

# WORLDS COLLIDING: TRANS-DISCIPLINARY APPROACHES TO GENDER AND ADDICTIONS

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**Abstract.** This paper recounts and analyzes our experiences as a trans- and multi-disciplinary team that has been collaborating on issues related to gender and addiction for more than five years. The three authors are an historian, a neuroscientist, and a community/clinical psychologist. We seek to transcend a long-standing division between positivists and constructivists that has limited feminist analysis of and approaches to problems faced by women and girls who struggle with addiction. We combine strategies from the field of public history with insights from interdisciplinary practice, including the creation of boundary objects. We recount challenges in developing collaborative models across disciplines and approaches, including differences in methods, vocabulary, and priorities. We pay particular attention to the roles that historians can play in fostering cross-disciplinary communication and in connecting theory and practice.

We cannot understand the present without understanding how and why “what is” came to be. If we were designing things from scratch to meet current conditions, based on current knowledge, our policies, structures, understandings of things, etc. would not look like they do.

-Beth Glover Reed

## INTRODUCTION

The quotation from Beth Glover Reed (who is not an historian) helps illustrate why history matters. Everyone working in the field of gender and drugs has inherited many stubborn legacies that constrain our work, whether we recognize it or not. Historians can help illuminate

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SHAD (2017): 107-25

those legacies, the power dynamics that they reflect and reinforce, and the reasons they took shape as they did. Communicating these historical insights in ways that are intelligible to research scientists, policy makers, and others is critically important – but not easy. What happens when an historian joins a multi-disciplinary research team, not analyzing the findings in retrospect (as historians are trained to do), but actively engaging in the work as it unfolds by participating – theoretically at least – as an equal partner?

This paper recounts and analyzes our experiences as a trans- and multi-disciplinary team that has been collaborating on issues related to gender and addictions for more than five years. Coming from very different disciplinary backgrounds and academic departments, we three met at the University of Michigan through the UM Substance Abuse Research Center (UMSARC) and the Institute for Research on Women and Gender (IRWG). McClellan is a social and cultural historian focusing on the nineteenth- and twentieth-century United States. She specializes in women's history and the history of medicine and has increasingly turned to the tools of public history. Reed is a community/clinical psychologist engaged in community-based action-research and training, collaborative policy development, and social change focused projects. She helped pioneer treatment programs for women through the National Institute for Drug Abuse (NIDA) in the 1970s and 1980s. Becker is a neuroscientist who has spent the last thirty-five years investigating how biological sex and ovarian hormones influence behavior and the underlying neurochemistry of the brain, using rats as the experimental subject. Finding common interests in a nexus of issues related to substance use, addictions, sex differences, and gender, we looked for and ultimately created ways to collaborate in research, writing, and teaching.

Why did we decide to embark on this despite the many challenges involved? While many universities, including our own, devote considerable rhetorical attention to the value of interdisciplinarity, the reward structure of academia often mitigates against it. It has not always been easy to justify the time we have committed to our joint venture, especially since our ideas have not aligned easily with existing funding sources and publishing outlets.

Nevertheless, we believe that the absence of systematic attention to sex differences in paradigms and scholarly methods in multiple fields and disciplines has led to incomplete and biased knowledge. This situation, in turn, creates further barriers to understanding, particularly interfering with our ability to analyze the relationship between biology and social systems. Moreover, the current state of affairs faced by women and girls who struggle with drug abuse, compulsive behaviors, and other manifestations of what we now call “addictions” is a matter of social justice, and only multifaceted approaches can hope to improve it.

Over the past several decades, new methodologies have illuminated biological mechanisms in ways that were not possible earlier. Research and demonstration projects informed by feminist questions and analyses have created new bodies of knowledge and interpretive paradigms. Results clearly indicate that gender (cultural and social meanings and power relations attached to masculinity and femininity) and biological sex interact with each other and with substance use/abuse in complex ways. Despite advances in research, treatment, and prevention models, however, little synthesis exists of this knowledge or methodological issues and challenges across disciplines, fields, or settings. Thus, investigators or practitioners in one discipline or field often know little about findings relevant for their research or work. Extant syntheses are organized by discipline and topic, not by cross-discipline themes.<sup>1</sup> Even we three brought very different understandings of “addiction” and “sex differences” to the table, and we believe that our communication challenges reveal larger disjunctures and lost opportunities in the field as a whole.

