Multidisciplinary obesity research: a local strategy for breaking new ground

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Abstract

Obesity has myriad causes that are both highly interconnected and embedded within a complex web of social, cultural, political and economic institutions. We outline the potential of a multidisciplinary approach for generating novel research streams in the study of population obesity, by considering current gaps in obesity research and methodological challenges in generating research that is accessible to researchers, policy makers, and health practitioners alike. We argue that in order to curb the unchecked rise in global obesity, new research must transcend conventional boundaries between the social and medical sciences. This paper begins with a description of several disciplinary approaches for understanding the macro- and micro-level causes of obesity that are employed within the framework of the Unit for Biocultural Variation and Obesity (UBVO) at the University of Oxford. We highlight opportunities for collaboration between these approaches within a local, leaderless but purposive structure. By elaborating the research questions to be answered within this particular constellation, we encourage other institutions to similarly mobilize local resources for developing their own type of multidisciplinary obesity research.

Introduction

Currently, there are no successful approaches to reducing obesity and promoting long-term healthy weight maintenance at the population level. While shorter-term interventions may be strongly informed by knowledge of physiological mechanisms that operate within individuals, a sustainable reversal of current obesity trends requires an enhancement of macro-level policies, mitigation of the health impacts of poverty and urbanization in relation to food and physical activity, and identification of the negative effects of economic growth on obesity. This complicated problem engages researchers from numerous intellectual disciplines that span the social and medical sciences. We argue that rather than continuing to operate along disconnected trajectories, researchers of population obesity must coordinate their efforts in order to break new theoretical ground. Only when they manoeuvre more like a single organism than a collection of individuals (1) will their work have a high impact.

Figure 1

The Foresight obesity systems map (FOSM) (2, 3) demonstrates obesity to be a complex biological system set within an equally complex framework of culture and society (Figure 1 (3)). Foresight suggests that the problem needs to be reframed to reflect the broader contexts in which individuals operate, embracing input from a wider range of disciplines and institutions including the private sector (2). Meeting these needs requires joined-up research that underpins joined-up interventions, which should also reflect joined-up policy. The establishment of the English Cross-Government Obesity Team is an important step in this direction, but its work is still at an early stage of development.

Academic disciplines are positioned differently in their understandings of obesity and its macro- and/or micro-level causes. In this paper we describe several disciplinary approaches to population obesity research that are employed within the Unit for Biocultural Variation and Obesity (UBVO) at the University of Oxford, and we highlight opportunities for collaboration between these disciplines. While individual members function independently in developing their particular research interests and expertise, their collective action gives rise to a larger entity with its own shape and direction. The UBVO exists through coordination of complementary projects by individual contributors, who can move around freely within the body of the Unit.

UBVO was established after three of its fellows took part in the Foresight *Tackling Obesities: Future Choices* project, of which the obesity systems map was one output. The FOSM is therefore a logical starting point for identifying promising lines of multidisciplinary research that could lead to effective long-term, macro-level interventions. We argue that in addressing obesity, multidisciplinarity must transcend conventional intellectual boundaries, particularly those between the social and medical sciences. We do not claim to have yet identified multidisciplinary interventions for obesity, but we clarify the need for new tools for such identification. We acknowledge that the nature of multidisciplinarity will vary locally, as particular project streams will emerge out of particular expertise and institutional resources. In putting forward our own model for multidisciplinary obesity research, we challenge other researchers, institutions, and funding bodies to move beyond the familiar disciplinary structures that have so far failed to yield robust solutions for curbing population obesity.

Different disciplinary approaches to obesity

The need to research obesity in the wider context (4) requires a shared common language that spans macro- and micro-levels of analysis. Academic disciplines currently engaged in obesity research at the University of Oxford include public health, epidemiology, sociology, politics and international relations, anthropology, business studies, economic and social history, human biology, psychology, and medicine (particularly genetics and endocrinology). These disciplines at Oxford vary in degree of commonality and conflict in their study and understanding of obesity. Disciplines may have commonality in terms of research questions alongside conflict in terms of research methodologies. Levels of affinity for obesity research may be reflected in the geographical arrangement of academic institutions; the relative geographical positions of departments with a stake in obesity research at the University of Oxford is shown in Figure 2. Some disciplines are clustered in the same or neighbouring buildings (e.g. politics, economics and sociology; public health and epidemiology), reflecting institutional expectations of high affinity, while others are physically separated by several miles (e.g. anthropology and public health; business studies and clinical medicine), making collaboration more difficult. Still other disciplines do not have separate facilities but are incorporated into multiple departmental structures, as in the Oxford case in which nutritionists work in both epidemiology and anthropology, and human biologists work in both anthropology and zoology.

Figure 2

Disciplinary perspectives

Figure 3a

It is the less obvious intellectual connections that can be fostered through a multidisciplinary forum such as the UBVO (Figure 3a). This constellation links researchers approaching obesity from a macro- descriptive perspective with those using a micro action-focused approach. One strand of the constellation (encompassing politics, sociology, and epidemiology) emphasizes broad societal trends and mainly employs quantitative methods, while the other (encompassing business studies, economic and social history, and anthropology) emphasizes variation among smaller groups and incorporates more qualitative description in its methodologies. Economics and public health are viewed as hub disciplines that incorporate elements of both of these strands. Operationally, collaborations occur within a horizontal structure that involves multiple departments, which maintain autonomy and control over their own resources.

