important insight into diet. Finally, trauma, where present, is also discussed. The following sections review each of the conditions detailed in the upcoming age chapters.

Rickets [24]

Metabolic conditions are those typically associated with deficiency or excess (Roberts and Manchester 2005). These conditions affect the normal health of bone, particularly bone modeling and remodeling (Brickley and Ives 2008: 2). Rickets, or vitamin D deficiency, is one such condition. Vitamin D is necessary for bone to ossify, or harden, and is synthesized through exposure to UVB radiation and through some food resources. When the body is deficient in vitamin D, the bone structure can be compromised and leave skeletal markers, both while the condition is active and while it is healing (Mays et al 2009:406) Vitamin D can be synthesized from the fat of some animal products (Steinbock 1976: 263) and fish oils (Roberts and

[24] The following discussion of rickets follows previously published accounts of this condition among the remains in Ellis 2010 and Ellis 2014.

Manchester 2005: 239). Most vitamin D, however, is synthesized from exposure to sunlight (Roberts and Manchester 2007: 239). UVB radiation is absorbed by the skin by 7-dyhyrocholesterol (Holick 2008:S183). Additionally, individuals must consume adequate levels of calcium and phosphorus for vitamin D to synthesize (Roberts and Manchester 2005: 239). Three very important socioeconomic factors, therefore, affect historic cases of rickets: access to necessary foods and nutrients; exposure to sunlight; and the pigmentation, or melanin, in the skin. The amount of melanin present in the skin determines how much UV radiation passes through the skin to the body for vitamin D synthesis. It is estimated that, even today, people with darker skin in northern latitudes require approximately 5-10 times longer exposure to sunlight to produce similar levels of vitamin D as those with lighter pigmentation (Holick 2008:185). It is further estimated that 54% of those of Hispanic and African ancestry are deficient (Holick 2008: 186-187).

Some recent research and debates (see Robins 2009 and Chaplin and Jablonski 2009, for instance) have questioned just how much skin color really affects vitamin D synthesis. Other factors, such as cultural choice in clothing, overcrowded living conditions, smog from industrialization, and labor patterns that limit exposure to sunlight, may be more important (Brickley and Ives 2008: 93-95). Nutritional factors are also particularly important, as deficient breast-milk, weaning stress, and diarrheal diseases can all contribute to a vitamin D deficiency (Brickley and Ives 2008: 93).

Vitamin D has been found to play a role in other biological processes. Vitamin D also assists in immune system regulation and performs anti-cancer actions (Lin and White 2003; Tavera-Mendoza and White 2007). Those who were deficient, therefore, might have had compromised immune systems, and thus been vulnerable to infectious disease outbreaks.

Common outbreaks in New York City in the 19th century included yellow fever, scarlet fever, cholera, and smallpox as discussed in Chapter 2.

Traditionally, vitamin D deficiency has been considered a hallmark of urbanization. Movement towards working indoors, clustering in cities, and pollution led to inadequate access to sunlight, and are undoubtedly important factors. It should be noted that New York City, at a latitude of 40 degrees and a longitude of 74 degrees, gets an average of 2557 hours of sunlight in a year (Brickley and Ives, 2008: 77-80). Adults, on average, need somewhere around 5 minutes of sunlight a day, or 30 hours of sunlight a year, to maintain vitamin D synthesis. Children need even less (Brickley and Ives 2008:77-80). New York City receives inadequate levels of sunlight for consistent, year round vitamin D synthesis from sunlight only. This is complicated by issues of cloud cover, architecture, and cultural practices of clothing choice (Brickley and Ives 2008: 778-79).

The failure of new bone to mineralize, or harden, causes visible changes, the most obvious of which is bowing of the long bones. This occurs when the child walks or crawls and places weight and pressure on the long bones. Other changes include compression of the bone surfaces that are under pressure, which results in porosity; fraying, cupping, deformation, and resorption of the bone at the metaphyses of long bones and ribs; and even fracturing of elements due to compromised bone structure (Brickley and Ives 2008: 97; Mays et al. 2009: 406). Additionally, the buildup of unmineralized bone can result in elements that are preserved in the archaeological record with little to no cortical bone, leaving the bone with a porous or “spongy” appearance (Brickley and Ives 2008).

Scurvy

Another metabolic condition present in the remains is scurvy. Scurvy is a vitamin C deficiency. Vitamin C is acquired through consumption of specific foods, primarily fresh fruit and vegetables and some meat, fish, and dairy products (Brickley and Ives 2008: 41). Brickley and Ives report that the recommended daily allowance of vitamin C is around 30mg/day, but that recent research suggests that levels as low as 6.5-10mg/day may prevent scurvy (2008:47-48). Roberts and Manchester 2005 write that scurvy would have been most prevalent in the past in early agricultural communities that relied on staple crops; those traveling long distances, particularly by sea; and in areas affected by seasonal availability of fresh foods, such as northern climates (236). One last group particularly likely to be affected by a vitamin C deficiency is weaning or weaned children who move from vitamin-rich breast milk to often vitamin-poor diets (Brickley and Ives 2008: 45; Lewis 2007: 132; Roberts and Manchester 2005: 237).

Historical accounts of sailors from Europe indicate that they were aware that fresh fruit and other fresh foods could "cure" certain feared swelling pestilences possibly as early as the late 14th century and certainly by the early 17th century. The sailors and doctors who wrote about the condition did not seem to clearly understand the causes of the diseases—attributing it to infections, foul air, or contact with native peoples—but recognized the curative potential of fruit specifically (Carpenter 1986). By the 1840s, there were discussions of land scurvy versus sea scurvy, numerous theories of the causes of scurvy, and the discovery that potatoes also worked to help cure the disease. The disease was seen particularly among those traveling overland to the west, and urban areas were noted as having little evidence for the disease (Carpenter 1986: 99, 109).

Diagnostic evidence of scurvy is usually associated with abnormal porosity, less than one millimeter in size, of the sphenoid, mandible, maxilla, and orbits (Brickley and Ives 2008:57). However, researchers generally caution that multiple indicators of scurvy should be present to aid in a diagnosis of the condition (Brown and Ortner 2011; Geber and Murphy 2012; Ortner et al 1999). Analysis of possible indicators of scurvy follows Geber and Murphy (2012), who attempt to illustrate lesions in individual elements in a partially commingled collection.
The specific locations considered for this collection are on the sphenoid, the greater wing, at the location of the origin of the *temporalis* muscle (Ortner and Ericksen 1997), with porosity of the lesser wing also noted. For the maxillae, the posterior surface of the alveolar bone is considered, where the *temporalis* muscle inserts, as is the palate (Ortner and Ericksen 1997). Orbits were examined for formative lesions where both new bone and porosity is present. While this can be indicative of other conditions (e.g., anemia, rickets, trauma, or infection), it has been noted as a lesion that is suggestive of scurvy.

Nondescript Stress Markers

The next set of conditions is labeled as nondescript stress markers, as they have no specific etiologies. However, they do indicate that a health or dietary concern was present and affecting the individual, and thus provide important insight into the health of the children in this collection. As Wheeler notes, the immature immune system of young children and infants make them vulnerable to stress, and also likely to have physiological indications of that stress (Wheeler 2012:219; Goodman and Armelagos 1989).

Cribra Orbitalia

Cribra orbitalia manifests as lytic lesions, or porosity, of the eye orbits. It is an expansion of the diploë of bone. It was once associated with iron-deficient anemia only, but more recently connected to childhood stress more generally (Wilbur et al 2008; Walker et al 2009).[25] It is put perhaps best by Wheeler who writes "Macroscopically, cribra orbitalia appears as areas of porous and thickened bone resulting from the hypertrophy of the diploë on the orbital roofs…and has been reported to be an osseous response to one of the genetic anemias or an acquired anemia. These responses can be the result of poor nutrition, metabolic or blood disorders, infectious disease, parasitism, diarrhea, or a combination thereof," (Wheeler 2012: 224). While at this time cribra orbitalia in this collection cannot be associated with one specific condition, particularly because the elements are disassociated, all researchers agree that the presence of cribra orbitalia suggests childhood stress.

Periostitis

Periostitis is a reaction in the periosteum that surrounds bone that results in new bone growth (Weston 2006:48). It can appear as pitting and striations in new bone deposits (Weston 2006:28; Wheeler 2012: 225). Periostitis can result from any number of conditions, but primarily stems from infectious disease, trauma, or nutritional deficiencies (Wheeler 2012: 225). Weston notes that the term is used to cover a variety of bone-changes induced by some insult to the periosteum, and that there is no standard bioarchaeological or clinical language used to describe or classify the bone condition (Weston 2006: 49). As it is a non-specific indicator of health for bioarchaeological populations, it cannot conclusively be linked to any one disease or traumatic event in an individual's life. However, it does suggest that the individual was under some type of stress that stimulated osteoblast activity.

[25] And yet many researchers still connect cribra orbitalia to iron deficient anemia or mention its historical connection to that condition, as there is no one clear etiology for these lesions (see, for instance, Petersone-Gordina et al 2013; Harkort 2012; Schillaci et al 2011; Djuric e t al 2008).

In this collection, periostitis has been recorded in terms of both its location as well as whether it is active or healed. Periostitis can be localized, which suggests trauma as a cause, or widespread, which more likely suggests an infection (DeWitte and Bekvalac 2011; Ortner and Putschar 1981). In addition, active periostitis at the time of death suggests something specific about the life of the individual at that moment, while healed periostitis suggests something specific about the past of an individual. These distinctions are discussed within each age cohort.

Cranial Lesions

In this collection of subadults, four types of cranial lesions have been observed: endocranial (interior of the skull) formative lesions, often marked by a gray plaque; endocranial porosity; *serpens endocrania symmetricans* (SES), or lytic lesions on the endocranial surface; and ectocranial (exterior of the skull) porosity. These are all non-specific indicators of health and stress, and may be found in tandem or separately. Little research has been done on these types of cranial lesions. The only one that has been discussed in the literature is SES. Although its exact etiology and relationship to bacterial or viral infection is not known, it has been hypothesized that it is related to meningitis, tuberculosis, trauma, rickets, scurvy, and a host of other disorders (Roberts and Manchester 2005: 179; Lewis 2007: 141).

Where possible, individuals with cranial lesions as well as other skeletal lesions are noted. These cases highlight potential connections between better understood diseases, like scurvy or rickets, and lesser understood health stressors. While the presence of cranial lesions on individuals with other known conditions does not necessarily mean the two are related, such observations may prove useful later if more work is done on the etiology of cranial lesions.

Dental Pathology

The introduction of solid foods allows for the development of infections and degeneration of teeth. Dental signatures of solid foods, therefore, can provide a great deal of insight into when weaning began and also help track dietary patterns. Carious lesions, or caries, are the product of the fermentation of food particles by bacteria on the teeth. Sucrose in particular leads to carious lesions, as can starches (Roberts and Manchester 2007: 65). When bacteria interacts with these, an acid can form that erodes the enamel (Roberts and Manchester 2007:65). This erosion leaves behind lesions that we typically today refer to as cavities. Of interest for this research is the fact that caries require the presence of fermenting solid or liquid food, and not breast milk. The presence of carious lesions on teeth, therefore, indicates that these individuals affected were consuming some form of solid food.

A second method of observing the presence of solid food in the diet is attrition, or wear. Grit in food, behavior that involves using teeth as tools, and even acidic diets can all contribute to the wearing down of the tooth enamel (Roberts and Manchester 2007: 78). Wear of the occlusal surface in particular can provide insight into diet, as foods processed with hard materials may leave behind grit that wears down the chewing surface of the crown (Roberts and Manchester 2007: 78). Subadult teeth with wear, then, would suggest that food besides just breast milk was present in the diet.

To evaluate this in the subadults, all erupted teeth were examined. For those teeth still in occlusion (i.e., present in the socket of the mandible or maxilla), this was a fairly straight forward process. For the loose teeth, however, which make up a large portion of the teeth in the Spring Street Presbyterian Church collection, observing eruption is not possible. In order to include as many teeth as possible, some educated assumptions were made. Unfortunately, eruption timing varies widely between populations and individuals, even though tooth development is tightly genetically controlled (Lewis 2007: 41). Dental eruption also varies with disease and "...with caries, with severe malnutrition, or premature shedding of the deciduous teeth reported to delay eruption of the succeeding permanent teeth," (Lewis 2007:41). Despite this, in order to accommodate the most teeth possible, the median age of eruption was used. That age was then correlated with the appropriate stage of Moorrees, Fanning, and Hunt (1936a, b), which was the standard used to record teeth in this collection. Almost all teeth reached the median age around the development stage of root ¾. Therefore, any commingled tooth marked as root ¾ was analyzed as likely erupted and therefore exposed to the mouth and its food environment.[26]

Dental Anomalies

Developmental defects can be particularly useful for understanding childhood growth and development. Linear enamel hypoplasias, or LEHs, are commonly recorded lines or grooves on the enamel of the teeth, most often on incisors and canines (Hillson 1996: 165-171; Aufderheide and Rodriguez-Martin 1998: 405-407; Roberts and Manchester 2005: 75; Lewis 2007: 104-105). These defects occur while the tooth is developing and represent a cessation of growth due to deficiency, trauma, or illness. Because teeth are permanent and the enamel of a tooth does not turn over like bone, these markers remain in teeth. Since tooth development is tightly genetically controlled, measuring the location of these LEHs allows researchers to note at what age the insult occurred (Hillson 1996: 165-171; Aufderheide and Rodriguez-Martin 1998: 405-407; Roberts and Manchester 2005: 75; Lewis 2007: 104-105). Other developmental defects can occur when

[26]This methodology is unfortunately problematic. In some cases, this may be excluding teeth that have erupted. For others, it may be including some which have not. It is at best an imperfect way to deal with two main obstacles inherent in this dissertation: a commingled collection and age categories.

the individual has specific infectious diseases. For example, Mullberry molars and Hutchinson's incisors are malformations of the crown of teeth caused by congenital syphilis (Hillson 1996: 171-172; Roberts and Manchester 2005: 77-78; Hillson et al 1998; Nystrom 2011). These conditions are good examples of the Barker Hypothesis, the theory that insults early in life affect later frailty and mortality. Defects from congenital syphilis highlight a direct link from the mother's health, in this case, venereal syphilis, to the eventual health and death of the child from congenital syphilis.

Even more interestingly, Armelagos et al (2009) used LEH data to test the Barker Hypothesis, looking for correlations between early childhood stress and adult frailty. They conclude that a correlation between LEHs and adult health may come from three possible mechanisms. First, they link LEHs and adult health through a "lifelong pattern of frailty," (2009: 268). Essentially, underlying frailty is both the reason for LEH susceptibility as well as health conditions later in life (Armelagos et al 2009: 268). Secondly, the authors posit that the data is actually showing "…a differential pattern of social, cultural, and behavioral exposure to stressors," (Armelagos et al 2009: 68). In this case, external factors that contribute to health are present from young age through adulthood, specifically environmental and social factors. Finally, the third scenario is that the stress that causes the LEHs may also make individuals less able to cope with stress in the future. The authors write that, "In a sense, these individuals are ''biologically damaged'' by these earlier stressors, in accordance with Barker's hypothesis," (Armelagos et al 2009: 268).

All three of these mechanisms highlight how early childhood stress, the physical environment, and the later adult health status are interconnected. Individuals are not simply frozen static in a moment in time, but rather recognized as individuals with a life history.

Trauma

Trauma can provide insight into the health of an individual, as it can occur both from acts of violence as well as from disease. Trauma in subadult collections can be expected from three sources: accidents, the causes of which are not easily detectable in the archaeological record; child abuse, also a rare find; and disease-related fractures (Lewis 2007: 163). Subadult trauma in the archaeological record is not common. “It seems unlikely that children did not suffer injury in the past, but the nature of immature bone and rapid repair can mask the subtle changes, meaning that rates of non-adult trauma in the past are almost certainly an underestimate,” (Lewis 2007: 163). Clinical studies suggest that car accidents, abuse, and sports-related injuries cause most of the trauma seen in children today (Lewis 2007: 163). In the Spring Street Presbyterian Church subadult remains, few cases of trauma have been identified.

Stable Isotopes

The last data from the skeletal remains comes from a pilot study of stable isotopes. Stable isotope analyses on human remains are used to track food, water, and trace elements consumed and absorbed into the bone and teeth. Stable carbon and nitrogen are acquired by the types of foods one consumes, and as these isotopes are stable and are not subject to radioactive decay, they retain their signature within bone and teeth that are preserved. Terrestrial diets can be distinguished from marine diets, and levels of meat versus grain in the diet can be distinguished by the ratios of $^{13}C/12^{C}$ and $^{15}N/^{14}N$ in bone collagen and $^{13}C/^{12}C$ in bone apatite (Katzenberg 2008). The addition of stable oxygen isotopes ^{18}O to the analysis also allows researchers to examine patterns of migration. Oxygen is absorbed into bone hydroxyapatite from drinking water. ^{18}O levels are influenced in water by local environmental conditions, so variation in ^{18}O levels in a population would suggest a variety of points of origination for individuals within that population (Richards et al. 1998; Harrison and Katzenberg 2003; Bower et al. 2005; Coltrain 2006; Kosiba et al. 2007; Prowse et al. 2007; Coltrain 2007; Coltrain et al. 2007; Katzenberg 2009; Turner et al. 2009; Schroeder et al. 2009; Rutgers et al. 2009).

Much work on stable isotopes from children has focused on the topic of weaning, using $^{13}C/^{12}C$ in tooth enamel to estimate when weaning foods enter the diet, and therefore when the weaning process has begun (Wright and Scwartz 1998; Huray et al. 2006; Prowse et al. 2008; Katzenberg 2009). In a complementary measure, $^{15}N/^{14}N$ isotope ratios in bone collagen register in nursing children one trophic level above the mother's diet. When comparable samples of adult and children's remains are available, children who are still nursing can be identified versus those who have been weaned (Schurr 1997; Richards et al. 2002; Huray et al. 2006; Fuller et al. 2006; Jay et al. 2008; Katzenberg 2009). Stable oxygen isotopes ($^{18}O/^{16}O$) also contribute to weaning analysis as they register the isotope signature of drinking water. Similarly for ^{18}O as it is for ^{13}C, nursing infants consume water through their mothers' breast milk, which distinguishes nursing infants from those children that are fully weaned. When the water source switches, so does the oxygen signature; a nursing infant's ^{13}C shows slight tropic enrichment providing a second indicator of subadult diet. Weaning practices have been investigated in past settings with good success, including Iron Age and Medieval Britain (Richards et al. 2002; Jay et al. 2008), Imperial Rome (Prowse et al. 2008), and prehistoric Ohio (Schurr 1997), among other locations.

A 2011 pilot study of ^{13}C, ^{15}N, and ^{18}O from Spring Street included 5 subadult bone samples. Additional funding for stable isotope analysis was not secured during the time this research was completed. However, even with this limited pilot study, questions are raised for future research. In particular, future stable isotope studies will help shed light on weaning timing, dietary changes, and migration patterns.

Historical and Archival Sources

The emphasis in this dissertation on situating the skeletal data in the context of the site means that work has also been done with archival resources. In particular, this dissertation draws from two archives: the Presbyterian Historical Society (PHS) in Philadelphia, Pennsylvania, and the New York State Historical Association Research Library (NYSHA) in Cooperstown, New York.

PHS contains the surviving records from the church, including scattered sermons from the first pastor, the Reverend Matthew La Rue Perrine, images and a few documents from the Rev. Cox, and the meeting minutes of the board of trustees for the church and for the Third Presbytery, of which the church was a part. In this dissertation, these documents are referenced for information about who was in the congregation and the historical circumstances of the church.

NYSHA contains the letters of the Rev. Ludlow starting at age 11 to his mother Phoebe and his sister Caroline, as well as letters to his uncle Samuel from his youth and to his second wife later in life. Also mixed in are travel documents, sermons, poems, notes, and other assorted paperwork. Occasionally letters from Caroline to the Rev. Ludlow, to her girlfriends, or to her husband John Frey appear. Letters dated during the Rev. Ludlow's time with the church (first informally from 1825-1828 as a visiting pastor, and then as a permanent pastor from 1828-1837) are often cited in this dissertation. While he infrequently talks about his work in these letters, preferring instead to write about his travels, his friends and family, and his religious beliefs, the occasional mention of the congregation is present. In addition, his thoughts about life reflect one possible understanding of those in the church. As the pastor, we can assume at least some of his musings on, for instance, disease and morality would have been made known to his congregants.

The sermons included in his papers are an additional direct source of information about what he was preaching to those who would come to be buried in the vaults.

Beyond these documents, this dissertation also draws on several historical documents from the period that are not necessarily directly related to the church. These include the diary of a young girl who grew up in the city in the 19th century (Catherine Havens), parenting manuals, meeting minutes from the Common Council, and scattered news articles and reports. A wealth of secondary sources is utilized as well, including historical data compiled by other researchers who have worked on the Spring Street Presbyterian Church project (Rebecca White, Elizabeth Meade, Douglas Mooney, Ed Morin, and Katherine Hicks). Some of this work undertaken on the project has tracked names from the coffin plates that survived and found biographical information on the individuals and their families (White and Mooney 2010). This information is used throughout the dissertation to help "flesh out" the skeletons with documented lived experiences. Unfortunately these coffin plates, excluding two cases, could not be associated with a specific set of skeletal remains. However, they, like the population data from the commingled elements, provide insight at a different scale of analysis.

All of these historical sources are woven into the narrative alongside the skeletal findings to better illustrate the life experiences of childhood at the Spring Street Presbyterian Church. Together, these lines of evidence enhance each other and provide greater insight than any of them could on their own.

Comparative Sites

While this dissertation stresses the Spring Street Presbyterian Church as its own unique historical entity worth exploring on its own contextual merits, periodically in this dissertation a few comparative sites are discussed. Few sites have skeletal data that is comparable in both time and location. As discussed in Chapter 1, there are no contemporaneous sites from the city proper from the early 19th century. The following four sites are perhaps the most comparable.

Table 3.1: Comparative Sites

Site Name	Dates	Number of Individuals	Number of Subadults[27] (%)
Christ Church, Spitalfields, England (Reeve and Adams 1993)	1727-1859	938	187 (19.94)
St. Martin's Church, Birmingham, England (Mays et al. 2006; Brickley 2006; Mays et al. 2009)	1800s	857	164 (19.14)
First African Baptist Church, Philadelphia, Pennsylvania (Rankin-Hill 1997)	1825-1842	135	60 (44.44)
St. Thomas' Anglican Church, Belleville, Ontario (Saunders et al. 1993)	1821-1874	600	280 (46.67)

Christ Church, Spitalfields, a site with extensive historical documentation and a somewhat comparable 18th and 19th century location in England, is perhaps the best comparison. The church vaults were cleared during restorations, and of the 938 individuals, 400 had coffin plates with names, ages, and dates of death (Molleson et al 1993). This record allowed for extensive reconstruction of life histories. Many of the individuals were found to be middle class tradespersons and workers (Molleson et al 1993). Its burials were during a time of urbanization and industrialization in a city somewhat like New York. Of the individuals with historical information available, 91 are under the age of 21. Of those, 36 (39.56%) of them are from

[27] Definitions of the upper limit age for subadults used by researchers involved with these projects range from 15 years of age to 19 years of age. Data for number of individuals given for each site is based on the most recent publications or grey literature available; some sites have multiple numbers reported in the literature.

individuals less than a year in age, 37 (40.66%) are from those between one and five, and 18 (19.78%) are from those between 5 and 21 (Cox 1996: 20).

St. Martin's Church in Birmingham, England, is likewise an urban 19th century congregation. The site was not only urban but also industrial with noted high levels of industrial pollutants (Mays et al 2009: 407). This urban environment would have been similar to New York City, although the population may have been poorer and exposed to more industrial pollutants. Excavations at the site revealed 857 burials, 164 of which were from subadults (Mays et al 2006; Mays et al 2009). Of those discussed in the published literature, 37 subadults are between one and five years of age, 14 are between six and 10 years of age, and nine are between 11 and 17 years of age (Mays et al 2008).

St. Thomas's Anglican Church in Belleview, Ontario, while contemporaneous to Spring Street in time (1821-1874), would have been more rural. Historical information also indicates a more uniform European-based population than was present at the Spring Street Presbyterian Church (Saunders et al 1993). Settlers in the area were mainly from Britain, Ireland, and Western Europe. The area, while largely rural in the 18th century, would transition to a larger urban area late in the 19th century, with ties to the railroad and manufacturing (Saunders et al 1993: 268). And so in many ways, it is similar to the Spring Street Presbyterian Church, and yet reflects its own unique environment. Excavations in 1989 uncovered 576 skeletons, 80 of which could be identified from coffin plates and parish registers (Saunders et al 1993: 266). The MNI for subadults in this collection is 156 based on femorae (Saunders et al 1993:265-269). From this collection, 85 burials are from infants (54.49%), 32 are from toddlers and younger children (20.51%), and 39 are from older children through age 11.5 (25%).

A final comparative site is the First African Baptist Church in Philadelphia, Pennsylvania. This church is perhaps the closest in time and location, although the population which it served would have more uniform than a the Spring Street Presbyterian Church, as it catered specifically to an African American population. The church opened in 1809 under the direction of the Reverend Henry Simmons. A group of congregants broke away from the church in 1816 over issues of membership, and eventually settled on the Reverend's property in 1822. It is from that space that the burials were excavated. Few records remain that discuss this breakaway group (Rankin-Hill 1997:2-4). Sixty subadult burials were recovered that had been interred between1825 and 1842 (Rankin-Hill 1997:24-25). In this collection, 34 burials are from infants under a year (56.67%), 14 burials are from children between one and five (23.33%), and 12 are from children between the ages of six and 16 (20%).

These sites will be referenced for their health indicators, where available. Table 3.2 presents the comparative health data that will be referenced. Note that only three of the sites have information on conditions that will be discussed for the Spring Street Presbyterian Church subadults. This reflects the unsystematic reporting of subadult remains in the bioarchaeological literature.

Table 3.2: Pathology at Comparative Sites

Site Name	**N**	**With Rickets (%)**	**With Scurvy (%)**	**With Cribra Orbitalia (%)**
Christ Church, Spitalfields, England (Reeve and Adams 1993)	187	20 (1021.7)	0	63 (33.69)
St. Martin's Church, Birmingham, England (Mays et al. 2006; Brickley 2006; Mays et al. 2009)	164	21 (12.8)	N/A	16 (9.76)

First African Baptist Church, Philadelphia, Pennsylvannia (Rankin-Hill 1997)	60	1 (1.7)	1 (1.7)	3 (5)
St. Thomas' Anglican Church, Belleville, Ontario (Saunders et al. 1993)	280	N/A	N/A	N/A

These sites provide a backdrop against which some trends in age and health can be assessed. They, too, however, are unique sites enmeshed in their own historical and cultural contexts, and this dissertation is not focused on comparative analyses.

The discussion presented here allows for the remainder of this dissertation to focus in on the skeletal remains and history. The dissertation turns next to the bodies themselves.

Chapter 4: Vital Statistics

> *The ages at death make one of the most important elements in vital statistics. Combined with the ages of the living, they give us the means of measuring the value of life…*
> --John Bolles, 1843

Introduction

Bioarchaeological work recognizes the value in understanding not just an individual life story, but how that individual fits within a wider population of people. This chapter presents demographic data about children and mortality in the 19th century, derived from national historical data, coffin plates, and the subadults buried at the church. These historically-named "vital statistics" became increasingly important as the country grew and expanded. For this project, these vital statistics provide the backdrop for the analysis of the skeletal results. In particular, this chapter explores age distributions of childhood death and asks whether the subadult burials at the Spring Street Presbyterian Church are a good representation of historical patterns in the early 19th century. I begin by examining national, state, and local historical data. Then I turn to the data available from archival records, coffin plates, and the skeletal remains themselves. In the end, we see that the Spring Street Presbyterian Church does indeed match the expected distribution of childhood death, with nearly 50% of the subadult remains from infants, and only 5% from the oldest of the children. The examination of the patterns of age at death set up the discussions that follow in the next chapters.

National, State, and City Statistics

The population of the United States was growing and spreading in the first half of the 19th century (Haines 2000: 315; Klein 2012: 64). Efforts to track people and their movements, however, were not always consistent (Anderson 1988: 19; Haines 2000: 311). Economists and historians use historical records as best they can to infer and calculate population and mortality trends. We know that between 1790 and 1810, the population grew an average of over 3% each year (Haines 2000:314). This came from a combination of high levels of fertility in the early 19th century and growing immigration (Haines 2000:314-317; Klein 2012: 68). In addition, the East Coast, and particularly the Middle Atlantic States with their large cities, grew rapidly. In 1830, 33% of the population of the country was clustered in the Middle Atlantic States (Haines 2000: 319).

While population distribution and growth is well documented, mortality is not. Information on the mortality of children is particularly scarce. Although early forms of census taking started in the 1790s as required by the Constitution, the first time full national statistics were kept was 1933 (Anderson 1988: 14; Haines 2010). Early efforts dealt with the growing states and proportional representation in Congress (Andersen 1988: 14-16). This census data also helped determine taxation, and a manufacturing census was designed to track the growth of industry in the early 19th century (Andersen 1988: 16-19). The official Death Registration Area, the first multi-state tracking system, was not formed until 1900 (Haines 2000: 329). Few states tracked their mortality figures independently. Massachusetts was the first state to begin systematically recording vital statistics in 1842 (Haines 2000: 311; Haines 2010). What information is available is often incomplete. In Massachusetts in 1842, for instance, 35 towns were cited for not reporting their data (Bolles 1843: 16). In fact, prior to 1860, the statistics Massachusetts kept are not considered reliable, and, although they are often used as a proxy for national trends, they are not perfect comparisons for other locations (Haines 2000: 329).

One key figure for this dissertation is infant mortality. The first year for which experts can calculate infant mortality figures for the United States is 1850. That year, infant mortality was estimated to be 216.8 out of 1,000 live births for Euroamericans and 340 out of 1,000 live births for African Americans (Haines 2010).[28] In 1880, infant mortality was between 150-250 deaths out of 1,000 live births, a decline from earlier in the century (Klein 2012: 91).

Some individual cities, independent of state efforts, tracked their populations. New York City was one such city; in fact, it was one of the earliest. The first time census data was taken in New York City was in 1686 (Rosenwaike 1972: xvi). The city kept mortality statistics during the first half of the 19th century; starting in 1803, death certificates were required for all burials, greatly contributing to the effort to keep track of population growth, disease outbreaks, and mortality levels (Duffy 1968: 143). However, the city's births were not recorded until the 20th century, making some calculations, such as reliable infant mortality figures, impossible (Rosenwaike 1972: xvii).

On the other hand, general population growth can be tracked. New York City and Brooklyn had 177,000 residents in 1825, and by 1860 that area had increased to over 1 million residents (Rosenwaike 1972: 33). Deaths likewise increased, such that in 1811, the year the church was opened, 2,431 deaths were recorded, and in 1846, the last known burial date in the vaults, 11,411 deaths were recorded (Rosenwaike 1972: 176).

Historian of public health John Duffy has calculated from the City Inspectors' records that approximately one third of recorded deaths were from children under the age of two. In 1816, out of 2,739 deaths, 600 were children under two. In 1825, out of 5,018 deaths, 1,495 were children under the age of two (Duffy 1968: 259). Duffy further calculates that the annual average death rate for children under the age of five in between 1815 and 1819 was 952, and that number climbed to 1,291 in between 1830 and 1834 (Duffy 1968: 578-579).

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[28] 1850 is a little later than the last known use of the Spring Street burial vaults, but no national data is available before this date.

This should not be surprising, as the young were most vulnerable to the many epidemics that passed through the city, as well as to common fevers, weaning diseases, malnutrition, accidents, and infanticide (Scott 1989). Major sanitation issues cropped up with the increasing population in the city, and disease epidemics became a familiar part of life. As discussed in Chapter 2, there were outbreaks of yellow fever in 1805, 1819, and 1822, and of cholera in 1832 and 1834 (Duffy 1968: 101, 283; Werner and Novak 2010: 102). There were also smallpox outbreaks in 1824, 1834, and 1835 (Werner and Novak 2010: 102). And as previously discussed, scarlet fever increased between the years of 1840 and 1870 (Codran 1995: 34-35).

In the *Coroners' Reports: New York City, 1823-1842*, the most commonly listed cause of death for children in those decades was drowning, followed by suffocation and burning. For instance, Catherine Donahue, only five weeks old, died from "suffocation by being overlaid by her parents," (Scott 1989: 55). Being "overlaid" could have been an accidental death resulting from living and sleeping patterns, but the condition also served as a euphemism for infanticide. Other deaths include accidental poisonings, often with medications meant to heal; congestion, inflammation, and dropsy; malnutrition or marasmus; whopping cough; visitation by God; and various accidents and symptoms of disease.

The health of children was primarily a family concern, and there was a florescence of literature available to middling families on infant and childhood care and health (Brown 2009). Popular books like Mary Hunt Palmer Tyler's *The Maternal Physician: A Treatise on the Nurture and Management of Infants, From the Birth Until Two Years Old* (1811) stressed that it was the duty and obligation of mothers to attend to the health of their children. Tyler, wife of playwright Royall Tyler and upper class mother (Brown 2009: 191), writes,

> Some time since, while looking over a file of old newspapers, I cast my eyes upon the obituaries, and was forcibly impressed with the great proportion of children

> who are yearly consigned to the relentless grave under the age of two years. It evolved in my mind why it was so, and could not avoid concluding that it must be in some great measure occasioned by some gross mismanagement in mothers or nurses, or perhaps both (A2).

Tyler's observation that most of the children were under the age of two agrees with Duffy's calculations that one third of all deaths were those of young children.

Spring Street's Statistics

We would expect that, to a certain extent, the church would reflect the demographic makeup of the city, or at least of the neighborhood of the church. And yet neither the city nor the church were biologically stable populations. Thus the demographics of the church congregation and of those who would be buried in the vaults are important variables to consider.

Census Data

Census data can show us what families were like at the time, and if we parse the data, it can also tell us a bit about the numbers of children present. Historian Elizabeth Meade compiled a list of all families who were members of the church that she was able to identify in the 1820 and 1830 censuses. In these families, 105 children were recorded. In the 1820 census, 77 children were recorded. In the 1830 census, 28 children were recorded. Age categories changed between the two census periods. The data is presented in Table 4.1.

Table 4.1: Children present in 1820 and 1830 Census Data

Age	Under 5	Under 10	Between 5 and 10	Between 10 and 15 (1820) or 16 (1830)	Total Children Recorded
1820 Census	---	52	---	25	77
1830 Census	11	---	11	6	28

Adapted from Meade 2007

Though this data does not represent all families in the church, it does show that children were present in the congregation. More children were recorded in the 1820 census, and this may reflect the changing demographics of the area as it went from being part of the countryside to part of the heart of the city, and thus turned towards more working individuals and fewer families. Such families also may have required fewer children. The data also indicates that the majority of the children, in both census years, were younger. Fifty-two of the 77 children in the 1820 census were under 10 years of age, and 22 of the 28 children in the 1830 census were 10 or under. This opens up the question of when children left home and set out on their own or as apprentices, as they do not appear to be in family homes in great numbers over the age of 10.

Coffin Plates

Although historical records cannot give us exact statistics on the congregation, the burial context of the vaults can provide some additional details. Along with the skeletal data, some 56 whole and partial coffin plates were recovered at the site; of them, 10 were from children's coffins, representing 11 total children buried (two children were recorded on one coffin plate) (White and Mooney 2010: 41). The inscriptions from the children's coffin plates as transcribed by conservationists are in Table 4.2.

Table 4.2: Coffin Plates for Children

Charles Morgan Died 1(6)th Jany 1820 1 Yr 1 Month 12 Da	Ann Semantha Whelpley Died Febr 19th A 1825 Aged 14 Yrs& 2 D^{ys}
Emma Fitz Randolph died 16th Aug 1822 Aged 5 Yrs 8 Mo 12 Da	James Kauck Died 24th Sepr 1829 Aged 11 Months & 13 Das
Oswald Williams Roe Died 27th Nov 1822 Aged 10 Mon 5 Days	J W Root Died Nov 26th 1830 Aged 4 Mos 5 D
John R Clark died 21st Sept 1824 Aged 12 Yr& 10 days	Josephine Dunham Died Dec 1830 Aged 2 Yrs 10 Mos 22D
Alfred Roe Cox Born Feb 7, 1825. Edward Dorr Griffin Cox Born Sept 18, 1828. Died Jan 1,2 1832	Miles Ray Died 19th April 1835 Aged 1 Yr 8 Mos 17 D

Adapted from White and Mooney 2010: 45, Table 3.

Interestingly, most of these children died on the earlier end of the use of the vaults, in the 1820s. This is particularly worth noting, as the burials of children (as will be discussed below) are clustered in the oldest of the vaults. Additionally, only three of the ten plates are for girls. While this may be an accident of preservation, it does at least suggest a value difference.

Most importantly for this dissertation is the question of age. Does the data from the coffin plates match the statistics out of New York City more generally at this time?[29] Of the children with surviving coffin plates, 7.14% are infants (birth-1.5 years of age), 5.36% are toddlers and younger children (1.5-4.5 years of age), 3.57% are from older children (4.5-9.5 years of age), and 3.57% are from the oldest group (9.5-14.5 years of age). This distribution is illustrated in Figure 4.1.

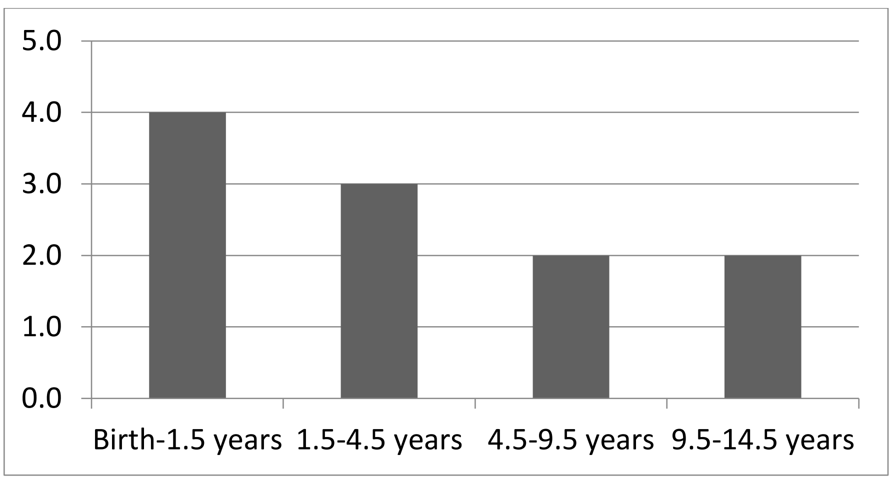

Figure 4.1: Age Distribution from Subadult Coffin Plates (N=10)

It is quite likely that there were more coffin plates that did not survive, so these findings represent only a fraction of those children buried in the vaults below. Moreover, not all children were interred with such plates. Coffin plates, as discussed previously, would not have been

[29] Further information about coffin plates is explored in the next four chapters.

affordable for all congregants, and so the fact that there are few plates also suggests that there was economic disparity in the vaults.

Skeletal Remains

While the coffin plates give some indication of the population of the vaults, the skeletal remains can provide perhaps more complete information on the demographics of those buried in the vaults. As discussed previously, the remains excavated from the Spring Street Presbyterian Church are organized into three categories: Burials, which were designated at the site by the archaeologists; Individuals, who were designated from a sort in the laboratory; and ossuary elements, which could not be associated with other elements. It is important to remember that the Burials and Individuals are of varying levels of completeness and have their age estimates from a variety of methods including dental aging, long bone length, and seriation. Seventy-three Burials and Individuals were identified. Table 4.3 displays the age distribution of these Burials and Individuals:

Table 4.3: Age Distribution of Remains

Age	**Burials**	**Individuals**	**Total (%)**
Birth- 1.5 years	9	23	32 (43.84)
1.5-4.5 years	3	19	21 (28.77)
4.5-9.5 years	5	10	15 (20.55)
9.5-14.5 years	0	5	5 (6.85)

There is a decrease in the numbers of children as the ages increase, which is consistent with initial statistics and what has been seen in the coffin plates:

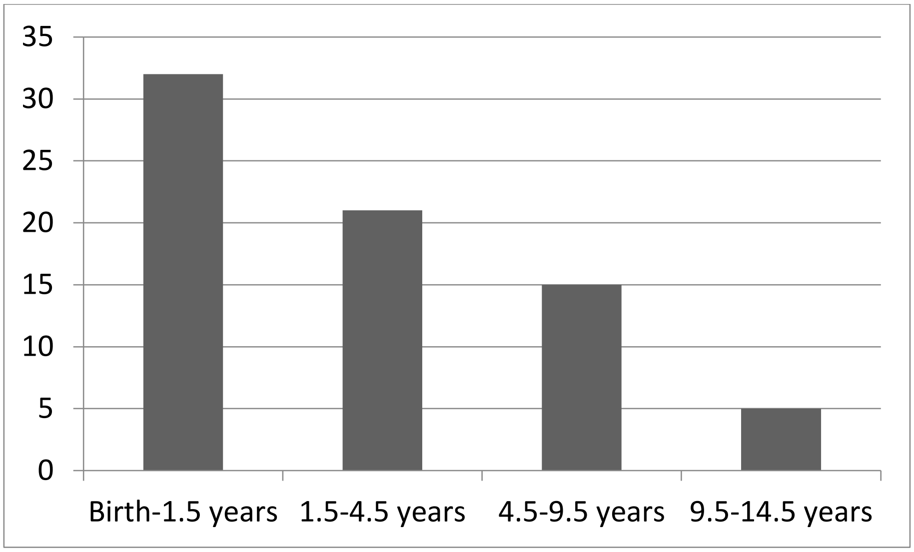

Figure 4.2: Age Distribution from Total Number of Burials and Individuals (N=73)

While the Burials and Individuals account for many of the subadults buried at the vaults, a great deal of the material also comes from ossuary analysis, as was discussed in Chapter 3. Table 4.4 below illustrates the MNI of each element discussed in this dissertation.