In part, then, we are responding to a simple need for synthesis across fields, since investigators working on related questions from different disciplinary perspectives are often unaware of each other or unable to communicate clearly even if they are. The resultant gaps in knowledge have critical implications for treatment, policy, and the continuing stigma faced by any addicted individuals, but especially women and girls. Many institutional and ideological barriers continue to constrain the development of new knowledge and insights, as well as their application. Securing funds for research on sex differences and gender and on females (animal models), girls, and women continues to be very challenging for many reasons. Gender-responsive programs and services for girls and women are still scarce, and examining gendered issues for men and boys is rare.<sup>2</sup> We know even less about how gender interacts with other societal status characteristics (e.g., race, religion, age, (dis)ability, economic class, and cultural factors). Large proportions of resources are focused on pregnancy and the consequences of mothers’ use on children, often coupled with negative and punitive attitudes towards women. Prevention models are minimally informed by knowledge of either biological sex differences or gendered roles and expectations.

Our hope is to build collaborations across fields that can generate cross-cutting research questions, inform current policies and practices, and mobilize the will and resources to address these issues and work for change. We also seek to transcend a long-standing division between positivists and constructivists that has limited feminist analysis of and approaches to problems faced by women and girls who struggle with addiction. Our work seems especially timely in the current political climate; we believe that the nexus of issues centering on gender and addiction are important for

their own sake and illustrate scholarly, methodological, epistemological, and political challenges more broadly.

#### MAKING HISTORY MATTER

Readers of the *Social History of Alcohol and Drugs (SHAD)* understand how much ideas about addiction have changed over time. Readers of these special issues of the *SHAD* and *Contemporary Drug Problems* know – or are rapidly learning – how much gender has mattered in the history of alcohol and drugs. Historians who have engaged in discussion with scholars from other fields may recognize some of the following themes and the challenges of conversation, never mind collaboration. They may be less familiar with the strategies of public history, described below.

The first order of business for historians is to demonstrate that substance abuse is neither a novel phenomenon nor a recent concern in American (or world) history. Many scholars in the natural and social sciences, policymakers, and clinicians consider substance abuse and other compulsive behaviors to be a new, inherently “modern” problem. Many are unaware of – or see themselves as outside of – historical currents that have fundamentally shaped our attitudes toward alcohol and drug use, gambling, disordered eating, and other behaviors, as well as our beliefs about those individuals who consume (or abstain) to excess. Yet it is challenging to simultaneously convey historical content and the epistemological underpinnings of history as a discipline. For example, audiences of all kinds are startled to discover how much colonial Americans drank and equally unnerved to learn that mind-altering drugs were largely unregulated in the United States until the twentieth century.

Offering up facts about the past gets historians a seat at the table with scientists, who are primed to see facts as a finding. But that brings both opportunity and risks, because it reinforces the erroneous notion that history is simply a catalog of obscure facts. And efforts to convey the otherness of the past can easily lead to a facile dismissal of history as profoundly separate from the present. Perhaps because notions of progress resonate so strongly in science and medicine, many scientists assume a deep divide in periodization between the modern “now” (which can be a moving target but generally means the last decade or so, if that) and the past. In this framework, the present is distinguished from a kind of dark ages, and one reaches across that division only to extract lessons that can serve present-day agendas.

This way of using the past surfaces in ahistorical truisms, articulated often by students but others as well. Students often insist, “But people will *always* want to drink or smoke,” a characterization that can be termed “vice essentialism” that transcends time. A human desire to alter consciousness may well be remarkably consistent across time and place, but even if so,

this pronouncement is frequently offered not as an interpretive conclusion, but as a statement of self-evident fact whose supposed obviousness renders unnecessary any attempt to demonstrate or qualify it through historical research. As Helen Keane shows in her critique (in this issue) of Becker et al.'s discussion of women's drug use throughout centuries, overarching historical arguments can also serve to reinforce (even if inadvertently) stereotypes and stigma in the present – which is all the more reason for historians to get involved.

The extractive model also surfaces when unreflective “lessons” of the past are applied simplistically to the present in an equally self-evident way: “We all know that Prohibition didn't work; therefore, we should legalize marijuana.” Such statements ignore evidence about the multifaceted outcomes associated with the period of Prohibition, what was learned from how people, society, and those engaged in efforts of social control responded, or about differences between conditions today and those in the early twentieth century. Importantly, such statements do not only present an argument; they also challenge the methodological integrity of historical inquiry. In a circular process that can be almost invisible, fluency in present-day issues is projected backwards to become expertise about the past, again rendering historical analysis superfluous.

More broadly still, this view of history can be articulated as a reductionist dismissal of the past, often prefaced with “now we know” to underscore the division between before and after. This attitude presumes that history – in the sense of past events and developments – is completely separate from present-day endeavors. To be sure, learning about history can be an interesting diversion, like a hobby or antiquarian pursuit, but modern scientists, by virtue of the advances in their fields, often believe that they have transcended history. In this view, history – by definition – is that which has been superseded. And it follows that historical expertise carries less value in scientific collaborations.

