

## Article

# 'Mother's Ruin' – Why Sex and Gender Differences in the Field of Alcohol Research Need Consideration

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We are particularly pleased that *Alcohol and Alcoholism* has dedicated this special collection to 'Sex and Gender differences in Alcohol Use Disorder'. To date, a series of preclinical and clinical studies have tried to shed light on the similarities and differences in the field of alcohol research between men and women (Agabio *et al.*, 2016a and 2017; Salvatore *et al.*, 2017; McHugh *et al.*, 2018; Ait-Daoud *et al.*, 2019; Becker and Chartoff, 2019). However, our understanding of the complexities on this topic remains limited.

Why should we be interested in identifying similarities and differences in potential sex (relating to biological factors) and gender (relating to identity and cultural factors) in the field of alcohol research? We should because sex and gender have been demonstrated to be important modulators of disease risk, prevalence, intensity, and response to treatment (Legato *et al.*, 2016; Phillips and Hamberg, 2016) in other conditions, for example cardiovascular disease (Poorthuis *et al.*, 2017; Bushnell *et al.*, 2018), pain (Bradbury, 2006; Mogil, 2012; Vetvik and MacGregor, 2017), and psychiatric and neurological disorders (Ecker *et al.*, 2017; Li and Graham, 2017; Neu *et al.*, 2017).

The role of sex and gender differences has also been demonstrated for people with alcohol use disorder (AUD) (Agabio *et al.*, 2017; Becker and Chartoff, 2019). For instance, it is known that lower proportions of the female population drink compared to men (WHO, 2014). However, sex and gender differences in drinking habits have narrowed progressively as women's drinking patterns have become more similar to men's, particularly in recent birth cohorts of the general population (Slade *et al.*, 2016). Women also appear to be more sensitive than men to toxic effects of alcohol (Agabio *et al.*, 2016a). Gin became known as 'mother's ruin' during the 18<sup>th</sup> century in England, in part due to the social approbation towards women who were dependent on it and unable to fulfil their childcare and other responsibilities, as depicted by William Hogarth's picture 'Gin Lane'

in 1751 (see Fig. 1). This higher female vulnerability appears to be multifactorial and only partly related to the higher blood alcohol levels achieved by women after drinking equivalent amounts of alcohol to men (as confirmed by the results reported in this issue by Dr. Cherpitel and colleagues (2019)). Furthermore, women also are affected by specific alcohol-related consequences, such as the risk of foetal alcohol syndrome in their children if alcohol is consumed during pregnancy (Sokol *et al.*, 2003; Riley *et al.*, 2011) and a dose dependent increased risk of breast cancer, from relatively low levels (10 g/day) of alcohol consumption, of which many women remain unaware (Chambers *et al.*, 2019; Sinclair *et al.*, 2019).

Despite the mounting evidence, evaluation of sex and gender differences and similarities in the field of alcohol research is often lacking. This is surprising given the increasing interest in precision medicine, which begins with attention to sex differences (Legato *et al.*, 2016). One recent study found that the number of women recruited by studies evaluating the efficacy of some medications used for the treatment of AUD and alcohol withdrawal syndrome (AWS) like disulfiram, benzodiazepines, and anticonvulsants was too low to establish possible gender differences (Agabio *et al.*, 2016b). Accordingly, the study concluded that women receive medications for treatment of AUD and AWS for which efficacy has been not clearly demonstrated in female patients. In addition, the side effect burden of naltrexone may be greater in female patients, but again as the numbers involved in studies are small it is not possible to establish this difference with certainty (Sinclair *et al.*, 2016).

Given that there is a higher proportion of men than women in treatment services and clinical trials, the evidence base for treatments that are effective and tolerable is, by definition, biased towards the needs of men. It is known that the majority of individuals never seek or receive medical treatment for AUD (Cohen *et al.* 2007; Mark *et al.* 2009; Grant *et al.* 2015). The stigma attached to