Table 4.4: MNI of Each Element [30]

Element	Number Right	Number Left	Single Element
Femorae	68	**75**	--
Fibulae	27	24	--
Humerii	50	65	--
Radii	51	54	--
Tibiae	69	70	--
Ulnae	41	47	--
Frontals	--	--	68
Occipitals	--	--	74
Parietals	65	72	--
Sphenoids	36	37	--
Zygomatics	7	14	--
Mandibles	13	7	36
Maxillae	37	30	--

[30] An additional 58 fragments from frontals and 48 fragments from occipitals were recovered. These fragments likely represent portions of other frontals and occipitals and so are not counted in the element MNI.

The most commonly occurring element in this collection is the left femora, which has an MNI of 75 (in bold). The majority of the femorae, some 54 (72%), were ossuary, while 8 (10.69%) were from burials and 13 (17.33%) were from individuals.

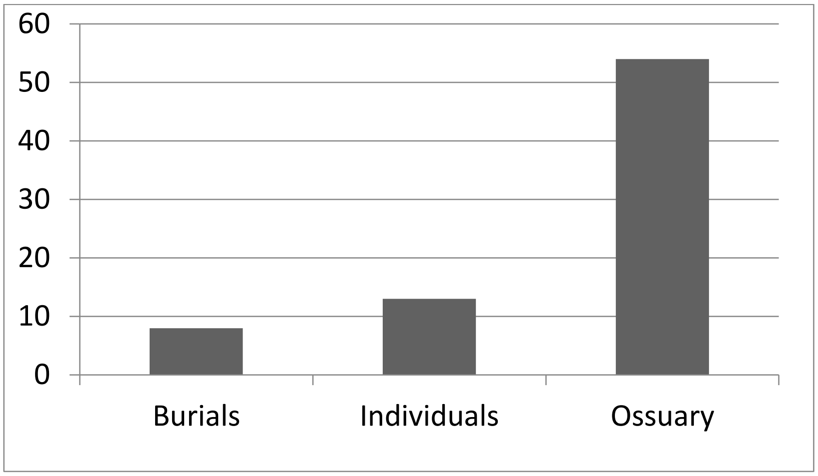

Figure 4.3: Association of Left Femorae (N= 75)

This distribution is largely a product of the collapse of the coffins and the excavation process, which left most of the remains commingled. However, the distribution of children's burials is not consistent through the four vaults. All 10 coffin plates were found in Vault IV, as were most of the skeletal remains. Table 4.5 shows the distribution of subadult left femorae.

Table 4.5: Distribution of Left Femorae

Vault Number	Total Left Femorae (%)	Femorae from Burials	Femorae From Individuals	Ossuary Femorae	Total
Vault I	1 (1.33)	0	0	1	**1**
Vault 2	7 (9.33)	3	4	0	**7**
Vault 3	2 (2.66)	1	1	0	**2**
Vault 4	65 (86.66)	4	8	53	**65**
Total	**75**	**8**	**13**	**54**	**75**

Of the left femorae, 86.66% were found in Vault IV. The majority of the adult remains were also found in Vault IV, one of the oldest of the vaults. Why the children are clustered in this area is unknown.

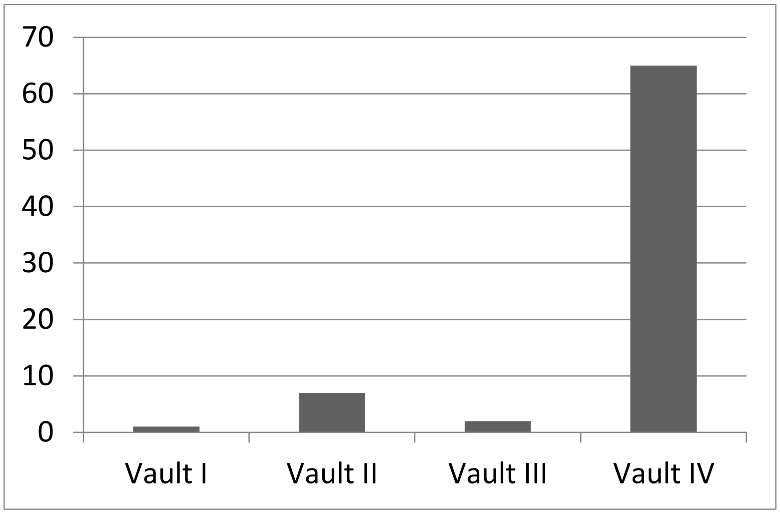

Figure 4.4: Distribution of Left Femorae (N= 75)

It is worth remembering that more children were recorded as congregants living in the area during the 1820 census than during the 1830 census (see Table 4.1). As Vault IV is one of the older vaults, it may simply be a product of the neighborhood and church demographics that more children are present in it.

Perhaps most importantly for the chapters that follow, the femorae also do not distribute evenly across the age categories. Instead, we see that nearly 50% of them cluster as infants, with far fewer in the other age groupings.

Table 4.6: Age Distribution of Left Femorae

Age	Number of Left Femorae (%)
Birth-1.5 years	37 (49.33)
1.5-4.5 years	16 (21.33)
4.5-9.5 years	10 (13.33)
9.5-14.5 years	5 (6.66)

As will be explored in the upcoming chapters, this distribution is not surprising; it represents the risks to which infants were most exposed, including infectious disease, weaning, and accidents. As children aged, these risks changed. When these percentages are represented graphically, the distinction between the age groups is quite striking, and very similar to the distribution seen in Figure 4.2, the age distribution from Burials and Individuals.

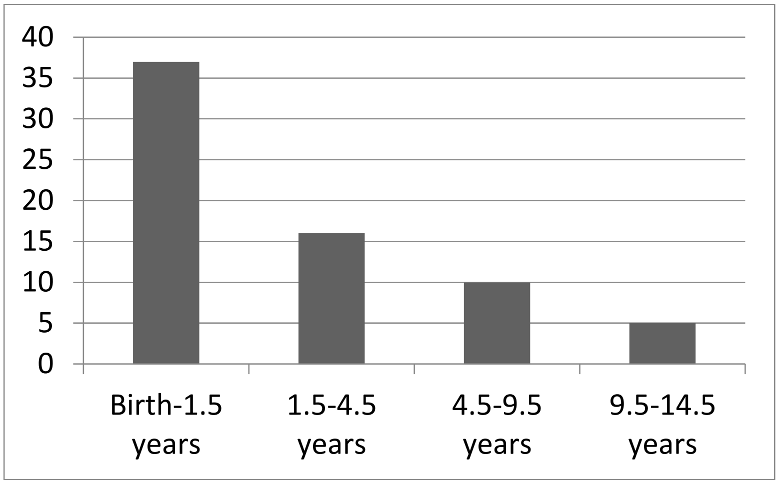

Figure 4.5: Age Distribution of Left Femorae (N=75)

Long bones are not necessarily the most reliable way to determine age, however.[31] Teeth, which are under a more tight genetic and thus chronological control, can be a better source for this data, particularly when they are in occlusion in a mouth and associated with other elements of an individual (Hoppa 1992: 276; Saunders et al 1993: 268; Miles and Bulman 1994: 122; Lampl and Johnston 1996: 348; Cardoso 2007:231). A single quadrant of the mouth, in this case the right mandible, was selected as a sample for age distribution in order to account for loose teeth, burials, and individuals. 170 deciduous and permanent teeth were observed. These teeth had good enough preservation for an age to be estimated. 103 are permanent teeth; 67 are deciduous teeth. The age distribution of the teeth follows:

Table 4.7: Age Distribution from Dental Sample

Age	Number of Deciduous Teeth	Number of Permanent Teeth	Total Number of Teeth
Birth-1.5 years	38	15	53
1.5-4.5 years	20	24	44
4.5-9.5 years	9	37	46
9.5-14.5 years	---	27	27

[31] See Chapter 3 for more on subadult age techniques.

In order to compare this distribution to the long bones, two teeth have been selected: deciduous molar one and permanent molar one. Bioarchaeologist Mary Jackes recommends the use of molars for analyses such as these as they are the most likely to be represented in a sample (2011:134). They were also among the more commonly occurring teeth with adequate preservation in the Spring Street Presbyterian Church sample. The MNI for the teeth appear in Table 4.8.

4.8: MNI for Deciduous and Permanent First Molars

Age	Deciduous M1	Permanent M1
Birth-1.5 years	15	---
1.5-4.5 years	8	12
4.5-9.5 years	3	10
9.5-14.5 years	---	3

When the dental MNIs are compared against the left femorae, the results are interesting. In both data sets, infants represent the largest grouping. Femorae continue to drop in number through the toddlers and younger children, down through the oldest children. Deciduous teeth likewise decline in frequency, in part because this first set of teeth is lost as children age. The permanent teeth likewise decline, after first appearing in the toddlers and younger children. The pattern is remarkably consistent, and indicates that, despite issues of commingling, age estimations from long bones and teeth are comparable and offer a fairly consistent MNI. When the age distributions from the Burials and Individuals as well as the coffin plates are all added in, we again see a consistent age pattern in this group.

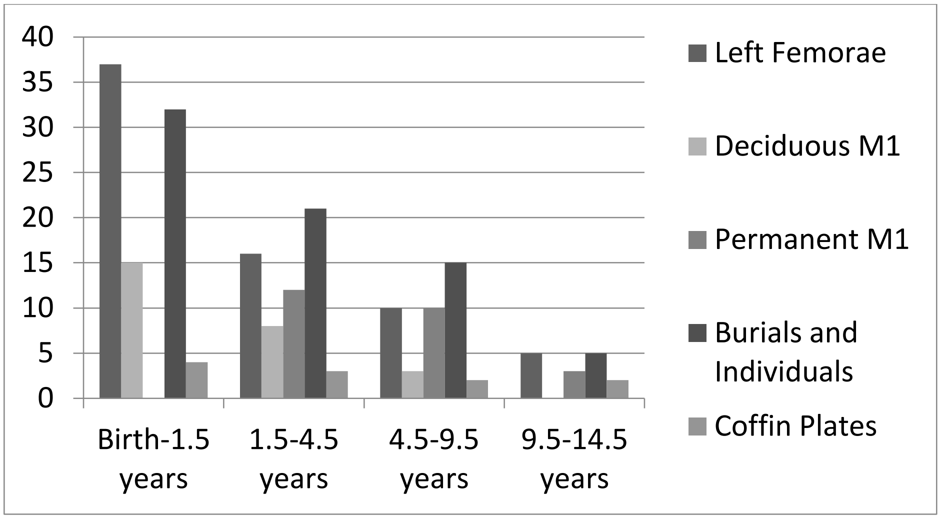

Figure 4.6: Comparison of Age Distribution between Left Femorae, Right Mandibular Teeth, Burials and Individuals, and Coffin Plates.

There is a steady decline in numbers present as the children increase in age, in all samples. The threats of early childhood, up until age 4.5, appear to be the most serious. The sharp decline once children reach 9.5 years of age suggests that the oldest of the children were the least vulnerable to the risks that surrounded them or possibly no longer present in the Spring Street Presbyterian Church congregation.

Conclusion

The start of this chapter posed the question as to whether childhood mortality at the church was consistent with historical data for the time period. Ultimately, it appears that the subadult remains buried at the church match the expected distribution. Interestingly, a few other questions emerge from this data. First, the lack of coffin plates for children raises questions of class. Only some members of the congregation could afford these plates, as is obvious by the fact that the MNI for the subadults is 75, yet only 10 coffin plates are present for these same children. We know from the historic documentation that the church was mixed class, and so this should not be surprising. It was reported that the Rev. Ludlow once said that the church was made up of individuals who could not afford pews elsewhere, and so it is not surprising to see that they could not afford coffin plates either (Meade 2010).

A second question emerges from the distribution of the remains within the vaults. The majority of the remains, and the majority of the subadults, are located in Vault IV, one of the oldest of the vaults. This may be related to burial activity, including the moving of coffins to make room for new burials in other vaults. It may also be related to demographic shifts in the ward that show fewer children present in 1830 than in 1820. Fewer children living in the area and attending church means that there would be fewer children to bury in the vaults, especially the most recent vaults built in 1831. It may also reflect the changing nature of burial in the city, with the increasingly restrictive burial laws and push to bury outside the city.

Finally, the age distribution of the remains is interesting. Across the board, whether the children are counted through coffin plates or skeletal remains, as individuals or as MNI estimations, the same pattern of age distribution emerges. The infants are the largest subadult population, followed by the toddlers and younger children, the older children, and the 9.5-14.5 year olds. This confirms two important ideas: first, it matches historical expectations for death patterns in the subadults. What risks to which these different groups were exposed will be explored in the upcoming chapters in order to help make sense of this trend. Second, it confirms age estimation techniques and verifies that, despite disparate age estimation methods used for individuals, long bones, and dentition, the resulting data appears to be consistent. Given the health concerns discussed in upcoming chapters, this is an important methodological consideration.

And so the data explored here sets up the questions the next chapters will examine. What risk factors are present that affect the distribution of age at death? When we incorporate the historical record, can we begin to see what risks were present and how those risk change as children grew older? The aggregate data presented here gives us an overall sense of the population. The next chapters of this dissertation examine parts of that data with the historical context and theoretical models previously discussed to begin to understand the experience of life and growing up in the Spring Street Presbyterian Church. These individual experiences, we find, indicate that the children buried at the Spring Street Presbyterian Church did indeed have changing health trends as they aged, and that their life and health experiences were somewhat unique when we compare them to other groups.

Chapter 5: Hearth and Home: Infants, Birth through 1.5 years of age

> *In the following work I propose to take the babe from the birth, and attend it through every stage until it is two years old; after which period children in general, having cut all their teeth, grow more robust (that is, if they have been properly managed,) and will increase in health and strength without any attention except the ordinary care conducive to cleanliness and exercise.*
> --Mary Hunt Palmer Tyler (1811: 18)

Introduction

The church, much like "American Matron" and writer Mary Hunt Palmer Tyler, regarded children under two years old as different than other children, in this case, charging the least for their burials (see Table 1.1). Infants also differ from other children in that they are the most dependent of children on adults, as Tyler points out. Their immediate world, comprised largely of hearth and home, influences their health, growth, and development. The dangers of these early years are also important: diseases, weaning, and accidents are prevalent for infants. And so it is not surprising that data from the remains of the subadults buried at the Spring Street Presbyterian Church have a large cluster of individuals in this age range (birth to 1.5 years).[32] Eight designated Burials are those of infants; an additional 19 infants were identified from the commingled remains.

Table 5.1: Burials and Individuals[33], Infants

Identification	Age	Preservation	Completeness	Pathologies
Vault II Individual A	Birth – 6 months	Good	2	Rickets
Vault II Individual B	Birth – 6 months	Good	2	----
Vault II Individual C	6 months –1.5 years	Poor	3	----

[32] Our age standards proceed in one year increments after the first six months. Therefore, this age group ends at 1.5 years. The next nearest age category ends at 2.5, which exceeds this range.

[33] It is important to note that Burials and Individuals are not necessarily discrete, as they are often incomplete and therefore may overlap with other Burials and Individuals.

Vault IV Burial 1-4B	Birth to 6 months	Good	2	----
Vault IV Burial 1-4C	Birth to 6 months	Good	3 Long bones only	----
Vault IV Burial 1-4D	Birth to 6 months	Fair	2	Rickets
Vault IV Burial 1-4E	6 months—1.5 years	Poor	1	----
Vault IV Burial 1-4F	6 months – 1.5 years	Good	2	Rickets; rib fractures
Vault IV Burial 1-4G	6 months – 1.5 years	Fair	2	----
Vault IV Burial 1-4H	6 months – 1.5 years	Good	2	----
Vault IV Burial 1-4L	6 months – 1.5 years	Good	3 Long bones only	----
Vault IV Burial 1-4N	6 months – 1.5 years	Good	3 Cranium only	SES; deformation of ectocranial surface; gray plaque
Vault IV Individual A	6 months – 1.5 years	Good	3 Cranium only	Postmortem craniotomy
Vault IV Individual B	6 months—1.5 years	Good	3 Long bones only	----
Vault IV Individual O	Birth – 6 months	Good	2	Periostitis right tibia
Vault IV Individual R	6 months – 1.5 years	Fair	2	Rickets, scurvy, cribra orbitalia, SES, gray plaque
Vault IV Individual U	6 months – 1.5 years	Good	3 Cranium only	Scurvy
Vault IV Individual Y	6 months – 1.5 years	Poor	3 Cranium only	Scurvy
Vault IV Individual Z	6 months – 1.5 years	Good	3 Cranium only	Scurvy; endocranial gray plaque; ectocranial porosity
Vault IV Individual II	6 months – 1.5 years	Poor	3 Cranium only	----
Vault IV Individual LL	6 months – 1.5 years	Poor	3 Cranium only	Cribra orbitalia; porosity on parietal

Vault IV Individual BBB	6 months – 1.5 years	Good	3 Long bones only	Rickets
Vault IV Individual CCC	6 months—1.5 years	Good	3 Long bones only	Rickets
Vault IV Individual DDD	6 months – 1.5 years	Good	2	Rickets
Vault IV Individual EEE	6 months –1.5 years	Fair	2	Rickets
Vault IV Individual HHH	Birth – 1.5 years	Good	3 Long bones only	Rickets
Vault IV Individual MMM	Birth – 6 months	Good	3 Long bones only	Widespread periostitis
Vault IV Individual PPP	6 months – 1.5 years	Good	3 Cranium only	----
Vault IV Individual MMMM	Birth to 6 months	Fair	2	----
Vault IV Individual PPPP	Birth – 1.5 years	Poor	3 Cranium only	SES; ectocranial porosity
Vault IV Individual QQQQ	Birth – 1.5 years	Good	3 Cranium only	Porosity
Vault IV Individual XXXX	Birth – 1.5 years	Fair	2	Rickets

Completeness: 1) 75% or more of skeleton is present; 2) 25-75% of skeleton is present; 3) 25% or less of skeleton is present.

The overall MNI for the infants, including Burials, Individuals, and commingled elements, is 37 based on left femorae, or 49.33% of the subadult collection (in bold; Table 5.2). As previously discussed, this is the single largest grouping of subadults in the collection.

Table 5.2: Elements from Infants

Element	**Number Right**	**Number Left**	**Single Element**
Femorae	21	**37**	--
Fibulae	8	7	--
Humerii	18	31	--
Radii	19	19	--
Tibiae	30	36	--
Ulnae	21	21	--
Frontals	--	--	24

Occipitals	--	--	30
Parietals	10	9	--
Temporals	12	11	--
Sphenoids	7	6	--
Zygomatics	4	2	--
Mandibles	5	6	15
Maxillae	6	5	--

Among the 56 coffin plate and coffin plate fragments recovered from the Spring Street Presbyterian Church vaults, four, or 7.14%, are from infants (see Table 5.3). The youngest with a coffin plate is J.W. Root, who died at the age of four months. Historical research shows that he was the son of a fur merchant (White and Mooney 2010: 45-50). There is also the silver coffin plate of Oswald Williams Roe, who died at the age of 10 months and 5 days. He was the nephew of silversmiths and the son of Peter Roe, a merchant (White and Mooney 2010: 50). His silver plate likely reflects both his uncles' profession and his family's middle class status. Additionally, all of the plates present for the infants are for boys. The infants buried in the Spring Street Presbyterian Church vaults also included the children of the Rev. Cox and the Rev. Ludlow, though there are no surviving coffin plates for the Rev. Ludlow's unnamed son or for Mary Liddon Cox (11/23/1831-11/25/1831).[34]

Table 5.3: Coffin Plates for Infants

Name	Information on Coffin Plate	Additional Historical Details
J. W. Root	"Died Novr 26th 1830" "Aged 4 Mos 5 Ds"	Son of James Root, Fur Merchant. Lived at 20 Bedford.
Oswald Williams Roe	"Died 27th November 1822" "Aged" "10 Months & 5 Days"	Son of Peter Roe, merchant. Lived at Dey c. Washington. Uncles were silversmiths in Kingston, NY.
James Kauck	"Died 24th Sepr 1829" "Aged" "11 Months & 13 das"	----

[34] Birth and death dates are not available for the Rev. Ludlow's first child. The only mentions of his life and death are in the Rev. Ludlow's letters, which do not provide any specifics.

Charles Morgan	"Died 1(6)th Jany 1820" "Aged 1 Yr 1 Month" "And 12 Days"	----

Information from White and Mooney 2010 and Hicks n.d.

What follows is an analysis of what the remains can tell us about the health and diet of the infants, and how this evidence relates to the first half of the 19th century and the historical literature about the church. As discussed in Chapter 1, we know that the amount of control children have over their own lives and behavior is in part determined by the structures by which they are surrounded. They both negotiate the *habitus* and also affect it. For the Spring Street Presbyterian Church children, those environments include family members and the home, their environment, the congregation, and the city space. For infants, family and home would have been perhaps the most important structures. Children up to the age of 1.5 years have more limited abilities to affect their environments than older children would. The subsequent outcomes of health and diet seen in the skeletal remains of the infants emerge from this primary relationship.

We should then expect the infants to reflect the challenges of the family. This might include nutritional deficiencies associated with weaning and food availability for adults, markers of stress from growth, and perhaps even signs of class difference in the timing of weaning and changes to diets. As expected, we do indeed see that infants have the highest rates of the metabolic conditions rickets and scurvy among the children from the Spring Street Presbyterian Church. However, the infants have the lowest rates of the non-specific health stressors cribra orbitalia and periostitis, which suggests that their young and vulnerable state may have prevented them from surviving challenges to their health, such as epidemic disease outbreaks, long enough for those conditions to affect bone. There is also a high frequency of cranial lesions in this age group. These lesions disappear in the older groups of children, which suggest that there is something specific about early life that contributes to these markers. Finally, the teeth do indeed show that some infants were weaning or weaned by the age of 1.5 through the presence of caries and attrition. This chapter examines these findings within the historical context of the home and family.

Historical Considerations

The home and the family are key structuring institutions in the first year and a half of life. It is where food, shelter, and safety for growing bodies was secured. The choices that adults make about food, clothing, and behavior directly influence the life experiences of the infants in their care. Thus it is important to consider how the environment of the city and the church affected the choices of adults.

We know that the city was a rapidly changing, urbanizing place. Availability of fresh food, clean water, and clean air was declining. The city was not clean, not sanitary, and not the lush farm land and village life that it had been a decade prior to the building of the burial vaults. At the outset of the 19th century, New York City had poor sanitation and water, but good quality food (Duffy 1968; Burrows and Wallace 1999). New York City was fortunate to have regulation of bread prices and butchers, resulting in city licensed and controlled markets and vendors (Duffy 1968). By the 1840s, however, bread price regulation was giving way to market forces, and markets themselves began closing as the city began licensing permanent butcher stores (Duffy 1968:423). This drove down the quality of goods and drove up the price.

A list of travelling expenses dated March 1830 from a member of the Ludlow family lists the price of several food items. It appears that either the Rev. Henry Ludlow or his brother-in-law John Frey noted such expenses for a trip from New York to Charleston, South Carolina, and back.[35] Figs are listed as $0.25, oranges as $0.50, oranges and lemons "for the voyage" as $1.12, a cigar as $0.37 ½, oysters as $0.37, and breakfasts at various establishments as from $0.30 to $0.50. The focus on fruit may be related to the traveling and the desire to ward off scurvy. In any case, it gives us an idea of the cost of fresh foods. The $0.50 paid for the oranges was more than $0.25 he paid for a servant (Expenses 1830). As a likely member of the middle class, these food items would have been more affordable and thus accessible than for individuals of the working classes.

For most of the year, the urban 19th century diet was low on fresh fruits, vegetables, and milk, with staples coming in the form of pork (mostly preserved) and breads, puddings, and potatoes (McIntosh 1995: 84-85). While the invention of the icebox in 1803 was leading towards more and better preservation of food, urban areas had difficulty accessing fresh foods, even in the summer, before they spoiled (McIntosh 1995:84). As noted previously, while fruit may have been expensive, sugar, on the other hand, was relatively cheap. New York City, as a port city, may have had more access to fish, but overall a worker's diet would have been lacking. The fruit that the Rev. Ludlow or Frey bought would have been a luxury for the working class. Historian McIntosh notes that a good meal for a worker in early industrial urban spaces would have been blood pudding (a byproduct of butchering) and butter crackers (1995:85).

We also know that Spring Street hosted a market at the docks during the early part of the church's existence. The Spring Street market was in existence from at least 1810 until it was closed and sold off in 1829 (Common Council 1931). Butchers, tanners, and fishmongers may have been present, and would have provided opportunity for food purchases for those in the

[35] This document was found among the letters of the Rev. Ludlow held in the Frey Family Papers at the NYSHA Library in Cooperstown, NY. The primary documents from this time period are letters from the Rev. Ludlow to his mother and his sister. Occasionally, a document from his sister's husband, John Frey, turns up in the files.

neighborhood. Once that market left, however, options may have been more limited. Parents would have been directly in charge of what food was available to infants, whether the infants acquired it through breastfeeding or through consuming solid foods. So the limitations that parents faced in acquiring food were passed down to the infants, and we might expect evidence of this to appear in the children's remains.

Additional food-related stresses for infants would come during the weaning process, a time when infants are particularly vulnerable. Of the weaning process, reformer Tyler writes "This is perhaps one of the severest trials a mother is called to endure; and no one can possible conceive the pang she feels when compelled to relinquish the sweet office of nurse to her babe, but those who have themselves experienced its fascinations," (Tyler 1811:140). Tyler recommends that children be weaned by the age of 12 months, and recommends that they be weaned on to bread and milk and other starches, and that they never be permitted any meat other than broths or jellies (Tyler 1811: 145-147). William Andrus Alcott, in his book *The Young Mother, or Management of Children in Regard to Health* (1836), on the other hand, recommends weaning take place between 12 months and 2 years as suits the mother (Alcott 1836: 150). He is less concerned with the age of the infant and more concerned that mothers do not begin weaning in late summer or early fall "…at which season bowel complaints are most common, most severe, and most dangerous," (Alcott 1836: 150). Alcott too advises the best weaning foods to be bread, milk, boiled rice, and also recommends against meat and rich foods (Alcott 1836: 152-153). These recommendations, of course, depend on a mother who is able to be home and nursing her child through the first year or two. Working mothers may have had to wean much earlier, and this would have been an important consideration for some of the mothers of the Spring Street Presbyterian Church, with its mixed class congregation. Thus the children of these families had very different experiences surrounding weaning. Evidence of this appears in the dental health discussed below.

Besides food and weaning, families also decided on appropriate behavior for children. During this time, there was a changing philosophy on children and childhood. Earlier forms of Puritan and Calvinist thought emphasized that infants were born in a state of sin and in need of saving: “they [Puritans] regarded even newborn infants as potential sinners who contained aggressive and willful impulses that needed to be suppressed….In Puritans’ eyes, children were adults in training who needed to be prepared for salvation,” (Mintz 2004:10; see also Cable 1975). Puritans, as Mintz writes, were interested in the “moral reformation of childhood” (Mintz 2004: 11). Furthermore, Puritans believed that infants who died and had not converted were sent to hell (Mintz 2004: 15). These beliefs are often lumped under the title of “infant depravity.”

In the 1830s and 1840s, however, the more liberal denominations began to adopt ideas about children as blank slates (courtesy of John Locke), malleable beings that needed to be sheltered and nurtured. Historian Barbara Finkelstein identifies two waves of this shift in the conception of childhood: the first, from 1790-1835, is the period of reformers. This time period saw the emergence of literature on how to raise children, such as Tyler’s book *The Maternal Physician*, and the development of institutions devoted to “saving” children who were in poor circumstances or in trouble (Finkelstein 1985: 119). In this phase, Finkelstein writes that the emphasis was on education and suppression of emotions (Finkelstein 1985: 118). Mintz further adds to this data on family size, noting that birth rates drop drastically during the 19^{th} century (Mintz 2004: 77). He attributes this change to a changing notion about children and economics, as the country shifted from a household economy that demanded large families, to the notion that each child was an investment (Mintz 2004: 77; see also Sellers 1994: 242). The institutionalization and emphasis on education in this first wave led to an atmosphere of regulation: “It was an atmosphere designed to stamp out differences among individual students, to secure a rigid conformity to rules and regulations,” (Finkelstein 1985: 121). All of this came from a belief that children needed to be sheltered from the world and protected (Finkelstein 1985: 124).

Finkelstein’s “second wave” focuses on this idea of separation from the evils of the world, increasingly centered on middle class families and the role of the mother as nurturer. Mintz notes that by the 1830s, even orthodox and evangelical Calvinists, the last to really hold on to the idea that children were born sinful, had changed their practices (Mintz 2004: 81). The emphasis was on education, and the literature on the subject continued to blossom, shifting its emphasis towards mothers and their duties (Cable 1974: 90)

In keeping with the new notion of mother as nurturer, body reform movements from the 1830s onwards began to stress clean, orderly bodies, particularly the bodies of children, as signs of clean, ordered morality (Brown 2009: 327). Regular washing of body and clothes was seen as a sign of regular spiritual care as well (Brown 2009: 329). Fresh air was stressed, and the middle class began to move towards dressing older children in light or airy clothing (Brown 2009; Cable 1974: 145). Middle class reformers such as Tyler wished away restrictive clothing for infants: “And I sincerely hope that they will be ere long be consigned to complete oblivion, together with the skull caps, forehead cloths, swaddling bands, and stays, in which our great grandmammas used to imprison their hapless offspring,” (Tyler 1811:136). And yet we know infants often continued to be swaddled by lower class mothers and by slaves and southern women (Brown 2009: 351).

Finally, even with a growing focus on healthy food and appropriate clothing, we know that many factors for infant health and death were out of families' control. Difficult births and disease outbreaks could take children from all groups. The Rev. Cox lost four children during his time in New York City. One of them, Mary Liddon Cox, is from this age group and likely buried in the Spring Street Presbyterian Church Vaults.[36] Mary Liddon died November 25th, 1831, two days after she was born (Cox 1912). The Rev. Ludlow's first child, who died a few days after birth, is also likely buried in the vaults. On June 25th, 1832, he wrote the following to his mother:

> Thus dear Mother has the cloud passed and sunshine throws its radiance around us. Our little Son was a fine boy and practical love desires his society. But God has done right – and acted in love, by taking him away. We were all together unprepared to receive such a blessing (Ludlow 1832b).

And so the death of the very young would have been common, albeit challenging and tragic for the families who loved them.

Other risks faced by these infants came right from their own homes and families. Entries in the *Coroners' Reports, New York City, 1823-1842*, which recorded names, ages, and causes of death for some of the city's residents, can elucidate some of these risks. Agnes Marie Johnston died at the age of two weeks when her mother gave her an opiate by mistake (Scott 1989: 108). John Smith died at the age of 9 weeks from marasmus, another name for malnourishment (Scott 1989: 195). These accidents, or intentional infanticides, were direct risks of infancy in urban, and often poor, environments. In the very clear case of a "female infant" of Ellen Connell, the girl died after "violence inflicted by the mother on the head and back of the child," (Scott 1989: 40). Ellen Connell had apparently only recently come from Ireland and was working as a servant (Scott 1989:40).

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[36] Archival sources indicate at least three of the Rev. Cox's children are buried in the vaults at Spring Street, likely buried there with their grandmother, Elizabeth Cleveland Cox (1756-1826).

Then there were the risks from the home environment itself, such as in the case of Mary Ann Riley, who died at the age of 9 months after she was accidentally burned (Scott 1989: 178), or the case of Archer Wilock, who at the age of 10 months died after falling “into a tub of water,” (Scott 1989: 224). Drowning and burning are the most common type of death for most age groups recorded in the *Coroners’ Reports*, and reflect the dangers of the rapidly urbanizing city (Scott 1989: iii).

And then there were the less dramatic deaths, those from infectious disease, fevers, and diarrheas. Michael McAvoy, a year and a half old, died from diarrhea caused by measles, acquired while traveling to the city in 1841 from Liverpool (Scott 1989: 128). Margaret Elizabeth McGinnis, a two month old, died from convulsions (Scott 1989: 135). The ten day old male infant of Ann McIntire and Barney McCormick died from “congestion of the lungs,” (Scott 1989: 136), as did John O’Neil Jr., at the age of 6 months (Scott 1989:162). Anne Lawrence, aged seven months, died from inflammation of the bowels (Scott 1989: 122). These types of entries in the *Coroners’ Reports* are unfortunately common.

While not all of these types of deaths are evident in skeletal remains, the diversity of infant experiences is represented. From the middle class children like Roe, a nephew of silversmiths and the son of a merchant, or the Cox and Ludlow children, to the unnamed experiences of the infants from the working class, we find that weaning time varied historically and in the evidence in the skeletal remains. Access to food, especially luxury items like fruit, would have varied, and this is corroborated in the remains by nutritional deficiencies. Given the varied historical records of this age group, it is no surprise then that there is a range of health outcomes in the skeletal remains of the infants buried in the vaults. As the deaths of the Rev.

Cox's children from scarlet fever remind us, infant death was common and cut across race and class lines.

Skeletal Findings

Infants are the most numerous group represented in the subadult remains. Each of the categories of markers of health discussed below highlights the conditions particular to infants, and each category will be examined for the remaining age groups and compared across age ranges. These categories are rickets, scurvy, cribra orbitalia, periostitis, cranial lesions, dental disease, and trauma. The prevalence of these conditions, examples of individuals with these conditions, and images of these conditions are detailed below and in each age chapter. This allows us to see the particular patterns for infants as well as the change in risks and health outcomes throughout childhood. The causes and implications of these conditions are elaborated upon in the Discussion section. Skeletal Findings exclusively presents the scientific data and evidence.

For the infants, high rates of rickets and the presence of scurvy give us insight into deficiency of both the children and their mothers. Combined with dental evidence of solid food consumption, we also see signs that weaning was taking place for up to a quarter of the children represented here. Lower rates of some non-specific health stressors likely reflect the fact that these children died young, while the presence of cranial lesions suggest very specific health stressors were indeed present, perhaps in the form of infectious disease. These markers are discussed in detail below.

Rickets

As discussed in Chapter 3, rickets is a vitamin D deficiency that results in weakened bones that bow, compress, and even break under the pressure of growing and moving bodies

(Brickley and Ives 2008). Vitamin D is synthesized from sunlight and food sources, and a lack of vitamin D leads to bone that fails to harden. Long bones are especially prone to showing evidence of rickets. Bowed limbs, expanded metaphyses, and fractures are diagnostic features of the condition in human remains (Brickley and Ives 2008). In the infants, as many as 52.78% have rickets, based on the left tibiae (see Table 5.4). This is exceptionally high, as will be discussed throughout the dissertation.

Table 5.4: Elements from Infants with Rickets

	Right		**Left**	
Element	N	With Rickets (%)	N	With Rickets (%)
Femorae	21	6 (28.57)	37	9 (24.32)
Fibulae	8	2 (25)	7	1 (14.28)
Humerii	18	5 (27.78)	31	2 (6.67)
Radii	19	7 (36. 84)	19	2 (10.52)
Tibiae	30	8 (26.67)	36	19 (52.78)
Ulnae	21	5 (23.81)	21	2 (9.52)

On the right side, arms and legs seem to be equally affected, between 23-37% of elements showing rickets. On the left side, the legs appear to be more affected than the arms. It is important to remember that bowing occurs because of movement and weight on limbs. So the more even distribution of bowing between arms and legs suggests behaviors such as crawling. This distribution changes in the younger children as discussed in the next chapter, illustrating the transition from crawling to walking. The cause of higher proportion of elements with bowing on the left side is unclear. And while this age group has the most cases of rickets, it is also the largest group, and, as will be seen in later chapters, the differences between this cohort and the next is not statistically significant.

In one extreme case, Vault IV Individual DDD, an infant between the ages of six months and 1.5 years at the time of death, the weight of the child caused the proximal end of the left tibia and fibula to compress and fracture (See Figure 5.1).[37] IV-DDD has widespread porosity on all elements, a product of new bone failing to mineralize and preserve in the archaeological record, and expanded sternal rib ends, a classic sign of rickets. The fractured tibia and fibula indicate a few things: first that the child was walking, as the compression fracture would have resulted from weight on the tibia and fibula. Second, the severity of the deficiency suggests that the child had been deficient for some time. Third, given the age of the child, IV-DDD was likely deficient while nursing, meaning that the child's mother was likely vitamin D deficient herself.

Figure 5.1: Compression Fracture of the Tibia, Individual IV-DDD. Arrow indicates compressed area.

This relationship to the deficiency of the mother also comes up in the case of Vault II Individual A. II-A was a very young newborn at the time of death, between nine lunar months

[37] This individual is represented by long bones and ribs. Age was determined using long bone length.

and one month post-birth.[38] Despite being so young, II-A shows signs of nutritional deficiency. All elements that are present have some porous lesions on the cortical surface, just like IV-DDD.[39] A sternal rib end is expanded and flared as well, again consistent with vitamin D deficiency. Given the age of the child, it is likely that the deficiency began in utero. Dietary deficiencies in a pregnant woman can affect the developing child, and II-A seems to be such a case.

These two case studies reinforce the biological connection between mother and infant, showing how health challenges experience by the mother affect the unborn and infants. As will be discussed below, the mother is the first and primary structure to which an infant is exposed. The presence of such severe illness in these two children does more than simply suggest that the children suffered; it also tells us about the health of the mothers, and the struggles those women faced in getting, and providing, adequate nutrition for themselves and their children. It perhaps also suggests something about the behavior of those mothers, and practices such as swaddling.

Scurvy

Like rickets, scurvy indicates that something is missing from the diet, in this case, vitamin C. Vitamin C affects the development of connective tissue, and movement can cause hemorrhaging (Ortner and Ericksen, 1997: 213). In particular, locations on the skull can develop formative lesions and porosity associated with this hemorrhaging, especially at muscle attachment sites related to chewing or suckling. However, porosity at these locations can be indicative of other stressors on those attachment sites, and so the presence of porosity is not

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[38] This individual is represented by partial cranial and postcranial elements. Age was determined using dental calcification and long bone length standards.

[39] Along with IV-A and IV-DDD, three other cases of this widespread cortical bone porosity from rickets are present among the infants.

necessarily diagnostic of scurvy. Typically a complete skeleton is needed for a definitive diagnosis. The commingled nature of this collection inhibits conclusive diagnoses. However, the presence of some elements with lesions consistent with or suggestive of scurvy is noted here, based on work done by Geber and Murphy (2012) that outlined an approach to commingled remains.

Table 5.5 shows the results for infants in this collection, categorized by lesions that are consistent with or suggestive of scurvy.

Table 5.5: Cranial Elements from Infants with Scurvy

	Right		**Left**	
Element	**N**	**With Lesions (%)**	**N**	**With Lesions (%)**
Maxillae	6	4 (66.67)	5	1 (20)
Sphenoid	7	0 (0)	6	0 (0)
Orbits	9	4 (44.44)	7	5 (71.43)

Over 66% of right maxillae and 20% of left maxillae have bone formation consistent with scurvy. Additionally, over 44% of right orbits and over 71% of left orbits have bone formation suggestive of scurvy. Infants and toddlers and younger children are the only two groups with these lesions. Between these two age groups there is no statistically significant difference, however. The presence of this condition exclusively in these two age groups suggests that its presence may be related to weaning stress.

One individual with lesions suggestive of scurvy is Vault IV Individual R. IV- R is a subadult between the ages of six months and 1.5 years, and is represented a partial cranium and a few long bones.[40] What makes IV-R so interesting is this infant's suite of pathology: the infant has rickets, as indicated by bowed femorae, an expanded ischium, flared metaphyses on all long

[40] Age based on long bone length and cranial suture closure. Preservation is good.

bones, and porosity along posterior surfaces of long bones. In addition all endocranial surfaces have *serpens endocrania symmetricans* (SES) (lytic lesions, discussed more below) and all cranial elements have formative bone on the endocranial surfaces (see Figure 5.2).[41]

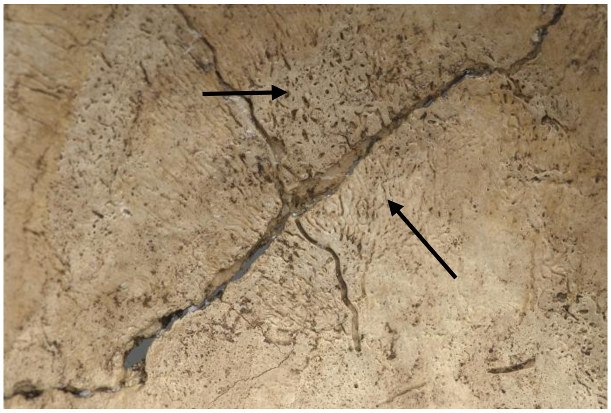

Figure 5.2: SES on the Occipital, IV-R.
Arrows indicate some of the affected areas.

In addition, the left orbit has formative lesions suggestive of scurvy (Figure 5.3). In short, IV-R seems to have had a suite of health concerns, including rickets, cranial lesions, and probable scurvy. The potential for scurvy is not surprising, as overall the health of this individual seems to be poor and the diet deficient.

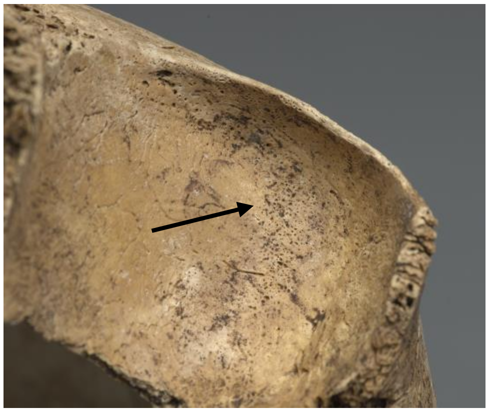

Figure 5.3: Formative Lesions in the
Left Orbit, IV-R. Arrow indicates lesions.

[41] Cranial lesions are discussed below.

Once again, at such a young age, the poor health of this child suggests that the mother was likely also deficient. It is also possible that, given the range of health conditions seen in IV-R, this child was particularly disadvantaged. Perhaps caregivers did not have access to appropriate foods; perhaps the family was socially disadvantaged, whether by class or race. The fact that IV-R had so many health challenges indicates that the immediate caregivers likely struggled as well.