So what can historians do if they wish to make a difference in present-day research and policy discussions? The tools of public history can help. Public history is a broad term that can refer to many aspects of history practiced outside the academy (and increasingly inside as well). The underlying philosophy of public history can be understood as “putting history to work in the world.”<sup>23</sup> Rather than conducting solitary research in archives and then reporting their findings in a monograph, public historians produce historical analysis through participatory forms of knowledge production, what pioneering oral historian Michael Frisch called “shared authority.”<sup>24</sup> Public historians, like investigators who conduct fieldwork or engage in other forms of interdisciplinarity, believe that collaboration yields knowledge that would not have been possible otherwise.

Public history strategies have been developed and are usually used in

initiatives with community stakeholders. Examples include neighborhood oral history or preservation projects, and museum exhibits that focus on ethnic groups that had previously been ignored in public representation. Collaborating with academic colleagues from the sciences is not an identical process, but the impulse and many of the tools are the same. One needs to communicate with those who do not share one's specialized training, methods, and intellectual assumptions. All are working toward a common goal, often with a social justice component – in this case, better research models, policy, and prevention and treatment for girls and women (and boys and men) who struggle with substance abuse and compulsive behaviors. In our work, we have combined public history tenets with wider literature on interdisciplinarity.

Our experience has shown that with the right invitation, many present-day researchers, policymakers, treatment providers, activists, and people who are coping with their own compulsive behaviors are eager to learn about the history of this field – to know what has been tried before and to gain a wider sense of what alternatives might be possible now and in the future, as Reed's quotation above suggests.

#### BOUNDARY OBJECTS: BUILDING COMMON GROUND

Research on interdisciplinarity reveals that successful cross-disciplinary projects take time, with significant effort devoted to team building, group dynamics, and meta-questions (reflecting on interdisciplinarity itself).<sup>5</sup> These aspects of collaborative intellectual work can be frustrating to all concerned, perhaps especially to historians and those in any field where practitioners are trained to work alone. Each of us brought to this collaboration separate experiences within multidisciplinary settings, and each of us had in various ways spanned other boundaries within and outside the university. These included administrative and faculty governance roles, change efforts on women in STEM, public history projects, public education and community organizing, multiple boards and advisory groups, and working in explicitly interdisciplinary settings (Social Work, Women's Studies, the Molecular and Behavioral Neuroscience Institute, and the University of Michigan Substance Abuse Research Center).

All of these experiences helped orient us, but we still needed to allocate considerable time to preparation, particularly in creating opportunities for us to learn to work together, develop common frameworks, and establish our own working relationships and group processes.<sup>6</sup> Planning and delivering joint presentations at conferences and on our campus, teaching together, and writing grant and program proposals all forced us to conceptualize our goals and consider our future directions. We expanded outward from our "core team" by consulting with others on campus, both those with content expertise in addiction and those who could help us methodologically,

including information scientists.

To expand still further, we needed to create boundary objects. A boundary object is information or a tool, such as a specimen, field notes, a map, or even a set of principles, that is used in different ways by different communities. Boundary objects are plastic, interpreted differently across communities but with enough immutable content to maintain integrity.<sup>7</sup> For instance, in planning one of our first major initiatives, a working conference at the University of Michigan in May 2012 with more than fifty participants, we asked participants to respond to a series of questions in advance about addiction, sex and gender differences, feminism, and participants' experiences to date with interdisciplinarity. We distilled their responses into a resource guide we produced for the conference, which included other material we composed and compiled on neuroscience, history, psychology, and principles and practices of interdisciplinarity. This resource guide constituted a boundary object, and the process of creating it revealed important insights and challenges.

The range of disciplines, methodologies and fields we attempted to bridge at this event was very unusual. The people involved represented basic science, social science and humanities disciplines, and many applied professions. We attempted to invite people who already engaged in many interdisciplinary conversations and collaborations, but we found that everyone needed to be open to new language and approaches, to articulate and define disciplinary, field, and technical "jargon," and to grapple with challenges to their usual assumptions.

Not surprisingly (at least in retrospect), the written responses provided by participants to the questions we posed varied widely as well. We called these written responses "brain dumps" and emphasized that they could be informal. The responses revealed significant differences, not just in content but in format, approach, and length. Some of the natural scientists responded with a single sentence or key phrase, or even just "yes" or "no." Meanwhile the scholars from the humanities filled pages and pages, some with footnotes. The social scientists were usually in between, studying their responses with headings and bullet points rather than narrative prose. Respondents also used very different kinds of language. The natural scientists tended to use very straightforward, instrumental language with no reflexivity. In contrast, some individuals from the humanities, social sciences, and applied fields spent considerable time contextualizing their views and explaining why they had chosen particular approaches. Questions about feminism sparked long answers from some, while others declined to answer, claiming they lacked the requisite expertise.

