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Sex and Gender in Psychopathology: *DSM–5* and Beyond

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Sex and gender differences in psychopathology have been understudied, yet identifying and understanding variability by sex and gender is important for the development of comprehensive etiological models as well as effective assessment and treatment of psychopathology in all persons. In the current article, we discuss the importance of sex and gender in psychopathology research, review terminology used when examining these constructs, and present multiple explanations for differential prevalence rates. Next, we review articles from psychopathology journals and conclude that researchers more often include both males and females than they did two decades ago, but still do not consistently analyze by sex or gender. We also provide an update of male-to-female ratios as presented in the *DSM–5* and conduct a systematic review of the literature for selected disorders. We conclude that the *DSM–5* presentation of sex or gender ratios is not systematic. Finally, we provide suggestions for the next *DSM* task force, researchers, journal editors, and funding agencies. These recommendations focus on more consistently and systematically considering sex and gender in all aspects of psychopathology research.

Public Significance Statement
The authors reviewed existing theories for interpreting sex differences in psychopathology. Next, they reviewed data from major journals and concluded that researchers often include both sexes but do not consistently analyze data by sex, which limits practical applications. Rates of mental health problems for males and females as presented in the diagnostic manual were also reviewed, and the authors systematically compared this information to the literature for selected disorders. They conclude that the presentation of sex/gender ratios is not systematic.

Keywords: sex differences, gender differences, psychopathology, mental illness, *DSM–5*

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Identifying and understanding sex and gender in psychopathology is an issue that has been understudied, or even neglected, for decades (Hartung & Widiger, 1998). Yet, delineating sex and gender differences is important in continued efforts to assess and treat psychopathology effectively in all persons, as well as for the development of comprehensive etiological models (Eaton et al., 2012). Moreover, it is important to document differences and similarities (Evans & Reynolds, 2015), as both are vital to a full understanding of the etiology of psychopathology. Researchers in the broader health science community are calling on their colleagues to consider and accurately report sex and gender constructs at each stage of the research process (Day, Mason, Tannenbaum, & Rochon, 2017; Heidari, Babor, De Castro, Tort, & Curno, 2015). As argued by Cahill (2010), "the burden of proof regarding [sex and gender] has shifted from those examining the issue in their investigations generally having to justify why, to those not doing so having to justify why not" (p. 29).

In the current article, we provide contemporary updates on some of the issues raised by Hartung and Widiger (1998) who examined sex and gender in the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (*DSM–IV*, American Psychiatric Association [APA], 1994). First, we discuss the importance of sex and gender in psychopathology research, review the terminology typically used when examining these constructs, and present multiple explanations for differential prevalence rates. Second, we conduct three investigations to explore the current state of knowledge as related to sex and gender in psychopathology: (a) we review data from top psychopathology journals to examine recent practices for sampling and analyzing by sex and gender; (b) we provide an

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overview of differential prevalence ratios as presented in the 5th edition of the *DSM* (*DSM–5*; APA, 2013); and (c) we present the results of systematic reviews of the literature for six selected disorders. Finally, we provide recommendations for future *DSM* task forces as well as researchers, journal editors, and funding agencies in an effort to continue to move the field forward with regard to our understanding of psychopathology across sex and gender.

Importance of Sex and Gender in Psychopathology Research

Our historical understanding of psychopathology is at best sex/gender neutral and at worst decidedly sex/gender biased.[1] In the past it was commonplace for women and girls to be left out of mental health research, or for researchers to study only the presumed majority sex/gender (Gannon, Luchetta, Rhodes, Pardie, & Segrist, 1992; Grady, 1981; Hartung & Widiger, 1998; Hayden & Mash, 2014). In subsequent years psychopathology researchers have been more likely to include both males and females; however, some have argued that the research has been largely sex/gender neutral. That is, the studies may have included males and females, but there were often no a priori hypotheses about sex/gender differences, no analysis by sex/gender, and no discussion of the sex/gender implications (Gannon et al., 1992; Hartung & Widiger, 1998; Howard, Ehrlich, Gamlen, & Oram, 2017). This may render some sex/gender neutral research findings uninformative for males or females.