Cribra Orbitalia

As introduced previously, cribra orbitalia is the name used to describe lytic lesions, or porosity of the eye orbits of the frontal bone. The etiology of this condition is debated, with some research indicating it is related to iron-deficiency anemia, and other research suggesting it is more likely related to B12 anemia or trauma (see Walker et al 2009). Whatever the specific etiology, the porous lesions on the eye orbits are caused by diploë expansion of the bone and are visible as small holes on the orbital roof. Among the infants from the Spring Street Presbyterian Church, 16 eye orbits are present. Of the seven left eye orbits, none show evidence of cribra orbitalia. On the right, 44.44% of the orbits show cribra orbitalia, or four out of the nine present (see Table 5.6).

Table 5.6: Cribra Orbitalia in Infants

Side	N	With Lesions (%)
Left	7	0 (0)
Right	9	4 (44.44)

As will be shown later in the following chapters, the infants have fewer lesions than the toddlers and younger children or the older children. It seems that the longer children live, the longer they have to be exposed to deficiencies, stress, and trauma, and so the fact that the infants have a lower occurrence of cribra orbitalia may be linked to their shorter life span.

Periostitis

In the infants buried at the Spring Street Presbyterian Church, periostitis is fairly *uncommon*, particularly when compared to the toddlers and younger children in this series. Periostitis is a reaction to trauma or infection that results in new bone growth developing localized or widespread patches on an element (Weston 2006:28; Wheeler 2012: 225). Localized periostitis is more likely related to trauma, while widespread periostitis is more likely associated with infection (DeWitte and Bekvalac 2011; Ortner and Putschar 1981). Table 5.7 shows the cases of periostitis in the infants.

Table 5.7: Periostitis on the Long Bones of Infants

	Right				Left			
Element	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**Total Lesions**	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**Total Lesions**
Femorae	21	1 (4.76)	0 (0)	1	37	2 (5.40)	1 (2.70)	3
Fibulae	8	1 (12.5)	0 (0)	1	7	0 (0)	0 (0)	0
Humerii	18	1 (5.56)	0 (0)	1	31	0 (0)	0 (0)	0
Radii	19	0 (0)	0 (0)	1	19	0 (0)	0 (0)	0
Tibiae	30	4 (13.33)	0 (0)	4	36	3 (8.33)	1 (2.78)	4
Ulnae	21	0 (0)	0 (0)	0	21	0 (0)	0 (0)	0

The highest frequency appears on right tibiae with 13.33% of elements showing evidence of a periosteal reaction. On the left side, the fibulae, humerii, radii, and ulnae have no evidence of periostitis, and on the right, the radii and ulnae have none as well. In the infants of the Spring Street Presbyterian Church, periostitis is most likely to be found on the legs. Some conditions, including scurvy, have been linked to periosteal reactions of the legs, which may account for its presence. All cases of periostitis here are widespread, indicating that they are more likely connected to infection rather than trauma. All but two of these cases are also active, indicating the infection was present at the time of the infants' deaths.

One interesting case of periostitis in this collection comes from Vault IV, Individual MMM.[42] IV- MMM is a subadult between the ages of birth and six months.[43] What is interesting about IV-MMM is that all of the elements that are present are wrapped in a sheath of periostitis. Formative bone circumscribes the shafts of all of the long bones. It is obvious in places where damage has occurred postmortem and the periostitis is peeled away, revealing smooth, healthy cortical bone underneath (See Figure 5.4). IV-MMM has no other obvious pathological lesions.

Figure 5.4: Left Fibula with Periostitis Sheath, Individual IV-MMM

This infant was clearly undergoing some kind of systemic stress. Inflammation of the periosteum resulting in widespread bone formation suggests widespread bleeding or infection between the bone and periosteum. Research suggests that such a widespread and severe periosteal reaction in children can result from tuberculosis, syphilis, and infantile cortical hyperostosis (Ortner 2003; Lewis 2007). And yet none of these conditions can be diagnosed from the periosteal reaction alone. In fact, Lewis argues that infantile cortical hyperostosis as a diagnosis has been overused by paleopathologists as "…a catch-all to describe widespread lesions on infant remains," (Lewis 2007: 145). Lewis suggests that some of the lesions may be

[42]This individual is represented by a complete left clavicle, complete left and right femora, a mostly complete right tibia, and a fibula fragment. The bone is in good condition.

[43]Age was estimated from long bone length measurements.

confused with rickets and scurvy (Lewis 2007:144-146). Given the age of the child, infectious disease and/or malnutrition might be contributing factors as well.

Cranial Lesions

As discussed in Chapter 3, the etiologies of cranial lesions are, in general, even less clear than those of cribra orbitalia and periostitis. They include formative and lytic lesions and occur on endocranial and ectocranial surfaces. Researchers have suggested these lesions result from everything from tuberculosis to meningitis to trauma (Lewis 2004: 82). It is likely that the lesions observed have a variety of origins. Some types of lesions overlap in some individuals, while others do not. They may indicate infectious disease, malnutrition, or a growth disruption. Unfortunately little literature exists discussing these conditions (Lewis 2004). Table 5.8 shows the frequencies of cranial lesions in infants.

Table 5.8: Cranial Lesions in Infants

		Endocranial			**Ectocranial**
Element	**N**	**Formative (%)**	**Porosity (%)**	**SES (%)**	**Porosity (%)**
Frontal	24	2 (8.33)	0 (0)	0 (0)	3 (12.5)
Occipital	30	1 (3.33)	1 (3.33)	1 (3.3)	3 (10)
Left Parietal	9	1 (11.11)	1 (11.11)	1 (11.11)	2 (22.22)
Right Parietal	10	1 (10)	0 (0)	1 (10)	2 (20)

The most common lesion observed is ectocranial porosity. Of the left parietals, 22.22% have porosity, and of the right parietals, 20% have porosity. This particular porosity could represent early stage porotic hyperostosis (Ortner 2003). Porotic hyperostosis is often associated with cribra orbitalia and iron-deficient anemia, although like cribra orbitalia, no clear etiology is known. In the early stage, porotic hyperostosis can present as pinpoint ectocranial porosity (Ortner 2003). However, rickets can also cause similar lesions, and the porosity documented here cannot be definitively diagnosed as porotic hyperostosis (Ortner 2003; Lewis 2007).

Serpens endocrania symmetricans (SES) is only represented by three cases in the infants' remains, whereas more cases are present in the toddlers and younger children, again suggesting that the length of the life span and level of exposure experienced by the infants was not long enough to allow the condition to be recorded in bone.

One case of SES and endocranial formative lesions shows up in Vault IV, Burial 1-4N. IV-1-4N was between six months and 1.5 years of age at the time of his or her death.[44] SES and the formative lesions are both present on the occipital and sphenoid (see Figure 5.5). It would be interesting to know if the conditions are related. Unlike IV-R discussed earlier, this individual has no postcranial elements and only one partial orbit. So, we are unable to determine if other pathologies are present, like rickets or possibly scurvy. The commingled nature of this collection, therefore, limits some interpretations and associations of conditions.

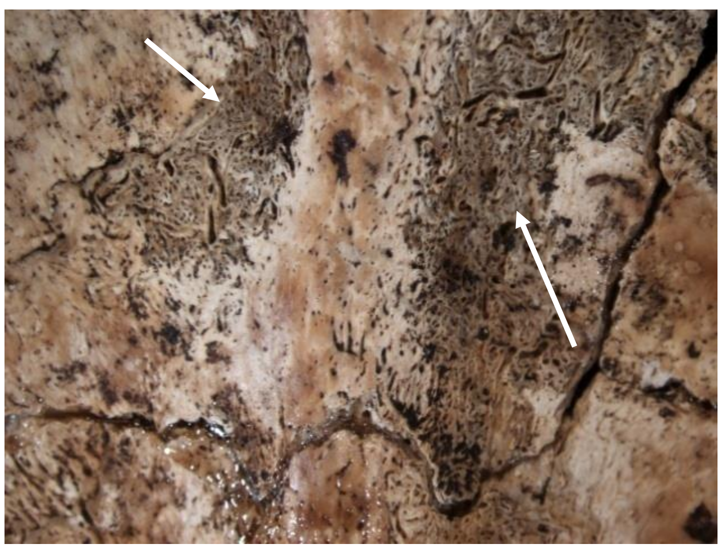

Figure 5.5: SES and Endocranial Formative Lesions on the Occipital of Burial IV-1-4N. Arrows indicate lesions.

[44] This individual is represented by occipital, a frontal fragment that includes the left orbit, and the right greater wing of the sphenoid. Age is based on seriation.

Dental Health

Dental health refers the rates of carious lesions in teeth and the presence of attrition, or wear.[45] As discussed previously, carious lesions result from the fermentation of food particles caught on or between teeth (Roberts and Manchester 2007). Attrition, or wear, occurs because particles abrade the tooth surface, wearing it down. This can be caused by food, the preparation mechanisms for food, or by using the teeth as tools (Roberts and Manchester 2007). In particular for the infants, presence of caries and attrition indicate solid food in the diet, a clue to understanding when weaning ensued. Table 5.9 presents the results of these lesions on the teeth of infants.

Table 5.9: Dental Pathology in Infants

Tooth Type	**Number Observed**	**Number Carious (%)**	**Number with Attrition (%)**
Rdi^1	0	0	0
Ldi^1	0	0	0
Rdi_1	1	0 (0)	0 (0)
Ldi_1	0	0	0
Rdi^2	0	0	0
Ldi^2	1	0 (0)	0 (0)
Rdi_2	0	0	0
Ldi_2	0	0	0
Ldc^1	1	0 (0)	0
Rdc^1	1	0 (0)	0
Ldc_1	1	0 (0)	1 (100)
Rdc_1	1	0 (0)	0 (0)
Rdm^1	5	4 (80)	0 (0)
Ldm^1	4	1 (25)	1 (25)
Rdm_1	5	0 (0)	0 (0)
Ldm_1	4	1 (25)	1 (25)
Rdm^2	2	1 (50)	0 (0)
Ldm^2	1	1 (100)	1 (100)
Rdm_2	2	0 (0)	0 (0)
Ldm_2	3	0 (0)	0 (0)
Total	**32**	**8 (25%)**	**4 (12.5%)**

[45] The other age groups also have other dental pathologies examined, including growth disruptions, abscessing, and congenital deformations. None of these are present, however, in the infants.

The teeth listed here are those that can reasonably expected to have been erupted, and therefore exposed to potential bacteria and wear.[46] The MNI for this group is 5. The most commonly occurring teeth are the deciduous first right maxillary molar and first right mandibular molar. It is worth noting that no permanent teeth were observed in this age group. Of the 32 teeth observed, 8 are carious, or 25%. Four out of the 32 (12.5%) show signs of wear. Considering that children who are fed exclusively breast milk would not be likely to have carious lesions or wear present, this suggests that some portion of this age group was indeed in the process of weaning and consuming solid foods that had both enough grit to wear down teeth and enough sucrose to encourage carious lesion formation.

The data from specific teeth are interesting as well: the only second left deciduous maxillary molar has both attrition and carious lesions. On the right side, one out of two, or 50%, has a carious lesion. Most of the lesions and wear are found on the molars, and more is found on the maxillary teeth than the mandibular teeth. Given that this grouping represents at least five children, we can assume that some of these teeth, many of which are commingled, represent individual children with exposure to foods that cause both carious lesions and wear. Attrition, when combined with the location of the pathology, suggests that some children were actively chewing solid foods.

Trauma

While trauma in this collection is not prevalent, in the infants, there are two notable cases. The first is the previously discussed pathological fracture in Vault IV Individual DDD. This fracture is caused by bearing weight on bone weakened from rickets. The only other

[46] Teeth also had to be complete enough for an age estimation to be made.

individual in this age cohort with trauma is Vault IV Individual A. IV-A was between the ages of 6 and 12 months when he or she died.[47] All that we have identified from this individual is an incomplete cranium. The cranium has been section so that the top portion could be removed. Craniotomies at the time were rare and usually done in conjunction with autopsy or illicit dissection for education. Novak and Willoughby note that this particular craniotomy seems to have been done with some skill with a fine-toothed saw (2010: 139). The presence of this skull, along with a second older subadult skull and one adult skull, raises questions about why it was included in the vaults. There were at least two doctors in the congregation, Dr. John Ray and Dr. Joseph Hanson, noted on a list of elders in 1822. Additionally, the death of a young child might have raised questions causing a family with enough means to request such an examination postmortem.

Discussion

This dissertation has suggested that learning about the life experiences of the children of the Spring Street Presbyterian Church involves understanding the rings of structure within which they were enmeshed. Structures are the social norms of society, the ordering and enabling institutions and relationships that surround us (Giddens 1979:25). The body acts as the vehicle by which we interact with these structures and act or have agency within them, and so in order to understand the shape of the body left behind, we have to be aware of the sociality with which the biology was interacting. Sofaer reminds us that "…the materiality of the body is brought into being over the life course through social practices," (Sofaer 2006: 129) and that those social practices shape the body through everything from diet to social interactions. What defines different categories of bodies, in this case different age stages, is how bodies are formed by

[47] Age based on fusion of sutures, including the sutura mendosa.

changing circumstances around them, that is, are differently exposed to their worlds (Sofaer 2006: 129-130).

For the infants, the home and caregivers is the first and perhaps most important of these structures. Additional relationships likely existed with the neighborhood and physical environment that surrounded that family life. Beyond that, we must also consider the interactions with institutions to which the family and caregivers, and by extension then the infants, would have belonged; most centrally, this includes the church. And then, of course, we also have to consider the city itself, with its flow of people, goods, and ideas that were reshaping all aspects of life in the early 19th century. Given the skeletal data above, we can begin to draw some conclusions about these rings of structure and how they influenced the lives of infants.

Mothers and Caregivers

The first, and perhaps most influential structure, in the lives of infants is the mother or caregiver. The relationship starts with total dependency in utero and then shifts towards a more fully realized relationship in infancy. There are biological consequences of the actions of the mother and other caregivers. Perhaps the most obvious of these is nutrition. The rapid growth of infants means that they require very specific nutrition (Lewis 2007: 97). The deficiencies that we see in some of the infants' remains related directly to what was available to, and chosen by, the mother for her own diet and for the diet of her infant. Breast milk, up until 4 to 6 months, is traditionally the best supplier of these nutrients (Lewis 2007: 97-99). It contains lactose, iron, and zinc, all of which are necessary for adequate growth (Lewis 2007:98). Deficiencies in these compounds in the mother lead to breast milk deficiency, and may contribute to rickets and scurvy. Weaning off of breast milk too early may also lead to deficiencies for the infant, and the weaning process at any age exposes children to new pathogens and bacteria.

Weaning foods can also be problematic or dangerous, with research suggesting that cow's milk, for instance, can lead to bleeding in the stomach and thus contribute to anemia and diarrheas (Lewis 2007: 99-100). And so the weaning period is a crucial time for children. The choices mothers and families make about weaning—when to start, when to stop, and on to what foods to wean—have a big impact on the health of children.

So what about the infants discussed here? Both vitamin D and C deficiencies can be tied to dietary practices. The fact that this age group has such a high frequency of rickets means that we do have to consider the actions in this first structure—the actions of the mother and caregivers—as important. Rickets was known in the 19th century, although the exact causes of the condition were not clear, and some, like Tyler, tied it to weaning practices. Tyler quotes an unnamed authority who writes that feeding an infant improper food, particularly food that is too thick, or too much food at any one time, "…prevents this work of digestion, and, by making bad juices, weakens instead of strengthens the habit; and in the end produces worms, convulsions, rickets, kings-evil, slow fevers, purging, and general decay," (qtd in Tyler 1811: 38). She then writes that she believes that nursing until at least the age of two prevents many common childhood illnesses, including rickets (277).[48] She adds that infants, "…for want of proper attention to their first complaints [of these conditions], and sufficient exercise in the open air, too frequently afflict them through a long life, or sink them to an early grave," (Tyler 1811: 277).

Alcott writes of the same cause for rickets as Tyler, saying "A mistake is often made, in connection with weaning, in giving the child not only too much food, but that which is too solid, or too rich….And if there should be a tendency in the child's constitution to rickets, scrofula,

[48] There is a discrepancy in Tyler's advice; at one point, mentioned earlier in this chapter, she recommends weaning take place by 12 months, and later says to breastfeed until 2 years of age. It is possible that her earlier recommendation may be for the beginning of weaning rather than the cessation of weaning.

consumption, and other wasting diseases, such a course would be likely to bring them on, and destroy life," (153-154). While Tyler and Alcott's understanding of how weaning foods caused rickets is incorrect, they were correct in seeing improper weaning—weaning on to the wrong foods—as a potential culprit in this condition.

The high rates of rickets in the infants could very well be related to weaning choices. However, since rickets can also be caused by lack of exposure to sunlight, other behavioral choices could contribute to the condition in the infants. For instance, clothing choice could have had a great impact on vitamin D and rickets. Lack of exposure to sunlight due to swaddling would have increased the risk for infants. As mentioned earlier, reformers like Tyler were concerned with ending this practice, and yet many women still swaddled their infants. Like dietary causes, this behavior on the part of caregivers directly impacts the resulting health of the infant.

Scurvy must also be considered in this primary relationship. As high as 71% of orbits have lesions suggesting scurvy and as high as 66% of maxillae have lesions consistent with scurvy. Scurvy is directly related to diet and weaning time can be complicit in vitamin C deficiency. In fact, Lewis notes that the most common age for clinical cases of scurvy in children is between 6 months and 2 years of age (2007:127). In particular, this is associated with deficiency of the mother, weaning stress, and rapid growth (Brickley and Ives 2008).The data from the infants fits with the clinical data presented by Lewis, and also with the skeletal indications of weaning and general dietary stress.

In the historic record, however, there is little discussion of scurvy as related to infants. This may be in part because of a lack of understanding of the disease or a product of its association with other diseases, like dropsy.[49] The only reference among parenting manuals that I have found comes once again from Tyler, who recommends strawberries for the treatment of "…long and obstinate diarrhoeas, and an excellent remedy for the scurvy," (Tyler 1811: 274). It is possible that the symptoms of scurvy—rashes, tender gums, bleeding—may have been associated with weaning more generally for this group and perhaps were less likely to be noted as a separate condition. And, it is worth remembering that the lesions observed here are not definitively diagnostic of scurvy, and may very well be associated directly with weaning stress more generally. Tellingly, there is also a decline in number of cases of scurvy in toddlers and younger children, and a complete disappearance of the condition by the time we reach the oldest subadults.[50] And so weaning appears to be a significant factor in this pathology.

If we are to understand weaning as a possible cause of rickets and scurvy, this is where it is then crucial to turn to another piece of skeletal evidence: the dentition. Twenty-five percent of the teeth have carious lesions and 12.5% have some degree of attrition, both of which indicate the presence of solid food in the diet. This means that at least some of the infants were weaning or weaned. In addition, they were being weaned onto foods that had some grit present, enough to abrade the surface of some teeth. The foods also had enough sucrose present to encourage bacteria fermentation and carious lesion development. While Alcott and Tyler recommend weaning at or around age two, not all mothers had the luxury to wait that long. Given the mixed class neighborhood and congregation, some mothers may have had to wean much earlier. The dental caries and attrition confirm this.

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[49] Dropsy was a medical term used to refer to any swelling of soft tissue.

[50] It is not a statistically significant decline, however.

The non-specific diseases can also give us some insight into this primary relationship. The infants show a relatively low occurrence of cribra orbitalia and periostitis. Up to 44% of orbits have lesions from cribra orbitalia. And while that number might seem high, it is lower than what will be seen in the toddlers and younger children and older children. It is present, however, and as it is sometimes associated with iron-deficiency anemia or B12 anemia, it suggests missing nutrients and/or stress, again possibly related to some weaning in the population.

Similarly, rates of periostitis are low, with the highest occurrence at 13.3% in right radii. Since periostitis develops over time in reaction to trauma or infection, it is not surprising to see a relatively low occurrence of the condition in these infants. They simply may not have lived long enough to have reactions in skeletal elements to trauma or infectious disease. What occurrences there are could be tied to specific instances or perhaps to other conditions, like scurvy.

The cranial lesions also suggest stress—possibly infectious disease, or possibly related to metabolic conditions—and their prevalence in the infants as well as the toddlers and younger children and absence in the older children and teenagers present a pattern that is intriguing. Unfortunately, at this time, no clear etiologies are known for these lesions. And yet given that the relationship with the mother and caregivers was likely the most important factor in infant health, and the fact that these lesions disappear as children grow older—and, perhaps, more independent—we might consider them related to this age and the vulnerabilities and risks associated with infancy.

Institutions

In these ways, the role of the mother and subsequent caregivers are crucially important in the health of the infants. For this age cohort, it may be the most important structure. And yet, this analysis posits the choices made by mothers and caregivers as true *choices*. We know, however, that constraints existed on the family from the outside environment. The choices adults made were based on the resources available, the rules and advice passed down from family members and institutions, and were full of all of the challenges of the early 19th century in New York City.

Specifically, the church would have served as a structuring institution, as the faith, pastors, and community would have been proscribing beliefs and behavior, including who should be a part of the congregation and what foods were appropriate to eat. Religion, as Mellor and Shilling (1997) argue, uses the body to create and control the religious experience. Christian rhetoric often relies on imagery of the body and can also use the body as site of reformation and control (Mellor and Shilling, 1997:37). These can include controlling the diet through fasting and body reform; controlling behaviors such as sex, social relationships, and discipline, both for adults and children; and controlling emotions, such as creating the sublime experience in Catholic rites or the attempt to curb such emotions in some Protestant denominations (Mellor and Shilling, 1997). One such ideology was the church's political stance on race. Recall that those with more melanin in their skin are more vulnerable to vitamin D deficiency. The fact that the church ideology encouraged a multiracial congregation is important. The composition of the congregation may be predisposing the remains to higher rates of rickets.

In addition, there is suggestive evidence that the pastors of the church were connected to Sylvester Graham and his body reform movement, mentioned previously (Abzug 1994). This movement was reacting to both the emerging market economy and conceptions of moral impurity. Grahamites, as they were called, were supposed to shun commercially made bread and eat only bread made at home from special Graham flour. Additionally, meat, hot foods, and beverages other than water were to be avoided. Finally, in the most extreme cases, eating was to be restricted to the bare minimum necessary to survive (Abzug 1994). A testimonial from a woman who grew up on one of these restricted diets notes that she was allowed to eat

> …only bread and vegetables and dr[i]nk water….we became more dyspeptic, however, and, of course, thought we must diet more rigidly; we partook of but one meal in twenty-four hours, and this consisted of a thin slice of bread, about three inches square, without water….Thus we passed most of our early years, as many can attest, in hunger, pain, weakness, and starvation," (Griffith 2004: 75).

Dietary reforms, even if they were not this extreme, when coupled with food availability, clothing choice, and ancestry, could be a contributing factor to vitamin D deficiency and vitamin C deficiency.

The City

Choices by families were also structured by what was available for those families. For instance, we know from the historic record that fresh fruits and vegetables were hard to come by for some adults. When the markets closed at the end of the block on Spring Street, families would have had to go further from home to acquire goods. We know too that even in a port city, fresh food was hard to come by. In the winter, it may not have been available at all. In the summer, it quickly spoiled. And on top of this, the cost of items such as oranges exceeded the cost of items like sugar. Such dietary constraints on adults undoubtedly affected their children.

And so factors of the environment need to be considered as well. As discussed in Chapter 2, the streets of the city would have been full of trash left behind by corrupt street cleaners. Fresh water was a constant issue. Diversifying neighborhoods could lead to tense labor relations, and census data reminds us that there were a variety of household types within the congregants of the church. Such a range of life circumstances—Euro-American and African American, immigrant and native, working and middle class—contributes to the variety of infancies observable in the remains.

Similarly, weaning timing is about more than just simple choices made by families; it is also about the social circumstances of those families. Mothers who had to work outside the home would have had to wean earlier. We know that in the church there would have been women laboring in early industry, in shops, and on the streets. Similarly, there were middle class families, like those of the pastors, who may have had time to be home with children and nurse longer. The range of women, and the rationales for the choices they made, goes far beyond advice manuals like those written by Tyler and Alcott. The presence of dental pathology, scurvy, and rickets in the infants, while a product of the relationship with the mother and caregiver, is also a product of the environment in which these adults lived.

One really important example of this comes with the discussion of rickets. The previously mentioned fact that the neighborhood and congregation included African Americans is very important. Melanin in the skin blocks UV radiation and vitamin D synthesis, and thus those with darker skin in northern latitudes are particularly susceptible to rickets. Such biological and social structures—who was in the congregation and what their ancestries were—are contributing factors to the health conditions we see in the infants. New York City at this time with its diverse population and family types predisposed the church to such diversity and, therefore, infancies.

Conclusion

Given this, we can begin to elaborate on what it was like to be an infant who did not survive in the congregation. Up to 25% of the teeth show signs of weaning, suggesting that weaning was occurring during this stage for at least some children. Children of this age group had a one in four chance of being vitamin D deficient, likely from combination of ancestry, clothing choices, and/or food deficiencies. They had a greater than 50% chance of having hemorrhaging consistent with scurvy, and a 44% chance of having stress indicators from cribra orbitalia. Infants had fewer instances of cranial lesions and periostitis, but both are present, suggesting that the risk of exposure to infection or trauma was present. And yet, at the same time, half did not have rickets, a third did not have scurvy, and three quarters of them show no clear signs of weaning. The structures with which the infants interacted—mother, caregivers, physical environment, and institutions—contributed to this range of potential experiences.

What these conditions can do is point us back towards individual experiences, like that of Individual IV-MMM, the birth to six month old wrapped in a sheath of periostitis discussed earlier. This systemic inflammation suggests an infant who was very ill, and recalls the stories from the *Coroners' Reports* of infant suffering and death. And then there is the case of Individual IV-R, who had cranial lesions along with rickets and possible scurvy, a combination of conditions that indicate very serious nutritional deficiencies. These particular cases remind us that individual children in this congregation were indeed suffering, and that that suffering is a product of the social and institutional relationships the infants experienced.

And yet so many of these factors related to the health of the infants related to the city itself; the changing neighborhood, including the closing of the market, the availability of food, and the types of families living in the 8th Ward, was tied to the shifts in the economy, in the politics, and in immigration in New York City in the first half of the 19th century. What makes the infants buried at the Spring Street Presbyterian Church so unique is precisely this complicated set of factors. And while, with the infants in particular, we are most narrowly concerned with hearth and home, those hearths and homes are in part products of this complex time period and location.

We know too that families struggled to understand the death of their young children. The Rev. Ludlow, in trying to come to grips with the death of his own firstborn, turned to his faith and the Bible when he wrote the following to his mother:

> "A living man should not complain for the punishment of his sins" My life has been one of unusual events and it regards prosperity- but I cannot truly say, I cannot enjoy the gift of unless I [respect] the Giver too. Pray that I may and A too find the end of the rod, like that of Jonathon, dipped in honey (Ludlow June 5th, 1832c).

Chapter 6: Exposures: Toddlers and Younger Children, 1.5-4.5 Years Old

> *One little boy, four or five years old, saw, as he passed to and from his school, a man who kept his store open on the Sabbath. One day he saw the man standing in the door, and went up to him and said 'Sir, you ought not to keep your door open to-day' 'Why?' said the man. 'Because it is wicked, sir.' 'How do you know that?' said he. 'Because God says, Remember the Sabbath day to keep it holy.' The man turned and went in; he could not stand the force of an infant's reproof. Soon after, the child came to his teacher for a Tract on keeping the Sabbath, to give to the man.*
> --Rev. Ludlow (1833)

Introduction

The child in the story above could have been a contemporary of some of the toddlers and younger children buried in the vaults at Spring Street. These children, 1.5 to 4.5 years in age, were moving out into the world, having survived the perilous first year and a half of life illustrated in the previous chapter. And yet the risks they encountered were still very real. While infants primarily interacted with family and the home environment, we expect that the toddlers and younger children were able to explore more away from the home. For instance, schooling for some children started as early as 18 months, and we know that the Spring Street Presbyterian Church had a Sunday school for this group. And while more interaction outside the home meant that these children may have had more agency, like the boy in the story above, it also means they may have been exposed to new risks and encounters. And so it is perhaps no surprise that this group is the second most numerous of the subadults buried in the Spring Street Presbyterian Church vaults. Twenty-one Burials and Individuals have been identified in this age range (see Table 6.1).

Table 6.1: Burials and Individuals[51], Toddlers and Younger Children

Identification	Age	Preservation	Completeness	Elements Present	Pathologies
Vault I Individual A	1.5-2.5	Poor	2	Cranium only	---
Vault II Burial 2	2.5-3.5	Good	2	Cranium and long bones	---
Vault III Individual A	2.5-3.5	Fair	2	Cranium and long bones	Cribra orbitalia; ectocranial lesions; periostitis
Vault III Individual B	2.5-3.5	Fair	2	Cranium and long bones	---
Vault IV Burial 1-4K	2.5-3.5	Good	3	Long bones only	---
Vault IV Burial 1-4O	1.5-2.5	Good	3	Cranium only	---
Vault IV Individual Q	2.5-3.5	Good	3	Cranium only	Cribra orbitalia; SES
Vault IV Individual S	1.5-2.5	Good	3	Cranium only	---
Vault IV Individual T	1.5-3.5	Good	3	Cranium only	SES
Vault IV Individual V	1.5-2.5	Good	3	Cranium only	Cribra orbitalia; ectocranial porosity; endocranial formative
Vault IV Individual W	1.5-2.5	Fair	3	Cranium only	Cribra orbitalia
Vault IV Individual X	1.5-2.5	Fair	3	Cranium only	Endocranial porosity; endocranial formative
Vault IV Individual AA	1.5-3.5	Excellent	3	Cranium only	Endocranial porosity; ectocranial porosity
Vault IV Individual BB	1.5-2.5	Good	3	Cranium only	Endocranial porosity; ectocranial porosity

[51] It is important to remember that Burials and Individuals are not necessarily discrete, as they are often incomplete and therefore may overlap with other Burials and Individuals.

Vault IV Individual CC	1.5-2.5	Fair	3	Cranium only	SES
Vault IV Individual DD	2.5-3.5	Good	3	Cranium only	Cribra orbitalia; ectocranial porosity
Vault IV Individual FFF	2.5-3.5	Good	3	Long bones only	Rickets
Vault IV Individual TTT	1.5-3.5	Good	3	Cranium only	---
Vault IV Individual UUU	1.5-3.5	Fair	3	Cranium only	SES; endocranial porosity; ectocranial porosity
Vault IV Individual YYY	2.5-3.5	Good	2	Long bones only	Rickets
Vault IV Individual KKKK	1.5-4.5	Poor	3	Cranium only	Cribra orbitalia
Vault IV Individual OOOO	1.5-3.5	Fair	2	Cranium only	Scurvy; cribra orbitalia; endocranial formative; blunt force trauma; SES

Completeness: 1) 75% or more of skeleton is present; 2) 25-75% of skeleton is present; 3) 25% or less of skeleton is present.

When all elements are accounted for by ossuary analysis, toddlers and younger children make up 21.33% of the subadults based on left femorae (see Table 6.2).

Table 6.2: Elements from Toddlers and Younger Children

Element	**Number Right**	**Number Left**	**Single Element**	**Number Unknown**
Femorae	**20**	17	--	0
Fibulae	6	4	--	0
Humerii	13	14	--	0
Radii	11	8	--	0
Tibiae	23	12	--	0
Ulnae	8	10	--	0
Frontals	--	--	17	--
Occipitals	--	--	21	--
Parietals	15	15	--	0
Temporals	18	16	--	0
Sphenoids	6	5	--	0

Mandibles	2	1	3	2
Maxillae	4	2	--	0

In addition to the skeletal remains, the three coffin plates recovered for individuals from this age group highlight that the risks faced by the toddlers and younger children would include conditions like scarlet fever, which took the life of three year old Edward Dorr Griffin Cox, the Rev. Cox's son, just a day after it killed his older brother (see Table 6.3). And even the children of doctors were not immune, as Miles Ray, who died just shy of his second birthday, was the son of a physician. Two of these coffin plates are for boys, as versus the previous age cohort, in which all were for boys. The historical information recovered for Cox and Roe also remind us that they came from middle class families. Once again, we must remember that the mixed class congregation means that only some could have afforded coffin plates. For these children, coffin plates were present for a doctor's son and a Reverend's sons. Unfortunately, there is no additional information for the lone female with a coffin plate, Josephine, but we can assume that her family had some means since she was buried with a coffin plate.

Table 6.3: Coffin Plates for Toddlers and Younger Children

Name	Information on Coffin Plate	Additional Historical Details
Edward Dorr Griffin Cox	"Alfred Roe Cox" "Born Feb 7th 1825" "Edward Dorr Griffin Cox" "Born Sept 18th 1828" "Died Jan 1, 2 1832"	Son of Reverend Cox. Lived at 3 Charlton. Died in a scarlet fever outbreak and buried with his brother. Grandmother and two sisters also buried in the vaults
Josephine Dunham	"Died 23 Dec 1830" "Aged 2 Yrs 10 Mos 22 D"	-----
Miles Ray	"Died 19th April 1835" "Aged" "1 Yr 8 Mos& 17(D)"	Son of Dr. John E. Ray. Lived at 1026 Franklin.

Information from White and Mooney 2010 and Hicks n.d.

In the infant cohort, we saw high rates of rickets, the likely presence of scurvy, some non-specific health markers like cribra orbitalia, periostitis, and cranial lesions, and early signs of weaning in the dentition of some. We might then expect that the toddlers and younger children would have different skeletal markers than the infants, given their potential to interact with more around them. As they also survived this earlier life stage, we might expect that they may have covered from the previously discussed conditions. In the infants, rickets and scurvy would have been at least in part associated with parenting behavior. More exposure to sunlight and more control over food choice could mean that the toddlers and younger children should exhibit fewer lesions associated with these conditions. On the other hand, an extended life course means that there is more time for bone changes associated with illness to accumulate. Thus higher rates of the nonspecific conditions like periostitis might be expected, particularly periostitis related to activity.

This chapter will discuss the expanding social and material world of the toddlers and younger children, followed by an exploration of the skeletal findings in light of that setting. Some of the expected patterns do hold. The prevalence of scurvy, for instance declines in this age group, and periostitis increases. At the same time there are also some interesting trends: rickets continues to be a concern, as do cranial lesions. And, cribra orbitalia increases. The sociocultural and environmental conditions at the time can help make sense of these emerging trends.

Historical Considerations

Toddlers and younger children would have had some of the same risks as the infants did: dangers in the home and city, issues with access to proper food and sunlight, and the risks associated with epidemic and infectious diseases. And yet, toddlers and younger children differ in that they may have had more ability to decide what they ate, how they acted, and what their days were like. In addition, more of these children may have spent substantial amounts of time during the day away from home in early schooling programs. And so a discussion of life for these children should begin by understanding the widening structures to which they were being exposed and by which they were being sculpted.

Bourdieu considered the role of structure through the lens of the *habitus*. The *habitus* is learned through observation and imitation, through practices rather than discourses (Bourdieu 1977: 87). And so if we are to understand how the children of this group interacted with their worlds, exercised their agency, and embodied their sociality, we should take our cue from Bourdieu and his ideas of the transference of the *habitus*. Educational experiences both expose children's bodies to more of their immediate environments and expose children's minds to the structures of their society. Like the young boy at the start of this chapter, toddlers and younger children were beginning the process of adapting to and potentially perpetuating the *habitus* of their families, church, and city.

This era saw a variety of educational programs develop, many of them aimed at toddlers and younger children. This was the beginning of formal education in the United States, but it was not a uniform system. Rural areas more often had community school houses than urban areas, and education itself varied greatly by state and town (Kaestle 1983). It is estimated that in 1800, 37 percent of children under the age of 20 were in school in New York State, with that figure rising to 60 percent by 1825, with more children in rural areas in school than in urban areas (Kaestle 1983: 24). Historian of education Carl Kaestle links the rise in schooling in this era both to heightened political interest in the wake of the revolutionary era and the revival movements of the First and Second Great Awakenings (Kaestle 1983: 25).

Among those developing educational programs were religious institutions, whose leaders established schools as ways of reaching the public. Most of these programs were aimed at converting children while they were young. Sunday schools began springing up in the city in 1816 (Mohl 1972: 121). “The Sunday school movement drew upon humanitarian fervor and attempted to spread morality through the urban community as a method of social control,” (Mohl 1972: 123). Sunday schools were about saving children, through the learning of both morality and more basic skills such as reading and writing.

This would have included the Spring Street Presbyterian Church’s multi-racial infant class. Infant classes were a fashion picked up from England, and were designed to reach children while they were young and “unspoiled” (Laquer 1976; Kaestle 1983: 47). These schools were aimed at children of the working poor and particularly aimed at children of working mothers (Kaestle 1983: 47). Some infant schools started with children as young as 18 months, and continued working with them up through six years of age. About these schools, Kaestle writes, “To reach children as soon as they could walk, educators thought, was to break through the generational transmission of poor character and rescue infants from the newly alarming and vicious environment of early American cities,” (1983:48). Besides these child-saving ideologies, these schools also had the practical effects of relieving working mothers from providing day time care to their children when they could be working (Kaestle 1983: 47). This is an interesting consideration for the remains of the children of this age group, as weaning and weaning timing is in part related to the availability of the mother. School, by presenting a day care option for mothers, may have encouraged weaning in children before two years of age, the preferred age as proposed by reformers Tyler and Alcott, and we see signs of weaning behavior in the remains of the children of this age group.

For the more affluent, the education of children could come in other forms, including a tuition-based system of day schools, tutors, or boarding schools (Kaestle 1983:51). Some of these institutions received state grants, while others ran completely on private funds (Kaestle 1983:51-52). In her 1849 diary, Catherine Havens writes about her mother's experience with schooling in New York City in the first half of the 19th century. [52] Catherine herself was a child of the upper class, as Pflieger writes, "Catherine Havens (b. 6 August 1839) was born into a fairly prominent family which had lived in New York City for several generations. Her father, Rensselaer Havens (b. 13 March 1772), was a prominent merchant: a ship-owner and founder of an insurance company who rented warehouse space to John Jacob Astor," (Pflieger 2006). Of her mother and schools, she writes,

> The school at first was at 148 Chambers Street, on the south side near Greenwich Street….. On the wall in the four corners of the girls' room were oval places painted blue, and on them in gilt letters were inscribed, Attention, Obedience, Industry, Punctuality…. On top of the desks were little frames with glass fronts for the copies for writing, and the copies were slid in at the sides. Some of them were, Attention to study, Beauty soon decays, Command yourself, Death is inevitable, Emulation is noble, Favor is deceitful, Good Humor pleases, et cetera. (Havens 2006 [1920]: 99-102).

Catherine's mother's school exemplifies some of the *habitus* that was central to a moral education. An attention to the rules of society and a focus on the end of life as ever-present is consistent with the ideology of the Second Great Awakening, the revitalization of religious faith and fervor in the first half of the 19th century.

Catherine also writes of schools in her day, listing them by location and the women who ran them. Interestingly, she notes one school and church run by a male minister, Dr. Cheever: "On the corner of Fifteenth Street next to Spingler Institute is the Church of the Puritans. Dr. Cheever is the minister, and he and the church people are called a long name, which means that they think slavery is wicked, and they help the black slaves that come from the South, to get to

[52] Her diary was originally published in 1920 and transcribed into a web resource by Pat Pflieger in 2006.

Canada where they will be free," (Havens 2006 [1920]: 99-102). This was an abolitionist congregation. Catherine later identifies herself as an Old School Presbyterian, and writes of her grandfather's friend, the Rev. Cox, and labels him a New School Presbyterian (Havens 2006 [1920]: 136-137). These ideological and political elements were a part of the exposure and education of the children, and we can assume that the Spring Street Presbyterian Church's Sunday school would have been installing political and ideological messages in the children as well.

Much like the charity schools that the working and poorer classes attended, these upper class schools emphasized morality along with intellectual development. Yet, Kaestle argues, there was one fundamental difference: those institutions frequented by the middle and upper classes stressed education as an *extension* of family life, a continuation of the children's education at home within the moral and ethical structures provided by their mothers and family. On the other hand, Kaestle argues that the charity schools aimed at the poor or children of working mothers were explicitly attempting to "intervene between parents and the children of a supposedly alien culture," (Kaestle 1983: 55). These schools, in trying to "save" children, attempted to *intervene* between them and their parents. This follows from the infant schools' development in England, where Laquer writes "…children [were] considered by Sunday schools and religious organizations as the advance troops, leading an invasion of godliness into their parents' houses," (Laquer 1976: 7). Reformers were looking to reform society through children's education.

The religious and moral component of many of these education models was often non-denominational, but very clearly aimed at integrating religious practice, prayer, and behavior. For example, the 1829 publication *The Christian Reader: Designed for Use in Schools in the*

United States, published by the American Tract Society, includes a chapter entitled "To the Youth at School," which begins

> When you rise in the morning, fail not to acknowledge your dependance [sic] on God, whose watchful kindness continually preserves you. Adore him for his greatness and goodness. Confess to him your guilt. Beseech him to bestow pardon and purity of heart through his Son Jesus Christ. Pray earnestly for an increasing aptitude to learn. And while you pray for yourself, include your teachers, your school-fellows, your parents, your friends, and all mankind (36).

Here, an ability to learn is tied directly to obedience and mercy from God, and the *Christian Reader* reminds children to pray for themselves as well as members of the community that it deems appropriate: family, school friends, and all of mankind. In effect, rules, norms, and relationships were all being circumscribed under the umbrella of morality and education, thus promoting a form of behavior that is seen in the story told by the Rev. Ludlow at the start of this chapter.

The Rev. Ludlow, in fact, was a great supporter of Sunday schools and of instructing children in the *habitus* supported by the church. He gave a sermon during his time at the church on the importance of Sunday schools, writing,

> In as whatever may be said of the Influence of Bible Tract Temperance + other sacristies in forming the character and ameliorating the condition of Human Society, no Institution has stronger claims upon the sympathies and efforts of the Christian Community than the Sunday School….I do believe that the Sunday School with the Bible as its Fulcrum is the grand moral Lever that is to many the World, and it would be no difficulty to show that it promises more for the general diffusion of Happiness + the Principles of Rational Liberty than any other Human Institution now in existence…" Train up a child in the way he should go + when he is old he will not apart from it," (Ludlow n.d. 3).