When asked to define addiction, many scientists referred to the National Institute on Drug Abuse (NIDA) definition of "chronic, relapsing brain disorder," while others including clinicians referred to criteria in the

DSM (Diagnostic and Statistical Manual of Mental Disorders). Humanities scholars and some social scientists and activists challenged the concept of addiction, emphasizing instead how diagnoses of deviance can be used as instruments of social control. We have also differed on the significance of “normative” drug use for women and girls, for instance, focusing primarily on problematic consequences of use, and less on positive functions that psychoactive substances can play in many cultures and environments (e.g., for pleasure, social facilitation, spiritual enhancement). Those in recovery from earlier problems with addiction were often uneasy with all the ways that those primarily in academia talked about substance use and abuse. Another major difference centered on what if any mechanisms should be deployed to regulate use, and how scholarly knowledge could be mobilized to address these questions.

Our own experience and the literature on interdisciplinarity indicate that brokers are needed to yield productive insights from this fragmented and fraught series of conversations. Historians bring important skills to this role. Historians are already translators, interpreting the past for the present. Historians have the skills to identify common elements that underlie differing vocabulary, and conversely to highlight where meanings and intention diverge due to context even when terms remain the same. Historians can explain how and why language and meaning change over time and across domains. What is new for most historians in this kind of collaboration is not just identifying and analyzing these disjunctures and continuities but trying to facilitate communication across boundaries in real time. As with anything else, practice helps, as does significant preparation to develop structured roles and clear expectations for interactions. But the point is that historians already have many of the necessary skills to play this role.

Yet communicating historical insights across disciplinary boundaries often means letting go of some of the cherished conventions of historical practice. The resource guide we produced for our major conference – the boundary object – included a chronological table with three columns. This document was several pages long and covered three centuries, from the eighteenth century to the present. The first column included important events or developments in the history of alcohol and drugs in the United States – the rise of the Temperance movement, the Pure Food and Drug Act of 1906, and so forth. The second column featured turning points and milestones in American women’s history – Seneca Falls, separate spheres ideology, the percentage of women in the paid work force, etc. The final column included scientific developments and discoveries, including findings related to neuroscience, hormones, and the brain.

The creation of this table provoked considerable debate among the three of us. While McClellan was delighted that Reed and Becker wanted to include historical information, she was vehemently against this format,

which seemed simplistic in both form and content. Revealingly, McClellan was skittish about having her name attached to this document as a scholarly product – showing how the perceived or real imperatives of one’s own discipline and its reward system can hobble interdisciplinary efforts. In the end, the instincts of the non-historians (Reed and Becker) in creating this table proved correct: many conference participants commented enthusiastically about how much they learned from it – both new information and new perspectives on change over time and on how historical developments aligned. The table thus illustrates an important principle of sharing authority – moving outside the standard conventions of one’s discipline to accommodate the needs and preferences of the audience and collaborators.

#### YOU SAY TOMATO: SEX DIFFERENCES AND GENDER

One of the most fraught topics we have encountered is building a vocabulary related to sex differences and gender. “Sex differences” and “gender” remain fundamental on all levels of our work: as subjects of inquiry, as conceptual stumbling blocks, as forces that contribute to stigma and that distort the creation of knowledge within and across fields. We are not alone in having difficulty with these definitions. Karen Berkley, one of the contributors to the 2001 Institute of Medicine report on sex as a biological variable,<sup>8</sup> said that discussion of the definitions of sex and gender were so difficult that the panel eventually agreed to disagree.<sup>9</sup> Among ourselves and in our wider collaborations, we have encouraged the open discussion of what we mean by these terms and what underlying assumptions, beliefs, and values inform our definitions. These discussions have been slow, even painful at times. Yet we believe they are necessary, both to avoid misunderstandings later and to hew to a principle of interdisciplinary work, that of working on a shared task across boundaries.

Differences in approach and definition were especially evident in other boundary objects we attempted to create at our large working conference and in subsequent smaller interactive events. In their pre-conference writings and the in-person sessions at the conference, participants brought a variety of meanings and values to the issue of “sex differences” and “gender,” as well as varying degrees of self-consciousness about language. This should not be surprising; we intentionally brought participants from a variety of backgrounds. Disciplinary and methodological differences exist among researchers whose focus is primarily on different aspects of biological sex and also among those whose work focuses on gender in different disciplines, and especially between fields that focus on sex and those that focus on gender. These create difficult barriers to synthesizing relevant knowledge across disciplines and fields, and especially prevent those working on questions related to sex from having a working knowledge of research from disciplines that focus on gender and vice versa.