Understanding sex/gender differences and similarities in psychopathology is important for the advancement of effective assessment and treatment methods, as well as the development of comprehensive etiological models to explain psychopathology (Rutter, Caspi, & Moffitt, 2003; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Indeed, as Rutter et al. (2003) outlined, researchers need to examine sex/gender in psychopathology so that we can better understand variations by sex/gender in prevalence rates, comorbidity, severity, and chronicity. Furthermore, understanding differential manifestations of psychopathology by sex/gender will help clinicians more accurately diagnose and treat all patients. A consideration of base rates has emerged as a first step in the evidence-based assessment of mental illness (e.g., pediatric bipolar disorder; Youngstrom, Duax, & Hamilton, 2005). Specifically, base rates should be considered in the diagnostic process as a precaution against overdiagnosis of rare disorders. Thus, it is important to know whether a base rate is applicable to a particular person presenting for a diagnostic assessment. Moreover, understanding potential differential symptoms and types of impairment by sex/gender will help drive evidence-based treatments.

Next, it is important to study sex and gender in psychopathology to develop and test comprehensive etiological theories of mental illness (Rutter et al., 2003; Zahn-Waxler et al., 2008). As a field, we need to better understand the contributions of biological sex (e.g., hormones, brain differences) and gender role orientation (e.g., masculinity and femininity) in our multifactorial etiological models. Similarly, we also need to understand sex and gender similarities and differences across cultures and around the world to better grasp the impact of genetic vulnerabilities and environmental liabilities. If psychopathology researchers hope to more fully understand the etiology of each mental illness, sex and gender need to be better integrated into our studies and theories.

Terminology for Sex and Gender Constructs

It is important to use precise terminology regarding sex and gender because various explanations for sex/gender differences implicate different constructs. Unlike its predecessors, the *DSM–5* includes definitions of sex and gender. Specifically, the *DSM–5* defines *sex* and *gender* differences as follows: "Sex differences are variations attributable to an individual's reproductive organs and XX or XY chromosomal complement. Gender differences are variations that result from biological sex as well as an individual's self-representation that includes the psychological, behavioral, and social consequences of one's perceived gender" (APA, 2013, p. 15). The *DSM–5* goes on to state that "the term gender differences is used in *DSM-5* because, more commonly, the differences between men and women are a result of both biological sex and individual self-representation" (p. 15). Although there is room for disagreement about the nuances inherent in such definitions, we applaud this differentiation of constructs. Indeed, most contemporary operational research definitions separate sex and gender in roughly the same way (e.g., Caplan & Caplan, 2009; Howard et al., 2017; Nowatzki & Grant, 2011; Westbrook & Saperstein, 2015).

Despite increased recognition that sex and gender are not equivalent, and that neither concept is binary, the terms sex and gender have often been used interchangeably in social science research (Westbrook & Saperstein, 2015). Our knowledge of sex and gender differences in psychopathology research is limited by this imprecise use of terminology. There is a tendency to use *sex* only when referring to sexual intercourse and *gender* when referring to whether someone is male or female (Caplan & Caplan, 2009). However, this does not allow researchers to separate *biological sex* (i.e., XY, XX, or intersex) from *gender identity* (i.e., identifying as male, female, transgender, or gender fluid) or *gender role orientation* (i.e., the degree to which an individual identifies as masculine and/or feminine). This lack of clear operational definitions is a liability in psychopathology research.

Psychopathology researchers ask questions that conflate, or blur the distinction between, the concepts of sex and gender (e.g., What is your sex? What is your gender? Are you a male or female?). When researchers ask one of these questions it is not clear if they are asking: (a) whether a person is biologically male or female, (b) whether a person identifies as a man or a woman, or (c) the degree to which a person identifies as masculine and/or feminine. Importantly, we also do not know how a person who is transgender (i.e., a person whose biological sex does not align with their gender identity) or intersex (i.e., a person who has biological sex characteristics that do not fully conform to the male-female sex binary) would answer these questions. Without more clarity regarding what is being asked and how participants are interpreting the question, there is the potential for error and confusion. The prob-

[1] As suggested by Day et al. (2017), we will use the term *sex/gender* in this article. This is not because we want to convey that the terms are synonymous but because the current state of knowledge is limited by the way research questions have been presented. In addition, we recognize that neither sex nor gender is binary, but because the literature often defines them as such, we are sometimes limited to binary descriptions.

lem of conflated sex/gender constructs is evident in social science (Caplan & Caplan, 2009; Westbrook & Saperstein, 2015), physical health (Nowatzki & Grant, 2011), and mental health research (Howard et al., 2017).