Ludlow's ringing endorsement of Sunday schools is fitting, as the Sunday school, which was in existence from at least 1828, flourished during his time at the church (Moment 1886). Its program included an "infant class," and other classes aimed at educating children in morality and academics. At one time it was noted that the infant class alone had one hundred participants and was mixed-race, one of the first, if not the first, mixed-race infant class in the city (Moment, 1886: 13-15). We even know that buried in the vaults of the church is at least one school teacher, Joseph R. Murden, who died in 1841 at the age of 71 (White and Mooney 2010: 52).

The Rev. Ludlow, like other educators of the time, was interested in getting to children while they were young and malleable. Of this he wrote,

> But let us look for a moment at the object of Sunday Schools. What is their professed design. Their primary object is simply to lay the basis of moral character – To institute the principles of the Bible into the youthful mind, and to bring to bear a hallowed, sanctified influence, upon beings whose intellects are just beginning to expand….The Suspects to be operated upon are in the most favourable[sic] circumstances that can be imagined. Just starting into being, they have as yet contracted no stubborn habbits [sic] + imbibed no inveterate prejudices. Their consciences are not yet scarred by uprated [sic] acts of transgressions. Its monitions + rebukes have no yet ceased their influence, but are thriving around these Buds of Paradise, (Ludlow n.d. 3-5).

Similarly, a newspaper gives an account of a sermon by the Rev. Cox celebrating the opening of another church's Sunday school in 1823, during which he said children were like twigs to be nurtured into blossoming adults, and that they are "at the *happiest* moment of human life, and when the mind is susceptible of impression," (1823:29).

Given these accounts, then, we should expect that children of this age group would have been regarded as an investment. Having survived the dangerous period of infancy, children could now take on a different role in the family, a more active role in the home, in the church, and in schooling. It is likely that, by the age of one and a half, many of these children would have been weaning or weaned, with the children of the working and poorer classes weaned by necessity. Sunday schools, in fact, allowed for such early weaning, potentially directly influencing the decisions mothers made about weaning timing. Thus we should expect variable stresses on the bodies of these children, and thus different vulnerabilities to disease and nutritional deficiency.

And, the importance placed on these educational reforms means that many children were likely attending schooling, and therefore encountering new people, new diseases, and new risks.

Some of these diseases and risks are preserved in the writings of coroners in the *Coroners' Reports*. Many children are listed as having died from cholera infantum, including 18 month old Eliza Jane Chambers (Scott 1989: 33). Many others died from diarrheoa or inflammation of the bowels, including four year old twin Martha Ewell (Scott 1989: 64). Eliza Rice died of convulsions at the age of three (Scott 1989: 176) and John Sarto died of "scrofulous disease of the spine," a term for tuberculosis, at the age of three (Scott 1989:186).

The exposures these children faced also included accidents. The city posed dangers to children that were venturing out. Augustus Droz, like so many other children and adults in the city, drowned; in his case, he died in the East River when a small boat turned over. He was three years and 11 months old (Scott 1989: 59). Alonzo Drummond Jr. was run over by an omnibus at the age of two years (Scott 1989: 59). And then there is Sarah Wilson, who at the age of three years and nine months fell from a window in a garret bedroom (Scott 1989: 225). Or the case of Hannah Carlo, also three, who died from burns that she received when her clothes caught fire while she was home. Her mother had left her to go out to a grocery store (Scott 1989: 30). The report does not note if any other family members were home watching such a young child. The risks of growing up and growing out into the city were therefore manifested in the bodies of the children. What remains to be examined is how visible those manifestations are in the skeletons left behind.

Skeletal Findings

As mentioned at the beginning of this chapter, the toddlers and younger children are the second most numerous group of subadults in the collection. The data presented here expands on the data already presented in Chapter 5 to show how growing up altered health risks. It is important, once again, to remember the osteological paradox. The osteological paradox tells us that those with more lesions may actually be healthier, as those lesions are indications of having survived a stressful event (Wood et al 1992). And so some of the skeletal lesions presented below relate to surviving infancy as much as they do to the conditions of toddlerhood and younger childhood.

Rickets

The infants discussed in the previous chapter had high rates of vitamin D deficiency, as high as 50%. As discussed earlier, this deficiency can result from a number of factors, including ancestry, clothing, food availability, and weaning, and the resulting skeletal changes include bowed limbs, frayed or expanded metaphyses, fractures in metaphyses, and widespread porosity (Brickley and Ives 2008). Like the infants, the toddlers and younger children exhibit such skeletal changes from a vitamin D deficiency (Table 6.4).

Table 6.4: Long Bones with Rickets in Toddlers and Younger Children

	Right		Left	
Element	**N**	**With Rickets (%)**	**N**	**With Rickets (%)**
Femorae	20	5 (25)	17	3 (17.65)
Fibulae	6	0 (0)	4	1 (25)
Humerii	13	0 (0)	14	0 (0)
Radii	11	2 (11)	8	2 (25)
Tibiae	23	8 (34.79	12	5 (41.67)
Ulnae	8	1 (12.5)	10	1 (10)

The left tibiae are the most affected (41.67%) and the right femorae also have a high prevalence (25%). In general, numbers of cases remain high, and there is no statistical difference between the infant cohort and that of the toddlers and younger children.[53] There are, however, differences in the expression of the condition in this age group. While affect of the arms and legs of infants were similar, the leg bones predominate in this cohort. This is likely due to the changing locomotion of toddlers and younger children, away from crawling and bearing weight on their arms and legs, and towards walking and running and bearing weight on their legs only.

In addition, there are no cases of rickets in which the cortical bone is porous from a failure to mineralize, as seen in the severely deficient infants (e.g. IV-DDD). While there are five such cases of this condition in the infants, there are no additional cases in any of the older subadults. There are, however, some cases of rickets where the cortical bone is very dense, the opposite of what is seen in IV-DDD. Other researchers have noted this divergence in the appearance of rickets between age groups at other sites, and have suggested two possible explanations. One explanation is that the youngest individuals are the most vulnerable and also grow very quickly, resulting in porous, non-ossified cortical bone (Brickley and Ives 2008; Mays et al 2006). A second possible explanation is that the variation may be related to a difference in nutrition. Those with thin cortical bone may be cases of atrophic rickets, linked to malnutrition, while those with denser bone may be cases of hypertrophic, or well-nourished rickets (Brickley and Ives 2008; Mays et al 2006). Considering that these children lived longer than the infants, better nutrition is certainly a possibility. There is no conclusive research to back up either of these possible explanations, but both are worth considering for the Spring Street Presbyterian Church remains.

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[53]Fischer's Exact Chi Square tests were run for each element and each side comparing the two groups, and none of the results were found to be significant at the $p = .05$ level.

One individual with the dense bone expression of rickets is Vault IV Individual YYY.[54] IV-YYY was between 2.5 and 3.5 years of age at death.[55] IV-YYY has severe bowing due to rickets (Figure 6.1).[56] Yet the cortical bone is dense and the metaphyses are healthy. When standing, the child's legs would have bowed medially at the knees, and then back ankles, rather than the more commonly pictured posture where the legs bow out at the knees (see Figure 6.2 for examples of these different postures). All of the bowed surfaces under tension have porosity on them. In addition, the proximal metaphysis of the left femur is compressed, a condition also known as *coxa vara*, due to the pressure placed on this surface when walking. Given the severity of the bowing, and yet the density of the bone, this was clearly a child who was active and moving about. Whether the vitamin D deficiency observed here was due to a lack of exposure to sunlight or a nutritional deficiency, the individual seems to have been fairly healthy with normal bone development otherwise, suggesting that this is not a case of malnutrition, but rather of hypertrophic or well-nourished rickets.

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[54]Individual YYY is represented by leg bones only, and has fair preservation, though many of the elements have deep scratches from trowels used during excavation. This individual was reassembled based on the appearance of the elements, the excavation damage, seriation, and pathology.

[55]This individual is estimated to be 2.5 to 3.5 years of age based on long bone measurements. All elements measure in the 1.5 to 3.5 year range, but due to the extensive bowing of the bones and the likely under-estimation of age that results from metrics on pathological elements, the upper end of that range is more likely. It is possible that this individual is even older, in the 4 to 5 year age range, but that is impossible to determine from just these elements alone.

[56] The infants with cortical bone loss do not have bowing as severe as IV-YYY, perhaps in part because they were less likely to be walking.

Figure 6.1: Medial Bowing of Femurs and Tibiae, IV-YYY.

Figure 6.2: Historical Image of Rickets in Children (1920-1930). *Used with permission from the Wellcome Trust, http://www.wellcome.ac.uk*

Scurvy

Scurvy, a vitamin C deficiency, declines in prevalence in the toddlers and younger children (Table 6.5). As previously discussed, scurvy is not diagnostic in these remains, but the presence of bone formation and porosity at particular locations on the skull is consistent with, or suggestive of, the condition (Geber and Murphy 2012). On the maxillae, the presence of porosity along the posterior surface of the alveolar bone is indicative of the muscle tissue pulling away from the bone and hemorrhaging occurring. Likewise, similar porosity and bone formation on the greater wing of the sphenoid indicates hemorrhaging. Finally, bone formation in the orbits of the frontal bone indicate hemorrhaging, which is associated with scurvy (Ortner and Erickson 1997). Table 6.5 presents the results from the toddlers and younger children, noting lesions on the maxillae and sphenoids consistent with scurvy, and lesions in the orbits that are suggestive of scurvy.

Table 6.5: Cranial Elements from Toddlers and Younger Children with Scurvy

	Right		Left	
Element	**N**	**With Lesions (%)**	**N**	**With Lesions (%)**
Maxillae	4	0 (0)	2	0 (0)
Sphenoid	6	0 (0)	5	0 (0)
Orbits	10	1 (10)	10	0 (0)

What is interesting here is that the only element that has lesions in any way associated with scurvy is one orbit. This is a decline from the infants, where up to 71% of orbits had lesions. No other element has any lesion at all. This raises important questions about the presence of scurvy in these remains, the key question being why do these lesions only show up in substantial numbers in the infants? Possible explanations include deficient breast milk and the hemorrhaging of tissue during suckling and nursing, both of which would no longer be a factor in an age group that consists of children who are likely weaned.

The one lesion suggestive of scurvy in this cohort was observed in a right eye orbit. That orbit is from Vault IV Individual OOOO. IV-OOOO was between the ages of 2.5 to 3 years at the time of death, and is represented by a cranium only.[57] This subadult is particularly interesting because, at the time of death, the child appears to have had possible scurvy, cribra orbitalia, formative endocranial lesions, and SES (Figure 6.3).

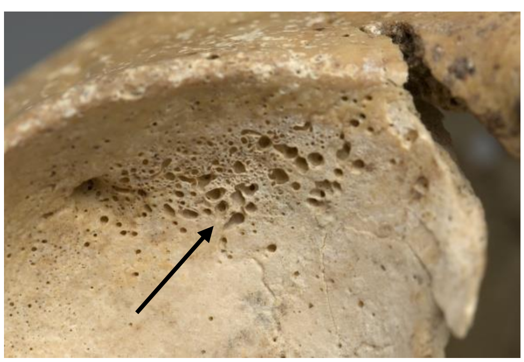

Figure 6.3: Possible Scurvy, Right Orbit, IV-OOOO. Arrow indicates lesions.

[57] Age is based on dental calcification and the formation of the Foramen of Huschke.

Such a suite of health concerns at such a young age is troubling. While etiologies are not known for most of the conditions, the co-occurrence of so many suggests that this was a child who had lived through episodes of poor health, surviving them long enough to have bone modifications throughout the IV-OOOO's cranium. In addition, the child has healing blunt force trauma to the left parietal, which is discussed further below.

Cribra Orbitalia

Cribra orbitalia manifests as lytic lesions in eye orbits of the frontal bone. Recall that these lesions are associated with diploe expansion due to anemia, but may also be related to B12 anemia, trauma, or infection (see Walker et al 2009). Interestingly, more cases of cribra orbitalia are present in the toddlers and younger children than are in the infants. Nearly all of the orbits observable in this age cohort have lesions (Table 6.6).

Table 6.6: Cribra Orbitalia in Toddlers and Younger Children

Side	N	With Lesions (%)
Left	10	7 (70)
Right	10	10 (100)

In the infants, less than half of right orbits had lesions (44%), and none of the left orbits were pathological. On the left side, the difference between infants and toddlers and younger children is statistically significant at the $p = .05$ level, though on the right, the difference is not statistically significant. The high frequency of cribra orbitalia continues in the older children, as will be discussed in upcoming chapters. This increasing prevalence of a condition suggests survivorship, that the risks for this condition were encountered by multiple age groups, and that, as children survived into older ages, they displayed the lesions from past biological stressors.

Periostitis

There are also some cases of periostitis in this age group. As previously discussed, periostitis is a reaction in the periosteum of bone that results in new bone formation (Weston 2006:28; Wheeler 2012: 225). In the toddlers and younger children the most affected element is the right femur (Table 6.7).

Table 6.7: Periostitis on the Long Bones of Toddlers and Younger Children

	Right				Left			
Element	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**Total Lesions**	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**Total Lesions**
Femorae	20	1 (5)	2 (10)	3	17	0 (0)	0 (0)	0
Fibulae	6	0 (0)	0 (0)	0	4	0 (0)	0 (0)	0
Humerii	13	0 (0)	0 (0)	0	14	1 (7.14)	0 (0)	1
Radii	11	0 (0)	0 (0)	0	8	0 (0)	0 (0)	0
Tibiae	23	1 (4.35)	0 (0)	1	12	1 (8.33)	1 (8.33)	2
Ulnae	8	0 (0)	0 (0)	0	10	0 (0)	0 (0)	0

When these results are compared to the infants, we see no statistically significant difference. In the infants, the right tibiae have the highest frequency of periosteal reaction (13.3%). For the toddlers and younger children, the right femorae have the highest frequency at 10%.

Periostitis has been linked to everything from trauma to scurvy. Localized lesions periostitis may be related to trauma and bone healing, whereas more widespread lesions may be connected to infectious disease. Four of the seven cases of periostitis in the toddlers and younger children are widespread, whereas three are localized. Four cases of widespread active periostitis indicate that infection was still a concern for this age cohort. The localized cases are on the femorae and tibia. Since localized cases are more likely to indicate trauma, the occurrence of these four sets of lesions suggests that these were children in motion. As all of the cases in the infants were widespread, this marks a departure. The toddlers and younger children, walking, playing, and interacting independently with the world outside the home, were recording evidence of that interaction on their legs.

Cranial Lesions

Cranial lesions are bone responses to unknown stresses. They manifest as endocranial porosity and formative lesions, SES, and ectocranial porosity. Some of these lesions may be associated with hemorrhaging due to tuberculosis or meningitis, while others may be indicative of trauma or infectious disease (Lewis 2004: 82). While the causes of these lesions are unknown, the patterns of their prevalence are interesting. In the infants, frequencies range from 3-22% of elements affected by cranial lesions. In the toddlers and younger children, that pattern remains roughly the same, with the highest frequency occurring as SES on the left parietals, 40%.

Table 6.8: Cranial Lesions in Toddlers and Younger Children

		Endocranial			**Ectocranial**
Element	**N**	**Formative (%)**	**Porosity (%)**	**SES (%)**	**Porosity (%)**
Frontal	17	2 (11.76)	3 (17.65)	2 (11.76)	1 (5.88)
Occipital	21	1 (4.7)	5 (23.81)	3 (14.29)	3 (14.29
L.Parietal	15	0 (0)	1 (6.67)	6 (40)	3 (20)
R.Parietal	15	1 (6.7)	2 (13.33)	4 (26.67)	2 (13.33)

While endocranial formative lesions and ectocranial porosity have similar frequencies in the infants, endocranial porosity and SES increase in this age group, although not a statistically significant amount. This is very interesting considering that these lesions almost entirely disappear in the older children. Thus the risk or risks for these conditions are most prevalent with this age group.

Individual Q from Vault IV exhibits some of these cranial lesions. Individual Q was between 2.5 and 3.5 years of age at the time of death, and is represented by a nearly complete cranium.[58] The bone is in good condition and has a green stain on the left parietal, likely from a

[58] Based on fusion of the metopic suture.

shroud pin.[59] This individual has a variety of cranial lesions, including active, bilateral cribra orbitalia, ectocranial porosity of the frontal, and SES on the frontal and both parietals. These three sets of lesions—cribra orbitalia, porosity, and SES—suggest that the child had some affliction(s) that was active at the time of his or her death. It is unfortunate that no teeth or postcranial elements were identified with this individual to more fully elaborate on the child's life history, but what IV-Q does illustrate is that these cranial lesions occur not only independently but also together on the same individual.

Dental Health

While the data from the crania and long bones suggests health challenges, the dentition also presents important information about diet and health. In the infants, deciduous teeth were examined for evidence of carious lesions and attrition, or wear. Both of these conditions require the mastication of solid foods. Carious lesions develop when food particles ferment on and between teeth, and attrition occurs when grit in food wears down the surface of teeth (Roberts and Manchester 2007). In the infants, this data suggested that weaning had occurred for at least some of very young. Up to 25% of deciduous teeth from infants had carious lesions, and up to 12.5% had attrition.

We should expect to see more instances of carious lesions and attrition in these toddlers and younger children, since these children were more likely to have been weaned, but the data do not perfectly fit that pattern (see Table 6.9).

[59]The bone is, however, warped from ground pressure.

Table 6.9: Dental Pathology in Toddlers and Younger Children

Tooth Type	Number Observed	Number Carious (%)	Number with Attrition (%)
Rdi^1	1	0	0
Ldi^1	1	0	0
Rdi_1	1	1 (100)	0
Ldi_1	1	0	0
Rdi^2	1	0	0
Ldi^2	1	0	0
Rdi_2	1	0	0
Ldi_2	1	0	0
Ldc^1	4	0	0
Rdc^1	2	0	0
Ldc_1	2	1 (50)	1 (50)
Rdc_1	1	0	0
Rdm^1	6	2 (33.33)	1 (16.67)
Ldm^1	5	1 (20)	1 (20)
Rdm_1	5	0	0
Ldm_1	5	0	2 (40)
Rdm^2	8	2 (25)	2 (25)
Ldm^2	9	2 (22.22)	2 (22.22)
Rdm_2	7	1 (14.43)	1 (14.43)
Ldm_2	3	0	0
LC_1	1	1 (100)	1 (100)
Total	**66**	**11 (16.67%)**	**11 (16.67%)**

The MNI for this sample is nine based on second left deciduous maxillary molars. This age cohort is also the first time we see permanent and deciduous teeth. While only one permanent tooth was recovered in this sample, others would have been present. Permanent teeth would be replacing deciduous teeth in this stage. The deciduous teeth would have been exposed longer than the permanent teeth.

These toddlers and younger children have fewer carious lesions than the infants do (16.67%, as compared to 25% of the observed teeth from infants). This cohort does, however, have a higher instance of wear (16.67%) than the infants do (12.5%). The caries and wear seem to be clustered primarily on the molars, and only one deciduous incisor has a carious lesion. The increase in the number of teeth with wear is more consistent with a diet based on solid foods, which would increase dental attrition.

However, we also expect these same children to be weaned, and therefore we might see more carious lesions. Yet there is a lower frequency of carious lesions in this age cohort. So while we may not be able to draw conclusions about weaning from this data, we do have to remember that these are the children who *survived* the first year and a half of life. There may have been some advantage that these children had that the infants who died did not, including the possibility that these children continued nursing for longer or that the foods they were being weaned onto were less cariogenic. In addition, attrition can wear away caries. So another possible explanation is that the higher rates of attrition could be masking carious lesions in the teeth.

In the toddlers and younger children, the longer lifespan also means we can begin to observe health disruptions recorded in growing teeth from earlier years. Linear Enamel Hypoplasias (LEH) were not present in the infants in part because the infants had not survived long enough for this type of dental development. LEHs occur when the body stops tooth growth due to severe illness or other biological stressors, but then recovers and resumes growth (Lewis and Roberts 1997). Four teeth from children who died as toddlers or younger children have LEHs.

Table 6.10: Linear Enamel Hypoplasias in Toddlers and Younger Children

Individual/Element	Tooth	Number of LEHs	Crown Stage	Age of Disruption*
Vault IV FS 21	SUBC[1]02L	2	Cr ½ Cr ¾	2 years 2.9 years
Vault III Individual A	SUBI[2] 01R	3	N/A	2.5 years 3.45 years 3.74 years
Vault III Individual A	SUBC[1] 01R	2	N/A	N/A

Vault IV FS 50+	SUBC$_1$01R	3	N/A	N/A

** Age estimated from dental calcification standards (Moorres et al 1963a, b)*

The osteological paradox reminds us that those who have more markers of stress may have actually been healthier, as they were able to survive those health challenges, and so the four teeth here with LEHs are from children who *survived* serious health disruptions and resumed normal growth before dying. As we will see in Chapter 7, this trend continues in the older children, who have twice as many teeth with LEHs as the toddlers and younger children.

For two of the teeth it is possible to calculate the age of the stress event. The permanent left canine from Vault IV FS 21 has disruptions at 2 years and at 2.9 years, indicating two serious disruptions and subsequent recoveries. The second permanent maxillary incisor from Vault III, Individual A, a subadult aged 3.5 to 4.5 years at death, has three defects—at 2.5 years, 3.45 years, and 3.74 years.[60] Because this tooth comes from an Individual, we can also see more of the child's life history.[61] III-A has bilateral cribra orbitalia. The right femur has widespread healing periostitis along the anterior diaphysis. Additionally, the left first rib has an expanded and porous sternal end, and the right clavicle has a cortical excavation along the inferior acromial end. Finally, the dentition has wear and calculus build up, particularly on the left side.

[60]Age for this individual was calculated using dental calcification and long bone length. The left humerus is approximately 140 mm in length, which puts this individual between 2.5 and 3.5 years of age. The left radius is 116 mm, which puts this individual between 2.5 and 4.5 years of age. The maxillary canine on the right at the stage of crown complete puts this individual at 3.95 years of age, and the left and right mandibular first permanent molars at root ¼ put this individual between 4 to 5 years of age. A final age range of 3.5 to 4.5 best encompasses this individual's likely age, with the individual probably right around the age of 4.

[61]This individual is mostly complete and represented by both cranial and postcranial elements. Over all the bone is in excellent to fair condition, with wear on the margins of the ribs, long bones, and the ectocranial surface of the crania. The humerus has weathering at Behrensmeyer stage 4, as do the ilia and the left femur, which also has heavy postmortem damage to the anterior surface.

So III-A has cribra orbitalia, some kind of trauma or infection that had previously affected the femur but was now healing, something affecting the bone development of at least one rib, and a muscle pull on the right clavicle. These conditions all speak to health challenges and to an active life—infection, bone growth disruption, and movement. In addition, this child would have experienced some pain while chewing on the left side. And, at three times during III-A's short life, the child experienced health conditions so extreme that the body stopped the growth of the child's teeth. Each time III-A recovered and continued to grow and develop. While the litany of conditions presented here suggests that III-A had a hard and unhealthy life, we must also remember that the child *recovered* multiple times.

Trauma

The one case of trauma present in this age cohort comes from the previously discussed Vault IV Individual OOOO. This antemortem injury is different than those previously discussed: it does not result from pathology or from intentional post-mortem dissection. Instead, this injury results from an accidental or intentional action that occurred during the life of the child. IV-OOOO has healing blunt force trauma to the left parietal (Figure 6.4). The trauma is small and circular (13 millimeters long and 15 millimeters wide). A bone bridge extends (8 millimeters by 4 millimeters) across the surface, which indicates bone repair was already underway at the time of death. An injury like this could have occurred from a fall or accident, or could be the result of an assault.

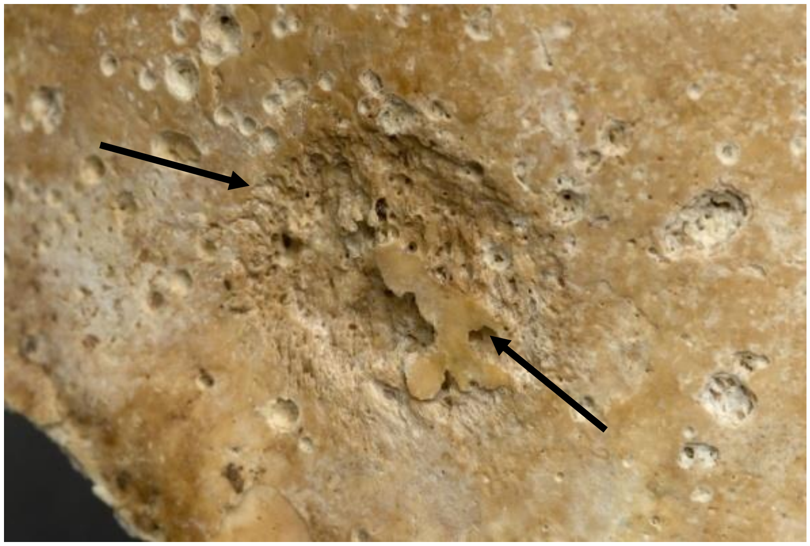

Figure 6.4: Healing Blunt Force Trauma, Left Parietal,
IV-OOOO. Arrows indicate the depression and bone bridging.

This traumatic injury, alongside all of the health concerns present, indicates that, for such a short life, this child suffered greatly before dying. IV-OOOO has been sampled for stable isotope and DNA analysis, and it is hoped that we can learn more about this child's life.

Discussion

The differences between bodies, Sofaer reminds us, are directly related to the differing circumstances to which they are exposed (Sofaer 2006). The toddlers and younger children buried in the vaults at the Spring Street Presbyterian Church are the second largest group of subadults, over 13% of the subadult population. And while that is a drastic decline from the infants, who made up nearly 40% of the subadult population, it is much larger than either of the age groups to follow. This group would have interacted differently with the structures to which they were exposed. And yet they were indeed still young children, at least in part dependent on their families, neighborhoods, and institutions. The data on health presented above, when combined with information about these structures, can help us understand if and how toddlerhood and younger childhood were different.

Mothers and Caregivers

In the previous chapter, many of the conditions seen in the remains could be connected to the primary relationships of hearth and home. As children grow older, they become more independent and have more agency. And yet, the relationship between the mother and caregivers and these toddlers and younger children would still have been central. While some children may have been headed to school, others were just as likely at home, learning from caregivers there. And while toddlers and younger children certainly held opinions about what they ate, they were still limited by what was available through those adults responsible for them. In addition, at home and elsewhere, these children were learning to internalize the rules and norms of society—*the habitus*. And so it is with this primary relationship that the discussion must begin.

Rickets is a concern in this population much like it was for the infants. In this way, the two age cohorts are similar. The high rate in the toddlers and younger children (46%) suggests that the condition is not exclusively related to nursing, weaning, and swaddling. Instead, as we will continue to see in the older age cohorts, rickets is a persistent problem. And so we should look for potential causal factors beyond just those that affect infants. For these toddlers and younger children, food availability in general may be part of this problem. We know that accessing quality food was an issue for adults, and thus would continue to affect these toddlers and younger children.

However, the near disappearance of scurvy in this age cohort means that the food resources available contained adequate levels of vitamin C. So what families were able to access may have included some fruit or vegetables as well as items like potatoes. The disappearance of potential scurvy also indicates that the children are likely weaned. This tells us something important about the mother-child relationship. By the time the children are 1.5-4.5, they are no longer considered fully dependent infants by their caregivers. Weaning may have occurred because the mother needed to work, or may have occurred because it was seen to be the appropriate time according to social norms. In either case, it does mean that the primary relationship between mother and child had changed. For instance, biologically, these children were no longer dependent on breast milk, and therefore their health was no longer tied directly to the mother's health. And yet, we know socially that the health of this age cohort would still have been very connected to family and caregivers.

Dental evidence further corroborates the weaning evidence. Though there is no dramatic increase, dental pathology is still present which is suggestive of the consumption of solid food. The increase in attrition in particular, which can disguise carious lesions, indicates that the toddlers and younger children were weaned. The lack of increase in visible carious lesions may also be related to the fact that these children survived infancy. They have had some advantage in earlier life, whether that is extended nursing or more nutritious weaning foods.

Even if general nutrition was improving with weaning cessation, there were still some potential dietary risks. There are increasing rates of cribra orbitalia in this cohort. Rates of this condition continue to be high through the older children. Cribra orbitalia may be tied to nutrition, but may also be tied to other conditions. Other evidence for the diet of this age cohort comes from the fact that over 16% of observed teeth have carious lesions and wear. This signals that at least some of the children were eating food with grit and sucrose. The one permanent tooth observed had both a carious lesion and attrition. The cheaply available sugar at the time may play a part in this, and so too may have the ability of children to have more choice in what they ate.

Institutions

While greater agency means more choice in food, it also means more direct interactions with institutions. Historical documentation from the church indicates how important schooling was to the leaders of the congregation, and how they encouraged families to put children in Sunday schools, starting as early as 18 months. The interactions with the structures of church and school would have been very important in developing the mind, habits, and behaviors of these toddlers and younger children. Like the family and caregivers, these institutions would have been primary vehicles for passing on the *habitus*. Such structures affect not only sociality, but also biology.

In order for toddlers and younger children to take advantage of the growth of education programs during the first half of the 19th century, they would have needed to be weaned. Since many of these classes started as young as 18 months, including the Spring Street Presbyterian Church's Sunday school, we have further evidence to corroborate the weaning trends already discussed for this age cohort. The choice to wean children at this age is results in biological consequences from a social action. Those children that survived the weaning threshold, as previously mentioned, may have had additional benefits in infancy.

The turn to education may also be implicated in the continuing presence of rickets among the toddlers and younger children. We know from exploring the condition in the infants that a variety of factors may be related to vitamin D deficiency's presence. However, the move towards more formal, structured education may also be worth considering, as it required toddlers and younger children to spend significant amounts of time indoors. It is particularly interesting to note that many of the schools were aimed at African American children as well as poorer families, those who might already be at high risk for rickets due to amount of melanin in the skin and issues with food availability. By the church and schools targeting specific social groups, we may see biological consequences exaggerated.

The City

We know that toddlerhood and younger childhood allowed for more independence, and therefore exposure to the neighborhood and city at large. We know that one such risk factor that was present at the time was epidemic disease. After the Rev. Cox lost two children from scarlet fever just a day apart, the Rev. Ludlow, who was pastor of the Spring Street Presbyterian Church at that time, wrote to his mother about burying the Rev. Cox's children. Edward Dorr Griffin Cox was one of those children, and is likely among the remains discussed here. As the second largest cohort of subadult remains, we can expect that some of the bodies present are from those children who quickly succumbed to infectious disease. Toddlers and younger children were still very vulnerable, and so they would have been at risk for many of the diseases that passed through the city. In fact, it is worth considering here that there are many of the elements examined in this age cohort do not have the previously discussed lesions. Over half are free of rickets. Almost none have scurvy. And, importantly, 84% are free of dental pathology. And so while this discussion has focused on the sick children, it is also worth remembering that many (if perhaps not most) of these toddlers and younger children died without evidence of health challenges. Instead, they may have succumbed to infectious disease or accidents that were so prevalent in the city and for this cohort.

Perhaps most puzzling of the increases from infant cohort are cases of cranial lesions, particularly SES and endocranial porosity. Both of these sets of lesions have their highest frequencies in the toddlers and younger children. Inflammation or bleeding on the interior surface of the skull could be connected to scurvy, meningitis, tuberculosis, or other infectious conditions. We know from the *Coroners' Reports* that children as young as three were dying from tuberculosis. And we know that these children were likely experiencing more contact with more people and more of the urban environment. As will be seen in the next chapter, only two more cases of cranial lesions were observed in the subadults, which suggest some kind of change takes place that removes the risk for these conditions as the children grow older.

This also provides context for the LEHs observed in this cohort for the first time in the subadults. LEHs are markers of survivorship; linear enamel hypoplasias indicate health disruptions that these children survived. As Table 6.5 shows, these health disruptions all took place during the second and third years of the children's lives. The lack of hypoplasias in the infants does not mean that they did not experience similar health disruptions, but it does suggest that they were less likely to survive them if encountered. Further, the presence of periostitis indicates that these children continue to fight infectious disease and injuries, with some completely recovering from it. The nearly equal split between cases of periostitis due to infection and those due to injury really highlight how this group is different than the infants: these are children both still vulnerable and exposed, but also actively engaged with their surroundings.

Conclusion

As the relationships between the children and the structures with which they interacted changed, so too did their bodies. Some aspects of toddlerhood and younger childhood look very similar to infancy: in particular, vitamin D deficiency. But other markers begin to change. Periostitis from trauma brings to mind moving and active bodies. LEHs remind us of the epidemic diseases to which these children would have been exposed. The disappearance of scurvy recalls that food access now came from different sources. These are illustrative of growing up in a changing urban world: the challenges of access to food and sunlight, the sweep of epidemic disease, the emerging world of education, the heavy emphasis on morality, the dangers and resulting trauma to the body. We should expect as the children grow older that these patterns of health will change again. If children as young as 18 months are already in school, then what was expected of a seven year old? A twelve year old? And how do those expectations alter biological outcomes? Educators and reformers were concerned about the future of these children too, and particularly how they would live out an appropriate morality in a difficult world. Even the *Christian Reader*, in extolling its young students to be pious and moral, acknowledges the challenges faced by these individuals:

> Forget not the goodness of his Providence. Exposed to a thousand dangers in infancy, not all your father's care or mother's tenderness could have preserved you, if God himself had not been ever present, ever active, ever kind….Health and peace, reputation and usefulness, and soon lost; but not easily regained….But if, early in life, you seek after the God of Israel, God will be glorified, and your everlasting happiness be secured (1829:38).

Chapter 7: Restless Youth: Older Children, 4.5-9.5 Years Old

> *Children are restless for employment; and if they are not furnished with what is useful or innocent, they will do mischief. No one who has not lived with a family of children can realize how very difficult is to keep a child of five or six years old employed.*
>
> -- Lydia Maria Child, *The Mother's Book*, 1831: 61.

Introduction

The older children buried at Spring Street, between the ages of 4.5 and 9.5, would have been restless, as Lydia Maria Child noted in her parenting manual, *The Mother's Book* (1831). As will be discussed in this chapter, these children could have had a much wider range of experiences and interactions in their daily lives. Their worlds and the structures to which these children were exposed continued to expand. While the immediate world of infants was largely surrounded by family at home, toddlers and younger children experienced more diverse settings. With these changes there was a potential increase in exposures to pathogens and injuries. In the older children, diversification would have continued, with some children continuing on with their education, some splitting time between learning and laboring, and some turning exclusively to work.

There are fewer children of this age range buried in the vaults. This is a continuing trend, as was seen in Chapter 4. There are 15 Burials and Individuals of older children (see Table 7.1), as compared to 27 infants and 22 toddlers and younger children.

Table 7.1: Burials and Individuals[62], Older Children

Identification	Age	Preservation	Completeness	Pathologies
Vault II Burial 3	4.5-5.5	Good	1	Periostitis of left fibula
Vault II Burial 7	4.5-5.5	Fair	2	Bilateral cribra orbitalia; lytic lesions on vertebrae
Vault II Individual E	7.5-8.5	Good	3 Legs only	
Vault IV Burial 1-4I	4.5-5.5	Excellent	1	Bilateral cribra orbitalia; rickets
Vault IV Burial 1-4J	4.5-5.5	Fair	3 Cranium/long bones	
Vault IV Burial 1-4M	4.5-5.5	Fair	3 Cranium only	Orbital lesions; SES on occipital
Vault IV Individual G	4.5-5.5	Good	3 Cranium only	Porosity of maxilla
Vault IV Individual NNN	4.5-7.5	Good	3 Cranium only	SES; ectocranial porosity of sphenoid and temporals; endocranial porosity of occipital
Vault IV Individual OOO	5.5-7.5	Poor	3 Cranium only	Bilateral cribra orbitalia
Vault IV Individual QQQ	4.5-7.5	Poor	3 Cranium only	Bilateral cribra orbitalia
Vault IV Individual VVV	4.5-7.5	Fair	3 Cranium only	
Vault IV Individual JJJJ	5.5-6.5	Good	3 Cranium only	
Vault IV Individual RRRR	4.5-11.5	Good	3 Cranium only	
Vault IV Individual TTTT	4.5-6.5	Poor	3 Legs only	Rickets, including bowing and compression of the neck of the femorae

[62] It is important to remember that Burials and Individuals are not necessarily discrete, as they are often incomplete and therefore may overlap with other Burials and Individuals.

Vault IV Individual VVVV	4.5-7.5	Poor	3 Cranium only

Completeness: 1) 75% or more of skeleton is present; 2) 25-75% of skeleton is present; 3) 25% or less of skeleton is present.

When the elements from only the ossuary counts are added, there is an overall MNI of 12 for this age group, based on occipitals. There are 10 left femorae, the most numerous element overall for the subadults from the Spring Street Presbyterian Church, or 13.33% of the collection (Table 7.2).

Table 7.2: Elements from Older Children

Element	**Right**	**Left**	**Single Element**
Femorae	11	10	--
Fibulae	2	4	--
Humerii	9	6	--
Radii	7	5	--
Tibiae	8	9	--
Ulnae	6	7	--
Frontals	--	--	10
Occipitals	--	--	**12**
Parietals	9	8	--
Temporals	8	4	--
Sphenoids	3	3	--
Zygomatics	0	0	--
Mandibles	0	0	11
Maxillae	9	9	--

Similarly, the number of coffin plates associated with older children is lower as well. Two coffin plates were found for older children (Table 7.3), as compared to four for infants and four for toddlers and younger children. Out of the 56 coffin plates recovered, 3.5% are for this age cohort. The first of the two plates was previously described as it has inscriptions for the younger brother Edward Dorr Griffin Cox and the older brother Alfred Roe Cox. Alfred Roe Cox died just shy of his seventh birthday from scarlet fever (White and Mooney 2010: 51). The second plate belongs to Emma Fitz Randolph, who died at the age of five. Interestingly, her uncle Lewis

Evans (1776-1822) is also buried in the vaults, and he is listed as having been a lime cartman (White and Mooney 2010: 50-52).[63] He died in July of 1822 at the age of 46, just a month before his niece. It is worth noting again that both of these individuals appear to have come from middle class families. Also interestingly, for the first time, there is an equal distribution of coffin plates for both females and males.

Table 7.3: Coffin Plates of Older Children

Name	Information on Coffin Plate	Additional Historical Details
Alfred Roe Cox	Born February 7th, 1825 Died January 1st, 1832	Son of Rev. Cox; buried with brother Edward Dorr Griffin Cox; lived at 3 Charlton
Emma Fitz Randolph	"Died 16th Aug 1822" "Aged 5 Yrs 8 Mo 12 Da"	Daughter of Stuart Fitz Randolph; lived at 502 Greenwich

Information from White and Mooney 2010 and Hicks n.d.

The children discussed in this chapter survived infancy, toddlerhood, and younger childhood. They survived birth, weaning, and early exposures in schools and on the streets. They survived earlier waves of epidemic diseases, including cholera and scarlet fever. The expectations are that these children should have different skeletal signatures accordingly. The health patterns in the bones of these children are indeed different than the younger age groups, but in some surprising ways. Most markers of poor health decline in frequency, with scurvy disappearing completely and only two cases of cranial lesions. Conversely, cribra orbitalia rates remain high, and there are increasing numbers of dental anomalies. Overall, however, these older

[63] Cartmen are among the occupations listed for those who lived in the 8th Ward and place Lewis Evans among the new working class (Common Council 1930). In addition, in the 1830s, New York City passed a regulation that banned African Americans from working as cartmen as part of a time period of measures designed to keep free African Americans from taking jobs from Euoramericans (Gronowicz 1998: 57). Cartmen were working class laborers, and yet managed to acquire a great deal of political power, leading Cheek to write that they really cannot be considered lower class or middle class (Cheek 2013:249).

children seemed not only to have survived the trials of earlier stages of childhood, but to have died with fewer markers of those trials than anticipated or might be predicted by the osteological paradox.

Historical Considerations

We know that the experiences of this age group would not have been uniform. Depending on their families, these children may have been learning household and work skills through play (Child 1831: 62). Or, they may have been living more challenging lives, with less time for education and play, and more time spent in the streets, at apprenticeships, or laboring during the early stages of industrialization. Historian Steven Mintz notes that the early 19th century saw the largest range in childhood experiences yet in America, from the small number of upper and middle class children, to the working class and poor children, to child-slaves and indentured servants. Childhood experiences varied by region as well by economic circumstances (Mintz 2004: 135). In cities, unlike in rural areas, the economy encouraged child labor in factories and mills. As Mintz (2004:136) notes, “While the Industrial Revolution did not invent child labor, it did make child labor more visible by removing child and teenage workers from domestic settings.” The household economy of the 1700s was replaced by a manufacturing economy, and children were a part of that change. Historians Volo and Volo write that whether part of the rural or new urban spaces, older children were expected to contribute:

> Except in the most affluent of circumstances, even preteens and adolescent children were considered an essential part of the family workforce either helping in the barnyard, hoeing in the garden patch, and plowing in the farm fields; or selling newspapers, clearing garrets, making deliveries, and laboring in the mills beside their city-dwelling parents, (2007: x).

The influx of poor immigrants during this time period also added to the number of children working for wages or, in many cases, living on the streets (Cable 1972: 126).

Historian Sanchez-Eppler writes that the formation of childhood as a distinct time is as much about class formation as it is about growing up. In this formulation, the ability to *have* a childhood in the mid-19th century was itself a marker of class. Thus those who had to engage in labor were not permitted a childhood as we might think of it today (Sanchez-Eppler 2003: 40).