In order to illustrate how researchers within these disciplines contribute to novel multidisciplinary work, we first elaborate on their individual perspectives. We do not claim to represent the perspectives of all researchers working within these disciplinary fields. The approaches to obesity employed by members of UBVO reflect their departmental affiliations as well as their own academic backgrounds; many have moved across disciplines during the courses of their careers, a factor that may be important in identifying individuals who might wish to undertake multidisciplinary approaches to obesity research.

The study of obesity can be approached at the macro-level through a focus on the global governance of obesity, defined as formal and informal institutions, norms and processes which govern or directly influence global obesity policy and outcomes. In this type of research, attention is paid to the main actors on the global stage including multilateral agencies (e.g., World Health Organisation); national or bilateral aid agencies (e.g., UK Department for International Development) and their special trust funds in the above multilaterals, non-governmental organisation networks, and public-private partnerships; and private actors (e.g. foundations, transnational corporations in the food, oil, and transport industries). Currently, obesity and chronic disease are not priorities on the donor agenda, as financial flows are primarily directed towards infectious disease; research into HIV/AIDS, tuberculosis and malaria continues to receive the bulk of funds (5), despite global chronic disease mortality now exceeding that of infectious disease (4). A major question in this area is why research and services to address obesity remain underfinanced relative to other health issues.

Business studies can take a lead in research on corporate social responsibility and obesity. While national economies rely on positive energy balance in the production and consumption of raw materials, goods and services, the economic health of food producers relies on expanding market size. Large-scale food producers and distributors are generally very successful in the delivery of secure and reasonably-priced uncontaminated supplies of food to populations. However, they face increasing pressure by regulatory bodies to provide clear information to consumers concerning the healthiness of the food products they carry. They are also scrutinized for evidence of ethical behaviour in their food marketing. Business studies research on obesity, which utilizes qualitative methods, can highlight forms of receptiveness or resistance by food companies to these external pressures.

Economic history can make major contributions to understanding the transition of food security, from preventing scarcity to promoting oversupply (6). It can also help in the identification of the distal and proximate correlates of this transition. These correlates include the nature of the food supply, its availability and relative prices; shifts between household and market production; cultural values surrounding eating, self-restraint, the body and physical attraction; the changing nature of work and family; and questions of social dislocation, stress, and comfort foods. Such work can be nuanced by class and gender, and cross-country comparisons can facilitate the identification of the underlying pressures driving change. Linking historical data held and managed by epidemiologists, sociologists and anthropologists and interpreting them in a multidisciplinary manner will add greatly to our understanding of these processes and how to address their obesogenic consequences.

Epidemiology enumerates obesity and represents it in functional terms, identifying the prevalence of obesity across populations and elucidating risk associated with its emergence (7). As a discipline it can serve as the foundation and logic of interventions made in the interest of public health and preventive medicine. Due to the complexity of obesity, the ability of epidemiology to identify which particular factors are most salient for curbing it is limited. In combination with other micro-level approaches, however, epidemiological methods could be used to tease out key causes of obesity and their relationships with other risk factors.

Obesity has recently been demonstrated to be embedded in relatively geographically-independent social networks (8). Use of network theory allows social networks to be understood as both a means

by which cultural products and knowledge are disseminated, and as outcomes of the nature of cultural capital that individuals possess. In both cases, obesity can be seen as an emergent property of a particular type of network. Using primarily quantitative methods, sociology can examine the importance of social proximity and density to the production of population obesity, and query the network properties that favour obesity emergence.

An anthropological approach to obesity can illuminate patterns of habitual action and value systems that may predispose populations to the emergence of obesity. Anthropologists are well placed to identify discrepancies between what people say they do and what they actually do in practice. Key lines of anthropological enquiry include the social valuation of particular foods, perceptions of physical activity, and patterns of consumption. An anthropological perspective can also be employed to explore the embodied experience of obesity, which may be understood as: the fat body as physical manifestation of a consumption-fuelled society; habitual diet and activity patterns through which people live out socially reinforced ideals; and/or institutionally-sanctioned conditioning of the body towards high-energy diets and increasingly sedentary activities.

Human biology views obesity as an outcome of the biological mechanisms that should maintain homeostasis, operating within particular environments. Its major focus is on the interaction between mechanism and environment, and ecological systems approaches are often used to investigate such interactions. In this scheme, obesity is considered as a biological phenotype that emerges among individuals as an outcome of the interaction of biological and social processes across their life-course (9).

Public health provides conceptual models to not only study the determinants of behaviours that may lead to obesity, but also to beget behaviour change, to design intervention methods and strategies, and to implement interventions (6). Most of the behavioural models used in health promotion are derived from cognitive social psychology, and assume that individuals will practice rational choice. Even though such approaches are implicitly macro-economic in framing the issue, structural deficits in the political and social system are often overlooked. Through a multidisciplinary approach, a more ecological outlook may be applied to health promotion.

Opportunities for multidisciplinary research

There are several areas of obesity research and intervention that lend themselves to collaboration between two, three or more disciplines. These include: 1) understanding intra-society variation in lifestyle and consumption choices; 2) exploring the use of local knowledge for enhancing macro-level policies, including establishing metrics for understanding culturally-specific factors that can lead to behavioural change; 3) understanding the social construction of environments in gene-environment interactions; 4) mitigating the health impacts of poverty and urbanization in relation to food and physical activity; and 5) identifying the negative effects of economic growth on obesity.

Raising public awareness of healthy lifestyle and consumption choices assumes that lay understandings match those of health professionals. While it is often acknowledged that a mismatch may exist in uneducated sectors of non-industrialized societies, it is usually assumed that such a mismatch does not exist among industrialized societies with universal access to education. Low advocacy for the control of obesity in societies may not be due to low awareness; it may simply be a low priority for most people. Anthropology and sociology are well-placed to unpack such an issue.