Interpretation of Differential Prevalence Rates by Sex/Gender

Although it is known that the prevalence of some disorders is higher in males than females (e.g., autism, substance use), and higher in females than males in others (e.g., depression, anxiety), we have yet to fully delineate why these sex/gender differences exist in each case (Eaton et al., 2012). Several hypotheses have been put forth to explain the preponderance of males or females with certain disorders. These hypotheses can be grouped based on whether the sex/gender difference is due to bias and is, therefore, invalid (i.e., bias hypotheses) or due to a true or valid difference between males and females (i.e., true difference hypotheses.) However, in practice, reported sex/gender differences may result from a combination of valid and invalid factors. An optimal approach for researchers would be to systematically rule out some of the bias hypotheses and then examine true difference hypotheses (see Arnett, Pennington, Willcutt, DeFries, & Olson, 2015). In the next section, we outline several of these explanations and provide examples from the psychopathology literature. These examples also serve to illustrate the importance of well-defined sex/gender constructs.

Bias Hypotheses

The *sampling bias hypothesis* could partially account for sex/gender differences that have been identified in psychopathology research (Arnett et al., 2015; Hartung & Widiger, 1998). This hypothesis suggests that differential sex/gender prevalence rates result from a lack of inclusion of males or females in research studies (i.e., studies are limited to one sex). When studies are conducted in clinical settings, the differential sex prevalence rate is often exaggerated compared to community settings. This has been demonstrated over the years for some disorders that differentially impact males and females (e.g., depression, anxiety, reading disorder, attention-deficit/hyperactivity disorder [ADHD]).

Related to sampling bias, we propose a separate type of bias that we refer to as *data analytic bias*. Data analytic bias occurs when researchers include males and females in their research studies but do not conduct any analyses by sex or gender. That is, researchers do not consider sex/gender as an important variable in their studies. When this type of bias occurs, it remains unclear whether the findings generalize across sexes. In the past, when the focus was on sampling bias and studies often included only one sex, data analytic bias was less relevant. However, if sex/gender neutral research is occurring at high rates, then data analytic bias may need to be addressed moving forward.

The rater bias hypothesis suggests that individuals who rate behavior, as part of the diagnostic assessment procedure, may rate the same behaviors differently in males and females (Hoyt, 2000). For example, parents and teachers may rate boys higher than girls on inattention and hyperactivity whereas adult women may rate themselves higher on anxiety and depression than adult men. *Referral bias* and *negative halo effects* are two types of rater bias. Referral bias occurs when one sex is more likely to be referred for treatment (e.g., boys may be more likely to be referred for developmental disorders because they are also more likely to display comorbid externalizing behavior problems).

Negative halo effects occur when symptoms of one disorder are erroneously inflated in the presence of symptoms of another dis-

Table 1
Examples of Disorders With Differential Sex/Gender Prevalence Rates, Possible Valid Interpretations, and Sex/Gender Construct Implicated

Disorder	*DSM-5* sex ratio	Possible valid interpretations	Sex/gender construct implicated
Antisocial personality disorder	M > F	Polygenetic multiple threshold (Cloninger, Christiansen, Reich, & Gottesman, 1978; Slutske et al., 1997)	Biological sex
Attention-deficit/hyperactivity disorder	2–3M:1F	Mean & variance differences (Arnett, Pennington, Willcutt, DeFries, & Olson, 2015)	Biological sex
		Polygenetic multiple threshold (Rhee, Waldman, Hay, & Levy, 1999)	
Autism spectrum disorders	4M:1F	Extreme male brain theory (Baron-Cohen, 2002)	Biological sex
		Polygenetic multiple threshold (Werling & Geschwind, 2013)	
Conduct disorder	M > F	Polygenetic multiple threshold (Slutske et al., 1997)	Biological sex
Eating disorders	10F:1M	Differential socialization (Hepp, Spindler, & Milos, 2005; Keel & Forney, 2013)	Gender role orientation
Generalized anxiety disorder	2F:1M	Differential socialization (Carter, Silverman, & Jaccard, 2011)	Gender role orientation
Intellectual disability	1.2–1.6M:1F	Constitutional variability (Eme, 1992)	Biological sex
Major depressive disorder	1.5–3F:1M	Differential socialization (Barrett & Raskin White, 2002)	Gender role orientation
Specific learning disorder in reading	2–3M:1F	Mean & variance differences (Arnett et al., 2017; Hawke et al., 2009)	Biological sex
		Polygenetic multiple threshold (DeFries, 1989; Eme, 1992)	