Here, language is an important clue to one's field and overall approach. Those who adopt the term "gender" are generally coming from a postmodern, critical theory perspective, focusing on language, power, contingency, and cultural factors. Many of these scholars avoid the term "sex" as reductionist. In contrast, those with a positivist approach, believing that an underlying truth can be discovered through methodical investigation, tend to use "sex." But some biologists and other basic scientists find "sex" ambiguous since it can refer to anatomy or sexual behavior. Becker prefers the term "sex differences" to avoid that ambiguity. For her part, Reed prefers not to use "gender differences," so the vocabulary construction is not parallel even among the three of us.

This language debate echoes and reinforces differences in research methods. We have found at our events a lack of understanding of the various methods through which participants produced knowledge: techniques included animal models, functional MRI scans, ethnography, epidemiology, and archival research, just to name a few. This lack of familiarity is of course completely reasonable, even to be expected, since we all devoted years to the specialized training necessary to master the methodologies specific to our fields. But it also means that we must be explicit about our approaches, rather than assuming that others comprehend our strategies and underlying assumptions. For example, historians and other scholars in the humanities and social sciences may not be familiar with the ways in which animal models are used in addiction research and to test pharmaceuticals before trials begin in humans. This stage is referred to as "pre-clinical" research. The vast majority of preclinical research in the addiction field uses rodents because their brains and reward systems resembles those of humans and respond in similar ways to pharmacology. On a pragmatic level, they are also comparatively small, relatively cheap, and it is possible to do experiments with rodents that one could not do with humans.

Some preclinical researchers argue that rodents do not have "gender," while others contend that experimental conditions – in which researchers determine rodents' living arrangements – mitigate against the ability to evaluate rodents' gender systems even if they have them. These are further reasons why many natural scientists in the addiction field prefer the terms "sex" or "sex differences," which are generally understood to focus on biology rather than culture. Yet some social scientists objected when natural scientists seemed to reduce sex differences to a variable, insisting instead that gender needs to be understood and investigated as a structure of interacting forces at multiple system levels. This difference in perspective simultaneously limits the relevance of animal research in understanding human behavior.

History can help illuminate the reasons for and the intensity of the sex-gender divide. Activists and scholars of second-wave feminism insisted on

that conceptual division; they argued that many socially constructed “feminine” qualities or traits were being attributed to fundamental biological causes, and thus perceived as inevitable and unchangeable. Scholars and activists argued that these attributions were major contributors to patterns of gender inequality. Thus, much feminist work has tended to emphasize social, cultural, and historical dimensions but has avoided biological explanations.

This focus on gender to the exclusion of biology can lead to the belief that gender is an overlay, secondary to sex. Indeed, many humanities scholars and activists who celebrate a fluidity of gender expression among people may assume that biological sex is fixed and binary. Today, however, scientists understand biology itself to be fluid and contingent upon a host of environmental influences. In other words, many natural scientists assume plasticity that they may not articulate clearly to those outside the field. At one of our events, for example, a neuroscientist was surprised that other participants, including humanists, social scientists, and activists, interpreted her statements as declarations that biology was destiny for her research subjects. She did not mean that at all, but had assumed that everyone shared her nuanced understanding of biology and the importance of environmental influences on development. In other words, scientists are increasingly focusing on the ways in which biological characteristics are more varied and dynamic than once was believed. In fact, it may be that social and cultural categories are more limited and fixed than biological factors – and that can be a call to action for historians and others who analyze culture.

These debates, though, do not necessarily clarify the language issue. Some scientists use “sex/gender,” a term that concerns Helen Keane in her article in this collection. Keane is not alone in this reaction: McClellan was confused and frustrated when she first heard this phrase at the beginning of our collaborative work. The term risks collapsing a distinction between biology and culture that was both hard fought and fundamental to second-wave feminism and its scholarly and social implications. Yet some who use the term are not necessarily trying to obscure or elide a distinction between sex and gender but to acknowledge the complexity of the connection between them and the difficulty of disaggregating them in the laboratory or any other setting. The relationship between sex and gender is much more complex than previously understood or acknowledged.

#### KNOWLEDGE, ACTION, AND VALUES

Another important division revealed by our language is the one between scholars in the academy and those in the addiction field as treatment providers, policymakers, and advocates. This division is not absolute, of course – many individuals move back and forth across it. But these two

locations and orientations bring very different value systems, priorities, and blind spots. At our events, activists often regarded basic scientists as unaware of the real-world implications of their work, while some scientists viewed activists as resistant to certain biological realities.