Establishing metrics for the understanding of culturally-specific factors that can lead to behaviour change requires interaction between public health practitioners and anthropologists. While evaluation of the effectiveness of community-based strategies to promote healthy living is effectively carried out by public health workers, investigations into why strategies succeed or fail could be audited by either anthropologists using ethnographic methods, or sociologists using structured techniques. Collaboration among these disciplines could yield a much richer understanding of 'obesogenic cultures', which seems to be a missing link between many single-disciplinary studies. Study of the interaction of environment and genes in risk factors and in outcomes requires more detailed understanding of how environments are socially constructed, and how they vary across the life-course. This life-course approach is something that epidemiologists are well-aware of, but which has involved scant attention from social scientists.

The influence of poverty on high-risk behaviour in relation to food and physical activity may be simply economic, or it may reflect fatalistic views of the world. Regardless, epidemiology, public health and sociology could supply convergent approaches to this issue. We need to understand the mechanisms by which institutions, industry and social structures act to create and maintain inequalities in population obesity prevalence, and how such inequalities might be sustainably ameliorated. These questions must be understood within a wider framework of the ongoing economic growth encouraged by businesses and governments, which researchers in politics and economics are particularly suited to address.

Problem identification using the Foresight Obesity Systems Map

Further intermediary questions that could be effectively addressed through multidisciplinary ventures become apparent when researchers employ an ecological perspective to obesity. The FOSM (Figure 1) is a useful guide to gaps in evidence, identifying both those areas that are under-researched to the extent that their role and influence is not known, and areas where priorities have been distorted because influence is small relative to the perceived impact (3). Working with the logic of the FOSM, it is possible to take one of two routes when trying to identify multidisciplinary research in obesity with the best pay-off.

The first is to explore clusters of variables with high and very high strength impacts on the four key determinants of energy imbalance, which are force of dietary habits, degree of primary appetite control, physical activity, and psychological ambivalence.

Convenience of food offerings has a strong positive influence on force of dietary habits, and a strongly negative one on the time span of meal consumption. In most industrialised countries, the demand for convenience in food follows trends of increased outsourcing of aspects of the domestic economy, including parenting and cleaning. Multidisciplinary research into convenience could examine causative links between force of dietary habits, food convenience, and rate of eating, and it should encompass history, social class and urban geography in its explanations. An understanding of food consumption patterns should involve sociology and business studies, while understanding motivations for the demand for convenience food can call on anthropology and psychology. The effects of price and accessibility to convenience food require the input of economists, while the impact of convenience on other obesity-associated behaviours such as physical inactivity requires expertise from public health and epidemiology.

Another possibility for multidisciplinary research is to test hypothesized linkages with the four key determinants where knowledge is currently lacking. For example, the FOSM shows direct postulated linkages between psychological ambivalence and food literacy, and between force of dietary habits and demand for indulgence or compensation, alcohol consumption and purchasing power. Multidisciplinary research into causative links between psychological ambivalence and food literacy could include identification of groups and populations with varying levels of food literacy, and the use of psychometric measures to examine variation in attitudes and perceptions of food and healthy diet according to level and type of food literacy. Such research could have immediate implications for obesity interventions using food literacy as its vehicle. It could also engage with weight management groups to see how self-perception changes these relationships.

Practical outcomes of multidisciplinarity

Three project streams, currently being developed within the UBVO, are illustrated in Figures 3b, c, and d. These diagrams indicate which disciplines have been mobilized to form research collaborations that address specific research questions.

Political ecology of obesity

Figure 3b

The highest level explanation for population obesity is that of increased food security that has come with economic growth and prosperity. However, obesity has emerged at different rates in different places, and increases in economic prosperity from very low gross national product have had highly variable effects on obesity emergence in different nations.

A dominant explanatory framework for the emergence of obesogenic environments is that of nutrition transition, a situation in which global food supply has become increasingly abundant, less expensive and more aggressively marketed. Absent from all accounts of dietary modernisation and nutrition transition, are the impacts of economic neoliberalism and globalisation on the emergence of obesity. In nations where population obesity has emerged since the 1980s, it has done so predominantly among nations adopting such policies. In the United States, the economic neoliberal shift in personhood from citizen to consumer has encouraged overeating while the neoliberal notion of discipline has vilified it, creating a situation of psychological ambivalence to obesity (10). Economic neoliberalism has made trade between nations easier and has enabled increased efficiency of production, fuelling higher profits. It has also allowed the free market into most spheres of economic activity, including those associated with food and physical activity. In identifying economic neoliberalism as a macro-level driver of obesity, it is important to identify lower-level factors that drive obesity prevalence at national and local levels. An analysis of nutrition transition, the production of obesogenic environments, and the increase in obesity rates in nations after the adoption of neoliberal economic policies is fundamental to the identification of lower-level factors that drive obesity prevalence. Within UBVO, key disciplinary inputs on the political ecology of obesity stem from economic history, human biology, and anthropology (Figure 3b). Knowledge gained through this work will have a direct impact on the political sphere, which will in turn affect the landscape for public health interventions.