Note. M = male; F = female.

order (Hoyt, 2000; Schachar, Sandberg, & Rutter, 1986). Halo effects in ratings of ADHD and oppositional defiant disorder (ODD) have been demonstrated in several studies with boys and girls (Hartung, Van Pelt, Armendariz, & Knight, 2006; Hartung, Lefler, Tempel, Armendariz, Sigel, & Little, 2010; Jackson & King, 2004). There is some evidence that negative halo effects may differentially impact diagnostic decisions for boys and girls. For example, Jackson and King (2004) found a sex/gender difference in teacher ratings such that boys were inaccurately rated as having more ADHD symptoms than girls in the presence of ODD symptoms, whereas girls were mistakenly rated as having more ODD symptoms than boys in the presence of ADHD symptoms.

Next, the *measurement variance hypothesis* suggests that differential sex/gender prevalence rates could be the result of differential validity in measurement tools (Arnett et al., 2015). Specifically, if the psychometric properties of rating scales and/or interviews differ by sex/gender, this could result in variance in the numbers of males and females who are diagnosed with a particular disorder. Measurement variance could result from sampling bias. That is, if psychometric studies of measurement tools are conducted without inclusion of both sexes/genders and/or without analysis by sex/gender, these tools might not be equally valid across groups.

The *criterion bias hypothesis* suggests that if diagnostic criteria are sex/gender biased, this will result in, or contribute to, differential prevalence rates (Hartung & Widiger, 1998). This issue was discussed at length by Hartung and Widiger (1998) and has received continued attention, especially in the personality disorders literature. For instance, it has long been debated whether the histrionic personality disorder (HPD) criteria are biased and result in more women being diagnosed than men. Because of this, the literature is mixed as to the true sex ratio for HPD (Mullins-Sweatt, Wingate, & Lengel, 2012). In an effort to address this issue, Samuel and Widiger (2009) created a set of symptoms that map onto *DSM*-based personality disorder symptoms conceptually but were recharacterized to adhere to the more gender-neutral five factor model of personality (FFM; McCrae & Costa, 1999). The authors concluded that while the traditional *DSM* symptoms consistently result in a sex/gender bias, the new FFM symptoms showed no such bias (Samuel & Widiger, 2009).

The *missing symptom hypothesis* is a specific case of criterion bias that occurs when symptoms that may be particularly useful for identifying one sex/gender are left out of a diagnostic criterion set. For instance, conduct disorder (CD) has been subject to extensive empirical examination regarding possible missing symptoms. First, some have argued that symptoms of relational aggression might be more pertinent for girls in the diagnosis of CD (e.g., Crick & Zahn-Waxler, 2003; Frick & Dickens, 2006). However, the data on whether the addition of a relational aggression item increases validity is mixed (Keenan, Coyne, & Lahey, 2008; Keenan, Wroblewski, Hipwell, Loeber, & Stouthamer-Loeber, 2010). Keenan et al. (2010) concluded that more work is needed to determine whether relational aggression should be included in the CD or ODD criteria. Another possible missing symptom is that of callous-unemotional traits in CD (e.g., lack of remorse or guilt). For this reason, a new specifier was added to the CD criteria in *DSM–5* and clinicians can now diagnose CD with limited prosocial emotions. Research suggests that consideration of these callous-unemotional traits may improve the predictive validity of antisocial behavior in boys and girls (Dadds, Fraser, Frost, & Hawes, 2005; Keenan et al., 2010).

