A sense of society: entheseal change as an indicator of physical activity in the Post-Medieval Low Countries: potential and limitations

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Summary

Chapter 1

The first chapter sets the scene for the current research. It points out how physical activity and the social perception thereof form an important aspect of a society, and details how archaeologists aim to research this societal element. Homing in on the current research, the chapter discusses archaeological research on human remains, and the markers of physical activity that have been analyzed on the human skeleton. The commonly used activity marker of entheseal change (EC) is singled out. ECs are the changes occurring at the attachment sites of muscles and ligaments (=entheses) to human bone. The premise is that entheses will adapt morphologically to the strain they are under, i.e., muscle use, and that osteoarchaeologists can then interpret past physical human behavior from them. Entheseal change is a highly active field of research, having gained traction in the 1990's and being continuously researched ever since. As such, much progress has been made, but there are several persistent problems and gaps in the knowledge. This dissertation identified and addressed four such issues. The first question is how entheseal change interacts with another often used marker of physical activity, namely osteoarthritis (i.e., joint wear). The second problem is posed by the myriad of different recording methods existent for EC, and the implications thereof for study comparability. The third issue is that there is as yet no system for the observation of EC in growing, nonadult individuals, even though they make up a substantial segment of society. Finally, the fourth issue is that entheseal change is often used as a proxy for social differentiation. This is based on the assumption that poor people perform more manual labor and that this will become apparent in their skeleton, yet this assumption has not been tested, and therefore does not pose a solid ground for conclusions on past peoples. The current thesis will address these four challenges within entheseal change research, using two unique post-medieval skeletal societies from the Low Countries, namely Middenbeemster (The Netherlands) and Aalst (Belgium). The ultimate goal of this dissertation is to provide the reader with a comprehensive study of the potential and limitations of entheseal change as well as new tools to address these limitations.

Chapter 2

Chapter two compares entheseal change to another osseous activity marker, osteoarthri-

tis, within the post-medieval farming community of Middenbeemster (The Netherlands). Using upper limb entheses and joints, this research found that the correlation between entheseal change and osteoarthritis is limited. This infers that if both are markers of physical strain on the body, they represent different types or aspects of strain. Additionally, this article evaluated whether signs of social differentiation were visible in the entheseal change data. No groups of higher social status could be discerned, but there was a gendered division of labor, with men having more pronounced ECs in all attachment sites except the one for the M. triceps brachii, which showed substantially more osseous adaptation in women.

Chapter 3

Chapter three compares the two currently most used methods for entheseal change observation and scoring to each other. Over the years, many different recording methods for entheseal change have been designed. The most commonly used methods as of now are the Hawkey and Merbs (1995) method (and the updated version thereof created by Mariotti (2004, 2007)), and the Coimbra method (2016). This last method aims to be biologically appropriate and replace all past recording systems. However, if data gathered using this method are not compatible with data gathered using the previous methods, this would mean that much previous research becomes incomparable and therefore obsolete. This chapter compares results obtained using the older method to results gained using the newer method, and found that, although some differences in nuance are present, the methods produce overall highly similar results. This proof of compatibility is crucial in activity marker research, where comparisons between different populations are key.

Chapter 4

Chapter four addresses the current lacuna in EC research, that there is no standardized method to observe and record EC in growing individuals. This research paper presents the first system for EC scoring in nonadults. The method is developed on a sample of known age-at-death and sex nonadults from Middenbeemster. As an explorative aspect of this chapter, correlation between age, sex, and EC is tested. No significant statistical correlations between these three factors were found in this sample of 29 individuals. This paper shows the spectrum of EC variation in growing individuals, and that this variation reflects more than just age, potentially implying that activity and/or unknown aspects of growth and development are causative factors. Thus, chapter 4 presents both a method to score EC and a motivation to do so.

Chapter 5 and 6

Chapters 5 and 6 present two halves of one study, with the main aim to assess whether EC can be used as a proxy for social differentiation. Chapter 5 provides a socio-economic and

historical context for the three skeletal collections from Aalst that are used (i.e., Saint-Martin's church, Hopmarkt and Louis D'haeseleerstraat) through a combination of historical, archaeological, and stable isotope data. Historic sources state that burial in the church was cheapest, burial in a cloister garth was less expensive, and burial in the general cemetery was the least expensive. The stable isotope ratios of carbon (χ13C) and nitrogen (χ15N) show that individuals at the Louis D'haeseleerstraat ate a substantially poorer diet than those at the Hopmarkt. Additionally, at the Louis D'haeseleerstraat the burials were organized in a large grid pattern which does not suggest a cloister context. Thus, the Saint-Martin's church sample is identified as the highest class individuals, the Hopmarkt (monastery, mainly cloister garth and alleys) sample as the middle class individuals, and the Louis D'haeseleerstraat (convent, outside later wall) individuals as the lowest class individuals. Chapter 6 then evaluates whether EC are correlated with these established socio-economic groups. For the 16 entheses of the upper and lower limb tested, no clear correlation between EC and social status was found. In the two cases where a correlation with burial site was statistically significant, the higher class individuals had more EC. Thus, EC was not a suitable proxy for socio-economic status in the post-medieval Belgian town context. This chapter thus serves as a cautionary tale against using EC to answer research questions concerning socio-economic status.

Chapter 7

Chapter seven summarizes the results from the five research papers discussed above, and presents a comprehensive conclusion about the value, potential, and limitations of EC research. By presenting the ways in which EC cannot be used (i.e., as a proxy for socio-economic status, or interchangeably with other activity markers), establishing that the predominant scoring methods give comparable results, and providing a tool for the study of nonadult EC, the current dissertation provides researchers with valuable information for research into physical activity in past societies.