Historical onset of obesity

Figure 3c

Obesity at the population level was largely unknown at the start of the 1950s. In the United Kingdom, the current surge in obesity rates is generally cited as beginning in the mid-1980's, when cross-sectional studies such as the National Heights and Weights Survey and the National Diet and Nutrition Survey showed that obesity prevalence was rising across all age groups. Later cross-sectional studies, particularly the Health Survey for England, indicate that rates have increased exponentially since then. We argue that although population obesity became apparent in the UK around 1984, the environmental conditions that allowed for its emergence were probably in place well beforehand. The factors commonly cited, particularly the availability of convenience foods and the increase in mechanized transportation, had been part of the UK landscape for much of the 20th century; why then did population obesity occur when it did, and not at an earlier time? Which groups of people showed the first signs of increased obesity prevalence? What were the key features of the obesogenic environments in which high obesity rates emerged? These questions remain unanswered but are crucial for developing effective intervention strategies, as well as for identifying populations that may be conditioned for an obesity epidemic.

As Figure 3c illustrates, expertise for this work will come principally from researchers in epidemiology, economic and social history, sociology, and anthropology. Future work in business studies and public health can then be informed by knowledge of obesity's historical origins. Implementation of public health interventions that take such knowledge into account should then follow, which will in turn provide a more substantial evidence base for developments in policy.

Graphing obesity systems

Figure 3d

Working within a multidisciplinary framework creates a climate for novel collaborations across disciplines. Although computer science is not a core research area within the UBVO multidisciplinary framework, a promising partnership has emerged through mutual interest in the FOSM (Figure 3d). The FOSM captures what no other obesity research, study or policy grouping has yet been able to represent, and while it is conditionally successful in representing the factors that comprise the current UK obesity system, the visualization of the model is neither simple nor intuitive.

We have laid the groundwork for the development of a user-friendly instrument for engaging with the map at three levels: researchers, health professionals, and lay individuals. Development of this instrument requires mathematical quantification of the relationships depicted in the FOSM, followed by generation of computational algorithms for linking these relationships in a dynamic network that can accommodate changes within the system over time. This collaboration has involved detailed discussions between social scientists working within UBVO and experts in mathematics and computer sciences. At the researcher level, this instrument could be used to identify potential upstream factors in need of empirical confirmation as risk factors, and to test the relative importance of specific obesity variables within the system. At the professional level, a simplified version of the

map could be used by health practitioners and primary care trusts to identify crucial sets of relationships that should be the focus of new obesity interventions. At the lay level, individuals concerned with their own potential for obesity could use a much simplified version of the map to identify the health and lifestyle factors that put them at greatest personal risk of obesity. This instrument will facilitate efficient research into population obesity across disciplinary boundaries, because it will serve as a thinking device that allows new hypotheses concerning multi-factoral obesity causation to be generated and tested, either against existing data or through new studies. Additionally, this project will inform the ecological systems approach to obesity that is employed by human biologists.

A difficulty encountered in the development of each of these projects was identifying appropriate sources of funding. The organization of the UK research councils mimics that of conventional departmental boundaries, making projects that cross these boundaries a difficult fit for any individual council. While the research councils have made welcome strides in establishing frameworks for multidisciplinary research, larger scale projects are in the main evaluated by single bodies, which may criticize researchers in the lead field for lack of detail while failing to fully assess the merits of the contributions made by complementary disciplines. Multidisciplinary research is therefore not for the faint-hearted, as many barriers to its successful implementation remain.

Conclusions

Multidisciplinary research is difficult but crucial to the understanding of obesity and its control. Obesity continues to garner considerably media attention, usually in relation to the publication of new studies undertaken by single disciplines, which may seem to conflict with findings on obesity from other fields. That researchers in these fields should coordinate their efforts is clear, and here we have presented a local strategy for doing so. We at UBVO recognize that effective strategies for tackling obesity must incorporate knowledge from sociological, anthropological, and historical perspectives in concert with medical, political, and economic ones. Without this more complete multidisciplinary outlook, well-intentioned obesity initiatives are likely to continue to fail.