An interaction of several types of bias (e.g., sampling bias, rater bias, measurement variance, criterion bias, and missing symptom hypotheses) is referred to as *ascertainment bias*. This concept has been used to explain, in part, the sex/gender difference in autism spectrum disorders (ASD) and it includes multiple biases that may be involved in the assessment and diagnosis of ASD (Van Wijngaarden-Cremers et al., 2014; Werling & Geschwind, 2013). Werling and Geschwind (2013) observed that boys with ASD have more comorbid externalizing behaviors and girls with ASD have more comorbid internalizing behaviors. Therefore, boys may be more likely to be referred for evaluation by parents and teachers (i.e., rater or referral bias). In addition, Van Wijngaarden-Cremers et al. (2014) indicated that most ASD research has been conducted with boys due to the male preponderance (i.e., sampling bias). There is also evidence that the disorder may present differently in boys and girls (i.e., girls may have fewer, or more socially accepted, symptoms of restricted interests; better imaginative play; more interest in social interactions; Kopp & Gillberg, 1992). Thus, Van Wijngaarden-Cremers et al. (2014) argued that differential phenotypes by sex, and more research with boys, may have resulted in criteria and assessment tools that are less sensitive to ASD in girls (i.e., criterion bias, measurement variance, and missing symptom hypotheses). The concept of ascertainment bias demonstrates how multiple bias hypotheses may interact to inflate sex differences.

True Difference Hypotheses

In contrast to bias hypotheses, true difference hypotheses suggest that the sex/gender differences in prevalence rates can be accounted for by actual differences between males and females. These hypotheses differ based on the explanation provided for the true sex/gender differences. For some disorders, biological sex largely accounts for the differential sex/gender ratio (e.g., autism spectrum disorders; Werling & Geschwind, 2013), whereas for other disorders the difference appears to be significantly impacted by social and cultural factors (e.g., eating disorders; Keel & Forney, 2013). Several theories for understanding true differences are described below, and relevant examples are provided.

The *polygenetic multiple threshold model* is a multifactorial model of psychopathology that suggests that multiple factors are involved in the etiology of a disorder (DeFries, 1989; Eme, 1992). These factors could be any combination of genetic and/or environmental which, together, determine an individual's liability for developing a particular disorder. Specifically, the sex/gender that is affected less frequently requires increased liability of the same causal factors in order to reach the threshold for the disorder, thus reducing their probability of having the disorder (Eme, 1992; Rhee, Waldman, Hay, & Levy, 1999). Rhee et al. (1999) found support for the polygenetic multiple threshold model in the case of ADHD, as girls (the less often affected group) "require a greater degree of liability (i.e., have to surpass a higher liability threshold) to manifest ADHD than do boys" (p. 38). Similarly, there has been some support for explaining differential sex prevalence rates via a multiple threshold liability model in antisocial personality disorder (e.g., Cloninger, Christiansen, Reich, & Gottesman, 1978), autism

(e.g., Werling & Geschwind, 2013), conduct disorder (e.g., Slutske et al., 1997), and reading disorder (e.g., DeFries, 1989).

The *constitutional variability model* proposes that males and females demonstrate different rates of a disorder because different causal factors are important for each sex (James & Taylor, 1990; Rhee et al., 1999). In contrast to the polygenetic multiple threshold model which posits the same causal factors experienced at differing degrees, the constitutional variability model suggests differential etiologies for males and females. The constitutional variability model further suggests that the more frequently affected sex/gender shows greater variability in a disorder, whereas the less frequently affected sex/gender may only manifest a disorder due to a discrete pathology, such as a birth complication (Eme, 1992). For example, Eme (1992) identified mental retardation (now intellectual disability) as an example of the constitutional variability model because the male preponderance is more pronounced for individuals with mild forms of ID, and less pronounced for those with more severe forms (which are more likely to be due to an organic or pathological event).