And yet, Sanchez-Eppler focuses her analysis, as do many historians of the 19th century, on childhood, labor, and class *after* 1850. The period of the church's burial vaults, 1820s-1840s, comes just before the time of rapid industrialization and emerging childhood industrial labor and labor laws. But we know that the traditional home- and apprentice-based labor models began to shift in the 1820s (Burrows and Wallace 1999). Thus we are left to explore a period where these older children may have been engaging in home labor and apprenticing out, may have been engaging in childhood play and education, or may have been working in early factories and the streets, or perhaps some combination. In fact, Reef writes that many apprenticeships and factory jobs gave their child employees a month or two or three for schooling, sometimes required by law, and sometimes out of custom (Reef 2002: 27). As schooling formalized later in the 19th century, this would change (Reef 2002: 32). And so these children, living and dying in this transitional period, may have had tremendously varied experiences.

These experiences include those structured by their *habitus*, but also those, increasingly for this age group, structured by the children themselves. This means examining how children influence and create their worlds along the continuum of their development. One important action of children is their potential to be producers in society. Levy points to a study by Mills that notes that "there are often 'hidden producers,' where more than one person is involved in production of craft items," (Levy 2007:197). The idea that the production happens only through one sex or one age category has been called into question by researchers of both gender and childhood (e.g., Finlay 1997; Kamp et al 1999; Grimm 2000; and Smith 2006). Analyses of material culture that look for the signatures of children remind us that children are not just static bodies absorbing what is presented to them, but active participants taking what they are given—material, ideological, and social—and molding it themselves (e.g. Finlay 1997; Kamp et al 1999; Grimm 2000; Baxter 2005; Smith 2006; and Levy 2007). Finding this information in material culture is not always easy, and remains a challenge in the historical record as well.

Particularly absent are the lives of children in working class families. Because of the economic pressures on these families, women often had to work outside the home. The new market economy meant that more individuals in the household needed to contribute to meet daily needs. "As jobs for men in the trades became less secure and wages declined, many working-class women found themselves obligated to shoulder additional responsibilities to supplement the incomes of their husbands; taking in piecework as milliners or seamstresses…hiring out as domestic servants in middle- and upper-class households, or renting rooms to boarders," (Burrows and Wallace 1999: 406). These were the families targeted by the infant schools, and yet we know those schools often ended by the age of six.

So what of the older children? Some older children in these families often ended up working as well. Some of them were working in factories, or joining their mothers on the streets "forag[ing] for manufacturing wastes—nails and screws, old rope, broken glass, shreds of cotton plucked from wharves where southern packets docked," for resale (Burrows and Wallace 1999: 477). Or, these children were dropping into crime and loitering as apprenticeship positions disappeared. Because of this, these older children of the poor became a target for reform groups, just as the infant schools were targeting the younger groups. In 1849, Catherine Havens, recalling her earliest memories, wrote in her diary about some less fortunate children than herself:

> The beggar girls bother us dreadfully. They always have the same story to tell, that "my father is dead and my mother is sick, and there's five small children of us, and nary a hapo." The hapo means money. They come down the steps to the kitchen door and ring the bell and ask for cold victuals; and sometimes they peek through the window into the basement, which is my nursery. And one day my brother said to one of them, "My dear, I am very sorry, but our victuals are all hot now, but if you will call in about an hour they will be cold." And she went away awfully angry, (Havens 2006 [1920]: 11-12)

Such attitudes towards the poor seem to have been more common among the upper class. The new middling class, however, while aspiring to the lifestyle of the elite, aligned themselves with the poor. Evangelist preachers especially looked at the poor as well as slaves as a population that could be saved, and they would go “trolling for souls” in any way they could (Burrows and Wallace 1999: 397).

Thus, children became the natural targets of reform movements, including orphanages, houses of reform, aid societies, and charity schools. As well intentioned as this sounds, “An underlying ambiguity marked these child-saving efforts. They attempted to both protect children from the dangers of urban society and to protect society from children. Many child-savers were guilty of paternalism, class and racial bias, xenophobia, and double standards regarding gender” (Mintz 2004: 155). In New York City, one of the first reform houses to open was the House of Refuge in 1825 (Cable 1972: 126). The house kept the children, most of whom were homeless or had been caught in minor crimes, on a strict schedule of labor (Cable 1972: 127). Other institutions followed suit; the Five Points House of Industry, founded in 1856, required the children who lived there to labor and learn “job skills” (Fitts 2001: 119), illustrating the change in these structures by the time the burial vaults of the church had closed. By 1850, there were around 100 orphan asylums in the city (Mintz 2004: 157). The benevolent acts of local churches and societies came to be institutionalized and managed by the state. Many of these institutions turned to labor as a method for "saving" these older children.

Other institutions were also involved in moderating morality. As discussed in Chapter 6, medicine was in its early stages in New York City in the early 19th century. Medicine at the time often conflated disease and morality. Historian John Parascandola writes that, prior to germ theory, sanitation and immorality were blamed for diseases (2008: i-ii). Immigrants were blamed for the diseases coming into the community, and immoral habits and even racial constitution were seen as the cause of early death from disease (Parascandola 2008: ii).

This conflation of morality and health is evident in the letters of the Rev. Ludlow to one of his family members during a cholera outbreak. In August of 1832, the Rev. Ludlow wrote to his sister Caroline that thus far only "drunkards and debauchers of every clap and both sexes have been remanded" in the cholera outbreak of 1832 (Ludlow 1832d). The Rev. Ludlow fled to Brooklyn Heights for the rest of the summer, as did many in the middle class to avoid the disease outbreaks. The Rev. Ludlow wrote to his mother upon his return in October (1832e):

> The Church of Christ in the midst of us has scarcely been touched-Very few useful lives have been taken. I have lost but two of my members, as far as I can learn and my congregation hardly shows one missing. This has been the case with all the church as far as I have learned. God has taught the world a lesson in fever of piety-and temperance-we have never had before.

And yet the middle class was not truly immune, and the Rev. Ludlow would suffer with cholera that winter.

So cholera, an infectious disease, was linked to morality of adults. How much worse, then, was a condition such a syphilis? Syphilis, a venereal condition, was linked to sexual immorality (see Novak 2008; Parascandola 2008). It was little discussed in the medical community because it was seeing as fitting punishment for immoral activities (Duffy 1968: 454).

In fact, historian Duffy writes that venereal disease was considered "the wage of sin," that is the, reward women received for prostitution (Duffy 1968:265).[64] Parascandola writes about this disease as well, saying that the medical community not only did not discuss the disease, but often refused to treat individuals suffering from it (2008:30). Parascandola notes that in New York, only one hospital would accept patients with venereal disease, the Penitentiary Hospital on Blackwell Island (Parascandola 2008: 30).

And yet it was a real risk for men and women—as many as 1,500 patients with venereal disease were in the Penitentiary Hospital (Parascandola 2008:30). If it was a risk for women, then, by extension, it was a risk for their children. Children born of women with the condition could contract congenital syphilis, a condition that would lead to early death. This medical condition is directly linked to the behaviors and activities of adults, and illustrates that, as independent as these older children might have been, they were still connected to their families and homes through their biologies.

These older children remained vulnerable to other diseases. *The Coroner's Reports* highlights this. Joseph Baker died of scrofula (tuberculosis) at age nine (Scott 1989:8). Mary Moore died around age five from inflammation of the stomach (Scott 1989: 151). Peter Pinckney died at the age of five years and nine months from scarlet fever (Scott 1989: 169). Finally, Wiley Rawle, who the report notes was "colored," died from disease of the intestines at the age of eight.[65]

And yet, while these children certainly had some agency, even older children were still often dependent on adults and their decisions. Thus is the case of Philip Cling and Fredericka

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[64] Prostitution is further discussed in Chapter 8.

[65] Interestingly, Wiley was born in Virginia in 1834; slavery was not outlawed in Virginia until 1864.

Cling, born in Germany, who, at the age of 8, arrived in New York City deceased, having died while traveling on the ship the Coral from Rotterdam, their deaths due to "insufficient wood and water to cook food," (Scott 1989: 36-37). The *Coroners' Reports* does not specific whether they were travelling from Rotterdam, NY, or Rotterdam in the Netherlands. Jane Pringle of England also died from starvation on a crossing, in her case from Liverpool, England, at the age of 10 (Scott 1989: 172).

Like some of the younger children discussed previously, the older children were also at risk from the many dangers of the urban environment. Independence could come at a cost, as the *Coroners' Reports* details. For instance, Michael Healy was killed at the age of nine from a wound in his knee. The wound was from a knife thrown by Richard Murphy (Scott 1989: 93). Such a stunning case of violence may have been an accident, may have been during work or play, or may have been intentional. Unfortunately, the *Coroners' Reports* only gives us the basic information. Eight-year-old Julia Alford was run over by a horse wagon (Scott 1989: 3). Uriah Brown, at the age of seven, died from "taking mineral poison into the stomach" (Scott 1989: 22), and Catherine Christmas died at the age of seven as well when bales of hay fell on her from the unloading of a cart (Scott 1989: 34).

The older children—in school, working, or playing—were still intimately connected to family and home but were likewise able to engage with the city around them. The accidents and diseases listed above indicate how wide a world of structures to which these children were exposed. These included other children, adults, schools, factories, ships, and the urban space itself, which was far from a clean and healthy environment. The bodies of these children, then, reflect these new exposures. They also reflect the survival of the children through the first stages of life, and highlight what challenges these older children were able to overcome.

Skeletal Findings

Given the active and diverse lives of these children suggested by the historical record, as a population, the children from the Spring Street Presbyterian Church who passed away between the ages of 4.5 and 9.5 have fewer skeletal lesions than might be expected. The older children continue to have high frequencies of rickets and cribra orbitalia, while scurvy is not present, and only two cranial lesions were observed. Periostitis and dental health are also concerns for this cohort. These frequencies are compared and contrasted to those presented for earlier age groups.

Rickets

As many as 50% of tibiae in the infants have rickets, and over 41% of the tibiae of the toddlers and younger children have rickets. In the older children, the frequencies of the condition remain high.

Table 7.4: Long Bones from Older Children with Rickets

	Right		Left	
Element	**N**	**With Lesions (%)**	**N**	**With Lesions (%)**
Femorae	11	2 (18.18)	10	2 (20)
Fibulae	2	1 (50)	4	2 (50)
Humerii	9	0 (0)	6	0 (0)
Radii	7	0 (0)	5	0 (0)
Tibiae	8	4 (50)	9	3 (33.33)
Ulnae	6	0 (0)	7	0 (0)

Fewer cases occur among the older children buried in the vaults than in the younger age groups, though the difference is not statistically significant (p= .05). Nonetheless, up to 50% of the left fibulae and right tibiae are affected. This means that there is no decline in frequency from the younger age categories. In the older children, only the legs are affected, which is consistent with behavioral patterns, in this case bearing weight on the legs while walking. In the infants, the affected elements were nearly equally distributed between the arms and the legs, but in the toddlers and younger children fewer cases were observed in the arms.

A severe case of rickets in the older children is in Vault IV, Individual TTTT. IV-TTTT is between 4.5 and 6.5 years of age.[66] IV-TTTT is partially complete, represented by long bones and some axial elements.[67] IV-TTTT has extensive and severe bowing from rickets. The right femur has moderate bowing and torsion of the head, while the left femur shows less obvious bowing but has a compressed femoral neck, or *coxa vara*. Both the left and right tibiae are extensively bowed, possibly the most bowed in this collection. The left fibula also appears to have bowing that is healing.[68] However, no fraying or porosity is visible on these elements. In addition, one rib on the right side has an expanded sternal end, suggesting the rosary-bead appearance may have been present.

Interestingly, however, the inferior pubic ramus on the left ischium is twisted posteriorly. This twisted pelvis is unusual. Changes to the pelvis can occur with rickets, but not many have been observed in the Spring Street Presbyterian Church collection. In IV-TTTT's case, it may also be related to the *coxa vara* of the left femur. The fact that some of the elements appear to be healing suggests that IV-TTTT may have begun receiving adequate levels of vitamin D and was

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[66]This individual was assigned an age category based on a series of factors. First, the long bones were all measured, and all measure within the range of 4.5 to 5.5 years of age except for the femora, which fall between 4.5 and 6.5 years of age. These metrics are complicated, however, by the severe bowing present and likely are under-aged because of this. Further age analysis from the fusion of the vertebral bodies, however, are consistent with an age of between 4 and 6, and a final range of 4.5 to 6.5 with a likely age around 5.5 has been assigned.

[67] IV-TTTT is represented by left and right tibiae, left and right femora, a left fibula, left and right calcaneii and talii, a left ischium, a right first rib and 10 additional right rib fragments, 10 left rib fragments, a partial C2, 2 additional cervical vertebrae, 8 thoracic arches and 2 centra, 3 lumbar vertebrae and one lose centrum, partial left and right clavicles, and partial left and right scapulae. Preservation across the elements varies from good to poor, with the worst weathering a Behnrensmeyer stage 3.

[68] As children recover from rickets, their growing long bones will straighten back out (Pinhasi et al 2006).

in the process of recovering from the deprivation at the time of death. Given this child's age, 4.5-6.5, it suggests that he or she was recovering from rickets, a condition with which the child likely began to suffer at a younger age. Thus, the skeletal lesions in this individual highlight an older child transitioning *out* of a deficiency, either through better exposure to sunlight and/or food sources with vitamin D.

Scurvy

Strikingly, there are no suspected cases of scurvy in the older children buried in the vaults. The disappearance of the deficiency at this age further supports the possibility that scurvy in the younger cohorts of children may be related to weaning stress. Therefore, the lesions, if they had been present in these older children, would have remodeled as the children grew and are no longer present. Additionally, as these children are survivors of some five to nine years, they may have had some advantages earlier in life that protected them from scurvy. Advantages may have included access to vitamin C rich foods during and after weaning.

Cribra Orbitalia

While vitamin C seems to have been adequate for these children, cases of cribra orbitalia suggest that other vital components of the diet may have been missing. While frequencies of this lesion type were low for the infants, toddlers and younger children had a 100% occurrence in observable eye orbits. All of the preserved eye orbits in the older children have indications of cribra orbitalia as well (see Table 7.5).

Table 7.5: Cribra Orbitalia in Older Children

Side	N	With Lesions (%)
Left	5	5 (100)
Right	5	5 (100)

These cases appear on five individuals, and all of them are bilateral and active. Two of the individuals have no other pathological conditions present, while one has rickets (IV-1-4I, discussed below) and two have cranial lesions (IV-NNN and IV-1-4M). No clear pattern emerges here for the etiology of this condition, except to suggest that it was a widespread affliction, whether or not the children were suffering from other conditions.

Periostitis

While levels of cribra orbitalia are high, the rates of periostitis are low (see Table 7.6).

Table 7.6: Periostitis in Older Children

	Right			Left		
Element	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**
Femorae	11	0 (0)	1 (9.09)	10	0 (0)	1 (10)
Fibulae	2	0 (0)	0 (0)	4	0 (0)	0 (0)
Humerii	9	0 (0)	0 (0)	6	0 (0)	0 (0)
Radii	7	0 (0)	0 (0)	5	0 (0)	0 (0)
Tibiae	8	0 (0)	1 (12.5)	9	2 (22.22)	0 (0)
Ulnae	6	0 (0)	0 (0)	7	0 (0)	0 (0)

The two cases on the femorae are both widespread, indicating that the cause was likely infection rather than trauma. Both are also healed, meaning that the individuals survived the episodes that caused the periostitis. On the tibiae, on the other hand, all of the cases of periostitis are localized, which are more indicative of trauma. On the right, one case is healed, indicating a past trauma. On the left, are both active localized cases. As high as 13% (right tibiae) of elements from the infants had periostitis, and up to 25% (left radii) of toddlers and younger children had periostitis. The older children have few cases of periostitis. It is not a statistically significant difference, however.

One of the active localized cases is found on the left tibia of Vault II Burial 3 (II-3). II-3 was buried with II-2, as discussed in the previous chapter. II-3 was 4.5-5.5 years in age at the time of death.[69] II-3 is mostly complete and in good condition.[70] Overall, II-3 has few lesions. II-3 does, however, have some dental pathology; numerous pit caries are present in the deciduous dentition, located primarily on the occlusal, buccal, and interproximal surfaces. Attrition is mild and concentrated on the anterior teeth. As will be discussed below, caries and attrition on deciduous teeth is not surprising given that they would have been erupted and exposed to the oral environment for a number of years by the time II-3 reached this age at death.

In addition, the midshaft of this child's fragmentary left tibia exhibits mild, active, and widespread periostitis across the medial surface (see Figure 7.1). Because only the midshaft of this element was recovered, the extent of the inflammation cannot be determined. However, at the time of death, II-3 had some kind of inflammation occurring on the tibiae.

Figure 7.1: Periostitis on the Left Fibula of Burial II-3, 1.5X Magnification

[69]Measurements of the long bones indicate that this individual is between 4.5 and 6.5 years in age. Dental calcification standards, however, are more consistent with 4.5 to 5.5 years in age, especially the mandibular first and second molars.

[70]The remains are in good condition, with most damage limited to postmortem breakage of the cranium and lower appendicular elements. The bone is golden brown in color and well preserved. Two shroud pins were identified with this individual; one beneath the skull and the other near the right rib cage, and green stains are present on the occipital and on a right rib. Also associated with these remains were three ceramic fragments. The two rim fragments appear to be from different vessels though both have a plain white finish. The third fragment appears to be from a third vessel, as the temper is pink. The finish on this fragment has a blue and white indeterminate design.

Cranial Lesions

The older children had very few cranial lesions with only two cases identified (Table 7.7). The fact that there are only two cases, or 8.33% of occipitals affected, in the older children is a reduction from previous age groups; infants had up to 22% of elements affected, and toddlers and younger children up to 23%.

Table 7.7: Cranial Lesions in Older Children

			Endocranial		Ectocranial
Element	**N**	**Formative (%)**	**Porosity (%)**	**SES (%)**	**Porosity (%)**
Frontal	10	0	0	0	0
Occipital	12	1 (8.33)	1 (8.33)	1 (8.33)	1 (8.33)
Left Parietal	8	0	0	0	0
Right Parietal	9	0	0	0	0

The case of SES appears on Vault IV, Individual I-4M, a 4.5 to 5.5 year old with bilateral, active cribra orbitalia. Unfortunately, no post cranial elements are present to further investigate the health of this child.

The child with the endocranial porosity and formative lesions is Vault IV, Individual NNN. IV-NNN is a 5 to 7 old child represented by cranial fragments only.[71] [72] He or she has formative endocranial lesions along the internal occipital crest and in the sulci. This plaque-like pathology also appears on the endocranial surface of the sphenoid and temporals. It is raised, gray in color, and present particularly in crevices and depressions in the bone (Figure 7.2).[73] On

[71]Age has been based on fusion of the elements of the occipital, placing this individual between five and seven years of age. Seriation further matches this estimate, as does the dense bone structure.

[72]This individual is represented by a partial frontal with no orbits, complete left parietal and a partial right parietal, complete left and right temporals, a partial occipital, and a complete right sphenoid. All elements articulate with each other and overall the bone is dense and robust. It varies in color from tan to brown to gray to golden. Preservation is good overall with some minor flaking along the sutures, particularly along the parietals.

[73] The lesions are serpentine in pattern, but are not the same as SES, as these are formative, plaque like growths. Under a microscope the raised nature and serpentine like pattern becomes apparent.

the ectocranial surfaces of the temporals, there is extensive porosity, particularly around the mastoid and external auditory meatus. This porosity is rather large, and not formative. It extends into the ear opening.

The interior skull of this child, then, was covered with porosity and a gray, plaque-like bone growth. The external surfaces of the temporals are porous, and that porosity extends into the ear openings. The porosity does not look like other cases in this collection, which are more consistent with conditions like scurvy. The actual etiology of this condition is unknown to us now, but suggests a systemic condition of the endocranial vault.

Figure 7.2: Endocranial Lesions of the Occipital of Individual IV-NNN. Arrow indicates lesions.

Dental Health

Dental health at this age includes an array of dental conditions. In previous chapters, attrition and caries have been examined to discuss the transition from breastfeeding to solid foods (Roberts and Manchester 2007). In addition, the presence of linear enamel hypoplasias, disruptions in the growth of teeth due to serious illness, were discussed. In the older children, we begin to see other markers as well, including abscessing teeth and dental anomalies. Another difference in this cohort is the number and types of teeth available for examination: the older children often have both deciduous and permanent teeth present.

Table 7.8: Pathology in Deciduous Teeth, Older Children

Tooth Type	Number observed	Number Carious (%)	Number with Attrition (%)
Rdi^1	2	2 (100)	0
Ldi^1	0	0	0
Rdi_1	1	1 (100)	0
Ldi_1	1	0	0
Rdi^2	2	1 (50)	0
Ldi^2	1	1 (100)	0
Rdi_2	1	0	0
Ldi_2	1	1 (100)	0
Ldc^1	2	0	0
Rdc^1	2	0	0
Ldc_1	3	1 (33.33)	0
Rdc_1	3	2 (66.66)	0
Rdm^1	4	2 (50)	0
Ldm^1	5	3 (60)	0
Rdm_1	6	3 (50)	0
Ldm_1	5	2 (40)	0
Rdm^2	**8**	2 (25)	2 (25)
Ldm^2	4	2 (50)	2 (50)
Rdm_2	7	1 (14.28)	0
Ldm_2	**8**	0	3 (37.5)
Total	**66**	**24 (36.36%)**	**7 (10.61%)**

Table 7.9: Dental Pathology in Permanent Teeth, Older Children

Tooth Type	Number Observed	Number Carious (%)	Number with Attrition (%)
RI^1	3	0	1 (33.33)
LI^1	1	0	0
RI_1	2	0	1 (50)
LI_1	1	0	0
RI^2	1	0	0
LI^2	1	0	0
RI_2	0	0	0
LI_2	3	0	1 (33.33)
RC^1	1	0	0
LC^1	0	0	0
RC_1	0	0	0
LC_1	1	1 (100)	1 (100)

RPM^1	0	0	0
LPM^1	0	0	0
RPM_1	0	0	0
LPM_1	0	0	0
RPM^2	0	0	0
LPM^2	0	0	0
RPM_2	0	0	0
LPM_2	0	0	0
RM^1	5	1 (20)	1 (20)
LM^1	6	1 (16.67)	0
RM_1	4	1 (25)	1 (25)
LM_1	5	1 (20)	1 (20)
RM^2	0	0	0
LM^2	1	0	0
RM_2	1	0	0
LM_2	0	0	0
Total	**36**	**5 (13.89%)**	**7 (19.44%)**

The MNI represented by these teeth is eight, based on both the right second maxillary deciduous molar and the left second mandibular deciduous molar. The older children have a higher instance of carious lesions on deciduous teeth than either of the previous age groups, with 24 out of 66, 36.36%, of teeth having one or more lesion. Out of 36 permanent teeth, only five have carious lesions (13.89%). The toddlers and younger children had carious lesions on 16.67% of observed teeth, as compared to 25% of the observed teeth from infants. This pattern is to be expected because the deciduous teeth in these older children are recording lesions that would have begun early on when those teeth first erupted. The permanent teeth, however, have more recently erupted and therefore have spent less time exposed to pathogens.

Attrition rates in the older children remain fairly low, with 7 out of 66, or 10.61% of deciduous teeth showing signs of wear. In the permanent teeth, 7 out of 36, or 19.44%, have attrition. The toddlers and younger had attrition on 16.67% of observed teeth, versus 12.5% of observed teeth from infants. In previous chapters, discussions of diet have shown that fresh foods were hard to come by, and that, particularly during the winter, working class diets consisted of crackers, breads, dried meats, pork, sausages, and fish (McIntosh 1995). These older children were likely eating a diet similar to adults. For those with more resources, fruits, vegetables, and even, as Catherine Havens's diary points out, candy may have been available. Processed foods such as the breads and crackers and candy all could have contributed to rates of carious lesions seen in these older children.

In addition, for the first time we see children with more severe pathology. Three sockets have abscesses, and one permanent molar has completely abscessed out (Table 7.10).

Table 7.10: Alveolar Bone Pathology in Older Children

Socket	Total Number Observed	Alveolar Abscess (%)	Antemortem Tooth Loss (%)
dm_2	14	2 (14.28)	0
M_1	15	1 (6.67)	1 (6.67)

One of the alveolar abscesses is in Vault IV Burial 1-4I.[74] IV-1-4I is a child 4.5-5.5 years of age.[75] This child has rickets, dental pathology, and cribra orbitalia. IV-1-4I has a nearly complete set of deciduous teeth and developing permanent teeth. Carious lesions pock the labial and buccal surfaces of nearly every deciduous tooth. Numerous interproximal caries are also present. The left maxilla and mandible have more pronounced pathology than the right side (Figures 7.3 and 7.4). IV-I-4I also has an active alveolar abscess. The abscess has perforated the cortical bone and created a large oval lesion on the buccal surface, near the root. In addition to the pain from the abscessing tooth, this child has extensive carious lesions that have exposed the pulp chambers of two teeth on the left side as well. Not surprisingly, IV-1-4I appears to have

[74] IV-1-4 is a mostly complete skeleton with excellent preservation and is brown in color.

[75] Dental calcification indicated an age of 4.5 to 5.5 years based on the second maxillary molar at crown one half and the first maxillary molar at root one quarter. Vertebral fusion is also consistent with a child approximately 5 years in age. Due to pathology, the long bone measurements under-age this individual.

focused chewing on the right side, as evidenced by the teeth on this side having much greater attrition. In addition, there are mild to moderate deposits of calculus on most of the teeth. All of this suggests a diet high in carbohydrates and sugars—including the previously mentioned possibilities of breads and candies, not to mention sugary beverages. Moreover, the extensive destruction of the teeth on the left side of the mouth suggest that, at one time, IV-1-4I was chewing on the left side of his or her mouth, but that by the time of death, the pain would have been such that that would no longer have been possible.

Figure 7.3: Occlusal View of the Mandible of Burial IV-1-4I.

Figure 7.4: Occlusal View of the Maxillae of Burial IV-1-4I.

Interestingly, IV-1-4I also has bowed femorae and tibiae and flared sternal rib ends, both of which are signatures of rickets. In addition, as mentioned earlier, IV-1-4I has bilateral cribra orbitalia. So while the diet of this child may have been high in sugar or carbohydrates, it was likely missing other key nutrients.

Finally, the older children have more dental defects than the toddlers and younger children do. Given that these older children have lived longer, this is not surprising. Five teeth have nine LEHs (Table 7.11). For those teeth with linear enamel hypoplasias, the age of the disruption(s) could be calculated, and they indicate stress events earlier in life. As previously illustrated, children are particularly vulnerable to epidemic diseases and health stress related to weaning in infancy and toddlerhood. Of the nine LEHs observed, the ages of disruption were before the age of three in six cases. All nine of the disruptions occurred before these children reached older childhood, which correlates to these previously discussed risks. These children, therefore, are survivors of past health insults.

Table 7.11: Dental Defects in Older Children

Individual/ Element	Tooth	Number of LEHs	Crown Stage	Age of Disruption*	Anomalies
Vault IV	SUB$I^2$02R	1	Cr ¾	N/A	---
Vault IV Individual JJJJ	SUBC^1 01L	3	Cr ¼, Cr ½, Cr ¾	1.7 years, 2.0 years, 2.9 years	---
Vault IV	SUB$C_1$02L	3	Cr ½, Cr $^2/_3$, Cr ¾	2 years, 2.5 years, 2.9 years	---
Vault IV FS 49	SUBPM_1 02L	1	Cr ½	3.5 years	---
Vault IV FS 49	SUB$PM_1$01 R	1	Cr ½	3.5 years	---
Vault IV FS 22 SUBMAX 15R	SUB$M_1$01R	---			Mulberry Molar; Enamel Pitting
Vault IV FS 22 SUBMAN21	SUB$I_1$01L	---			Hutchinson's Incisor; Enamel Pitting
Vault IV FS 22 SUBMAN 21	SUB$I_1$01R				Hutchinson's Incisor; Enamel Pitting
Vault IV FS 22 SUBMAN 21	SUB$M_1$01L	---			Mulberry Molar; Enamel Pitting
Vault IV FS 22 SUBMAN 21	SUB$M_1$02R	---			Mulberry Molar; Enamel Pitting

** Age estimated from dental calcification standards, Moorres et al 1963*

Three other defects are also present in these teeth: Hutchinson's incisors, Mullberry molars, and enamel pitting. Hutchinson's incisors, malformations of the occlusal surface that include notching and a tapered shape of the crown, are considered diagnostic of congenital syphilis (Hillson et al 1998; Nystrom 2011). Mullberry molars have cusps that do not form properly form, leaving them appearing like projections from the surface of the teeth. These too are considered diagnostic of congenital syphilis (Hillson et al 1998). Some discussion has arisen in recent work differentiating between true mulberry molars and those with addition enamel defects on the cusps, labeled as having cuspal enamel hypoplasias (Odgen et al 2007: 960). Rather than syphilis, these teeth are associated with a wider range of conditions, including chronic diarrhea, oxygen deprivation, and even environmental toxins (Odgen et al 20007; Nystrom 2011: 377). However, the cases presented here are in occlusion with Hutchinson's incisors and appear to be directly related to congenital syphilis.[76]

Finally, enamel pitting is noted. Such pitting is related with growth disruptions like enamel hypoplasia, but in this case the pitting is associated directly with the malformations from congenital syphilis. All of the anomalies noted in Table 7.11 are from the same individual, identified from a sort. That individual was between 6 and 7 years of age. Both the mandible and the maxilla have mulberry molars with enamel defects as well as Hutchinson's incisors (see Figures 7.5 and 7.6).

[76] There are multiple other cases of mulberry molars and Hutchinson's incisors from subadult dentition that are not presented in this dissertation. Unfortunately, these teeth have damaged roots that do not allow an age estimate to be made, and thus are not included here. Future work will incorporate all of the available teeth into a broader discussion of venereal syphilis in the adults, congenital syphilis in the subadults, and morality that is not dependent on age-based categories as is this presentation of the subadult remains.

Figure 7.5: Enamel Defects of the Molars SUBMAN 21.

Figure 7.6: Enamel Defects the Incisors of SUBMAN 21.

In addition to the mulberry molars and Hutchinson's incisors, in the mandible, two deciduous teeth have caries, and the deciduous teeth also have substantial wear. Despite debates over the etiology of the condition of the molars, this seems to be a clear case of congenital syphilis. Such a condition would have marked the individual, which is further discussed below.

Trauma

In this age cohort, there is one interesting case of trauma. A single unassociated humerii, Vault IV FS 112 SUBHUM 02R, has a compression fracture of the proximal metaphysis (Figures 7.7 and 7.8). The entire shape and angle of the metaphysis is altered by compressive forces. The proximal end is compressed and tilts anteriorly.

Figure 7.7: Compression Fracture of Humerus. Arrow indicates compressed area.

Figure 7.8: Close up of angled proximal metaphysis.

This injury does show some signs of healing and so was an antemortem event. Such a fracture results from falls or other impacts that compress the bone (Galloway 1999:46). We cannot know exactly what caused this injury, but it would have been painful. It also reminds us that these children were active, busy, and perhaps even laboring.

Discussion

At the beginning of this chapter, it was posited that these older children may have more skeletal lesions as markers of their longer life spans. And yet, the skeletal findings indicate that, while certain conditions remain a constant (rickets, for instance), others disappear (such as scurvy). In addition, new defects are seen for the first time, including dental defects associated with congenital syphilis. So how can this pattern be explained?

Perhaps the most important consideration here is that these children are older. They managed to survive to somewhere between 4.5 and 9.5 years of age. Expectations of them would have been different. Some would have been in school while others would have been working. Many would have been doing both activities. Additionally, the risks that were concerns in their earlier years—deficient breast milk, weaning, and serious vulnerability to infectious disease—would not be present in these later years. We are reminded that those children that survived the perils of infancy and toddlerhood were likely to continue to survive. For instance, cranial lesions are seen in much lower frequencies in the older children. While the absence of these lesions may indicate that these children never suffered from these stresses, the rapid remodeling of subadult bone may just as likely indicate that they were able to survive and recover. And so the older children once again remind us of the dangers and difficulties of infancy, toddlerhood, and younger childhood.

Of course, other risks *were present*, and the fact that these children did not survive past nine, and are the third largest cohort of subadults buried in the vaults, suggest that these risks were indeed serious. Turning to the rings of structure as in previous chapters, we can begin to understand what these risks were and how the skeletal data illuminates them.

Mothers and Caregivers

While nursing infants represent perhaps the cohort most dependent on mothers, children of all ages still interact with their worlds through their caregivers. For these older children, those caregivers were diversifying. At home, parents, siblings, and relatives were likely the main adults responsible for children. And yet outside the home these older children would have been exposed to teachers, pastors, and even employers. In many ways, caregivers begin to blend the structures of family and institutions.

Even if the circle of mothers and caregivers has widened with this age cohort, this group is still the one primarily responsible for setting the boundaries of dietary choice. The data in this chapter show two interesting things about diet and deficiency in the older children: first, that it is remarkably consistent with earlier stages of childhood, and second, that within the cohort itself, there remains a great deal of diversity, likely linked to family socioeconomic status.

The presence of rickets in 30-50% of some long bones highlights a continuing issue for children in this series: access to vitamin D. In the older children, however, we would expect them to exert more choice, including the ability to choose clothing, have access the outdoors, and select food. And yet, the condition remains, with many of the same factors still implicated. Food rich in vitamin D may have been hard to acquire, especially in the winter months, and particularly if the families were following restrictive diets, such as that of Sylvester Graham. It is worth remembering here that the data indicate up to half of the subadults were afflicted by rickets, which means that half were free of the condition.

The teeth provide some further insight into diet. The older children's teeth are carious and show wear consistent with a diet high in sugars and carbohydrates. Restrictive diets like the Graham diet and higher class diets with candy and sweetened drinks all may contribute to this prevalence, indicating a risk that existed across classes. In particular, the deciduous teeth highlight that the longer the children live, the more caries and attrition can occur. For instance, in the older children, the more recently erupted teeth have fewer carious lesions—36.36% of deciduous teeth are carious, as versus 13.89% of permanent teeth. This appears too in the data on alveolar abscesses, with 14.28% of the second deciduous molar sockets showing signs of abscessing but only 6.67% of permanent first molar sockets showing abscessing.

Another potential indication of diet comes from the presence of cribra orbitalia. Like in the younger children, 100% of eye orbits that were observable have signs of cribra orbitalia. This is high. And yet, it is not remarkably different from the younger children. In fact, in many ways, none of this data is remarkably different. The influence of families and caregivers over diet is similar to what the younger children would have experienced. And the skeletal indicators, excluding the disappearance of scurvy, remain relatively continuous with the younger cohorts. While caregivers are the most direct mediators of diet, the significance of these particular skeletal indicators for the older children goes beyond just highlighting this relationship. High rates of rickets, cribra orbitalia, and the dental caries, attrition, and alveolar abscesses in some ways give us insight into the pasts of these children. We are seeing, essentially, continuing trends of stress *over the course of the lifespan*.

This is perhaps best illustrated by the presence of LEHs. These lesions indicate the major health stresses of younger childhood. All of the LEHs, and the health disruptions they represent, occurred when those children were under the age of 4.5—the age when this cohort begins. Research indicates that the peak age for the development of LEHs is between 2 and 4, coinciding in many cases with weaning (Lewis and Roberts 1997: 582). This fits with the data observed in these older children.

The presence of Hutchinson's incisors and Mulberry molars reminds us that whether or not these older children were less dependent on adults, their health was still intricately connected to their families. Congenital syphilis results from the behavior of the parents, and given the demographics of the city and the 8th Ward at the time, it is not surprising that there is a case of congenital syphilis. We know from church records that at least one member of the congregation worked as a prostitute for a time, and that women often turned to prostitution for survival.[77] The *Session Minutes* of the church in January of 1833 record the story of Candence Myers “a coloured woman,” who lived in a house of “ill repute,” (1825-1841: 121). She was removed from that house upon charges of adultery and placed in a boarding house. In March of 1833, two months later, it is noted in the *Session Minutes* that she left the boarding house and returned to the first house, and the church excommunicated her (1825-1841: 127). A little over a year later she appears in the minutes again, restored to communion, having apparently redeemed herself in the eyes of the congregation (1825-1841). It is estimated that 5-10% of all women between the ages of 15 and 30 worked as prostitutes during their lives, with that number climbing even higher when economic depressions hit (Burrows and Wallace 1999: 483). Given the previously discussed association between disease and morality, particularly venereal disease, the presence of a child in the vaults with congenital syphilis suggests that the child’s life, and the child’s mother, may have been marked by discrimination. And yet, the remains are buried in the vaults, as are those of at least two adult females and two adult males with probable venereal syphilis.

Institutions

The presence of congenital syphilis reminds us that the distinct combination of families, and therefore the remains buried in the vaults, is due in part to the ideological appeal of the church to residents of the neighborhood. The influence of this, and other institutions, shapes what we see in the remains. One previously discussed example is rickets, which could be influenced by a variety of institutions and children’s interactions with them. As detailed earlier in this chapter, these older children would have been in diverse circumstances, with ranging levels of agency, at home, school, and at work. Those laboring on the streets, perhaps the poorest of

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[77] Prostitution will be discussed in more detail in Chapter 8.

these children, may have had the best chance to achieve adequate levels of vitamin D exposure. Children of the working and middle classes may have had the least access—spending their time indoors at school, in apprenticeships, or in industrial labor. And if families were following dietary restrictions, those restrictions were being taught by pastors and authority figures.

The presence of localized periostitis on three tibiae reminds us of other interactions with institutions. Localized periostitis, primarily caused by trauma, indicate that the children were moving—out and about in the city, schools, and work places. Both of the cases of periostitis on the femorae, which were widespread, are healed, markers of past vulnerability to infection.

The City

The fractured humerus could result from the interactions with the city environment. The *Coroners' Reports* point out, these older children would have been encountering the dangers of the urbanizing space on a regular basis—from streets busy with carts to goods being unloaded from docks and even violence, as was seen in the case of Michael Healy from a knife wound.

The older children would have been acutely aware of the dangers to which they were exposed. Catherine Havens writes in her diary about childhood death in a very matter of fact fashion. She, as would the other children of this age, would have witnessed the many types of early childhood death and how the adults handled them:

> Beside my little niece, I have a dear cousin near my age. Her father died in New Orleans, and her mother then came to New York to live. She brought all her six children with her, and also the bones of seven other little children of hers, who had died in their infancy. She brought them in a basket to put in the family vault on Long Island.

She then goes on to spend as much time commenting on the spelling of "infancy" as she does on the fact that she has seven cousins who died as infants and three sisters who passed away before she was born. This is suggestive of how prevalent early death was:

> I think spelling is very funny, I spelt infancy infantsy, and they said it was wrong, but I don't see why, because if my seven little cousins died when they were infants, they must have died in their infantsy; but *infancy* makes it seem as if they hadn't really died, but we just made believe. I have three little sisters who died before I was born and they are buried in the Marble Cemetery, and one day Maggy took me to see their grave, and the cemetery has a high iron railing around it and we had to open a gate and walk through the long grass. The oldest child was named Anna, and she was seven years old, and she went with my oldest sister to Miss McClenahan's school, and she was taken sick in school and my sister brought her home, and she died in forty-eight hours of scarlet fever (Havens 2006 [1920]: 17-18).

This short diary entry raises many interesting questions, but most striking is the odd value placed on the lives of these deceased children. On the one hand, the aunt brings the bones of her deceased children with her to New York, yet on the other hand, Catherine writes so little of her deceased sisters and remarks on the landscape as much as the people. It provides an excellent snapshot of a child living in a world of so much childhood death.

Conclusion

In 1849, Catherine Havens wrote, "New York is getting very big and building up," (1920 [1849]). So too were the city's children. The coming changes—the Industrial Revolution, the Civil War—would all fundamentally alter childhood. At the cusp of this period, we find older children in transition, between a time when education and labor was home based, and when the market revolution would see children headed out from the home to become educated members of the middle class or early labors in the working class. We also find these children, from 4.5 to 9.5 years, at a second transition point, ranging from a great deal of dependency on parents to the cusp of teenage years and the potential adult behavior that comes with it. The bodies of these children also show us a final change: surviving early childhood. The remnants of infectious disease in the femurs, the continuing prevalence of rickets and cribra orbitalia, and the dietary patterns highlighted in the teeth reminds us that childhood, from birth onwards, is a complex interplay of the sociocultural environment and the growing bodies of the children. Congenital syphilis highlights the relationship of children's biologies to the families, as do the metabolic conditions. The periostitis of the tibiae remind us these older children were active. When combined with the historical data, we get a sense of the variety of lives represented by these twelve or more individuals, who likely represented multiple classes and races, and yet found themselves all buried in the vaults of the church. As these children grew, explored, and ventured out, they and their bodies encountered and recorded the urbanizing space around them.

Chapter 8: Transitioning: 9.5-14.5 Years Old

> *"Adams, John, age 13 years, ap.[prenticed] to David Harrison, Jr., lawyer, of Rockville, Westchester Co., to learn some useful business,"*
>
> --Nineteenth Century Apprentices in New York City, *Kenneth Scott.*

Introduction

The final age cohort includes those persons on the verge of adulthood. These individuals might have found themselves living at home, going to school, and enjoying childhood. Or, like John Adams, they may have been apprenticed out, working, or even married and starting families of their own. The one thing that is consistent about this age cohort is that, based on historical records and the skeletal elements described below, this group is not internally cohesive. Instead, these individuals were transitioning into adulthood, and doing so at different paces and along disparate routes.

Of all of the groups discussed, this is the smallest. Five discreet Individuals have been identified in the Spring Street Presbyterian Church skeletal series (Table 8.1).

Table 8.1: Burials and Individuals[78], 9.5-14.5

Identification	Age	Preservation	Completeness	Pathologies
Vault II Individual G	10.5-11.5	Good	3 (Legs only)	----
Vault II Individual I	12.5-13.5	Good	2	----
Vault II Individual J	13.5-14.5	Good	3 (Cranium only)	Bilateral cribra orbitalia; craniotomy
Vault IV Individual RRR	9.5-10.5	Poor	3 (Cranium only)	----
Vault IV Individual NNNN	13.5-14.5	Good	3 (Cranium only)	Dental pathology

Completeness: 1) 75% or more of skeleton is present; 2) 25-75% of skeleton is present; 3) 25% or less of skeleton is present.