At our large interdisciplinary conference, a leading legal advocate took a call in the middle of a session. The call regarded a pregnant woman whom a judge had ordered to stop taking methadone while she was incarcerated. The woman was enrolled in an established treatment program, but the judge claimed that her use of methadone constituted “delivery of drugs to the fetus.” Scientists were aghast that a judge would issue an order that contradicted current scientific findings and medical protocols, which warn against uncontrolled withdrawal at any point in a pregnancy and note that any withdrawal can be dangerous for the fetus in the last trimester. These academics, especially bench scientists, were appalled by the ways in which policies, the legal system, and even treatment models misunderstand or ignore current understandings of biology. At the same time, activists and scholars from other disciplines, especially applied fields and women’s studies, seemed surprised that the scientists did not take issues of power and stigma into account as they conducted and disseminated their work.

During small-group discussion at the same conference, at a table that was deliberately filled with scholars from different disciplines, a neuroscientist explained that estrogen is implicated in the development of addiction in female subjects (rodents). When a women’s studies scholar at the table jokingly suggested that perhaps we should just all have our ovaries removed, the neuroscientist explained that that procedure could, in fact, be protective. The humanities scholars at the table were alarmed at what seemed to be a cavalier biological reductionism, especially given the history of forced sterilization in the United States. It took several more exchanges before it became clear that many of the scientists at the table were unaware of that history. After this discussion, the neuroscientists from that table exclaimed throughout the rest of the conference how shocked they were to learn of these historical events.

These examples illustrate the importance of “outsider” perspectives, a principle that is emphasized in much interdisciplinary research. Unexpected questions in any setting can provoke reflection and new perspectives for all concerned. Historians can be important interlocutors at scientific gatherings and in other venues as well, serving the intellectual equivalent of being a traveler to new lands.<sup>10</sup> The traveler gets a new view of her own culture and raises questions that can help the indigenous people (in this case, neuroscientists) see their own landscape in new ways. Historians are not the only ones who can play this role, of course, but their training and orientation, honed by studying the past, can help them do so effectively.

Yet asking pointed questions based on one’s knowledge is one thing; re-

vealing one's ignorance in any academic setting can be quite another. The first time McClellan heard Becker give a talk, McClellan was startled and fascinated by the experimental design Becker described, which allowed the research subjects to inject cocaine directly into their bloodstream by pressing a lever. Not until much later in Becker's presentation did McClellan realize that the research subjects were rats, not human beings as she had presumed. And it took months before McClellan admitted her misunderstanding to Becker and Reed.

Creating a cross-disciplinary collaboration involves messy emotional states such as embarrassment and pride as well as academic credentials. One's ego, values, and years of professional socialization complicate the process further. Our interactions have revealed hierarchies of power among disciplines and professions: it is certainly not news to historians of alcohol and drugs that neuroscientists have significant cultural authority in this historical moment. Conventions for establishing credibility differ by field and can be triggered in cross-disciplinary interactions, and also between those focused on scholarship and those focused on change in the policy and practice worlds. Although the format of our conferences and workshops included substantial time for de-briefing and other forms of intellectual and emotional processing, informal conversations in hallways during the workshops and personal communication after the events revealed impatience and even disdain. We addressed these reactions as best we could, and some were resolved or at least ameliorated when we included some of the same participants at later events. But these responses show the importance of personal relationships and trust in interdisciplinary work, and establishing those dynamics takes considerable time as well.

As the estrogen/ovary removal example shows, a secondary fault line related to the scholar-activist division had to do with animal models and their extrapolation to humans. The very different vocabularies and ways of communicating that participants have brought to our workshops led at times to frustration and even anger. Many treatment providers, activists, and humanities scholars felt that lab-based scientists lacked awareness of the stigma faced by addicted women, as illustrated by comments that sounded prejudiced or uninformed in dangerous ways. For their part, many of the biological scientists expected to be attacked by feminists and sometimes self-censored in anticipation of disapproval, an unfortunate outcome. In addition, those who use animal models felt caught in wider debates about animal research and its extrapolation to humans. Scientists who use animal models can find themselves in a "damned if you do/damned if you don't" scenario: criticized for overgeneralizing across species or dismissed as irrelevant if they fail to make real-world connections.

One of the main goals coming out of our conferences and workshops has been an attempt to build different kinds of animal models that better

reflect the complexity of substance use and addiction among humans, that analyze sex differences (and possibly gender) in meaningful ways, and that incorporate relational and contextual factors. Historians and others need to appreciate the constraints that shape scientific research and that limit the speed of change. Indeed, historians are ideally suited to identify and analyze political, cultural, and economic forces that limit and even distort research initiatives. Historically, most preclinical and clinical research, as well as intervention models for substance use have been conducted on males. Including women in clinical research was mandated by the National Institutes of Health (NIH) in 1994. Nevertheless, even when both males and females are included in studies, data are not always analyzed by sex and/or gender. Findings with males are frequently generalized to females, without regard to data that may be contradictory, or without any data whatsoever.