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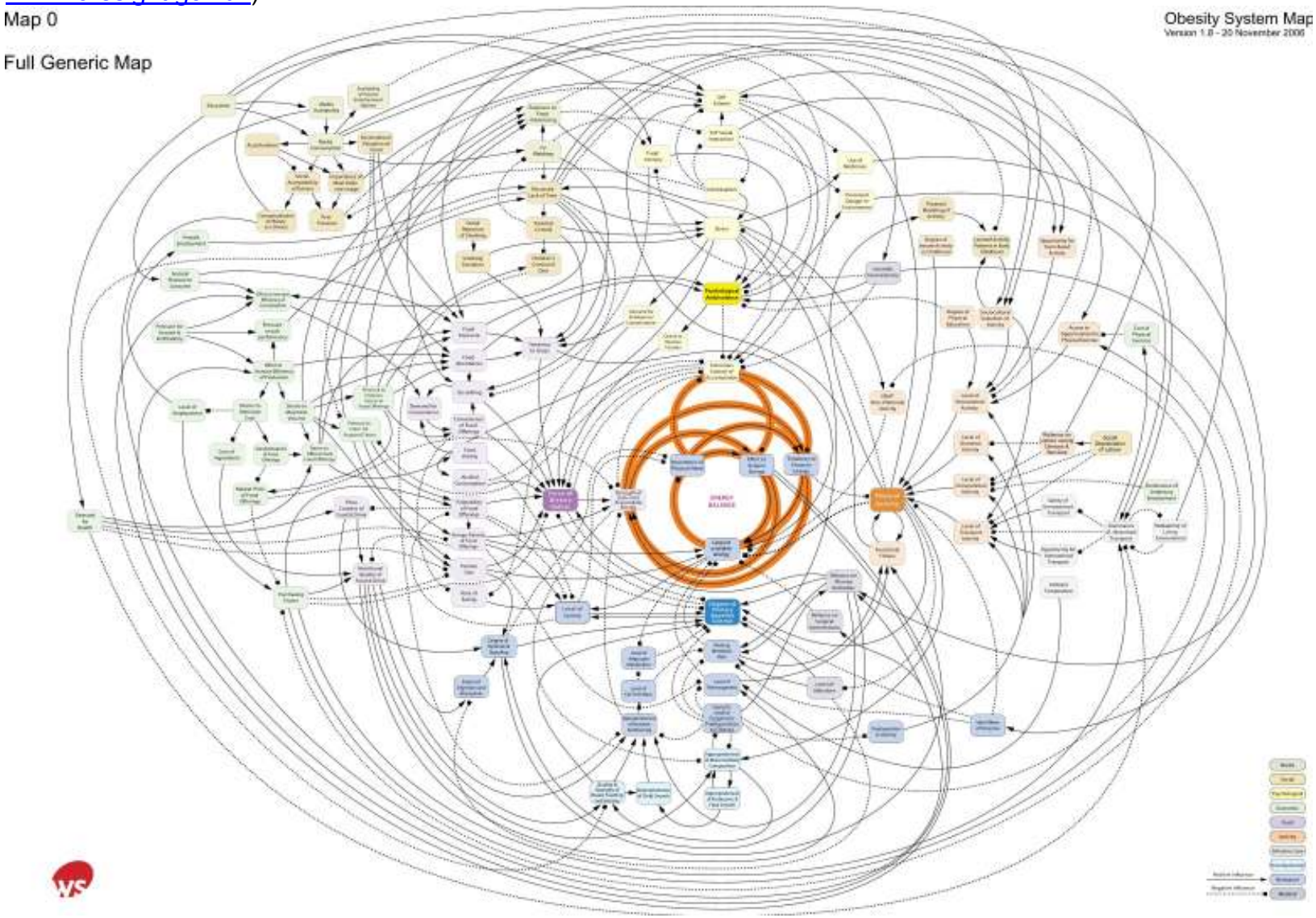
Figure 1: Foresight obesity systems map (Vandenbroek P, Goossens J, Clemens M. *Foresight. Tackling obesities: Future Choices - Obesity system atlas.* Department of Innovation Universities and Skills. 2007. Available at www.foresight.gov.uk)