[78] It is important to remember that Burials and Individuals are not necessarily discrete, as they are often incomplete and therefore may overlap with other Burials and Individuals.

The MNI for this age group, however, is seven based on right sphenoids. Recall that for the entire subadult series, the left femorae was the most common element overall (N = 75). Only five of these femorae (6.6%) are from the age group discussed in this chapter. In short, there are very few individuals buried at the Spring Street Presbyterian Church who died between 9.5 and 14.5 years in age.

Table 8.2: Elements from Subadults 9.5-14.5

Element	Number Right	Number Left	Single Element
Femorae	6	5	--
Fibulae	3	1	--
Humerii	5	0	--
Radii	3	2	--
Tibiae	3	3	--
Ulnae	2	1	--
Frontals	--	--	3
Occipitals	--	--	1
Parietals	2	1	--
Temporals	1	1	--
Sphenoids	**7**	6	--
Zygomatics	0	0	--
Mandibles	0	0	2
Maxillae	1	1	--

Historical perspectives on this age group are also limited. “Teenagers” as we think of them today did not exist in the 19th century (Teeter 1988). The 1820 census did recognize a group between the ages of 10 and 15, and the 1830 census recognized a group between the ages of 10 and 16, but historical documentation suggests that these children were either considered youths, much in kind with the older children previously discussed, or adults themselves, perhaps sent out to “learn some useful skill” as a member of society, as the quote above notes (Teeter 1988:15; Burrows and Wallace 1999: 501). Burrows and Wallace write that girls as young as 12 were working as prostitutes in the city (1999: 501), and the *Coroners' Reports* mentions at least one young man, married and working on a ship, who died at the age of 13 (Scott 1989: 209). And yet, at the same time, when Catherine Havens was writing in her diary in 1849 and 1850, she was 10 to11 years old, and very much still a child. She attended school, visited relatives, bought candy, and went to fairs (Havens 2006 [1920]). Unlike Catherine's journal, those historical accounts that do discuss "children" tend to focus on child-saving efforts and juvenile delinquents. The Police Chief of the city wrote in the 1840s that there were some 10,000 street children causing trouble (Teeter 1988: 17).

And so one way to think about this cohort is to think of them as transitioning into adulthood, some already there, some still in childhood, but all at the precipice of new levels of responsibility. For this reason, this group has not been given a name. To call them teenagers would be to impose a modern category that was not recognized at the time. Perhaps the best way to think about this group is not as a group at all, but rather as a few individual snapshots of life at this precipice.

Likewise, the coffin plates give us little information. In the Spring Street Presbyterian Church burial vaults, only two coffin plates were recovered for this age range (Table 8.3). John Clark died at the age of 12 years, and Ann Whelpley at the age of 14 years. No additional historical details have been recovered for either of these individuals.

Table 8.3: Coffin Plates for Subadults 9.5-14.5

Name	Information on Coffin Plate	Additional Historical Details
John R. Clark	"died 21st Septr 1824" "Aged 12 Yrs & 10 days"	----
Ann Semantha Whelpley	"Died Feb 19th A 1825" "Aged 14 Yr & 2 D"	----

Information from White and Mooney 2010 and Hicks n.d.

Though the sample is small, it is interesting. Out of a maximum of seven individuals represented in this cohort, only two coffin plates were found. So 28.57% of the collection is represented. That percentage is fairly high, particularly when compared to the younger age cohorts, who averaged 7-17% of individuals represented by coffin plates. It is possible that these oldest of children were marked with coffin plates more frequently in part because they may have been perceived differently. Additionally, this cohort has an equal split in coffin plates between males and females. This again potentially suggests a different way of valuing individuals who lived into these years.

This potential for the individuals between 9.5 and 14.5 buried at the Spring Street Presbyterian Church to be perceived as either children or adults means that their skeletal remains should begin to differ from the patterns seen in the younger cohorts. Expectations include high levels of dental pathology, general stress markers such as cribra orbitalia and periostitis, and perhaps on-going deficiencies leading to rickets, as has been a general trend in this collection. These conditions should mark the longer lifespan of these individuals as well as their transitions into independence. Scurvy and cranial lesions are not likely to be present, as previous analysis has shown that these markers are more closely associated with infancy and toddlerhood and children's associated dependency on adults. And as anticipated, rickets, cribra orbitalia, and dental pathology do continue to be manifest in this cohort, while periostitis is relatively rare and no cases of scurvy or other cranial lesions were observed.

But this data, and the historical background on this age group, are not necessarily the only thing that makes these individuals interesting. In addition to what is present, it is the *absences* that make these individuals notable: the lack of burials in this age range, the lack of pathological lesions, the lack of historical data. These 9.5-14.5 year olds that have been grouped together because of their skeletal age do not represent a consistent cohort of children, but rather a bridge between childhood and adulthood. This is reflected as much in the absences as it is in what is present.

Historical Considerations

Though this age cohort falls within a category designated by the census, it is clear that experientially, these individuals did not constitute a group as we understand it today. Instead, in practice they were living lives sometimes as children and sometimes as adults. Yet those who drew attention to this "group" were reformers, whose organizations saw people at this age as key targets for preventing immorality and vice. As briefly discussed in Chapter 7, child saving efforts increased quickly during the early 19th century. Anxiety over the dangers and corruption of urban life motivated religious reformers to intervene with Sunday schools, outreach programs, and reform societies. Educators in general worked to reach youths, as concerns "…over urban immorality and social fragmentation quickly found specific focus in anxiety about the city child," (Boyer 1978: 36).

Like John Adams, mentioned earlier, who was sent to "learn some useful business," the continuing concern that these children grow into productive members of society fueled a system of apprenticeships. As the market revolution was developing and wage labor was becoming more prevalent, we might expect to see older systems fall away. And yet during these transitional years of the 1820s and 1830s, evidence suggests that youths were still routinely sent to live and train with others. Kenneth Scott compiled *Nineteenth Century Apprentices in New York City* (1986) which notes each apprenticeship or adoption from New York City between 1822 and 1828. Much like the *Coroners' Reports*, the notations give the name of the child, the family to which the child is going, and the profession. If the apprenticeship was not successful, the cancellation date and sometimes the reason are also provided. Some children appear to have left their families at ages as young as just a few months. However, it is the children in this age cohort who were formally apprenticed out, rather than simply adopted.

Scott notes that boys were often sent to learn a trade and girls to work as servants (1986: i). The case of 13-year-old John Adams that introduced this chapter illustrates one such entry. Other cases include that of Thaddeus Morgan, just under 11 years of age, sent to apprentice with hair dresser Gottlob Bollet (Scott 1986:114), or Joseph O'Neal, 12 years old, sent to Charles Meahan, a tinsmith (Scott 1986:124). Both of these individuals stayed in the city proper. Others were sent away from the city, like Alfred Laman, 12, who went to a tobacconist in Fishkill, NY (Scott 1986:89), or Elisha Snow, 14, who went to a farmer in Riverhead. It should be noted that Snow ran away a few years into his apprenticeship (Scott 1986: 149).

The girls, as Scott writes, were sent to be servants. Sarah McMahon, for example, was 11 years old when she was sent to live with Andrew and Rebecca Purdy in January of 1834. Her entry notes that the apprenticeship was cancelled the next month, but no reason for the termination is given (Scott 1986: 272). Some entries are more detailed, such as that of Mary Francis, an African American girl of 13 years of age, who was apprenticed to William and Mary Treadway in 1840. The apprenticeship was cancelled "as a result of his [William Treadway] being threatened with trouble by the parents and others," (Scott 1986: 224). It is unclear what that means, but tells a story of relations between the girl's family and her employers that was not good. Finally, there are entries such as that of Catharine Roundtree, who at 10 years of age in 1846, was apprenticed to the baker Isaac Williams. In 1847 the apprenticeship was cancelled, but instead of being returned to a family member, she was sent to the House of Refuge (Scott 1986: 304).

Presumably, Catharine was just the sort of child reformers worried about—young, alone, and sent to live in an institution. The House of Refuge was one of the first reform houses to open in New York City, in 1825, as previously discussed (Cable 1972: 126). This house was mostly for those who were convicted of a crime. It stressed job skills, as did those that followed, like the Five Points House of Industry (Cable 1975: 127; Fitts 2001: 119). While these houses were well-intentioned, reform through labor was not always a successful model, which likely contributed to the "street children" noted by the Police Chief in the 1840s.

Whether through reform institutions or through families sending children out to learn skills, this concern with keeping youths productively engaged likely exemplifies apprehension about how the changing urban landscape was affecting youth. One group that was acutely aware of the corrupting influence of New York City was immigrants, some who expressed their dismay at the breakdown of the urban family (Ernst 1994: 179-181). An observer at the time noted the difference between youths back in Ireland and those who had immigrated to the States: "In Ireland every son was 'a boy' and every daughter 'a girl' till he or she was married…they were considered subject to their parents till they became parents themselves…In America, in consequence of the newness of the soil, and the demands of enterprise, the boys are men at sixteen….They all work for themselves, and pay their own board," (Thomas D'Arcy McGee, qt in Ernst 1994: 180). McGee connects this new found freedom of young men to the landscape and the market system directly, and projects anxiety about this break from tradition. His comments also remind us that at the age of 9.5-14.5, these individuals could be immigrating to the city with families, or may be traveling here on their own. The presence of so many transitional youths was alarming to both the families of those youths and the reform groups that were springing up in the city around them.

A very specific example of this concern comes through the moral reform movements targeting sexual immorality. Historical accounts indicate that prostitutes started working at as young an age as 12 (Whiteaker 1997: ix). Reformers believed that young girls without protection and young men without guidance could easily be lead down a path of immorality (Female Moral Reform Society of the City of New York 1835). Historian James Whiteaker notes that for many evangelical reformers, "…sexual immorality was the practice from which many of the other immoralities arose," (1997: x). And yet, prostitutes were seen by evangelicals, much like children, African Americans, and the poor, as victims to be helped rather than perpetrators to be blamed (Whiteaker 1997: 9). Whiteaker writes that the first annual report of the Magdalen Society in 1831 highlighted the blight of prostitution in New York City, claiming "…approximately ten thousand women earned their living as prostitutes, and another ten thousand were 'private or part-time prostitutes,'" (1997: ix). Whiteaker points out that prostitutes were in all sectors of the city (1997), and the presence of several "known blocks of prostitution" at one end of Spring Street confirm this (Homberger 2005: 85). In addition, we know that at least one congregant, Candence Meyers, was singled out for living in a house of ill repute. In the skeletal remains, there are at least four adult skeletons with skeletal lesions consistent with venereal syphilis, and at least two children with a congenital form of the condition. The presence of the condition could be related to what the church would have considered immoral practices.

Female moral reformed societies worked in outreach to prostitutes in the city. The New York Female Moral Reform Society was founded in May 1834, and treated prostitutes as "innocent victims of male lust," (Boyer 1978: 19). The Spring Street Presbyterian Church was part of a local branch of this organization (Wright 2006: 157). [79] The reformers describe their

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[79]This brief history of the founding of the group mentions Spring Street and Laight Street specifically:

object as "…the diffusion of light as to the causes, the extent, and the evils of licentiousness in our land; to warn the young of their danger; to show *all* their duty in relation to this vice, and to persuade them to do it, with the hope that a barrier might be raised to stop the progress of the evil, and the Redeemer's kingdom thereby be extend," (1835). One main focus of these activities, according to a pamphlet, is the education of children:

> INSTRUCTION OF CHILDREN.
> The Board hope also to be able to stir up parents and teachers and ministers to the importance of instructing children on this, as well as the other evils to which they are exposed. It is confidently believed that the general neglect of instruction on the subject of the seventh commandment, is a principal cause of prevailing licentiousness. If the same course had been pursued in relation to the vice of lying or stealing, we should have expected that the land would be filled with liars and thieves. If our efforts are successful in inducing ministers and parents and teachers, to do their whole duty to those under their charge, we shall feel that we have done another great and noble work. (1835)

And so adolescents engaging in sexually immoral behavior were targets of reform groups, as were younger children who might be lead astray in the urban environment. And yet, how realistic was this concern? Were children and teenagers really being led astray in the thousands, as reformers and civil authorities warned? Whiteaker writes that the figure of 10,000 prostitutes widely cited was probably an overestimation; he notes that a grand jury survey of prostitution in the city's wards in 1831 put the number around 1,438, a number that was likely an

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"The first society in this city for the suppression of licentiousness, of which we have any definite knowledge, was organized in 1830, and styled 'The Magdalen Society,' ….Its first report, published in 1831, and giving some account of the existing state of morals in the city, called forth many bitter feelings and much opposition. Not long after its publication the society ceased its operations and was dissolved. There was one individual, however, connected with the society, the Rev. J. R. McDowall, who felt that he could not retire from the field. For a long time he continued to labor alone. His "Magdalen Facts," published in 1832, awakened a deep interest in many minds in the cause of Magdalen Reform. To sustain him in his self-denying labors societies were formed in 1832 among the ladies of the Laight-street and Spring-street congregations," (1835).

underestimation (Whiteaker 1997: 26-27). An exact number is unknown, but a more accurate figure is probably somewhere between these two extremes (Whitaeker 1997: 27).

Prostitution is one of the few topics widely discussed in the historical literature that singles out this age group. And yet, as will be seen below, there is no skeletal pathology of venereal or congenital disease in this age group. Other potential markers of the condition, including pregnancies or early death are hard to interpret from the remains. The anxiety about sexual immorality that is in the historical literature is then perhaps a mismatch for the individuals between 9.5 and 14.5 in this congregation. The potential mismatch here again highlights that what is absent in the remains from this age cohort is as telling as what is present. And yet, it is also a symptom of the general anxiety over the transition to adulthood in the rapidly changing urban world of New York City.

Among the children of the reformers connected to the Spring Street Presbyterian Church, we can observe how some youths were making that transition. On one hand, the Rev. Ludlow's son, his second child Fitz Hugh Ludlow (1836-1870), would grow up to become a Victorian writer. [80] His memoir about his time as a drug addict, *The Hasheesh Eater: Being Passages from the Life of a Pythagorean*, was a huge success before the Civil War, running through four printings (Rachman 2006: ix). He spent the remainder of his unfortunately short life in the afterglow of the book's success, travelling, writing poetry, and living a bohemian life (Rachman 2006: xi). Fitz Hugh Ludlow was born in 1836 while his father was the pastor at the Spring Street Presbyterian Church.[81] Rachman writes that abolition informed his early life:

[80] Fitz Hugh Ludlow was named for the recently deceased son of the abolitionist activist Gerrit Smith (Rachman 2006: xiii).

[81] Ludlow left the Spring Street Presbyterian Church in 1837.

> Fitz Hugh grew up hearing stories about the "martyrdom of Nat Turner," who led an unsuccessful slave revolt in 1831….The young Ludlow saw at the breakfast table the rotten eggs with which hostile audiences frequently bombarded his father. In New Haven, the Ludlow home was a stop on the Underground Railroad, and at the age of five Fitz Hugh held the baptismal bowl while his father "baptized into …liberty" a runaway slave with a new name in order to protect him from his former master (Rachman 2006: xiii).

It was his father's activism, religion, and structure from which he both rebelled and profited. According to Rachman, Fitz Hugh's drug use was his attempt to find spirituality like his father had (Rachman 2006: xv). So too he produced his own ideology, one steeped in Victorian literature and drug-induced hallucinations. Fitz Hugh's drug use, bohemian lifestyle, and early death are perhaps not what a minister would want for his son, and in some ways reflect the influences of the changing society around them.

On the other hand, one of the Rev. Cox's surviving children, Arthur Cleveland, went on to become a Protestant Episcopal Bishop in New York (*Moderator's Biographical Sketches*). William Lloyd Garrison, the famous abolitionist who, among other works, started the paper *The Liberator*, saw all of his children grow up to be activists. They were first focused on abolition. As they grew older and started down their own paths, their focuses diversified to women's rights, black suffrage, racial justice, and nonviolence (Alonso 2002). So while the Garrison children took up their father's cause, and Arthur Cox followed his father's profession, the Rev. Ludlow's son rebelled against his father's ideology.[82] These children were from stable middle class families and were among those whose histories were recorded. Yet even with those benefits, one of the children, Fitz Hugh, did not survive far into adulthood.

[82] It is worth noting, however, that research by Meade and White (2013: 323) suggests that the Rev. Cox did not approve of the fact that five of his children became Episcopalians.

So what then of those with less famous fathers? Like the children detailed earlier, they may have been hired out, laboring at home, at school, or already living as adults. We must consider that by the age of 14.5, some of them may even have been married. As economist Michael Haines writes, "While we know relatively little about marriage in the early nineteenth century, female age at first marriage was probably rather young, perhaps below 20. Males on average married when they were several years older, and all but a relatively small proportion of both sexes eventually married," (2000: 317). In New York State in 1855, using census data, historian Maris Vinovskis estimates that 37.7% of women 15 and older were single, 56.4% were married, and 5.9% were widowed or divorced (1978:53). For some, this age was indeed the transition to new stages of life.

In order to understand what risks were present for the individuals present in this cohort, we can turn to those known deaths in the historical record. From *The Coroner's Reports* we have the case of Benjamin Totten, 13, who like so many others at this time, drowned. What's interesting about his note in the *Coroners' Reports* is that his father-in-law is listed as Joseph Sharpe, and that Benjamin "went in," or worked on, the sloop the Wild Cat (Scott 1989:209). So at the age of 13, Benjamin Totten was both working and married.

Other deaths that could be related to labor include Peter Shields, who died at the age of 14 from "injuries caused by the breaking of a machine," (Scott 1989: 190); Stephen C. Thomas, who died at the age of 10 when "a number of beams fell on him" (Scott 1989:207); and William Henry Waddell, who at the age of 11, was "struck by a fragment of rock at the Croton Water Works" (Scott 1989:214). While deaths related to labor certainly suggest a level of adult lifestyle, perhaps even more distressing are the deaths from suicide. Eliza Dan committed suicide by taking arsenic at the age of 11 (Scott 1989: 48-49). Ann Fluelling also committed suicide by taking arsenic at the age of 13 (Scott 1989: 70).

There are also the deaths from disease, much like those that took the lives of younger children. Sarah Bowie died at the age of 14 from a "disease of the stomach and bowels" (Scott 1989:16). Jane Pringle died at the age of 10 from "disease produced by starvation on the passage from Liverpool to New York," (Scott 1989:172). Mary Jane Gilbert, noted as "colored," died of heart disease at the age 12 (Scott 1989: 79).

Finally, one additional interesting death should be noted: Francis Jackson died at the age of one week after being born to 13 year old servant Elizabeth Jackson (Scott 1989: 165). So while Elizabeth Jackson at the age of 13 did not die, her child did. We must, therefore, consider that the "youths" in this age cohort may have also been parents. In addition, we must also be cognizant of the fact that some of *their children* may be buried in the Spring Street Church vaults. Molecular work in the future may help address such interesting possibilities.

And yet, some of these youths may still have been treated as children, and it would be unthinkable to some that someone so young could be employed, married, or a parent. Catherine Havens begins her diary in 1849 by writing, "I am ten years old today, and I am going to begin to keep a diary. My sister says it is a good plan and when I am old, and in a remembering mood, I can take out my diary and read about what I did when I was a little girl," (2006 [1920]). Her two years of diary writing, then, encompasses her thoughts about life at a time when her older sister, at least, still considered her "a little girl."

The transition to adulthood would not have been easy for some. The subadults discussed below provide insights into what life was like for a few at this time of transition.

Skeletal Findings

While the skeletal findings detailed here are thin, they still introduce us to some experience of lived life for this small group of individuals. Cases of rickets, cribra orbitalia, and periostitis as well as dental pathology highlight continuing health stressors for these so-called subadults. Cranial lesions and scurvy are absent, indicating that these risks were associated with early childhood and not this transitional stage.

Rickets

A continuing trend in this collection has been the presence of rickets due to vitamin D deficiency. In the 9.5-14.5 year olds, there are only four long bone elements that have rickets. They account for up to 40% of the left femorae (Table 8.4). Remember that as high as 40-50% of elements in earlier age groups had rickets.

Table 8.4: Long Bones with Rickets, 9.5-14.5

	Right		Left	
Element	**N**	**With Lesions (%)**	**N**	**With Lesions (%)**
Femorae	6	1 (16.67)	5	2 (40)
Fibulae	3	0	1	0
Humerii	5	0	0	0
Radii	3	0	2	0
Tibiae	3	1 (33.33)	3	0
Ulnae	2	0	1	0

None of these elements, unfortunately, can be associated with individuals; all four are from the ossuary remains. And yet their presence indicates that vitamin D deficiency was a health concern children experienced from birth all the way to the beginnings of adulthood.

Scurvy

As with the older children, there are no cases of scurvy in this cohort. The vitamin C deficiency seems only to be associated with those children that are likely still nursing or weaning.[83]

Cribra Orbitalia

Cribra orbitalia, porosity of the eye orbits linked to a variety of conditions, shows up consistently in the subadults of this collection. Only two sets of orbits were observable in this age group, and one set has bilateral cribra orbitalia (see Table 8.5).

Table 8.5: Cribra Orbitalia, 9.5-14.5

Side	N	With Lesions (%)
Left	2	1 (50)
Right	2	1 (50)

Fifty percent of the orbits were affected. Both the toddlers and younger children and the older children have cribra orbitalia in 100% of observable orbits, indicating a decline as these children aged. It is also possible that lesions were remodeling out at this stage. The one individual in this age cohort with cribra orbitalia is Vault II Individual J. II-J is between the ages of 13.5 and 14.5 and is a particularly interesting case among the Spring Street Presbyterian Church remains.[84] II-J has bilateral cribra orbitalia, porosity of the palate, and dental pathology. And, II-J is one of three crania displaying a craniotomy in the collection (Novak and Willoughby 2010). II-J is discussed more fully below.

[83] This also indicates that scurvy is likely connected to deficiencies of the mother. At least two adult females in the collection exhibit possible scurvy and/or osteomalacia: Vault III Burial X and Vault III Burial Y.

[84] Age based on dental calcification.

Periostitis

Periostitis, the inflammation of the periosteum caused by infection or trauma, has been present in all groups of subadults in this collection. That continues in this cohort, with up to 20% of elements (left femorae) affected. Previous age cohorts had frequencies ranging from 13-25% of elements. The difference is not statistically significant, however.

Table 8.6: Periostitis on Long Bones, 9.5-14.5

Element	**Right**			**Left**		
Element	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**
Femorae	6	1 (16.67)	0 (0)	5	1 (20)	0 (0)
Fibulae	3	0	0 (0)	1	0	0 (0)
Humerii	5	0	0 (0)	0	0	0 (0)
Radii	3	0	0 (0)	2	0	0 (0)
Tibiae	3	0	0 (0)	3	0	0 (0)
Ulnae	2	0	0 (0)	1	0	0 (0)

Only two elements are affected in this cohort. Both of the cases are from commingled elements that could not be associated with individuals or each other. They both come from individuals who were between the ages of 11.5 and 12.5, so near the middle of the spectrum for this age group. In addition, both elements display widespread inflammation suggesting that infection rather than trauma was the cause. At the same time, both elements exhibit signs of healing, which indicate that the infections were a past event. These past events, furthermore, were events that these individuals survived, reminding us that children who made it into this age cohort had likely survived a number of afflictions in their lifetimes.

Cranial Lesions

No cranial lesions were recorded for individuals between 9.5 and 14.5. This suggests that the cranial lesions observed in this collection are likely associated with risks encountered in infancy and early childhood.

Dental Health

As previously discussed, dental health is important for the intersection of diet and behavior in the remains. It is important to remember that these teeth are recording the behaviors of *up to* 14.5 years. As such, they are an excellent record of the life course of these individuals. The continuing presence of caries and attrition indicates that the diet consumed by subadults remained similar as the children grew up.

Table 8.7: Dental Pathology in Permanent Teeth, 9.5-14.5

Tooth Type	Number Observed	Number Carious (%)	Number with Attrition (%)
RI^1	0	0	0
LI^1	1	0	1 (100)
RI_1	1	0	0
LI_1	1	0	0
RI^2	1	0	0
LI^2	1	1 (100)	0
RI_2	1	0	0
LI_2	2	1 (50)	0
RC^1	2	0	1 (50)
LC^1	1	0	0
RC_1	1	0	0
LC_1	2	1 (50)	0
RPM^1	3	0	0
LPM^1	2	1 (50)	0
RPM_1	3	2 (66.67)	1 (33.33)
LPM_1	1	0	1 (100)
RPM^2	1	0	0
LPM^2	1	0	0
RPM_2	3	1 (33.33)	1 (33.33)
LPM_2	1	1 (100)	1 (100)
RM^1	1	1 (100)	0
LM^1	2	1 (50)	1 (50)
RM_1	3	2 (66.67)	2 (66.67)
LM_1	2	2 (100)	0
RM^2	2	1 (50)	1 (50)
LM^2	1	1 (100)	0
RM_2	**4**	1 (25)	2 (50)
LM_2	3	3 (100)	1 (33.33)
Total	**46**	**20 (43.48%)**	**13 (28.26%)**

The most frequently observed tooth for this age cohort was the right permanent second mandibular molar, resulting in an MNI of four from the teeth. A total of 46 teeth were assessed for pathology. In this cohort, 43.48% of teeth have carious lesions and 28.26% have attrition. The older children had caries on 36.36% of deciduous teeth and on 13.89% of permanent teeth. These 9.5-14.5 year olds, then, have more carious lesions. Again, exposure is important here; these children have had more time for carious lesions to develop. Likewise, while the older children had attrition on 10.61% of deciduous teeth and 19.44% of permanent teeth, 28.26% of the 9.5-14.5 year olds have attrition.

Alveolar abscessing and antemortem tooth loss was observed in only one individual, Vault IV Individual NNNN (Table 8.8). IV-NNNN is approximately 14.5 years old and represented only by a skull (Figure 8.1).[85]

Table 8.8: Alveolar Bone Pathology, 9.5-14.5

Socket	**N**	**Alveolar Abscess (%)**	**Antemortem Tooth Loss (%)**
M_1	4	2 (50%)	2 (50%)

[85] Age estimation is based on dental calcification, though individual tooth calcification was inconsistent. Mandibular M2 is apex complete (12.5 and 14.1 years of age); mandibular M3 is root ¾ (16 years); maxillary M3 is between cleft initial and root ¼ (13.6 and 14.6). Given these stages of development, an age of between 14.5 and 15.5 is a reasonable estimate.

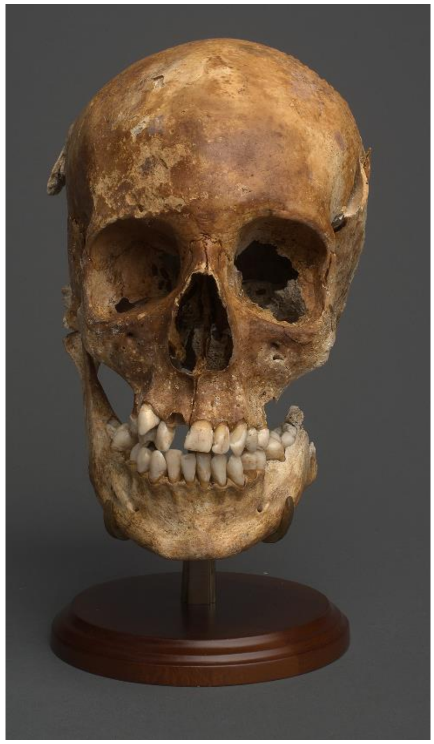


Figure 8.1: Frontal View of
Individual IV-NNNN

Both left and right first mandibular molars are abscessed out. In addition, thirteen teeth in the maxilla and mandible have caries, ranging from small to large lesions. Also of note, IV-NNNN has several malformations of the dentition. The right maxillary canine has erupted anterior to the second incisor in an ectopic eruption, and the mandibular incisors and canines are crowded, forcing the teeth to rotate medially (Figures 8.2 and 8.3).

Figures 8.2: Occlusal View of Maxilla Individual IV-NNNN. Arrow indicates ectopic eruption.

Figure 8.3: Occlusal view of Mandible of Individual IV-NNNN. Arrow indicates tobacco staining.

The molars of IV-NNNN have staining from tobacco in the form of a brown ring around the teeth. The stains continue onto the anterior teeth, especially on the left maxillary incisors. Wear facets on the left side, along with the tobacco staining, indicates that IV-NNNN was holding a pipe stem in his mouth. This pattern is common in individuals who habitually held a pipe made of abrasive material in the same location (Ubelaker 1996: 321).

In the first half of the 19th century, most tobacco was consumed either in the form of chewing tobacco (Gottsegen 1940: 9) or by pipe smoking (Gottsegen 1940: 139). Fashions towards cigar and other types of smoking were beginning. Cigar smoking, where prominent, tended to indicate a high status or importance to the event (Gottsegen 1940:9). Through the 1850s, however, chewing tobacco and pipe smoking remained the most common method of tobacco consumption. As IV-NNNN is the only *subadult* in this collection with such evidence of smoking, this suggests that he was practicing behaviors not common to the other children buried at the vaults. It indicates that he was leading a more adult lifestyle.

The only dental anomalies present in this cohort are two teeth with enamel pitting. Enamel pitting is not associated with any specific condition, but can be associated with stress during development of the tooth.

Table 8.9: Dental Defects, 9.5-14.5

Individual/Element	Tooth	Age of Disruption	Anomalies
Vault II Individual I	SUBM$_2$ 01L	4.45	Enamel Pitting
Vault II Individual I	SUBM$_2$ 01R	4.45	Enamel Pitting

Both cases come from Vault II Individual I, a mostly complete 13 year old. II-I is interesting for the range of dental pathology present, including numerous caries and wear, as well as enamel pitting on the mandibular molars (Figure 8.4). The enamel pitting at age 4.45 suggests that this individual survived early health stressors. The caries and wear indicate the length of life and exposure that II-I had.

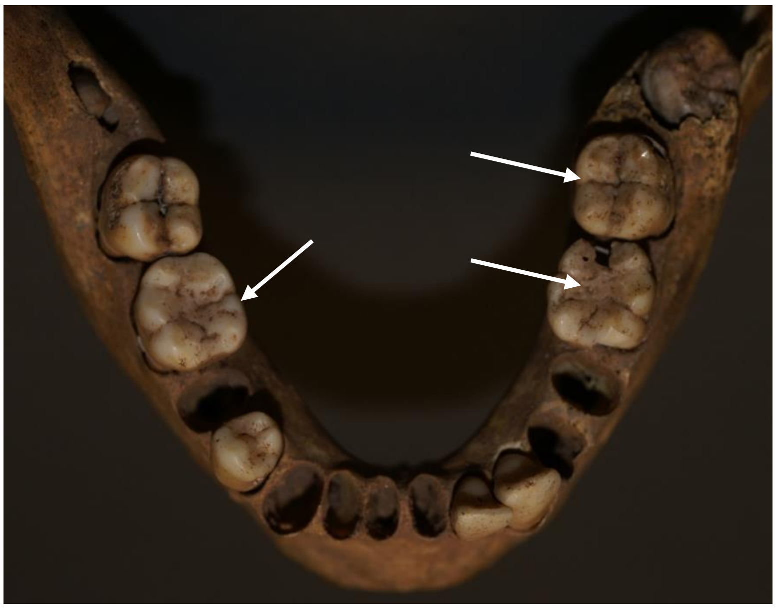
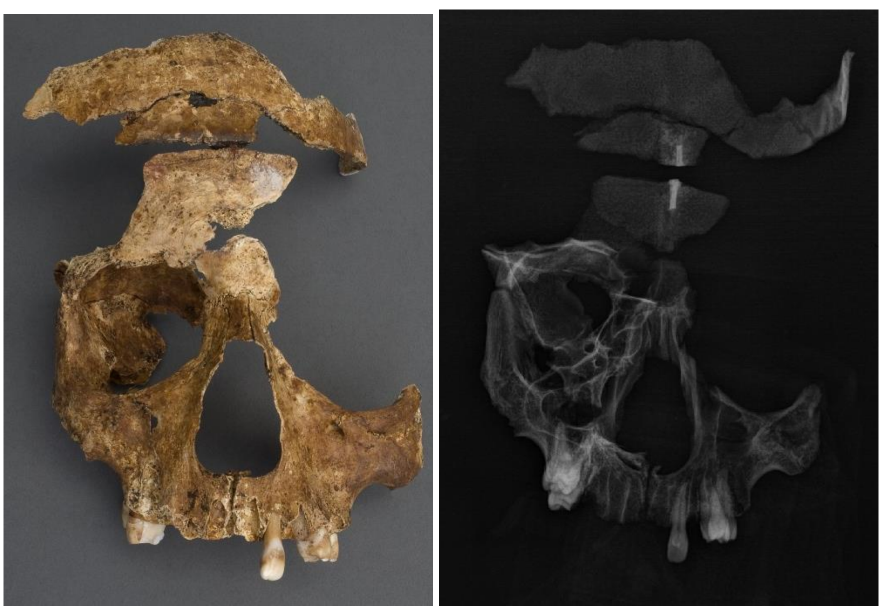


Figure 8.4: Enamel Pitting on Burial II-I. Arrows indicate pitting.

Trauma

There is one case of trauma in the 9.5-14.5 year olds, Vault II Individual J. II-J was 13.5-14.5 years old at the time of death.[86] II-J has bilateral cribra orbitalia and some dental pathology, as was noted earlier in this chapter. What makes II-J so interesting, however, is the presence of a post-mortem craniotomy.

As you will recall, there are three individuals, two of whom are subadults, in the Spring Street Presbyterian Church vaults with craniotomies. The other subadult is an infant, Vault IV Individual A. Both examinations used a fine toothed saw but, unlike IV-A, II-J has more wastage and false starts indicative of less skill by the practitioner (Novak and Willoughby 2010:143). II-J's skull is also notable for the presence of two metal pins embedded in the frontal and occipital, likely designed to allow the skull to be opened and closed, much like a modern teaching specimen would be today (Figures 8.5 and 8.6) (Novak and Willoughby 2010: 143).



Figures 8.5 and 8.6: Photograph and Radiograph of Individual II-J

[86] II-J is represented by a mostly complete cranium. Age is based on dental calcification.

So what is a skull that was likely a teaching specimen doing in the vaults of the Spring Street Presbyterian Church? Extensive historical research by Novak and Willoughby has highlighted the connection between the illicit dissection business and politically active groups. Dissection in general was morally ambiguous at best, and on occasion mobs attempted to reclaim these bodies and rebury them (Sappol 2002; Novak and Willoughby 2010). Given the political and ideological tactics of the church, it would not be surprising if a teaching specimen was reclaimed and buried in the vaults. The presence of this, and other autopsied crania in the collection, raises questions of how far the congregation took their moral reform work (Novak and Willoughby 2010).

It is also worth noting, however, that IV-J's skull is different than that of the other autopsied crania in the vaults. The other two skulls show more precise cuts and no clear evidence of use as a teaching specimen. These individuals may have been sectioned as part of an autopsy. Such craniotomies may have been extensions of the life course of those individuals. IV-J's cranium, however, appears to have been used post-mortem as an object, and thus represents a very different type of event (Novak and Willoughby 2010).

We also know, as discussed previously, that there are doctors in the congregation, including Dr. John Ray as well as Dr. Joseph Hanson, noted on a list of elders in 1822.[87] It is possible that this skull could be associated with a doctor in the congregation and reburied by him.

Discussion

The lack of these oldest of children in the census data, the lack of their bodies in the vaults, and the lack of health concerns recorded on their bones marks them as very different than

[87] Dr. John Ray is the father of Miles Ray, whose coffin plate is discussed in Chapter 6.

the younger cohorts. To start with, there are few 9.5-14.5 year olds buried at the church, 6.6% of the subadult collection. There are several potential explanations for the limited number of individuals in this age cohort. First, vulnerability is often associated with infancy and toddlerhood, and the fact that those who are older seem to be surviving into adulthood supports that. Simply, there may not be many 9.5-14.5 year olds dying. Epidemic diseases, starvation, infanticide, weaning vulnerabilities—all of these are associated with children much younger. So, the fact that there are few individuals in this age range in the vaults implies that, if they survived these earlier trials, they were likely to survive into adulthood. This pattern is consistent with other skeletal series from the time period. For example, at Christ's Church, Spitalfields, England, of the 398 named individuals in the sample, only four are from persons between 10 and 14 years in age (Molleson and Cox 1993: 93).

This changing sense of vulnerability is reflected in the historical literature as well. Much of the concern about this age group is about keeping them on a moral and productive path. The discussions of immorality, prostitution, and labor are somewhat different from the concerns of parenting manuals discussing infants, for instance. In those manuals, the concern was about keeping young children *alive*. Here instead the discussion has turned to how to make these almost-adults fit with the expectations of an emerging middle class ideology.

A second, and perhaps complementary explanation, is that there potentially are 9.5-14.5 year olds in families associated with the church who are dying with some regularity, but that they are no longer a part of the church in the same way as their younger counterparts. The historical discussion earlier in this chapter raised the fact that many of the individuals in this age range were away from home in one fashion or another. Some were living as apprentices in the city and beyond, and others were married with families of their own. If they are acting as adults, they may simply be choosing not be part of the congregation any longer. The presence of tobacco staining in IV-NNNN reminds us that some of these individuals were no longer children as we might imagine them. Thus “children” under the control of their parents may be attending and therefore be buried in the vaults of a congregation, while those who are considered adults may have moved on. In many ways, the *absence* of burials from this age range tells us much about 9.5-14.5 year olds in this context.

Mothers and Caregivers

Given the shifting agency of this transitional group, their social relationships would likely be different than their younger counterparts. This is perhaps most evident with the first ring of structure, mothers and caregivers. For some, parents and family would remain the primary relationship. Catherine Havens, for instance, was as connected to her family as any other child. Similarly, we know that the individuals represented by skeletal remains at the Spring Street Presbyterian Church were buried at the church by loved ones. So they may represent those that were still living with caregivers and families and buried by them in a family institution. While historical information suggests that caregivers as a category is different than with the younger cohorts, for the at least seven individuals buried at the Spring Street Presbyterian Church, family may still have been a central influence. It is worth remembering that people do not bury themselves.

Continuities in the skeletal data also highlight that, while mothers and caregivers may have had less impact on day to day decisions, such decisions were influenced by the *habitus* to which these children were exposed across the life course. The clearest cases of continuity are in the presence of rickets and dental pathology. Rickets, as has been discussed in detail in previous chapters, relates to both the biology and the behavior of the individual. Biology is inherited, and behavior, particularly when it comes to food choice and exposure to the outdoors, is often taught by caregivers. So the continued presence of this condition in the 9.5-14.5 year olds reminds us that rickets and the casual factors for it followed these subadults into adulthood.

Similarly, the presence of carious lesions on 43.48% of teeth and attrition on 28.26% of teeth illustrate patterns likely begun under the influence of parents and caregivers. As teeth do not remodel, they are recording the lifetime of the individual. The continuing increase in carious lesions and wear show consistency in diet as these individuals grow older.

Perhaps what is most interesting about the relationship between the 9.5-14.5 year olds and this level of structure, however, is an inversion of that relationship. The historical record reminds us that it is distinctly possible that some of the individuals in this cohort were not only no longer children, but quite possibly parents themselves. If this is the case, we have to reconsider some of the pathology present here in a different light. For instance, those with rickets in this age cohort could be passing along that deficiency through breast milk to their own children. And as the 13 year-old servant Elizabeth Jackson and her deceased newborn remind us, these young mothers and their offspring would have been at high risk for infant mortality (Scott 1989: 165).

Institutions

The next ring of structure discussed throughout this dissertation has been the interactions children have with institutions. Those institutions have included the church, educational systems, and labor institutions. The historical record discussed here suggests that we should consider these individuals not only in relationship to those organizations, but also to reform institutions, including moral societies and houses of reform. And yet such relationships are ephemeral in the remains. We have some indications of the interactions of these individuals through pathologies like periostitis. Two cases of healing widespread periostitis are present in this cohort. The fact that the cases are widespread suggests infection, and the fact that these two cases were healing reminds us of the resiliency of these 9.5-14.5 year olds. Whether they were laboring away from home, at home and in school, or perhaps part of the outreach programs to which the church ministered, these youths were survivors of at least 9.5 years and all of the risks that come with such experiences in the urban space.

In addition, their very presence in the burial vaults indicates a relationship with the church that many of their peers might not have had. The seven individuals represented here were still in contact with the church, and were potentially still influenced by the church's teachings. The continuing evidence for diet and deficiency may be related to this interaction, as has been posited throughout the dissertation. Yet other skeletal evidence to highlight these relationships is absent.

The City

There is, however, some skeletal evidence that ties these individuals to the larger city. Perhaps the best example of this comes from the previously discussed II-J, the 13.5-14.5 year old with the craniotomy. Isotope analysis indicates that II-J is an outlier when compared to the other individuals sampled, with a carbon 13 signature that most closely resembles a diet in childhood in temperate Europe (Dr. Joan Coltrain, pers. communication). Could this individual have lived, and perhaps even died, overseas? Was II-J's skull sectioned in Europe or in New York? If II-J was an immigrant, he may have been at particular risk for grave robbing (Sappol 2010). II-J reminds us that, just as the individuals from this age cohort may be living and acting as adults, they may also be immigrants to the city. The historical discussion in this chapter has raised immigration as a concern for reform groups, and so it is not surprising to find an individual who was a potential immigrant in this age range among the remains. The *Coroners' Report* raises this issue as well, as was noted earlier in the case of Jane Pringle, who died en route to New York City from England (Scott 1989:172).

This skeletal and historical data raises the larger question about who was part of the congregation and who was buried in the vaults. We must consider whether all of the remains in the burial vaults are those of congregants of the church. We know that the Rev. Cox buried three children in the vaults years after he had left the congregation. We know that immigrants were pouring into the city on a regular basis, and while the children are good barometers for the city, these older adolescents could very well be recent immigrants. And then we have the case of II-J, who potentially was a congregant, but just as likely may have been buried at the church for ideological purposes, and who may have lived some, if not all, of life overseas. Future isotope work might find more cases like that of II-J, whose childhood appears to have taken place somewhere else, though his remains would come to rest with other members of the Spring Street congregation.