To participate meaningfully in the creation of new research models, historians and others from the humanities and qualitative social sciences should develop some fluency in statistics and experimental design or develop partnerships with those able to translate and educate about these approaches. In our work, the natural and social scientists talk often about “powering” the study (making sure there is a sufficient number of subjects in each group to reach statistically significant results) and “controlling for” sex or gender difference (adjusting the means for males and females so they do not differ, thereby excluding the influence of sex or gender in the analysis). It is crucial for historians to develop enough familiarity with this language to understand how and why research on sex differences and gender is conducted – or not – and how it is conveyed to policy makers and the general public. At the same time, historians must practice their own craft in different ways. Historians need to make their findings accessible, which often means shorter and more direct means of dissemination than historians are trained to offer (out of fear, perhaps, that short and direct means simplistic).

It would be naïve to believe that an occasional conversation about the history of forced sterilization will make neuroscientists suddenly conduct their research differently, and changes in animal models will not come overnight. But some things have changed: the NIH recently issued guidelines on the inclusion of female organisms and cells in preclinical research, now requiring “strong justification” for “applications proposing to study only one sex.”<sup>11</sup> Notably, this directive thereby discourages studies of women-only or female-only subjects, pushing all investigators to incorporate sex as a biological variable into their research design. The NIH has also partnered with the Organization for the Study of Sex Differences to develop research and educational strategies, as well as monitoring practices, to increase the inclusion of female subjects in preclinical research.<sup>12</sup>

These steps represent opportunities for historians to help make the case for further changes in funding and program priorities. In particular, historians can contribute as scientists search for ways to create animal models that more closely mimic human circumstances. Neuroscientists and other bench scientists who have been involved in our collaboration report that the new historical knowledge they have gained has made them more attuned to the social context surrounding alcohol and drug use and has made them more reflective about the ways in which their results may be applied to humans. Collaborating with historians has thus improved their research approach as well as the manner in which they present and discuss the implications of their findings to general audiences.

#### HISTORIANS: TAKE BIOLOGY SERIOUSLY

More than a decade ago, Harold Kushner challenged historians of addiction to “take biology seriously.”<sup>13</sup> This is a tough one, especially difficult for feminist scholars. Yet it is crucial. There are good historical reasons for feminists to be suspicious of claims about biology, as the sex/gender vocabulary debate reminds us. But biology as a field has changed substantially since many second-wave feminists disengaged from it. The inclusion of more women in biological fields has brought greater attention to the importance of understanding the biology of female mammals, including women and girls, and as already noted, most scientists today emphasize that biology is not immutable.

We are trying to address Kushner’s challenge and the fragmentation that has often characterized the field through our research on the Michigan Longitudinal Study (MLS).<sup>14</sup> We are using data from the MLS to study the relationship between possible epigenetic changes and historical circumstances. “Epigenetics” refers to the ways in which experience can produce long-term changes in an individual’s gene expression without changing the genes coded in the DNA. In some cases this results in changes in the expression of the same genes in the individual’s offspring. Increasing evidence suggests that traits such as “resilience” are shaped by experiential phenomena and may be transmitted to offspring, by both epigenetic and cultural mechanisms. These processes play out differently in males and females. The demonstration that epigenetic transmission of behavioral traits can be measured in a longitudinal sample using peripheral fluids (saliva and blood) has opened a new avenue for us to explore the relationship between biology and culture, specifically between human development and historical circumstances.

Involving more than 2,000 individuals in more than 450 families, the MLS is a longitudinal study on the development of substance abuse, particularly alcoholism. At study onset, the MLS enrolled men who were arrested for driving while intoxicated, who had at least one three to five year

old male child (the “target child”), and who were living with the child and his biological mother at time of arrest. Control families without any substance abuse, but of similar family composition and living in the same neighborhoods, were also enrolled.

The study has been following these families for almost thirty years, during the target child’s youth, adolescence, and now adulthood. The study is currently enrolling its third generation offspring. It examines the capacity of children to be resilient in the face of considerable challenges such as alcoholism, drug use, poverty, and educational disadvantages. While originally focusing on boys, in its early years the study also enrolled girls and other male siblings as subjects and has been following all family members thereafter. The MLS involves a wide range of assessments, including genetic, brain-imaging, behavioral, social, demographic, and economic measures.