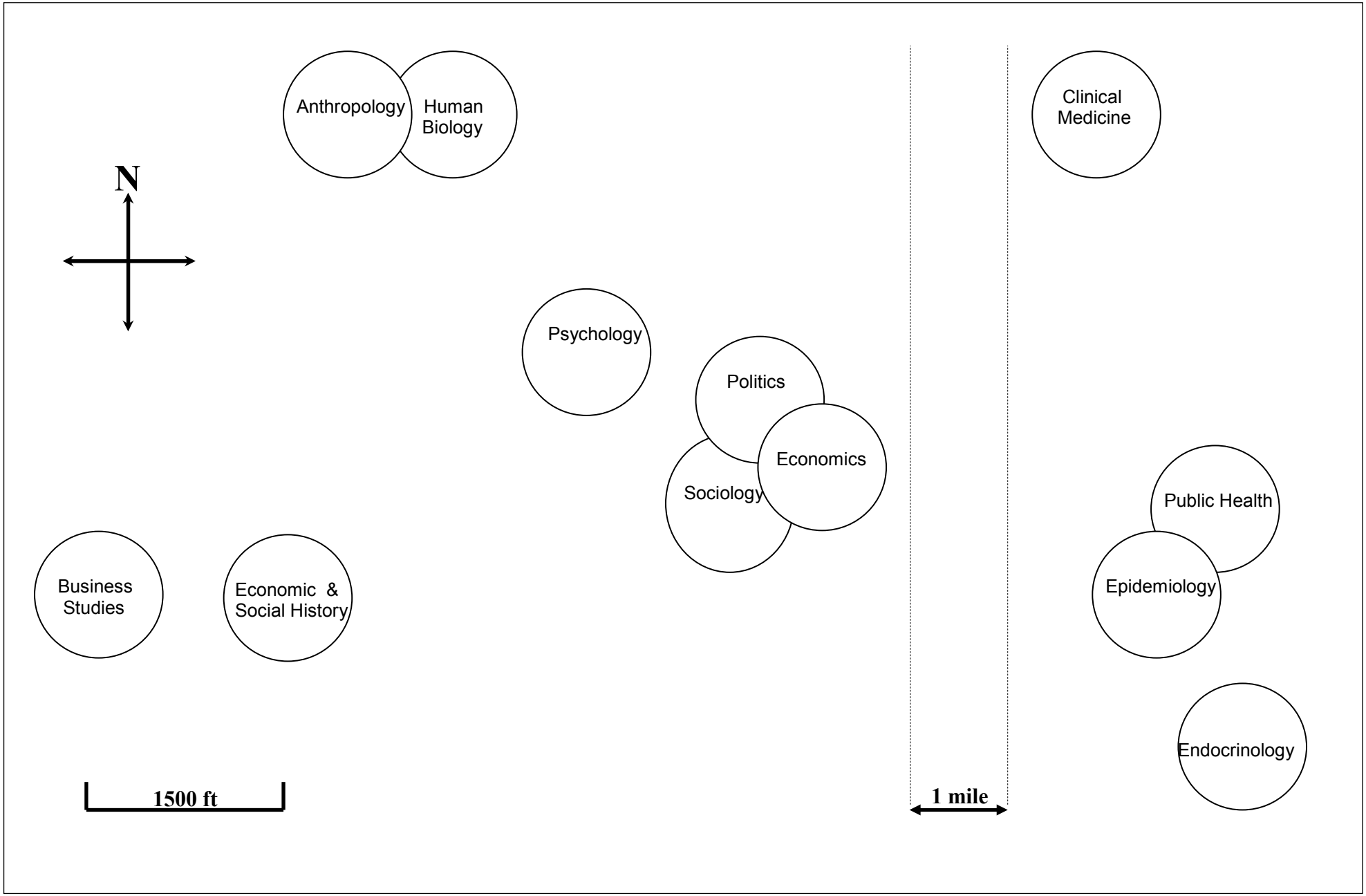
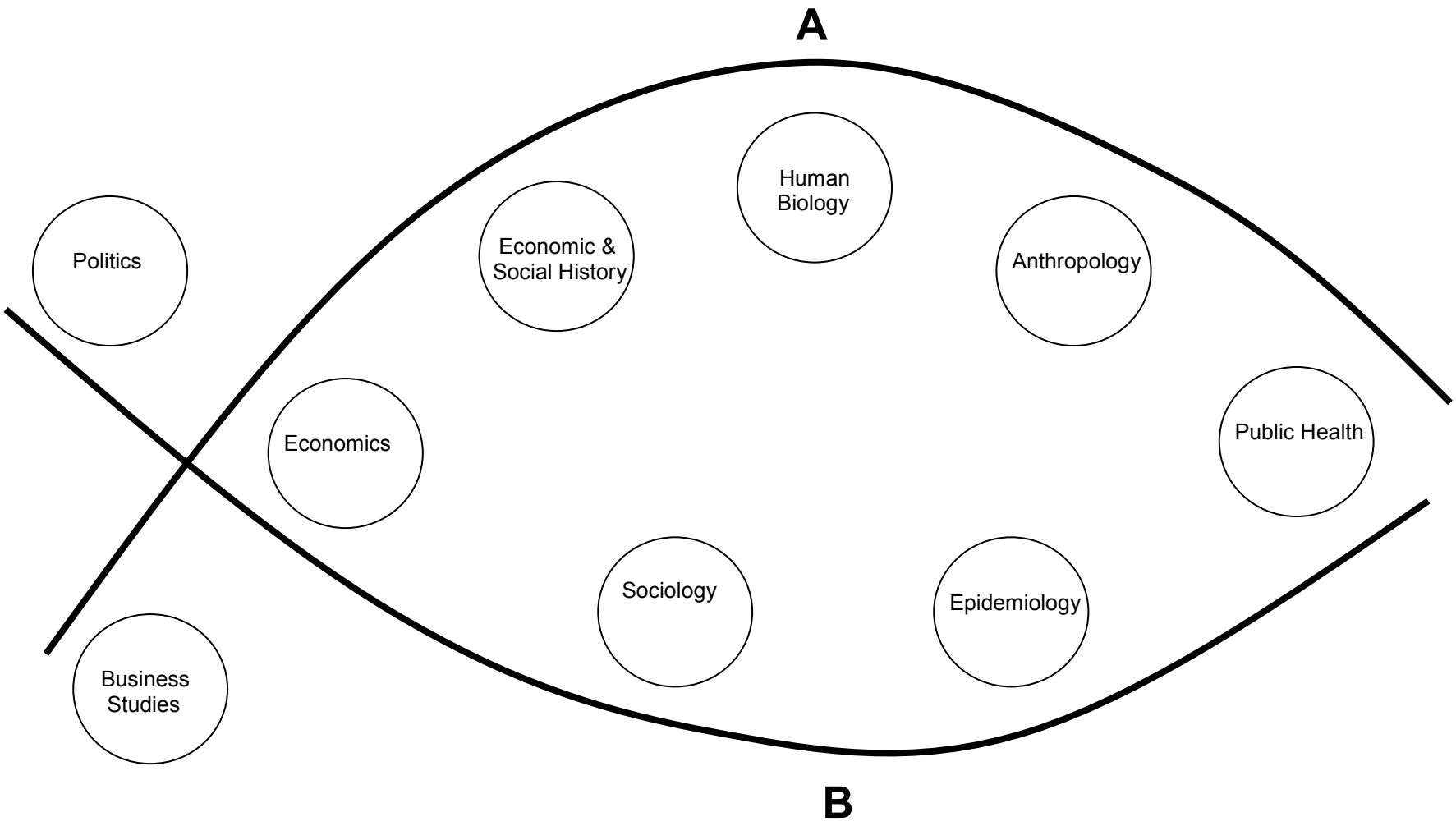


Figure 2. Oxford geographic landscape for obesity research (NB: department sizes not to scale)

Figure 3a. The Oxford constellation: local disciplinary affinities for population obesity research.



Strand A: disciplines exploring variation among smaller groups, employing mainly qualitative methods
Strand B: disciplines exploring broad societal trends, employing mainly quantitative methods;