Conclusion

These oldest of the children, transitioning into adulthood, in some respects look similar to their younger counterparts: rickets, caries, and periostitis are all still present. In important ways they are also different: cranial lesions and scurvy are gone. And yet the differences *between* these 9.5-14.5 year olds are as interesting as the differences between the cohorts. These were children transitioning into adulthood, whether through work or pipe smoking, immigration or marriage. Historical figure Catherine Havens ate candy, while Catharine Roundtree was being committed to a house of labor for orphans. The Rev. Ludlow and the Rev. Cox's children were being raised in the world of political activism, while II-J's body was being utilized post-mortem by the world of medicine. What is missing from the discussion of this cohort, both in the skeletal and historical data, is any sense of these individuals as a group. That very lack, that absence, indicates to us that these individuals were surviving and moving on, perhaps from the church, perhaps from the city, but most of all, perhaps from childhood.

Chapter 9: Conclusion

> *Actively pursuing research that incorporates children has the potential to inform many other questions traditionally considered important to archaeologists as well.*
> --Jane Eva Baxter (2005:111)

Introduction

This dissertation has explored the experiences of childhood as recorded in the skeletal remains of approximately 75 subadults buried in the vaults of the historic Spring Street Presbyterian Church. The remains have been organized by social age categories that are suggested by the burial vault records, the historical record, and the remains themselves. This dissertation has set up future research on the Spring Street Presbyterian Church collection as well as future comparative work on children and childhood. As Baxter notes, the importance of including and focusing on children goes beyond just learning about children, and hopefully this dissertation has illustrated her point.

In particular, this microhistory has focused on reconstructing lived experiences of and health challenges faced by these children, and how those experiences and challenges relate to the social institutions and structures with which children engaged. The structures include the church, schools, work places, reform groups and institutions, and the physical and biological landscape of the city itself.

As Sofaer notes, "…the instability of the body and differences between bodies can be understood not simply in terms of categories of identities to which they belong, but also in terms of how bodies situated within particular categories are formed over time and the conditions under which they move from one category to the other," (2006:130). And so this dissertation has endeavored both to examine children within social categories, but also to note how life experience changes as children age and progress through these categories, and what social structures are related to that process. The porous rings in Figure 1.1 remind us that these structures, and children's relationships to them, are fluid and dynamic. The result is a picture of shifting health, agency, and social relations during the first 14.5 years of life. The research done here shows how patterns in health and experience are intricately connected to the unique combination of factors present at the church—the combination of the people, the ideologies, and the environment that made up this specific congregation—and how those skeletal markers can be viewed through an embodiment lens.

Yet, Sofaer warns that attempts to categorize biological bodies into social age groups "risk[s] losing sight of the connections between age stages," (2006: 128). Lally and Ardren echo this, writing that "Rigid definitions by their very nature, are biased….Despite the importance of osteology and the biological paradigm, there are numerous examples in which culture dominates biology when construing age related identities," (2009: 64). This is a real risk in this dissertation, which has gone to great lengths to separate children out and distinguish between cohorts based on a combination of biological and social markers. And yet, I argue that this dissertation has shown that there is a value to reconstructing the stages of childhood in this population and in illustrating how childhood experiences, particularly health and diet, change as children aged. What emerges from this exploration are patterns in health and aging related to the specific social, economic, and even biological circumstances of families, of the church and other institutions, and of New York City in the first half of the 19th century. What follows in this conclusion is a consideration of the patterns that have emerged, and what questions these patterns raise for future research. The patterns indicate that some health challenges remained remarkably consistent as the children grew older; rickets in particular carries throughout the sample. This indicates that the risk factors for the condition—location, melanin in the skin, diet, access to the outdoors—are not clearly age-dependent. On the other hand, scurvy is tied into nursing and weaning specifically, and disappears as the children age. Likewise periostitis peaks in age groups were infection and activity also are likely to have peaked. The patterns in other health conditions are less easily explained, but all provide insight into the experiences of childhood and growing up in the church. Importantly too this chapter highlights how an embodiment approach helps make these connections between biological patterns and lived experience.

Patterns in the Data

This dissertation has asked how children's health, diet, and agency shifted as they grew older. The historical record and skeletal data combined have highlighted some of the changes that took place for children. In what follows, the skeletal evidence is reintegrated and reviewed for evidence of the changes that occurred and the implications of those changes. What emerges from this analysis is a clear sense that while some risk factors remained consistent—deficiency, infectious disease—others were tied into historical circumstances. Perhaps most importantly, when these patterns are compared to other sites, we see that the unique historical circumstances of the church lead to life experiences for the children that are different from other places. The ideology of the church, combined with the mixed class and race congregation, make this group of people different than so many others. In the bodies of their children, we can see how they were living out their ideas and circumstances to the best of their abilities.

Metabolic Conditions

Rickets and scurvy are two conditions explored in this dissertation that relate to deficiency. In the case of rickets, the lack of vitamin D from exposure to sunlight or appropriate foods has affected between 40% and 50% of the subadults in all age cohorts. In the case of scurvy, deficiency of vitamin C is prevalent early on but drops off quickly once children are weaned. These two conditions have been particularly interesting because they highlight direct connections between biology and behavior, and thus exemplify how an embodiment approach can provide insight into lived experience, as discussed below.

First, turning to rickets and the complex interactions that it exemplifies, we can see how it is a consistent problem for approximately half of the subadults buried in the vaults.

Table 9.1: Long Bones with Rickets

Element	**Right**		**Left**	
Birth-1.5	**N**	**With Rickets (%)**	**N**	**With Rickets (%)**
Femorae	21	6 (28.57)	37	9 (24.32)
Fibulae	8	2 (25)	7	1 (14.28)
Humerii	18	5 (27.78)	31	2 (6.67)
Radii	19	7 (36. 84)	19	2 (10.52)
Tibiae	30	8 (26.67)	36	19 (**52.78**)
Ulnae	21	5 (23.81)	21	2 (9.52)
1.5-4.5				
Femorae	20	5 (25)	17	3 (17.65)
Fibulae	6	0 (0)	4	1 (25)
Humerii	13	0 (0)	14	0 (0)
Radii	11	2 (11)	8	2 (25)
Tibiae	23	8 (34.79	12	5 (**41.67**)
Ulnae	8	1 (12.5)	10	1 (10)
4.5-9.5				
Femorae	11	2 (18.18)	10	2 (20)
Fibulae	2	1 (50)	4	2 (50)
Humerii	9	0 (0)	6	0 (0)
Radii	7	0 (0)	5	0 (0)
Tibiae	8	4 (**50**)	9	3 (33.33)
Ulnae	6	0 (0)	7	0 (0)
9.5-14.5				
Femorae	6	1 (16.67)	5	2 (**40**)
Fibulae	3	0	1	0
Humerii	5	0	0	0
Radii	3	0	2	0
Tibiae	3	1 (33.33)	3	0
Ulnae	2	0	1	0

The pattern of affect, as noted in earlier chapters, changed from a somewhat equal distribution across arms and legs in the infants to just affecting the legs as locomotion shifted from crawling to walking in older cohorts. This is an expected pattern and well documented in the clinical and historical literature (see, for instance, Ortner and Mays 1998; Brickley and Ives 2008). In order to track a pattern of occurrence throughout the age stages, we turn to the legs instead.

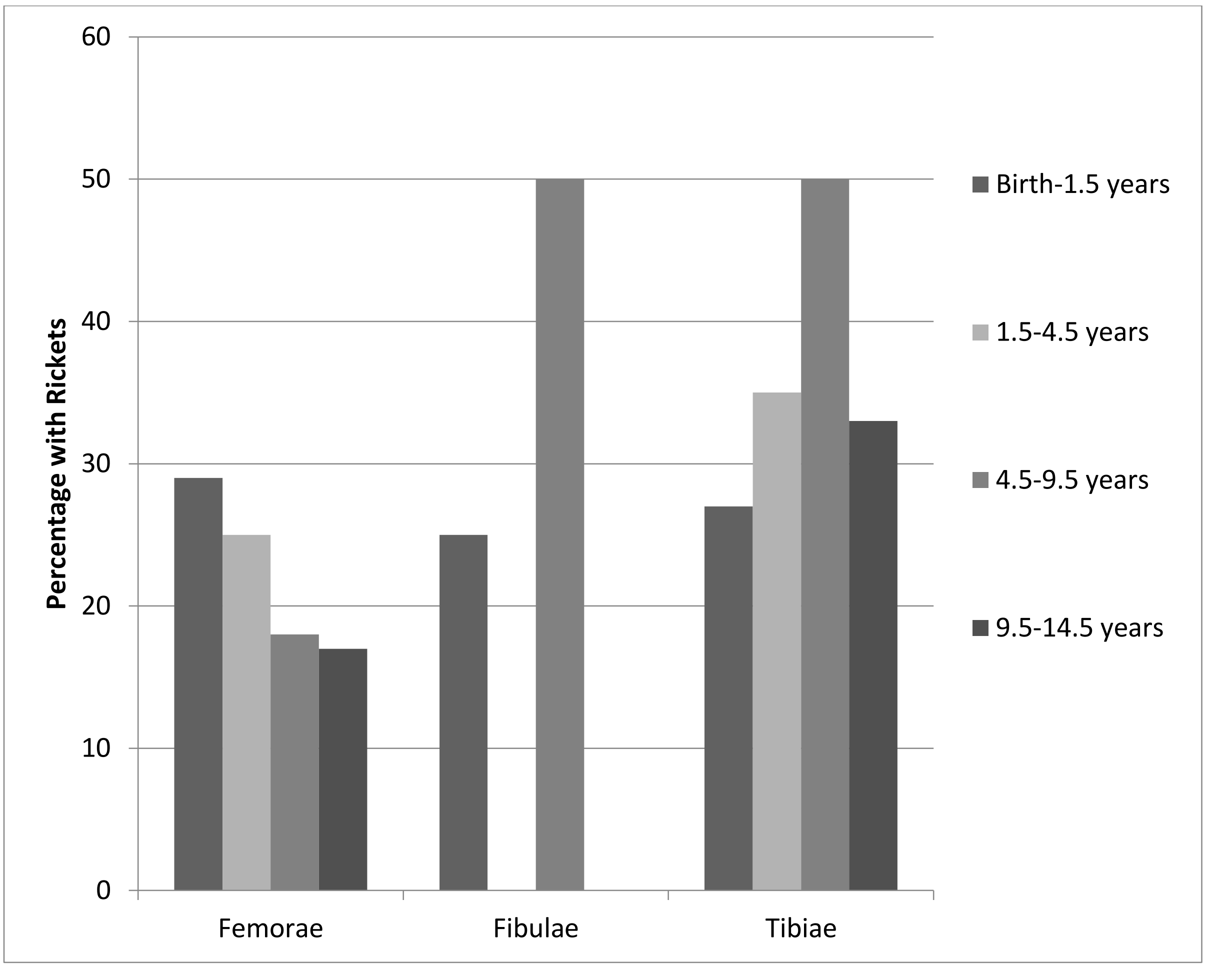


Figure 9.1: Percentage of Right Leg Bones with Rickets

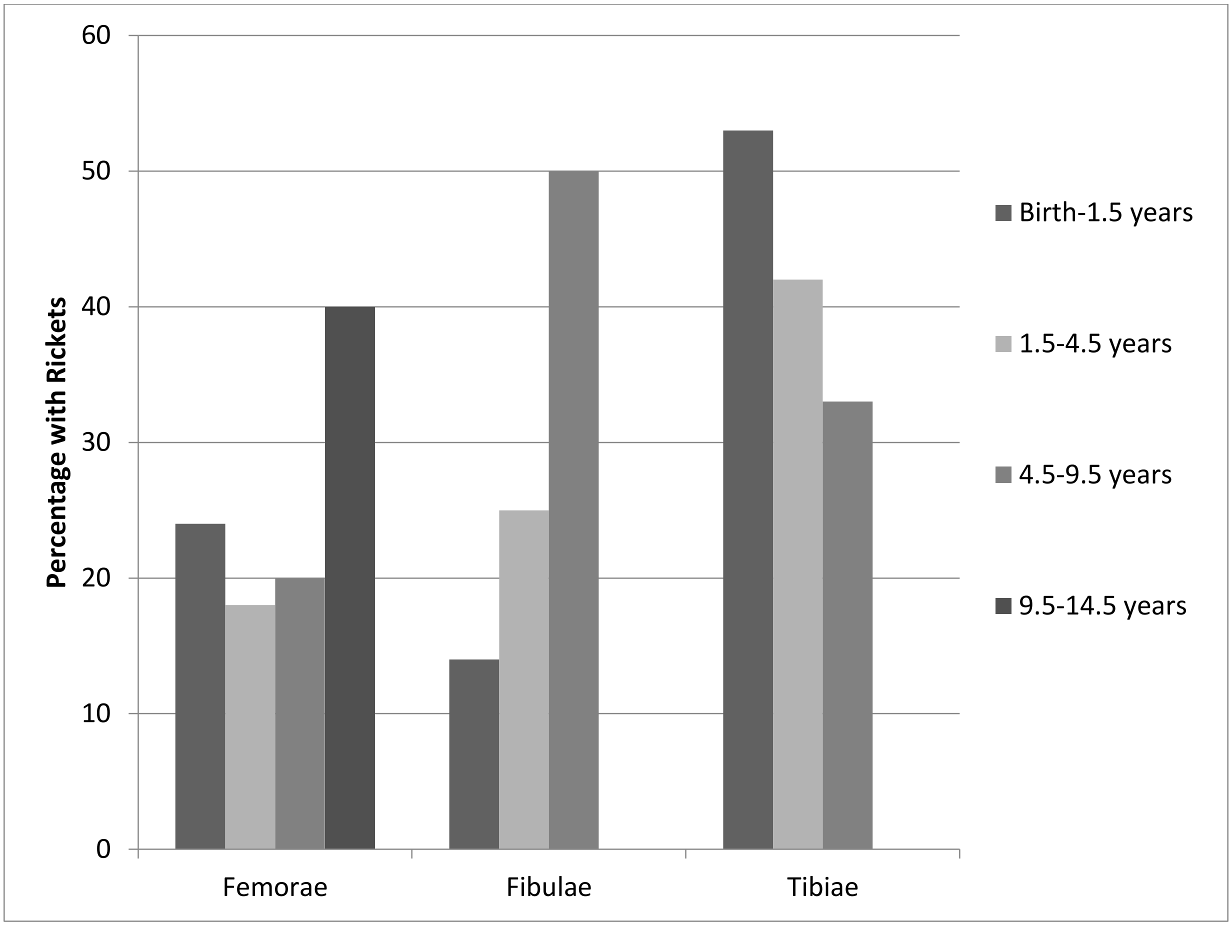


Figure 9.2: Percentage of Left Leg Bones with Rickets

The pattern of distribution is irregular across the elements and sides. For some elements, the infants have the most lesions. For others, it is the older children who were most affected. What this indicates is that the combination of factors that made rickets an obstacle for children was more than about a *stage* of childhood. It was a consistent problem for approximately half of the subadults, in part because the factors that contributed to the condition remained throughout childhood.

Embodiment theory reminds us that the social becomes the biological. In exploring cases of rickets, that certainly holds true. Four factors are important in this analysis: location, ancestry, exposure to sunlight, and diet. All of these factors are connected to the Spring Street Presbyterian Church as well.

This congregation's location in the north predisposes many of the children for such a deficiency. Given the church's political and ideological practices, children of both European ancestry and African ancestry are likely present in the vaults, further increasingly the likelihood of the condition among the subadult remains. Additional behaviors—education, labor, clothing choice—all can contribute to a lack of exposure to sunlight. And finally the potential for dietary reforms and restrictions based on both the location of the congregation and the teachings of the pastors may have limited access to vitamin D from foods. And while these variables would have been faced by many other children in urbanizing centers of the 19th century, there appears to be something unusual about the children in the Spring Street vaults. Compared to other contemporaneous sites, these subadults have an astonishingly high rate of rickets:

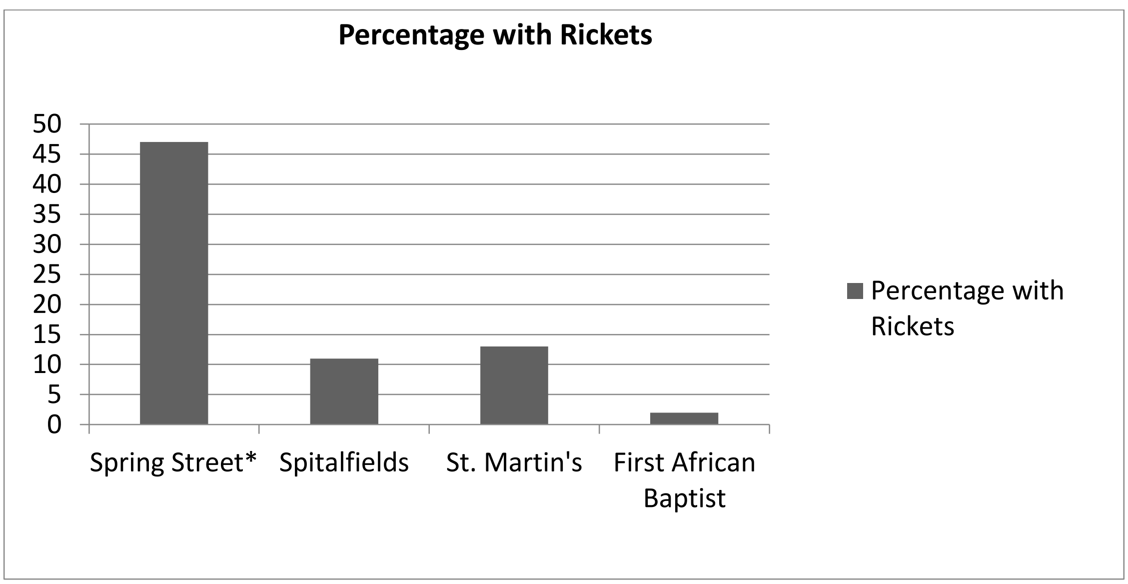


Figure 9.3: Percentage of Subadults with Rickets at Comparative Sites
**Spring Street's statistic is based on percentage of left tibiae with rickets.*

This is a significant difference between contemporaneous sites. All three sites were urban and should have had similar issues with location, sunlight, and industrialization. The First African

Baptist Church catered to African American individuals, and so should have had similar problems with UV absorption due to melanin in the skin. And all three may have had challenges accessing fresh foods, particularly during winter months. So why is it so different at the Spring Street Presbyterian Church?

I argue that the combination of people in the congregation, the ideologies of the church (including abolition and body reform), and the New York City environment—all three of the rings of structure with which the children were interacting— were ideal for such a high frequency of the condition. In many ways, the presence of rickets in this sample is the best example of how the Spring Street Presbyterian Church is a unique and informative case study. By applying embodiment theory, we can begin to understand that the church, as a religious institution, was directly in contact with the biology of its congregants (Mellor and Shilling 1997). Since the church was proscribing behavior and possibly even dietary rules, welcoming those of African ancestry, and spreading a message that appealed to middle and working class families, it was providing the conditions for which up to half of the children in any given age range suffered from rickets.

While the literature on rickets has mostly focused on compiling data and discussing diet and parenting, little work connecting institutions and embodiment has been done (see Ellis 2014). In addition, little work has been done that focuses on highlighting change, or lack thereof, through age categories. So the lack of pattern here in the remains, alongside a theoretical approach that interrogates the data, is a novel way of approaching rickets.

The conclusions drawn in the last chapter—the fact that some of the oldest subadults buried in the vaults may very well have been parents, and that some of the infants buried in the vaults may have been children of what we would today consider teenagers—reminds us too that rickets is not just about *children's* sociality, but also about biology that begins with the mother in utero. Armelagos et al (2009) and Gravlee (2009) both tell us that the health of the mother while pregnant greatly influences the health of the unborn child from birth through adulthood, and possibly into future generations. Deficiencies such as rickets, if they were affecting the mother, would be passed on to the children through the womb and through deficient breast milk. And thus *adult sociality* becomes *infant biology*. Such a consideration of this relationship is an important contribution to our understanding of health and sociality in skeletal remains.

In similar ways, the health of the mother is perhaps the most important concern for scurvy in this subadult population. Because of the pattern highlighted below, we can reasonably assume, in fact, that deficient mothers and weaning foods are the main factors for scurvy in the children of this collection.

Table 9.2: Scurvy

	Right		**Left**	
Element	**N**	**With Lesions (%)**	**N**	**With Lesions (%)**
Birth-1.5				
Maxillae	6	4 (66.67)	5	1 (20)
Sphenoid	7	0 (0)	6	0 (0)
Orbits	9	4 (44.44)	7	5 (71.43)
1.5-4.5				
Maxillae	4	0 (0)	2	0 (0)
Sphenoid	6	0 (0)	5	0 (0)
Orbits	10	1 (10)	10	0 (0)

Of all the afflictions discussed in this dissertation, scurvy shows the most dramatic decline across age groups. This deficiency is found exclusively in the infants and toddlers, indicating a strong link between scurvy and nursing. The *lack* of vitamin C deficiency in children as they get older suggests that adequate vitamins were available as they transitioned from breast milk to other foods.

Unfortunately, most of the comparative sites do not have data published on subadult scurvy. The only site that has data available is the First African Baptist Church, where only one case, or 2% of subadults, has the condition (Rankin-Hill 1997: 105). Combined with the lack of cases at the Spring Street Presbyterian Church, we are left with at least the suggestion that scurvy was not a major concern in the first half of the 19th century for children in urban areas, and, in that sense, the Spring Street Presbyterian Church does not appear to be unique. Added to this is the fact that few historical sources mention treating the condition in children, unlike rickets, which they discuss in some detail.

And yet, despite the lack of cases as children age and the lack of comparable sites, we still learn something important from scurvy. We learn about one specific age cohort, and how that cohort is threatened by a deficiency that rapidly disappears once children become less dependent on mothers. In this case, as a primary social relationship begins to shift, potentially so too does the biology of the child.

Non-Specific Health Stressors

Non-specific health stressors have been tracked in this dissertation, yet they are not necessarily connected to just one condition. While the information gleaned from them is less specific than that from the metabolic conditions, they still show us how social and structural interactions changed as children aged.

Cranial lesions are perhaps the least specific of the indicators presented. These conditions appear in much higher frequencies in the toddlers and younger children than in any other age range. None are present in the oldest subadults.

Table 9.3: Cranial Lesions

		Endocranial			Ectocranial
Element	**N**	**Formative (%)**	**Porosity (%)**	**SES (%)**	**Porosity (%)**
Birth -1.5					
Frontal	24	2 (8.33)	0 (0)	0 (0)	3 (12.5)
Occipital	30	1 (3.33)	1 (3.33)	1 (3.3)	3 (10)
Left Parietal	9	1 (11.11)	1 (11.11)	1 (11.11)	2 (22.22)
Right Parietal	10	1 (10)	0 (0)	1 (10)	2 (20)
1.5-4.5					
Frontal	17	2 (11.76)	3 (17.65)	2 (11.76)	1 (5.88)
Occipital	21	1 (4.7)	5 (23.81)	3 (14.29)	3 (14.29
Left Parietal	15	0 (0)	1 (6.67)	6 (40)	3 (20)
Right Parietal	15	1 (6.7)	2 (13.33)	4 (26.67)	2 (13.33)
4.5-9.5					
Frontal	10	0	0	0	0
Occipital	12	0	1 (8.33)	1 (8.33)	1 (8.33)
Left Parietal	8	0	0	0	0
Right Parietal	9	0	0	0	0

To illustrate this pattern, Figures 9.4 and 9.5 show the frequencies of lesions in the frontals and occipitals.

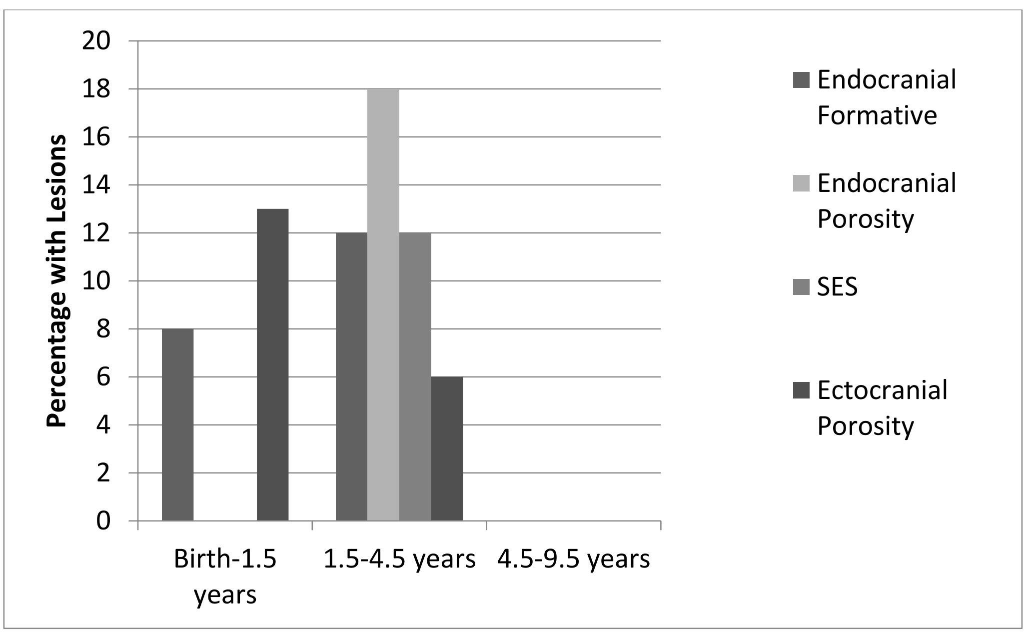


Figure 9.4: Cranial Lesions, Frontal

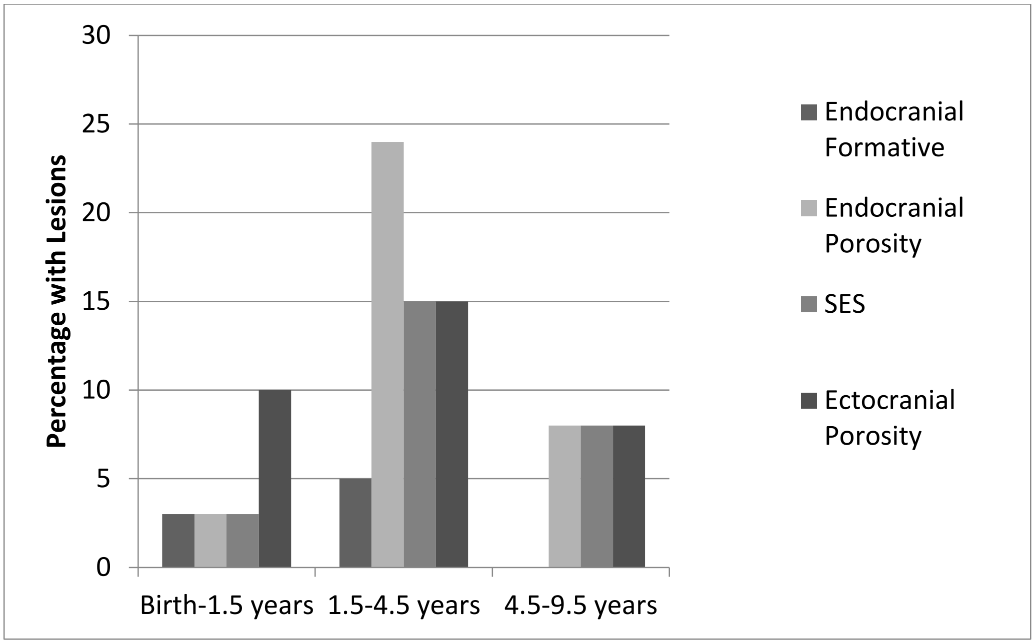


Figure 9.5: Cranial Lesions, Occipital

SES has an interesting peak in the toddlers and younger children for both the frontals and occipitals. Linked to possible meningitis, tuberculosis, or other infectious diseases, it may represent the recording of risks encountered from birth up until these early years (Lewis 2004). Such risks were likely related to the developing health crises in the city in the first half of the 19th century. Infectious disease outbreaks swept through the city at this time, and tuberculosis was common. Anxieties about these diseases were so high that a permanent Health Office was created in 1796 to deal with quarantines, city cleanliness, and even aspects of trade as related to health (Duffy 1968: 129). Statistics kept by the City Inspector's Office show that by 1825 one rising concern was tuberculosis, as the number of cases continued to increase despite declines in other diseases (Duffy 1968:279). But as historian Duffy notes, "Because tuberculosis was not an acute epidemic disease, it received little attention from the authorities, and yet it was without doubt the most significant single cause of death among the general population," (1968: 457). While SES is not definitively linked to tuberculosis, it is one of the leading potential causes, and it certainly would make sense for this population.

Tuberculosis is a disease that can flare up and recede, thus allowing individuals to live with the condition for some time. Roberts and Manchester note that the condition in clinical cases affects 3-5% of individuals, but was likely more prevalent in the past and particularly in children (2007: 188). This statistic only includes known skeletal changes, such as involvement of the ribs or vertebrae, and does not take into account possible cranial lesions as discussed here. If we consider that percentages of cranial elements affected by SES in this subadult population range from the low teens all the way up to 40%, a widespread condition like tuberculosis may be a good fit. And as city officials were not as concerned with the condition, it exemplifies how the urban sociopolitical environment could affect childhood health. It is not just that the health and activities of families influenced the health of children. Sanitation measures and health laws, or lack thereof, also helped determine subadult biology.

Possibly related to infectious disease as well are endocranial formative lesions. Endocranial formative lesions have no discussed etiology in the literature. It does not necessarily seem to occur in conjunction with SES. However, such lesions are a form of periostitis, which is a reaction to infection. It is present exclusively in the infants and toddlers and younger children, and even then it is fairly infrequent. Given the particular vulnerability of these youngest of children, infectious disease is a good candidate for an etiology. Endocranial porosity has a similar spike for both elements in the toddlers and younger children, again marking a particular risk factor at that age. It reminds us that these youngest children were susceptible to hazards present in the city and in the home, and that their health was intricately connected to the health, activities, and risks encountered not only directly by them but also by their caregivers and others in the household. Other possible etiologies, including scurvy and trauma, are also consistent with these risks.

We can imagine how easy it might have been for family members or older siblings to bring home infectious disease. Remember, the Reverend Cox lost three children in a matter of days, all from scarlet fever. Such an event likely suggests one child came home from school or play having contracted the condition and it spread through the family. This highlights that the biology and health of an individual is directly connection to the social relationships within which that individual is enmeshed.

While the other cranial lesions discussed in this dissertation seem most likely to be related to infectious disease, the ectocranial lesions discussed are possibly related to porotic hyperostosis, a manifestation of iron deficient anemia (Roberts and Manchester 2005). Early manifestations of that condition can appear as porosity on the ectocranial surface. In addition, rickets and scurvy have been linked to such porosity (Ortner 2003). The continued, although irregular, presence of ectocranial lesions in three of the four age cohorts is certainly consistent with these possible etiologies. If the condition is indeed from porotic hyperostosis, this would link it very closely to cribra orbitalia, another condition that some research suggests is caused by iron deficient anemia. In much of the literature the two lesion types are discussed as two forms of the same condition.

If we turn to cribra orbitalia then for further comparison, we see that lesions increase as the children get older, with their highest frequencies occurring in the older children, before falling back off again in the 9.5-14.5 year olds.

Table 9.4: Cribra Orbitalia

Side	N	With Lesions (%)
Birth-1.5		
Left	7	0 (0)
Right	9	4 (44.44)
1.5-4.5		
Left	10	7 (70)
Right	10	10 (100)

4.5-9.5		
Left	5	5 (100)
Right	5	5 (100)
9.5-14.5		
Left	2	1 (50)
Right	2	1 (50)

The increase in lesions and peak in frequencies in the older children is particularly noticeable in Figure 9.6.

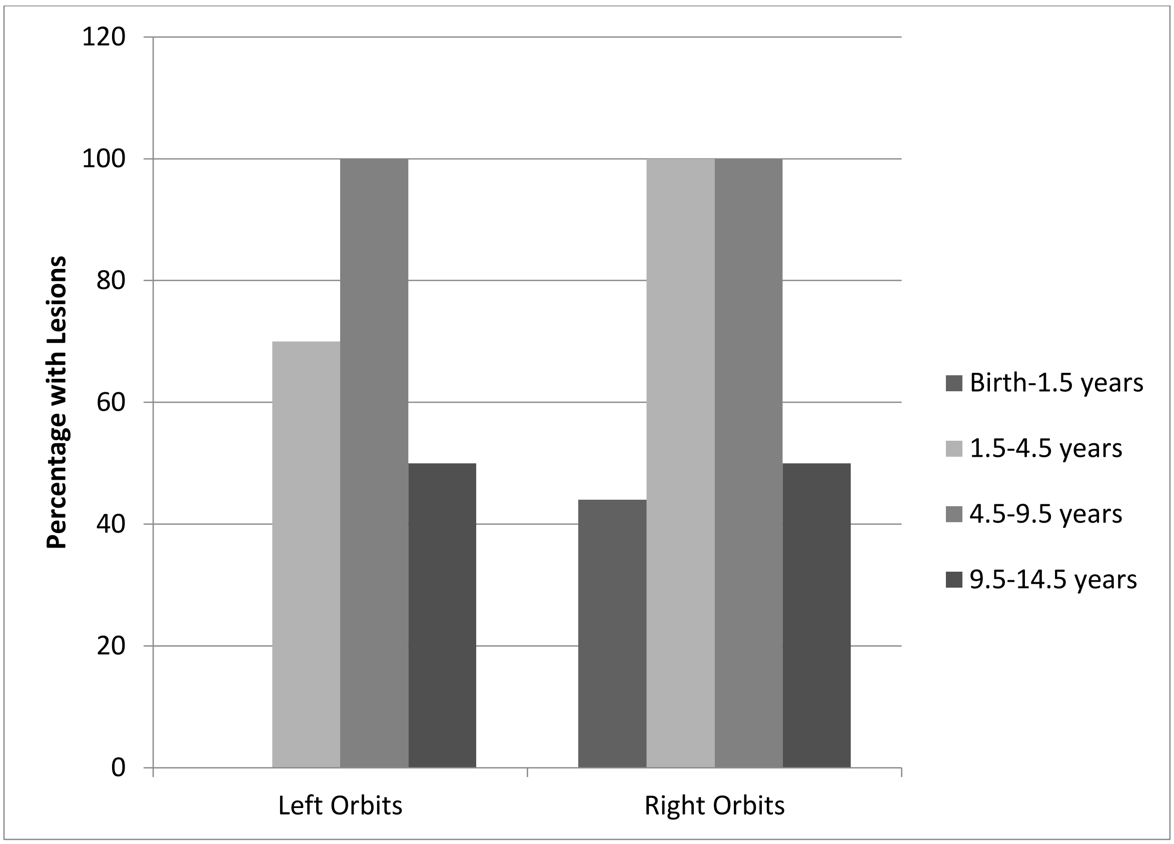


Figure 9.6: Percentage of Orbits with Cribra Orbitalia

The possible combination of causes of cribra orbitalia—iron deficiency anemia, B12 anemia, trauma, infection, and so on—seem to most affect the Spring Street Presbyterian Church children in these middle years. Part of this is likely the fact that these children have survived long enough for their bodies to record these stresses, but it certainly suggests something was changing as the children survived into older years. The decline in the oldest children may reflect changing risk factors as well as remodeling of bone that removes evidence of the condition in the past. While ectocranial porosity is more common in the infants and toddlers and younger children, cribra orbitalia is most common in the toddlers and younger children and older children. It also remains present in the 9.5-14.5 year olds, which is not the case for ectocranial porosity.

Studies highlight that some causal factors, like anemia, should be particularly present in infants over the age of six months due to depleted iron stores and weaning practices (Wright and Chew 1998). However, the lower frequency of the condition in the infants as compared to the older cohorts suggests that this is not necessarily the case, or the only cause of cribra orbitalia, for the Spring Street Presbyterian Church subadults. Other dietary issues—including deficiencies like rickets—may be contributing to the condition (Vasalech 2011). As Wheeler (2012) and Walker et al (2009) point out, anemia, though often associated with cribra orbitalia in past research, is not an adequate explanation for the biological processes observed in cases of cribra orbitalia. And thus ectocranial porosity and cribra orbitalia may be related clinically, but in the case of the Spring Street Presbyterian Church subadults, there may be more complex factors influencing these conditions and their manifestations. It is interesting that the occurrence of the condition is most prevalent in the middle age cohorts, around the time that children are engaging more with peers and with adults outside the home, and so may reflect this widening social sphere.

Cribra orbitalia, like rickets, also appears to be a symptom of unique circumstances of those young members of the Spring Street Presbyterian Church. When the average percentage of cases is compared to contemporaneous sites, the frequency in the Spring Street Presbyterian Church subadults is high:

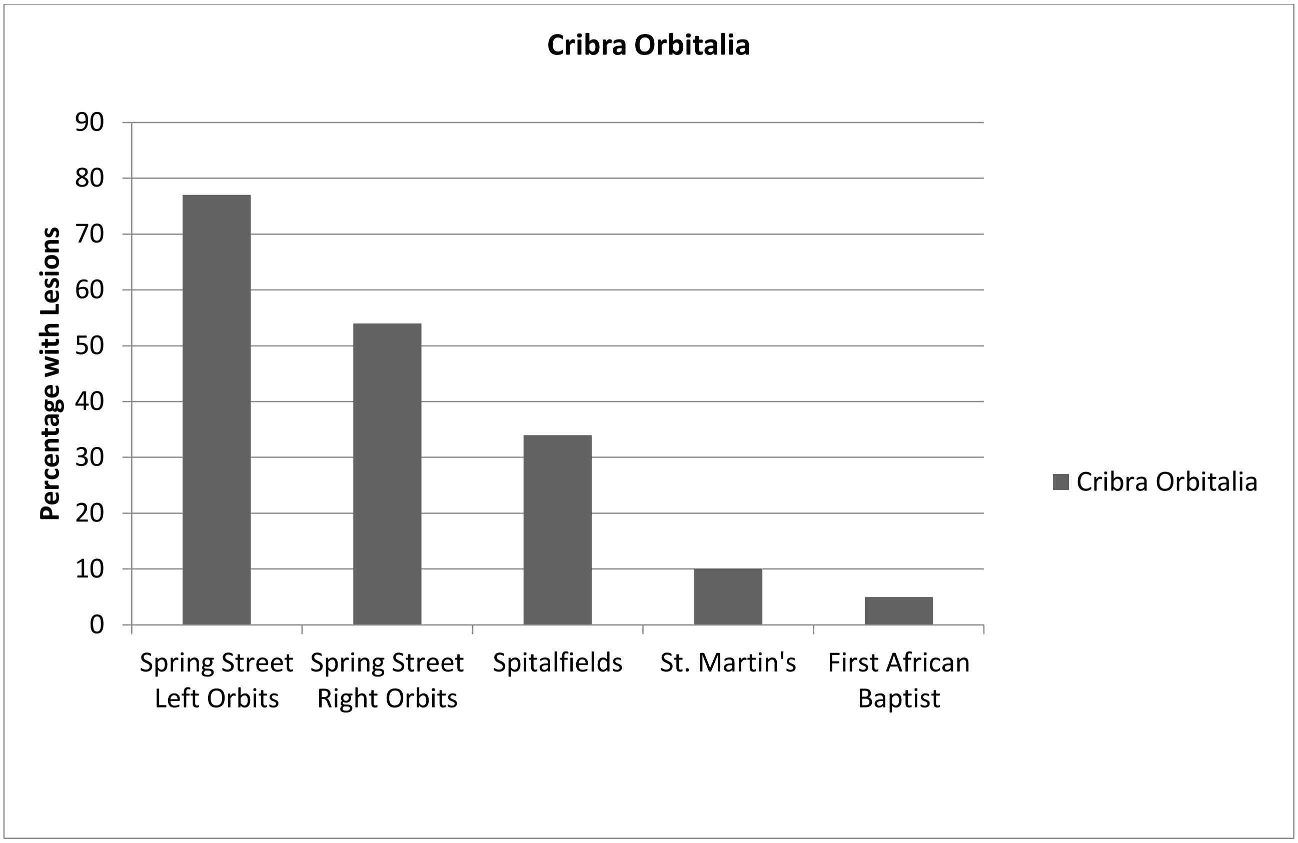


Figure 9.7: Percentage of Orbits with Cribra Orbitalia

Future work with isotopes and the adult population may provide more information on the more specific etiology of cribra orbitalia at the Spring Street Presbyterian Church. From the historical record, we know that infectious disease and dietary stresses both may have been contributing factors, and it will be interesting to see how the condition appears in adults and if we can trace dietary deficiencies through stable isotopes.

What we can note with this pattern is that the risk factors associated with the condition were serious in New York City. The three other sites are also urban, and while some catered to middle class congregants, others targeted more working class populations. And yet the subadult remains from the Spring Street Presbyterian Church have higher frequencies of cribra orbitalia. Thus we have a sense of the struggles of the urban environment in New York City. At the same time, we also have a sense of survivorship, as the children with cribra orbitalia here are those that survived long enough for the condition to affect the bone.

A similar connection between the environment and the subadults is seen in the data on periostitis.