To track and analyze epigenetic changes, and to contextualize the MLS, we have become more thoughtful about the concept of time. “Time” is a deceptively simple idea that can actually incorporate different scales and units of measure. Human beings are always moving through time (as well as space), and individuals also change and develop over time. The most straightforward way to think about time is as chronology, where the passage of time is measured by the calendar. Chronological time provides the backdrop of our lives, often unexamined or at least unquestioned. Chronological time is a fundamental unit of measure for historians, of course, and “periodization” – dividing time into eras based on significant developments and changes – is an important analytical tool.

In contrast, a longitudinal study like the MLS foregrounds generational or cohort time, dividing people into groups based on when they were born. The process of sorting people by birth date reflects the assumption that we are shaped by the historical context in which we grow up, and that developing and coming of age at the same time are powerful forces in standardizing people’s experiences. Since we are socialized literally from birth, the social context into which we are born – including our parents’ attitudes and the childrearing conventions they follow – plays a key role in shaping us as individuals and as members of families and communities. Ideas about gender and substance use patterns are both shaped in fundamental ways by cohort. Longitudinal studies also focus on developmental time, which measures the growth and maturation of an individual. Psychologists, biologists, sociologists, and others identify key periods during an organism’s development. An individual’s success and accomplishments develop over time and so do addictions, influenced by many complex factors.

As we investigate epigenetic change, we are attuned to all three types or levels of time, as well to the ways they interact. Research has shown that many different factors can induce epigenetic changes: diet, chemical expo-

sure, exercise, stress, and learning. Events that happen early in life tend to have greater effects on the epigenome, although further epigenetic changes can happen at all stages of development. Some epigenetic effects can even be transmitted from one generation to the next.

In order to explore these questions, we must develop new research methods, including historical research techniques. We are conducting “micro-histories” to delve deeply into specific communities, even neighborhoods, where study participants lived. We are doing this research at the most granular level possible to identify the kinds of circumstances and events that might contribute to risk and protective factors for alcoholism. We are looking for patterns that may link environmental events – such as plant closings, civil unrest, and the robustness of local institutions and traditions – with epigenetic changes in study participants that may exacerbate or decrease their risk of addiction and other health disorders. Identifying such patterns in human subjects will lead to better ways to model and analyze how environmental events modify human biology and health outcomes.

Because epigenetic changes happen over time, we are establishing a precise chronology that allows us to contextualize self-report data from the MLS. This process has been painstaking and slow, in part because of the human subjects protections which have made it very difficult to determine where subject participants live. In addition, the MLS is “floating” in chronological time, organized instead by cohort time. That is, the data gathered is sorted by “wave” (when the subject entered the study) and by the age of the subject. But because the study participants are different ages and joined at different times – a strength in terms of understanding developmental and cohort time – additional processing is necessary to sort the materials chronologically.

Finally, we have found the process of integrating historical findings into quantitative models to be a substantial challenge. After all, historians must work with the materials left behind, which are often fragmentary and incomplete. It is difficult for most historians to convert their findings into data points that can be “coded” and entered into statistical models. In fact, the very richness of the MLS data in terms of the insights it provides into individual lives seems to call for qualitative rather than quantitative analysis. But if historical information is to be used in the study of epigenetic change, we have to find ways to incorporate that information into quantitative assessments.

## CONCLUSIONS

Our experience has convinced us that addiction researchers, clinicians, and advocates want to learn more about the history of addiction and gender. They want to become more aware of the histories of their fields, of previ-

ous treatment protocols, of the rise and fall of various policy regimes over time.

Combining methods from history, psychology, and biology can help us understand the complicated nexus of sex differences, gender and addiction. But substantial tensions remain. Epigenetics brings these domains together in new and exciting, but also worrisome, ways. Scientific and popular accounts depict epigenetics as a “revolutionary” field with the potential to “transform” how we think about nature and nurture. For historians, however, epigenetics evokes social engineering and eugenics as practiced in the past, in the United States and elsewhere. As this field takes shape, historical, humanistic and feminist perspectives are critically important, for they are attuned to differences of gender, race, ethnicity, and class, as well as to issues of power in how science is practiced and its findings applied.

To address present-day concerns, we believe that investigators from a range of disciplines must contribute to research agendas that include reliable and systematic data on women, girls, and other female mammals. That data must be analyzed by sex and/or gender, and prevention strategies, treatment models, and policy recommendations must follow from that knowledge. Historians have an important role to play, contributing information about past successes and failures and conveying a worldview that is attuned to power, stigma, and the reality of unintended consequences. It is extraordinarily difficult to integrate positivist approaches to science with critical perspectives. But failing to engage in present-day debates about biology is a mistake. Precisely because the brain disease model is so dominant in the addiction field and the notion of a “sexed brain” gains more cultural traction every day, we need a diverse array of voices. The science is too important to leave to the scientists.

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#### ENDNOTES

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