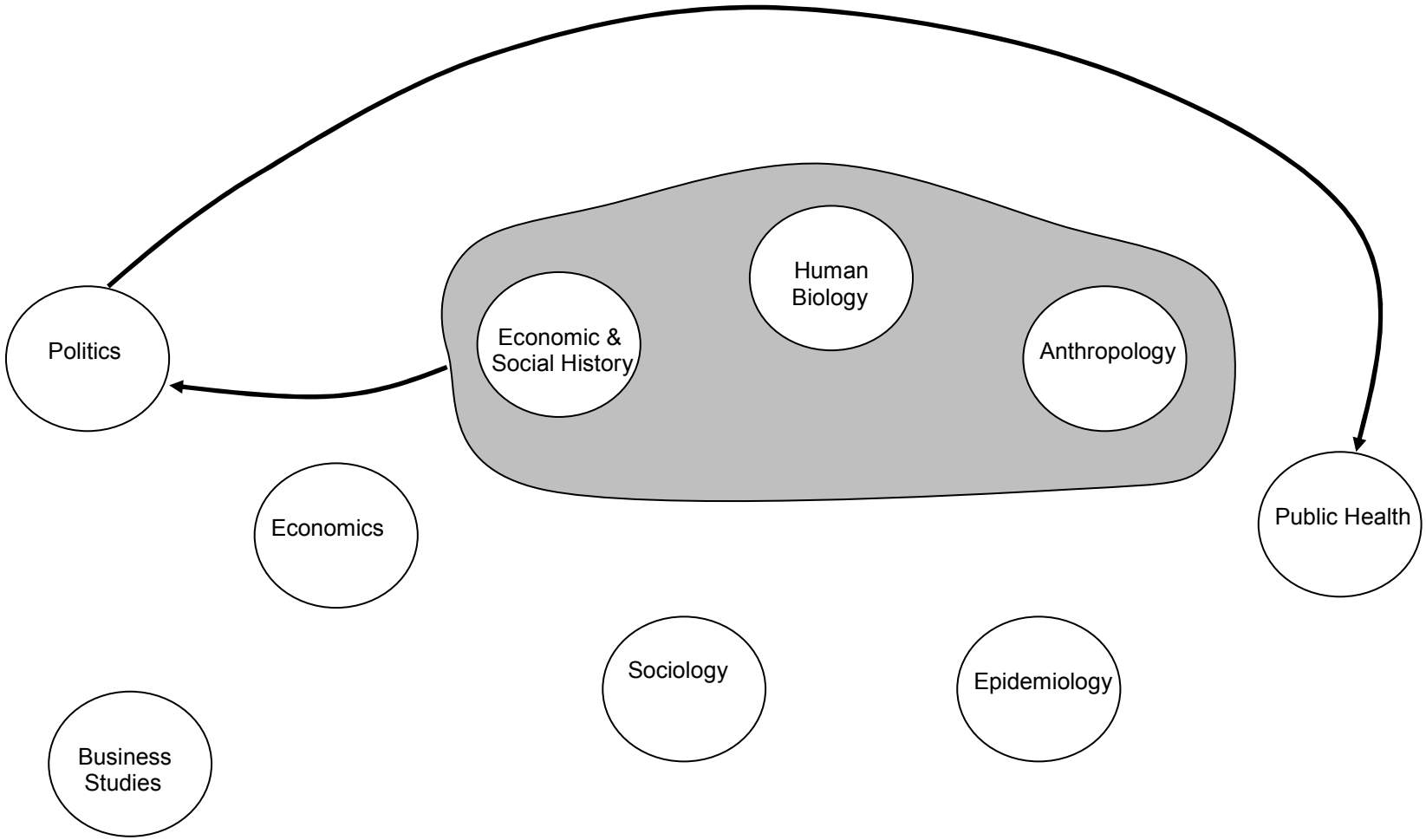


Figure 3b. Leaders and contributors in research on the political ecology of obesity