Table 9.5: Long Bones with Periostitis

	Right			Left		
Element	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**	**N**	**With Active Lesions (%)**	**With Healed Lesions (%)**
Birth-1.5						
Femorae	21	1 (4.76)	0 (0)	37	2 (5.40)	1 (2.70)
Fibulae	8	1 (12.5)	0 (0)	7	0 (0)	0 (0)
Humerii	18	1 (5.56)	0 (0)	31	0 (0)	0 (0)
Radii	19	0 (0)	0 (0)	19	0 (0)	0 (0)
Tibiae	30	4 (**13.33**)	0 (0)	36	3 (8.33)	1 (**2.78**)
Ulnae	21	0 (0)	0 (0)	21	0 (0)	0 (0)
1.5-4.5						
Femorae	20	1 (5)	2 (10)	17	0 (0)	0 (0)
Fibulae	6	0 (0)	0 (0)	4	0 (0)	0 (0)
Humerii	13	0 (0)	0 (0)	14	1 (7.14)	0 (0)
Radii	11	0 (0)	0 (0)	8	0 (0)	0 (0)
Tibiae	23	1 (4.35)	0 (0)	12	1 (**8.33**)	1 (**8.33**)
Ulnae	8	0 (0)	0 (0)	10	0 (0)	0 (0)
4.5-9.5						
Femorae	11	0 (0)	1 (9.09)	10	0 (0)	1 (10)
Fibulae	2	0 (0)	0 (0)	4	0 (0)	0 (0)
Humerii	9	0 (0)	0 (0)	6	0 (0)	0 (0)
Radii	7	0 (0)	0 (0)	5	0 (0)	0 (0)
Tibiae	8	0 (0)	1 (**12.5**)	9	2 (**22.22**)	0 (0)
Ulnae	6	0 (0)	0 (0)	7	0 (0)	0 (0)
9.5-14.5						
Femorae	6	1 (**16.67**)	0 (0)	5	1 **(20**)	0 (0)
Fibulae	3	0	0 (0)	1	0	0 (0)
Humerii	5	0	0 (0)	0	0	0 (0)
Radii	3	0	0 (0)	2	0	0 (0)
Tibiae	3	0	0 (0)	3	0	0 (0)
Ulnae	2	0	0 (0)	1	0	0 (0)

In general, we must remember that there are very few cases of periostitis in this collection. When active and healed cases are combined, however, we can see a trend. Using the femorae, which have the highest percentage of periostitis in the sample, Figures 9.8 and 9.9 illustrate how these lesions increase in frequency as the children grow older.

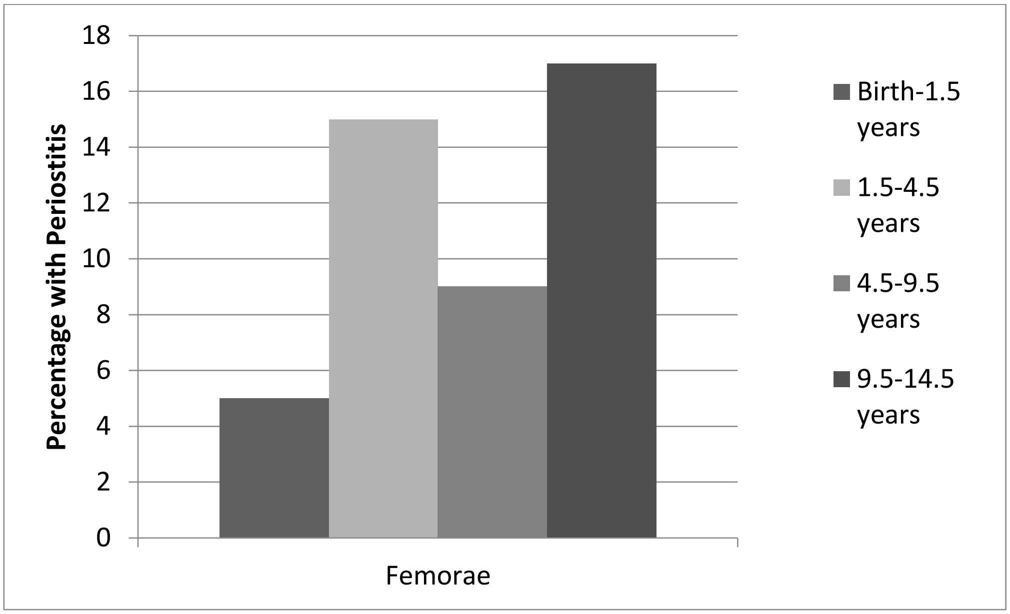


Figure 9.8: Periostitis on Right Femorae

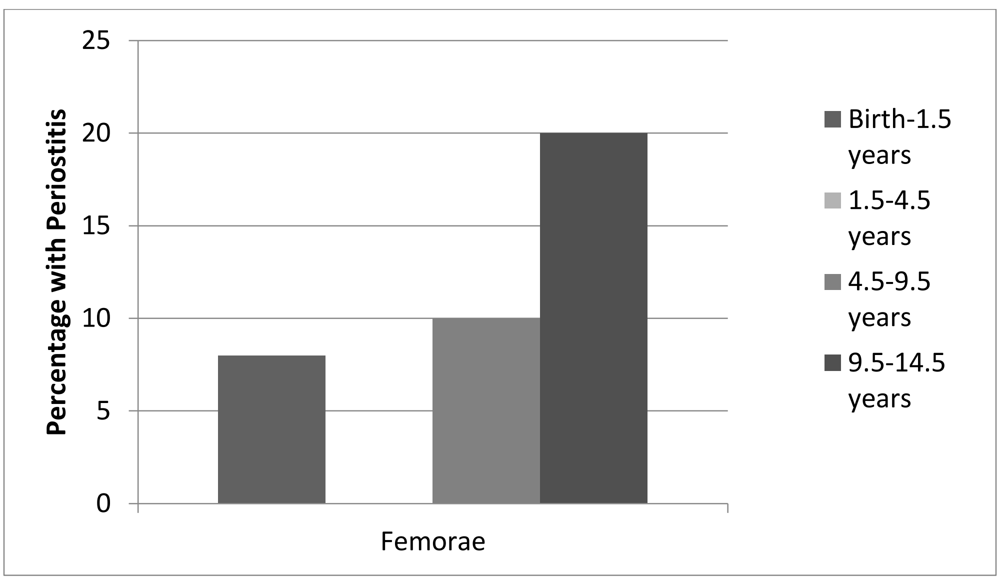


Figure 9.9: Periostitis on Left Femorae

On the right side, there is an increase in cases of periostitis on the femorae in the 1.5-4.5 year olds and the 9.5-14.5 year olds. On the left side, there are no cases in the 1.5-4.5 year olds, but otherwise the trend is an increase through the age cohorts. Since periostitis can result from both infectious disease and trauma, what we are seeing here are actually different responses based on different risks and exposures. Most of the cases are widespread and likely related to infection, but three cases among the toddlers and younger children, or 42.85%, are localized and more likely from trauma. As this is the age group that is getting out and around more, it is not surprising to see evidence of injury-related periostitis.

The trend towards increased periostitis reminds us that the children as they aged remained vulnerable to infectious disease and injuries. And it also reminds us that such diseases could take children very young, but that the evidence for the conditions appears once the children have lived long enough to record the condition in the bone, and, in many instances, survive the event. While the exposures these children faced varied, the presence of periostitis across the age cohorts highlights the interactions the children had with the wider New York City environment. Infection, trauma, and the ability to survive such challenges provides a glimpse of what it was like to live in the urban space.

Trauma

Trauma likewise tells us about urban life. A few cases of trauma have been documented in the subadult collection, and each are somewhat unique in their own way (Table 9.6)

Table 9.6: Trauma

Individual/Element	Age Category	Trauma Type
IV-DDD	6 months-1.5 years	Antemortem compression fracture of tibia and fibula from rickets
IV-A	6 months-1.5 years	Postmortem craniotomy
IV-OOOO	2.5-3.5	Antemortem blunt force trauma to the left parietal
SUBHUM02R	6.5-9.5	Antemortem compression fracture of proximal humerus
II-J	12.5 years	Postmortem craniotomy

The types of trauma fall into three categories: secondary fractures from pathological conditions, antemortem trauma, and postmortem alteration. Given the small sample, there are no clear trends for the population as a whole, but individual osteobiographies provide fascinating insight into these children's experiences during life and after death.

The pathological fracturing in IV-DDD reminds us of the severity of the rickets experienced by many of the infants. This rickets was directly connected to the diet and health of the mother, and in many cases would have begun in utero. The rickets in this child was so severe that bones fractured from the strain of movement. The causes of rickets, as has been discussed, are intricately connected to families and the church and city.

The healing blunt force trauma in IV-OOOO, on the other hand, raises many questions. What was the quality of life for this child? Did this injury result from an accident, or some violence, or abuse? Given IV-OOOO's range of health concerns (see more below), the child becomes a clear example of what can happen at this next stage of life with increased sociality and interaction with people and the urban space. The risks of toddlerhood and younger childhood are exemplified in the child's range of conditions and the child's trauma.

The compression fracture of the humerus in the older children similarly highlights one possibility that comes with increased activity, exposure, and perhaps even labor as children aged. We can imagine a range of causes—from a physical altercation at home or school, to an accident on the busy city streets, to a mishap at a shipyard or factory. Such a serious injury would have impacted the individual's movement in that arm and would have caused a great deal of pain.

While these antemortem fractures tell us a bit about the pain and struggles the children face during life, IV-A's craniotomy opens up a range of questions about the post-mortem life of the child. Was the craniotomy done to provide insight to grieving parents? If it was such an action, this craniotomy extends the life course of the child into death, as family members searched for answers. The child remained the subject of the love and concern of the family. In some ways, the sociality experienced by the deceased infant may have been much great than that experienced during IV-A's brief life.

At Christ's Church, Spitalfields, two children did have postmortem autopsies. A two year old and a ten month old were both found with evidence of the procedure. The ten month old was William Leese, the son of a surgeon (Cox 1996:97). This suggests that the autopsy of his son may have been done by a loving and concerned father. IV-A may similarly have been autopsied by family members in the medical field. As noted earlier, there were at least two doctors in the congregation, one of whom buried a young child. Whatever the reasons for IV-A's craniotomy, it may very well have been done out of love.

In a contrasting example, II-J's craniotomy consistutes the child not as the subject of family concern, but more likely as an object of the medical gaze. II-J was no longer an individual, but instead a specimen of analysis and education. In addition, II-J reminds us of the delicate question of who was in the city, and how those individuals came to be interred at the vaults. II-J was around 12.5 years of age, with an isotopic signature that is more consistent with temperatue clines in Europe than New York City. And so II-J could have been an immigrant in life or in death, and is a symbol of the ideology, biology, and urban development of the growing city.

Subadult trauma in bioarchaeological case studies is fairly rare. At the sites used for comparison in this dissertation, no cases of antemortem trauma are reported. The fact that trauma is present in the Spring Street Presbyterian Church remains then is significant. It suggests that the dangers of the urban environment noted throughout *The Corners' Reports* were very real for these subadults. The dangers of the streets, of labor, and of urban life were certainly serious enough to break bone.

Dental Health

Of all of the data examined in this research, the data that most captures the life course of these subadults is that on dental health. Because unlike bone, teeth do not remodel, they record the ongoing environment to which they are exposed. From the teeth we should get pictures of diet, health disruptions, and even some indicators of behavior. All of these categories connect us back to parenting behaviors, structuring institutions, and even the resources present in the city at the time.

The first data set is that on carious lesions and attrition, both directly related to what types of food were consumed.

Table 9.7: Dental Pathology

	Deciduous		**Permanent**	
Age Group	**Carious % (N)**	**Attrition % (N)**	**Carious % (N)**	**Attrition % (N)**
Birth-1.5	25 (8)	12.5 (4)	---	---
1.5-4.5	14.06 (10)	14.06 (10)	100 (1)	100 (1)
4.5-9.5	36.36 (24)	10.61 (7)	13.89 (5)	19.44 (7)
9.5-14.5	---	---	43.48 (20)	28.26 (13)

In general, rates of caries and attrition increase with age. The spike in permanent teeth in children 1.5-4.5 with caries and attrition is in part due to sampling: only one tooth was present. The more general trend, however, is for an increase in both conditions as children age. The fact that one quarter of the infants' deciduous teeth has caries is also consistent with expectation that some infants were being weaned, although the decline in the deciduous teeth of 1.5-4.5 year olds with caries is interesting. Also of notes are the high rates of caries in the older children and the 9.5-14.5 year olds. Figure 9.10 shows these patterns.

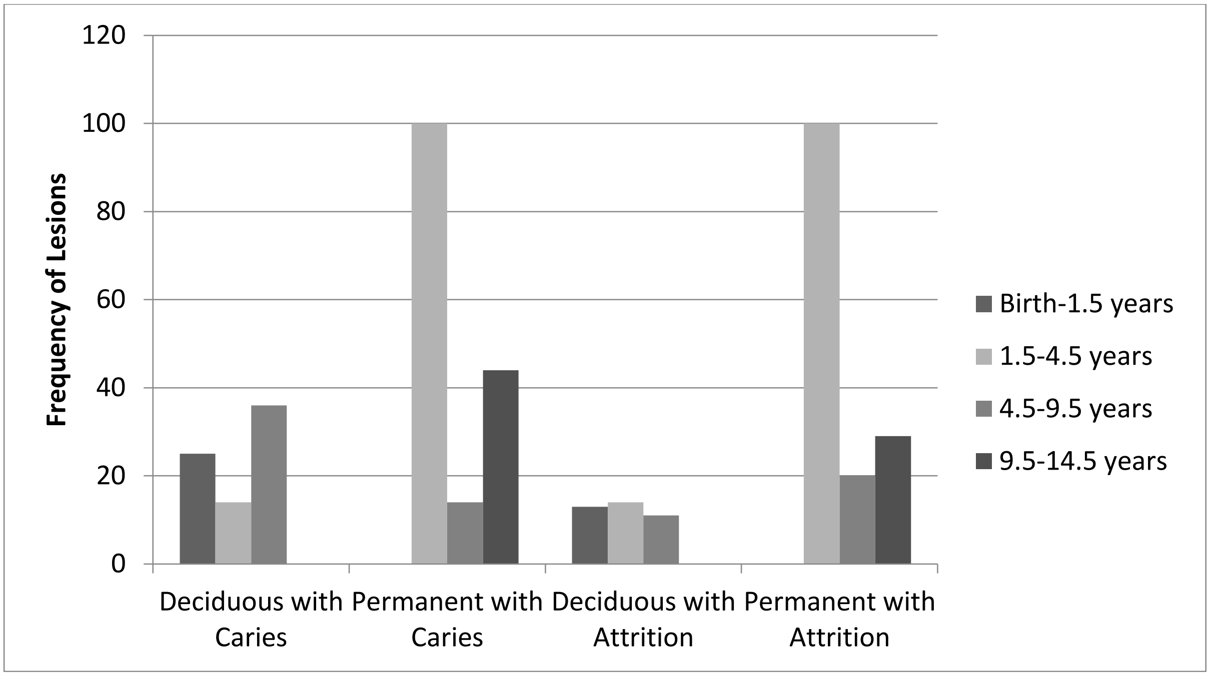


Figure 9.10: Caries and Attrition in Subadult Dentition

Carious lesions are caused by exposure to the fermentation of food particles by bacteria on the teeth. Sucrose in particular leads to carious lesions, as can starches (Roberts and Manchester 2007: 65). We know from the Rev. Ludlow's writings that fruits and vegetables were relatively expensive, though, comparatively, sugar was cheap. The Rev. Ludlow writes that he can purchase his mother sugar for $0.10, yet when he or a family member took a trip to South Carolina, the oranges that were purchased were $0.50 cents. The fact that up to 44% of the children's teeth had carious lesions certainly suggests access to sugar and starches. Attrition is also related to food consumption, and the continued exposure to grit in foods in the diet. The older the children were, the more time they had to accumulate these markers of mastication and diet.

What this data captures about the subadults is both the fact that weaning timing varied and that diets were high in sugar and carbohydrates. Both of these are confirmed by the historical record, as has been discussed throughout the dissertation. However, this information also tells us something about the congregation. If the pastors were, for instance, advocating dietary reform, how does the presence of carious lesions fit into that picture? Dietary reforms often focused on meat, hot foods, and commercial bread (Abzug 1994), but there is less discussion about sugar in general. Both carbohydrates and sugars are implicated in the carious lesions observed here. The presence of sugar may not be accounted for by the church, but certainly can be tied to the city. New York City's growing prominence as a port city can be seen in the Rev. Ludlow's own writings, with the cheap cost of sugar and the ease of travel to South Carolina. The mouths of these children are recording that socioeconomic reality of life in the early 19th century in New York. Of interest too is the fact that abolitionists often boycotted products from slave-holding groups. Sugar was one such product. The high rate of carious lesions, as well as the Rev. Ludlow's comments about purchasing sugar, remind us that the congregants and pastors were not always practicing what was preached.

Other dental evidence helps us observe the life course in these subadults. The presence of LEHs in nine teeth (Table 9.8), remind us that although these children ultimately did not survive into adulthood, they did survive infancy and some very serious early health challenges.

Table 9.8: Linear Enamel Hypoplasias

Individual/Element	Tooth	Number of LEHs	Crown Stage	Age of Disruption*
Vault IV FS 21	SUBC^{1}02L	2	Cr ½ Cr ¾	2 years 2.9 years
Vault III Individual A	SUBI^2 01R	3	N/A	2.5 years 3.45 years 3.74 years
Vault III Individual A	SUBC^1 01R	2	N/A	N/A
Vault IV FS 50+	SUBC$_1$01R	3	N/A	N/A
Vault IV	SUBI^{2}02R	1	Cr ¾	N/A

Vault IV Individual JJJJ	SUBC^1 01L	3	Cr ¼, Cr ½, Cr ¾	1.7 years, 2.0 years, 2.9 years
Vault IV	SUBC$_1$02L	3	Cr ½, Cr $^2/_3$, Cr ¾	2 years, 2.5 years, 2.9 years
Vault IV FS 49	SUBPM$_1$ 02L	1	Cr ½	3.5 years
Vault IV FS 49	SUBPM$_1$01R	1	Cr ½	3.5 years

** Age estimated from dental calcification standards (Moorres et al 1963a,b)*

LEHs are markers of survivorship. Rather than suggesting just risk factors and challenges of life at the time, they also suggest the influence of caregivers. LEHs represent severe disruptions (Hillson 1996: 165-171; Aufderheide and Rodriguez-Martin 1998: 405-407; Roberts and Manchester 2005: 75; Lewis 2007: 104-105). The fact that these children survived those disruptions reminds us that the social relationships that surrounded these children brought great benefit to them, and not just risks. In some ways, LEHs may represent an embodiment of investment by family members and caregivers.

Evidence for individual agency may come from the case of tobacco staining seen on the teeth of IV-NNNN. IV-NNNN has skeletal evidence of what appears to be adult behavior, and reminds us that growing up was a continuous process. While the children documented here all ultimately did not survive into adulthood, IV-NNNN may have crossed that threshold. While there is no church documentation on tobacco use and appropriate behavior, the fact that it is not present on most of the subadult remains suggests that it was not considered appropriate for children. And yet tobacco staining is present on adult teeth from this collection.Thus this is perhaps the best evidence we have from the skeletons to mark that there was a cultural and social change around the age of 14.5 that marked individuals as different—the ability to influence and alter the *habitus*, to engage with new responsibilities, and to fulfill new roles in the city.

From complex patterns like that of rickets, to more straightforward patterns as seen in carious lesions or scurvy, this dissertation has shown the value of combining the skeletal data with the historical record and an understanding of embodiment and agency. This begins with recognizing age stages, an approach not commonly taken in the osteological literature. By separating subadults along known cultural categories, we can reconcile the historical literature with the skeletal data. By then considering how children were interacting with family members, institutions, and the larger city, we can further understand how the social becomes the biological.

Ultimately, this dissertation has argued that to simply record the conditions present in subadults ignores the social context. In particular it is important to recognize that the bodies of the children were being molded people they met, places they traversed, and by ideas they encountered—ideas about how to behave, when to work, what to eat, where to live, and how to worship—ideas that were expressed by caregivers, influenced by structural institutions such as the church, and limited by the urban environment. To ignore such factors in an analysis is to do a disservice to the particular history of this group of people and to fail to fully flesh out their stories. While there is much still to be explored in this collection, this dissertation has provides a ground work for understanding childhood growth and change for a particular group of people in a specific place and time.

Future Research

The findings about childhood elaborated in this dissertation opens up questions about how childhood varied in the first half of the 19th century within one neighborhood and congregation. As I have illustrated above, some aspects of childhood varied by age. But the historical record that has been explored in this dissertation also has highlighted that childhood varied by socioeconomic circumstances: some children went to school; others labored. Some had access to wide ranges of food; others were left to beg. And so the historical data and the skeletal data raise another dimension of childhood variability—class—one which should be elaborated further in future research.

Historian Kathleen Sánchez-Eppler writes that, in the latter half of the 19th century, "play" and leisure time came to distinguish the difference between a middle class and working class childhood (2003: 41). Oddly though, the image of what childhood should be like, Sánchez-Eppler writes, was based on romanticized versions of the working class child who "teaches the middle class about fun" (2003:41). This was right at the very time that industrialization was increasing the use of child labor. The census first tracks child labor in the 1870s, and around the same time, states begin to regulate it (Sánchez-Eppler 2003: 41). And so this new, late 19th century notion of childhood as a distinct period of time was confusingly tied up in class ideology.

So what of the first half of the 19th century? Though little has been written about childhood experience in this time period, we know that rapid urbanization was changing everything about life for those in New York City. The landscape was changing, as the urban environment overtook the rural countryside (Burrows and Wallace 1999). The economic foundation of the city was shifting, as market-based wages changed what jobs people did, where they lived, and even how they got their food (Burrows and Wallace 1999; Sellers 1997; Wall 1995: Common Council 1990). The opening of the West with the Erie Canal was driving the port city to become the importing and exporting hub of the country, and attracting new types of workers and new types of industry (Burrows and Wallace 1999: Sellers 1997). Although economic circumstances certainly segregated the populace of New York City before this time, the changes taking place in the early 19th century would lead to even more class differentiation later in the century. And so we must assume that the experience of childhood would have varied based on socioeconomic circumstances, along with the relationships children had to family members and institutions previously detailed.

Fortunately, the skeletal data give us some insight into these relationships. The children's remains suggest that, despite emerging economic differences, some aspects of childhood were consistent during this time period of incipient class development. Infectious disease and food availability affected children. In these ways, childhood in New York City was dangerous, no matter what the socioeconomic circumstances of your family. Some dangers—early weaning and labor, for instance— likely only affected individuals of the working class. We might also think the comparatively high rate of rickets suggests something about class in the congregation. However given the fact that rickets may be related to melanin in the skin at this latitude, access to the outdoors, and food access and choice, it is just as likely to affect those middle class children in school as it is the poor or marginalized, who may have had more access to the outdoors. We have to remember that only around half of the children in the burial vaults were affected. So while that group may include children from across race and class lines, half of the children were free of this condition. Rickets, therefore, may not just show up in one socioeconomic group.

One condition that hints at class difference is the children's dentition. One quarter of infants appear to be weaning or weaned, and on to foods that cause carious lesions and attrition. That means, however, that potentially three-quarters of the children were not weaned. Those mothers who had to work would have had to wean earlier, and those who could afford to wait may have taken the advice of authors like Tyler and Alcott and waited longer. Schools like that at Spring Street gave women the opportunity to work while children were young. And so perhaps in the teeth is where we see our best indication of childhood class distinction.

A second important potential source of information about class comes from the preliminary isotope data collected thus far.

Table 9.9: Preliminary Isotope Data

Individual	**Age**	**^{15}N**	**^{13}C**	**Pathology**
IV-1-4F	0.5-1.5	12.4	-17	Rickets
II-2	2.5-3.5	12	-17.1	---
II-3	4.5-5.5	11.7	-17	---
IV-1-4I	4.5-5.5	10.5	-18	Rickets
II-J	12.-13.5	11.6	-20.9	Craniotomy

Interestingly, Individuals VI-1-4F, II-2, II-3, and II-J cluster in the higher ratios of ^{15}N, while IV-1-4I falls very near the bottom of the sample. Most of the adults sampled cluster between 11 and 11.5. We know that foods that were likely to be consumed in 19th century New York City, namely marine fish and some meat, are also enriched in ^{15}N, and thus those individuals that cluster with higher levels of ^{15}N are either likely a) for the younger individuals, still nursing and therefore registering a trophic level higher than the adults, or b) eating a diet with some component of marine resources and/or meat. It is interesting, then, to see II-2, who is between 2.5 and 3.5 years of age, with ^{15}N levels similar to that of the infant, IV-1-4F. It suggests that II-2 may not have been fully weaned. Even II-3 has a relatively high ^{15}N level, if we compare it to IV-1-4I, who was the same age. In terms of ^{13}C, individual J appears to be an outlier compared to the other samples, eating a diet composed of more C_3 plant material more indicative of Europe than the United States at this time, as previously discussed. These pilot study data suggests that there is variation in the diet of the subadults, particularly in ^{15}N levels. Such variation may be an important clue as to class. A larger sample of subadult isotope levels will tell us a great deal about differences and weaning.

As work moves forward with the Spring Street Presbyterian Church collection, the question of class and childhood is just one avenue of many to be explored. Stable isotope analysis, as noted above, will provide additional information on diet, weaning, and migration that will enrich the narrative that has begun to develop here. Another avenue is the incorporation of the adult skeletons, and particularly the analysis of the childhoods they experienced. I expect to see interesting differences in the two sets of childhood that can perhaps illuminate how the changing sociocultural environment around the children of the Spring Street Presbyterian Church influenced their lives. In many ways, the data presented in this dissertation is just the beginning of exploring childhood and life for the congregants of the Spring Street Presbyterian Church.

Conclusion

Bodies, Sofaer notes, are “the past personified” (2006:1). At the opening of this dissertation, lines from a poem by a member of the Ludlow family set the stage. Anna Frey, a deceased infant, is given voice to reflect on her brief life. And yet those words were not written by her. Our best opportunity to understand what life was like for those children who died and were buried at the Spring Street Presbyterian Church is contained in the bodies the children left behind. And the pasts that are incorporated into these remains have raised interesting questions about what it meant to be a child in the 8th Ward of New York City in the 1820s, 1830s, and 1840s.

The social history and skeletal remains discussed here have suggested that life on Spring Street was full and diverse, challenging and tragic. While dietary deficiencies might suggest malnutrition, cavities attest to access to sugary and starchy foods. Historical records remind us that children were in school, at work, and in church, engaging with the changing landscape of the city and reflecting those changes in their bodies.

Two specific bodies can highlight this (see Figures 9.11 and 9.12). Individual IV-OOOO was around 2.5 when he or she died. Life had been a struggle for this child. At the time IV-OOOO passed away, the child had scurvy, cranial lesions, cribra orbitalia, and healing blunt force trauma. Like the imagined lines from Anna Frey, death may have been a release from suffering for IV-OOOO. We can only wonder about the world in which IV-OOOO lived: was it one of poverty? Was it one of discrimination? How had IV-OOOO come to be a part of the Spring Street Presbyterian Church congregation?

Figure 9.11: Cranial Elements of Vault IV Individual OOOO

On the other hand, Burial IV-1-4I at the age of 4.5-5.5 died with a very different signature of lived life. IV-1-4I had rickets, cavities, abscesses, and cribra orbitalia at the time of his or her death.

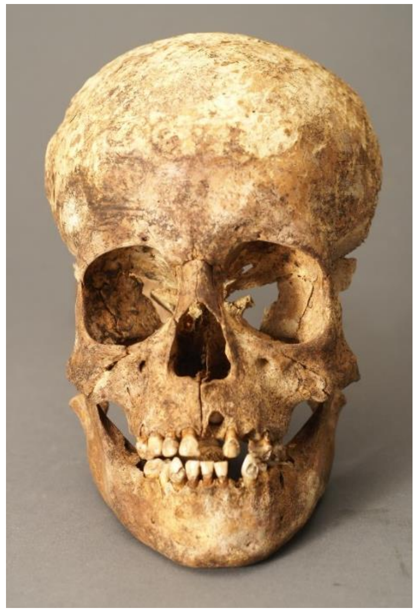


Figure 9.12: Vault IV Burial 1-4I

Though IV-I-4I was also ill at the time of death, such illness manifests in a very different way. IV-OOOO has markers of a very challenging life—deficient in vitamin C, a healed head wound, and some infectious disease that caused bleeding within the skull. IV-1-4, on the other hand appears to be well-nourished, despite being deficient in vitamin D. IV-1-4I's mouth is full of cavities suggesting a sugar-rich diet, yet the bowed limbs speak of a visible physical deformity influenced by the landscape and latitude as well as by choices made by the adults in the child's life. Was IV-1-4I the child of a middle class family, like the pastors of the church? Was IV-I-4I's rickets due to being kept inside in school, or from being fed a diet based on ideological reforms? Do the cavities tell us that IV-1-4I was offered candy or sweetened drinks as a treat or as part of everyday consumption practices?

While both of these children died and were buried in the same vault of the Spring Street Presbyterian Church, we cannot help but wonder how different daily life could have been for them. Much remains to be learned about these two people, and the 73 other children buried in the Spring Street Presbyterian Church vaults. Yet we too have learned much about their lives from their skeletal remains as a first step into understanding what it meant to grow up in the abolitionist congregation at the corner of Spring and Varick.

“As this calm, and holy dawning
[word unclear] guides my parting breath,
To an everlasting morning~
Gently, close my eyes in death.
Blessings endless, richest blessings,
Pour their streams upon thy heart
(Tho’ no language yet professing)
Breathes my spirit ere we part.”

–Lines on the Death of a Child

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2014 *Tracing Childhood: Bioarchaeological Investigations of Early Lives in Antiquity*. Gainesville: University of Florida Press.

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1978 Marriage Patterns in Mid Nineteenth-Century New York State: A Multivariate Analysis. *Journal of Family History* 3: 51-61.

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2010 Archaeologies of Disease and Public Order in Nineteenth-Century New York: The View from Spring and Varick. *Northeast Historical Archaeology* 39: 97-119.

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2006 Investigating the Specificity of Periosteal Reactions in Pathology Museum Specimens. *American Journal of Physical Anthropology* 137: 48-59.

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2012 Nutritional and Disease Stress of Juveniles from the Dakhleh Oasis, Egypt. *International Journal of Osteoarchaeology* 22: 219-234.

White, Rebecca L. and Douglas B. Mooney
2010 Stories from the Rubble: The Archaeological Findings from the Spring Street Presbyterian Church Vaults. *Northeast Historical Archaeology* 39: 40-64.

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1997 *Seduction, Prostitution, and Moral Reform in New York, 1830-1860*. New York: Garland Publishing, Inc.

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2006 *The First of Causes to Our Sex: The Female Moral Reform Movement in the Antebellum Northeast, 1834-1848.* New York: Routledge.

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1998 Stable Carbon and Oxygen Isotopes in Human Tooth Enamel: Identifying Breastfeeding and Weaning in Prehistory. *American Journal of Physical Anthropology* 106: 1-18.

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2000 Not Merely Child's Play: Creating a Historical Archaeology of Children and Childhood. In *Children and Material Culture*, ed. Joanna Sofaer Derevenski. New York: Routledge, 100-113.

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1999 When We Were Very Young. *Natural History* 108: 58-62.

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1992 The Stirrup Court Cemetery Coffin Hardware. *Ontario Archaeology* 53: 45-64.

Wyatt-Brown, Bertram
1969 *Lewis Tappan and the Evangelical War Against Slavery*. Cleveland: Press of Case Western Reserve University.

Yamin, Rebecca
2001 Introduction: Becoming New York: The Five Points Neighborhood. *Historical Archaeology* 35: 1-5.

Curriculum Vita

Meredith Alyson Berman Ellis
131 Alden Street
Syracuse, NY 13210
(315) 569-7802 (home)
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Education:

MA, Anthropology, *Syracuse University*, 2011.

MA, English, *University of Rochester*, October 2005.

BA, Anthropology and English, *William Smith College*, 2004.
Summa Cum Laude with Honors in Anthropology, Phi Beta Kappa.

Teaching Experience:

ANT/FSC 300: *Introduction to Forensic Anthropology*, Syracuse University, Fall 2013.
Designed and taught this new introductory course. This course introduces students to the field but is not lab based and is therefore suitable for interested majors as well as interested non-majors.

ANT 443/FSC 440/FSC 640: *Human Skeletal Anatomy*, Syracuse University, Summer Session 1, 2013.
Designed and taught this methods course in osteology.

MAX 123: *Critical Issues for the United States*, 2011-2012 and 2012-2013.
Teaching Fellow for the signature, team-taught Maxwell School of Citizenship and Public Affairs writing intensive course.

ANT/FSC 436/440: *Introduction to Forensic Anthropology*, MayMester 2012.
Designed and taught a course focused on the history, techniques, and critiques of forensic anthropology. Designed hands-on laboratory projects to give the students experience in the field.

ANT/FSC 300: *Introduction to Forensic Anthropology*, MayMester 2010.
Designed and taught a course focused on the history, techniques, and critiques of forensic anthropology. Designed hands-on laboratory projects to give the students experience in the field.

ANT 131: *Introduction to Biological Anthropology*, Spring 2010.
Teaching assistant in two discussion sections. Designed exams, laboratory exercises, quizzes, and reading assignments.

ANT 121: *Peoples and Cultures*, Syracuse University, Fall 2009.
Teaching assistant in two discussion sections. Introductory course on cultural anthropology for non-majors.

ENG 100/102: *Critical Writing*, Le Moyne College. Thirteen sections taught from 2005 through 2008.
Freshman composition course focusing on creating logical arguments.

ENG 200: *Perspectives in Literature*, Le Moyne College. Three sections taught from 2006-2007.
Undergraduate introduction to literature for non-English majors.

ENG101: *Introduction to Critical Writing*, Tutor, Le Moyne College.
Tutor to students in danger of failing English 101 Fall 2006, and tutor in Spring 2007 to those who failed Fall semester class. One-on-one tutoring in basic grammar and composition.

ENG 103: *Freshman Composition and Literature I*, Onondaga Community College. Fall 2006.
Freshman composition course focusing on diverse array of writing formats.

ENG 101: *Composition and Research*, Morrisville College. Four sections taught 2005 and 2006.
Freshman composition course focusing on diverse array of writing formats.

College For Kids: *Monkeys, Bones, and People: An Introduction to Evolution Theory*, Summer 2005 and Summer 2006.
Designer and instructor, educational summer camp course designed to introduce pre-teens to primates, evolutionary theory, and modern-day evolutionary variation. The course focused on primates at Rosamond Gifford Zoo.

College For Kids: *Introduction to Poetry Writing*, Summer 2005 and Summer 2006.
Designer and instructor, educational summer camp course designed to introduce preteens to various forms of poetry while encouraging them to explore their own writing.

Grants and Awards:

American Dissertation Fellowship, *American Association of University Women*, 2013-2014. $20,000

Student Paper Prize, *Biological Anthropology Section:* “A Disciplined Childhood: A Social Bioarchaeology of the Subadults of the Spring Street Presbyterian Church,” American Anthropological Association Meetings 2011. $500

St. Clair Drake Travel Grant, *Society for Anthropology of North America:* "A Disciplined Childhood: A Social Bioarchaeology of the Subadults of the Spring Street Presbyterian Church," AAA Meetings November 2011. $250

Gordon Bowles Graduate Student Essay Prize, *Syracuse University*, 2011. $100

University Fellow, *Syracuse University*. 2008-2009 and 2010-2011. $20,000 per year.

Dean's Summer Fellowship, *Maxwell School, Syracuse University*, 2011.
Funding to do archival analysis on the congregation of the Spring Street Presbyterian Church in Philadelphia, Pennsylvania and Cooperstown, New York. $3,200

Roscoe-Martin Grant, *Maxwell School, Syracuse University*, 2010.
Funding to conduct a pilot study of isotopes on the Spring Street Presbyterian Church remains. $1,000

Dean's Summer Fellowship, *Maxwell School, Syracuse University*, 2010.
Funding to analyze remains from the Spring Street Presbyterian Church collection. $2,500

Field Experience:

Syracuse University Physical Anthropology Laboratory. Spring Street Presbyterian Church Burial Vaults (1820-1846), 2007-Present.
Analysis of the some 250-300 individuals, including, cleaning, sorting, and coding remains, from the four burial vaults. In addition, I currently supervise undergraduate and graduate volunteers working on the Spring Street Presbyterian Church remains.

Fulbright Foreign Language Teaching Assistant (FLTA) Orientation Program.
Teaching Mentor, August 2010, August 2011, August 2012, and August 2013.
Served as a small group leader to a group of teaching assistants from all over the world coming to teach their native languages at American colleges and universities. Designed and taught small group sections on teaching practices, institutional resources, and life at American colleges and universities. Accompanied FLTAs to large group sessions, meals, and cultural events.

Harriet Tubman House. Field School, June 2008.

University of Montana. External Contractor, Trauma Analysis for China Gulch (1846) bone fragments. Summer 2007-Fall 2009.
Analyzed more than 86 animal bone fragments for trauma resulting from butchering and cooking. This analysis included identifying and differentiating between cut marks, chop marks, saw marks, percussion pits, heat fractures, and radiating fractures. I have coded, imaged, and illustrated these fragments.

Syracuse University. Trauma Analysis, Donner Party bone fragments. Winter 2007-Summer 2007.

I assisted in analyzing trauma on remains from the Alder Creek Site. This included identifying and differentiating between cut marks, chop marks, saw marks, percussion pits, heat fractures, and radiating fractures.

Publications:

Ellis, Meredith A.B. *In Press, Spring 2014*. A Disciplined Childhood: A Social Bioarchaeology of the Subadults of the Spring Street Presbyterian Church. In *Tracing Childhood: Bioarchaeological Investigations of Early Lives in Antiquity* ed. Jennifer Thomson, Marta Alfonso, and John Crandall.

Ellis, Meredith A.B. 2013. Book Review: *A Fine and Private Place: The Archaeology of Death and Burial in Post-Medieval Britain*. Annia Cherryson, Zoe Crossland, and Sarah Tarlow. *Historical Archaeology* 47(2).

Ellis, Meredith A.B., Christopher W. Merritt, Shannon A. Novak, and Kelly J. Dixon. 2011 The Signature of Starvation: A Comparison of Bone Processing at a Chinese Encampment in Montana and the Donner Party Camp in California. *Historical Archaeology* 45(2).

Ellis, Meredith A.B. 2010. The Children of Spring Street: Life and Rickets in a Nineteenth Century Congregation. *Northeast Historical Archaeology* 39.

Burying the Past: A Creative and Analytical Look at the Cultural Repatriation Movement. Honors Thesis, Hobart and William Smith Colleges, 2004

Conference Papers:

“The Text and the Body: The Case of the Reverend Henry G. Ludlow and the Remains of the Congregants of the Spring Street Presbyterian Church.” Society for Historical Archaeology Annual Meeting, Quebec City, Quebec, January 2014.

“The Text and the Body: The Case of the Reverend Henry G. Ludlow and the Remains of the Congregants of the Spring Street Presbyterian Church.” Return of the Text Conference, LeMoyne College, September 2013.

“Presence and Absence: An Exploration of Scurvy in the Subadults in the Spring Street Presbyterian Church Collection” Bioarchaeologists’ Northeast Regional Dialogue Conference, February 2013, Syracuse University.

“Person, Place, and Thing: Disassociations of the Spring Street Burial Vaults,” American Anthropological Association, November 2012, San Francisco, California.

"A Disciplined Childhood: A Social Bioarchaeology of the Subadults of the Spring Street Presbyterian Church," Bioarchaeologists' Northeast Regional Dialogue Conference, February 2012, SUNY Albany.

"A Disciplined Childhood: A Social Bioarchaeology of the Subadults of the Spring Street Presbyterian Church," American Anthropological Association, November 2011, Montreal.

"Severe rickets at the Spring Street Presbyterian Church" Poster Presentation, April 2011, American Association of Physical Anthropologists, Minneapolis, Minnesota.

"Starvation at China Gulch: The Story Told by Bone Processing at a Chinese Mining Camp," Society for Historical Archaeology 2010 Meetings, Amelia Island Plantation, Florida.

"The Children of Spring Street: Subadult Health, Disease, and Death in a Nineteenth Century Congregation," Society for Historical Archaeology 2009 Meetings, Toronto, Canada.

Other Speaking Engagements:

Reading the Body: Bioarchaeology and Interdisciplinary Life after William Smith, Hobart and William Smith Colleges, Young Alumnae Speaker Series, November 2012.

Biological Anthropology, Utica College, April 2012 and October 2012.

Meredith A. Ellis, Bioarchaeologist, inducts Amistad Abolitionist Lewis Tappan Guest on radio program "The Gist of Freedom." October 2010.

Lewis Tappan and the 1834 Race Riots: Abolition, Bioarchaeology, and the Spring Street Presbyterian Church, October 2010, Abolitionist Hall of Fame, Peterboro, New York.

Bones Talk, Pulse of the Planet radio program guest, September 20th, 2010.

Biological Anthropology, Le Moyne College, July 2010.

Stories from the Grave: Skeletal Archaeology, Fayetteville-Manlius High School, May 2010.

Grave Stones and Anthropology, Chittenango High School, September 2008 and September 2009.

Historical Bioarchaeology: Projects and Graduate School, Hobart and William Smith Colleges, December 2008.

What Happened to Spongy Kid? Investigating the Children of Spring Street, Brown bottle speaker, November 2008.

Service:

Bioarchaeologists' Northeast Regional Dialogue. Organizing Committee, 2012 and 2013 Conferences.

Anthropology Graduate Student Organization. Secretary 2012-2013, President 2010-2011, Faculty Representative 2009-2010.

National Abolition Hall of Fame. Reader, 2011 and 2012
Reviewed nominations for new inductees.

College of Arts and Sciences and Maxwell School, Syracuse University. Member, Promotions and Tenure Committee, 2011-2012.
I was one of two graduate students appointed to this committee.

Anthropology Department, Syracuse University. Graduate Student Organizer, Recruitment Weekend 2010.

Syracuse University. Proofread *House of Mourning: A Biocultural History of the Mountain Meadows Massacre,* by Dr. Shannon Novak, Spring 2007.

LeMoyne College. Adjunct training, Critical Writing Program.
Assisted in the training of a new adjunct instructor, Fall 2006.

Hobart and William Smith Colleges. Member, English Tenure Review One Committee for Professor Conroy-Goldman, 2003-2004.

Hobart and William Smith Colleges. Member, English Department Hiring Committee for Medievalist Tenure-Track Position, 2002-2003.

Hobart and William Smith Colleges. Editor-in-Chief of *Thel Art and Literature Magazine,* 2000-2004.

Professional Organizations

Society for Historical Archaeology, 2008-Present.
American Association of Physical Anthropologists, 2010-Present.
American Anthropological Association, 2011-Present.