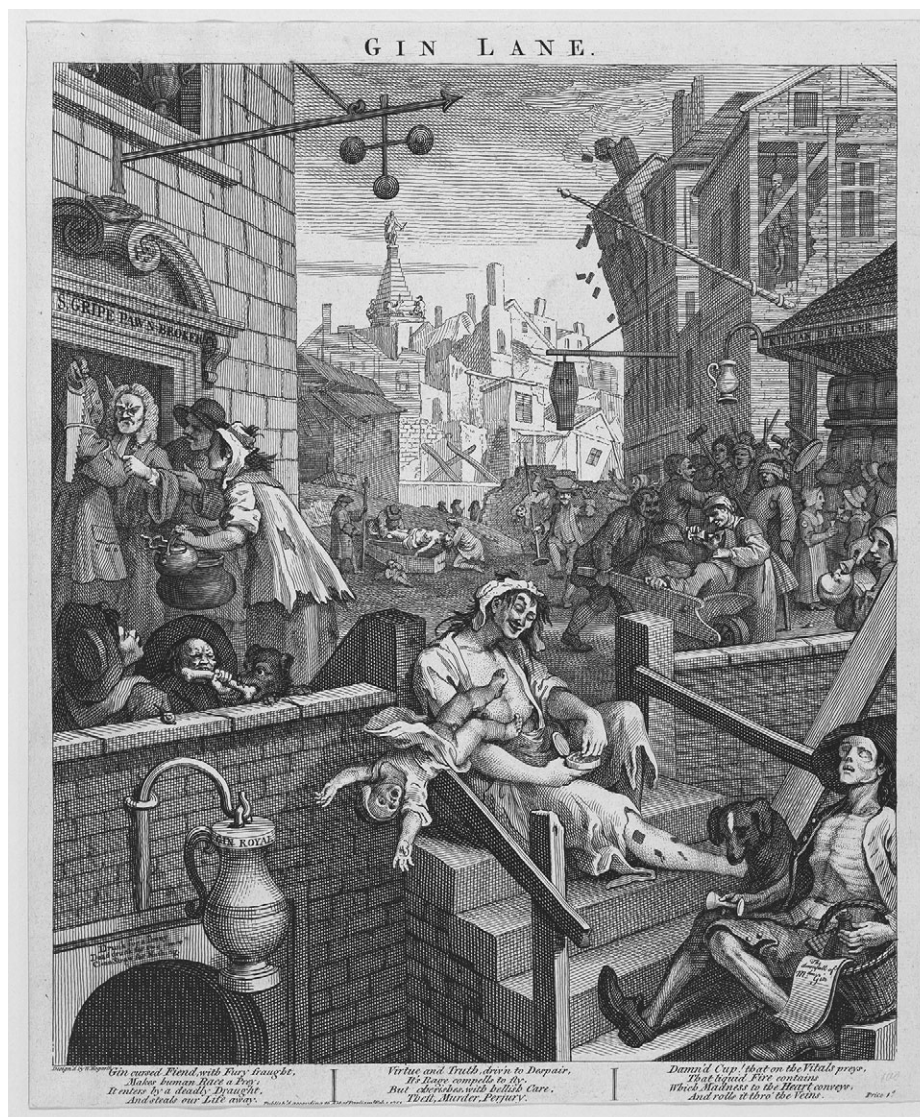


Fig. 1. Gin Lane (1751), William Hogarth. Print, 38.3 × 31.7 cm. The Metropolitan Museum of Art, New York (US). Open access image available on the Met's Website [www.metmuseum.org](http://www.metmuseum.org)

AUD constitutes one of the main barriers to seeking treatment. Women are less likely to seek and receive treatment than men (Greenfield *et al.*, 2007) and pregnant women are less likely to receive treatment than non-pregnant women (Terplan *et al.*, 2012), possibly due to social stigma and childcare responsibilities (Becker *et al.*, 2016). A recent study of one online peer support site for people with problematic alcohol use suggested that the vast majority were women, half had children at home and 47% had never sought help before, suggesting current treatment options were not perceived as targeted to their needs (Chambers *et al.*, 2017; Sinclair *et al.*, 2017).

The results of studies presented in this collection may help fill some gaps in our knowledge. For instance, Dr. Cheryl Cherpitel and colleagues (2019) analysed a sample of more than 18,500 injured patients arriving 51 emergency departments across 22 countries and found that women were at greater risk of injury than men following consumption of large quantities of alcohol, but there were no gender differences following lower levels of consumption. In another study,

Dr. Mogos and colleagues (2019) investigated the characteristics of alcohol related cardiomyopathy (ACM) among a sample of almost 240,000 individuals admitted to hospital and found a male-to-female ratio of 8:1. However, the prevalence of ACM decreased among men during study, while remaining unchanged among women. A further study (Lewis *et al.*, 2019) used well-validated experimental psychology techniques to assess the gender differences in a range of cognitive process in patients with AUD, and found that emotion processing deficits specifically were evident among women with AUD.

A better understanding of the sex and gender differences and similarities involved in the aetiology and maintenance of AUD would assist in improving the design and access to healthcare interventions and quality of medical care provided for this increasingly common, disabling disorder. Improving the quality of psychological, pharmacological and social interventions available may increase the number of both male and female patients seeking and receiving effective personalized treatment with beneficial results for the whole of society.

## CONFLICT OF INTEREST STATEMENT

None.

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