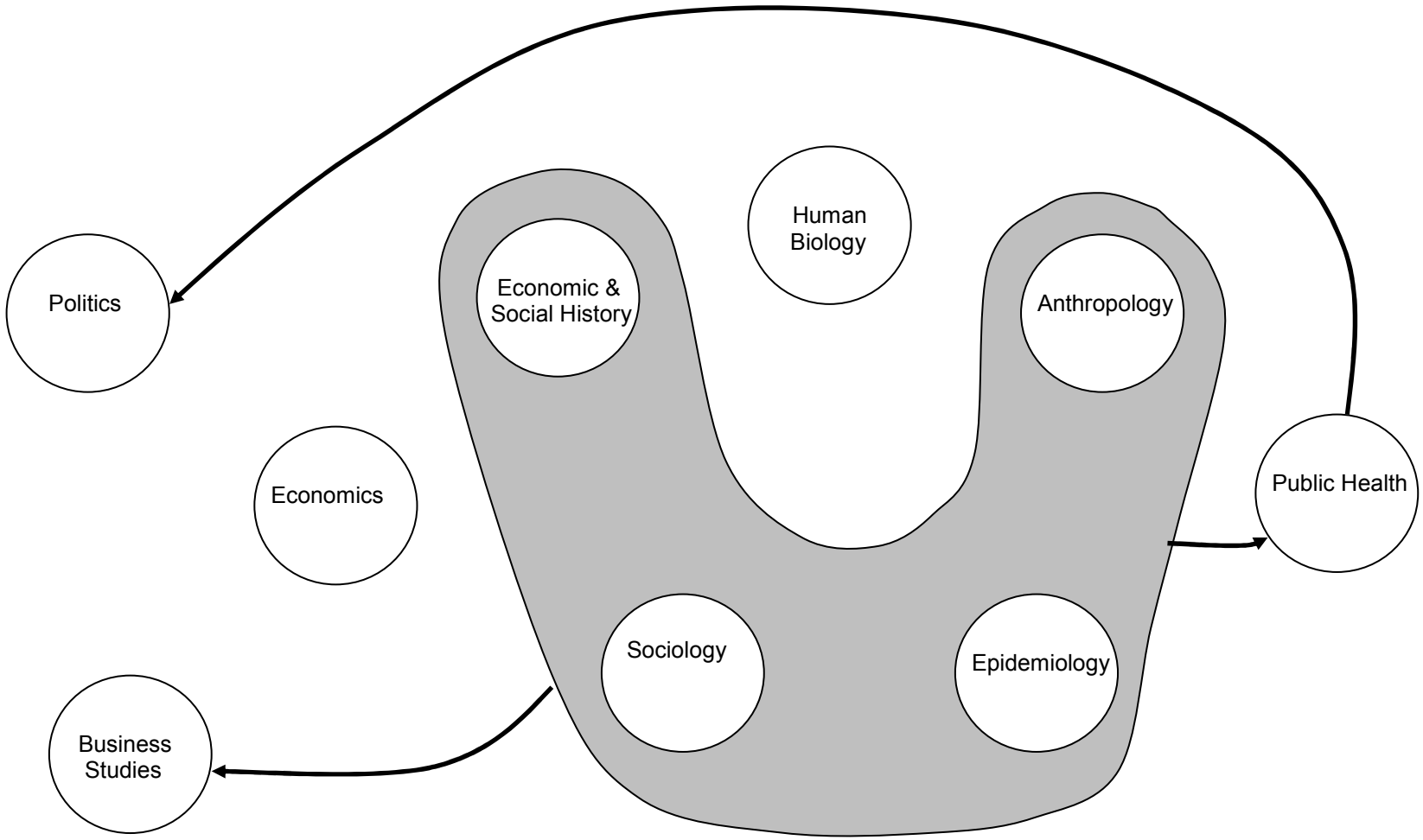


Figure 3c. Leaders and contributors in research on the historical onset of obesity

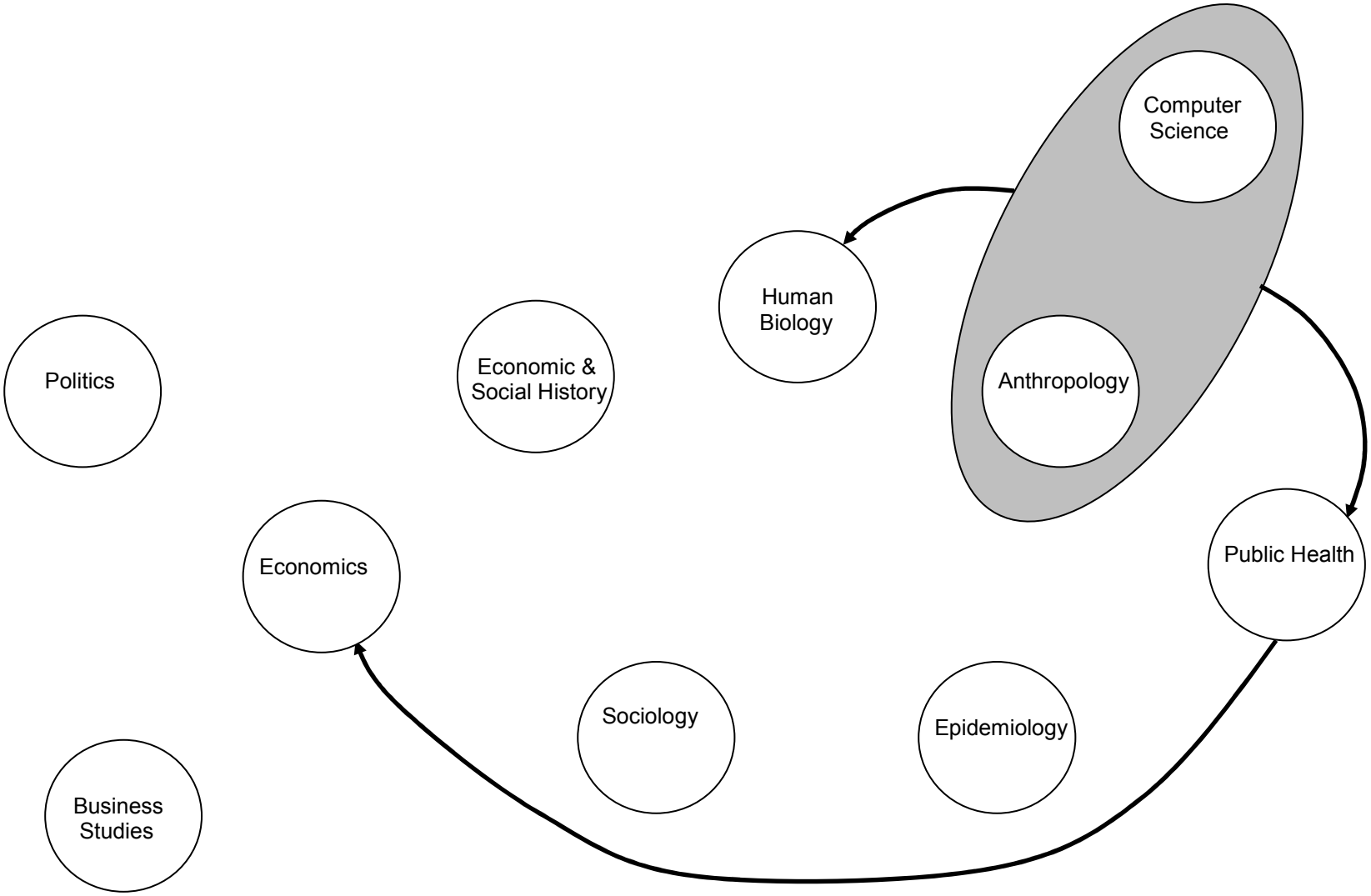


Figure 3d. Leaders and contributors in research on graphing obesity systems