In addition, the *gender invariant dimensional liability* model was put forth by Eaton et al. (2012) to help elucidate sex/gender differences in mental illness. Specifically, Eaton et al. examined patterns of psychopathology and comorbidity by sex/gender and confirmed that women have higher rates of internalizing disorders (e.g., anxiety, depression) and men have higher rates of externalizing disorders (e.g., antisocial personality, substance use). Using confirmatory factor analysis, they demonstrated that a latent internalizing-externalizing liability model fit the data for both men and women. Thus, the model was sex/gender invariant and suggests that "observed gender differences in prevalence rates systematically reflect gender differences in broad latent liability factors" (Eaton et al., 2012, p. 286). This model suggests that it may be more fruitful to focus on sex/gender differences at the level of internalizing and externalizing dimensions rather than focusing on individual disorders. Moreover, the model is not mutually exclusive from the polygenetic multiple threshold or constitutional variability models. For example, it is yet to be determined whether women require a stronger predisposition for developing externalizing disorders or whether they have a differential etiology for externalizing disorders than men.

Arnett et al. (2015) described two additional models for interpreting true sex differences. These two models are focused on the distribution of symptoms and are related to, but not mutually exclusive from, the models presented above which are focused on underlying etiological explanations. The *mean differences model* suggests that one sex/gender has greater symptom severity, or a higher mean level of symptoms, and this contributes to differential prevalence rates. The *variance differences model* suggests that one sex/gender has greater variability in symptom expression and this contributes to differential sex prevalence rates (Arnett et al., 2015). This model predicts that the more affected sex will have stronger representation at both the higher and lower ends of the distribution. In the case of ADHD, Arnett and colleagues found, after ruling out bias explanations (i.e., sampling bias, measurement variance, or missing symptoms), both models contributed to the sex/gender differences in ADHD symptomatology. Similarly, in another study, Arnett et al. (2017) found that mean and variance differences contribute to the sex/gender difference in reading disorder or dyslexia. Others have also found support for the variance difference model in explaining sex differences in reading disorder (Hawke, Olson, Willcut, Wadsworth, & DeFries, 2009). Specifically, these authors found that there was more variability in reading ability for boys than girls despite similar mean levels.

Next, the *extreme male brain theory* has been put forth as a possible explanation for the male preponderance in autism spectrum disorders (ASD). Baron-Cohen (2002) described this theory in detail and argued that ASD might represent an extreme version of the stereotypical masculine cognitive profile. In brief, Baron-Cohen (2002) cited multiple studies that show that females are better at tasks that require empathizing and males are better at tasks that require systemizing. Further, individuals with ASD tend to perform worse than neurotypical males or females on empathizing tasks and better than neurotypical males and females on systemizing tasks. Thus, male and females with ASD show a pattern that is similar to, but more extreme than, the pattern that is seen in neurotypical males. There is accumulating evidence that this extreme version of the stereotypical masculine cognitive profile in individuals with ASD may result from higher levels of fetal testosterone (see Baron-Cohen et al., 2011, for a review).

Finally, the *differential socialization hypothesis* suggests that social and cultural factors may impact the expression of psychopathology in males and females, creating a true difference in the rates of some disorders. One test of whether sex/gender differences are the result of primarily biological or sociocultural influences involves examining whether sex/gender difference replicate across countries. If sex/gender differences do not replicate internationally, or if they only replicate in developed Western countries for example, they are more likely to be social or cultural effects.

There are many instances of differential socialization effects on psychopathology in the literature. For example, in the depression literature, Barrett and Raskin White (2002) found that higher levels of masculinity in adolescence were associated with lower levels of depression in emerging adulthood in the United States. In addition, Fitzpatrick, Euton, Jones, and Schmidt (2005) examined the relations among gender role orientation, sexual orientation, and suicidality in emerging adults in the United States. These authors found that cross-gender roles (i.e., exhibiting traits that are associated with the opposite biological sex) were associated with suicidal ideation above and beyond sexual orientation. In Switzerland, Hepp, Spindler, and Milos (2005) examined gender role orientation and eating pathology in biological females with anorexia and/or bulimia. They found that androgyny (possessing both masculine and feminine traits) was associated with less severe eating pathology in women with eating disorders. There has also been accumulating research on gender role orientation and anxiety disorders in youth. Carter, Silverman, and Jaccard (2011) studied gender role orientation and anxiety in children in the United States and found that femininity and anxiety were positively correlated, whereas masculinity and anxiety were negatively correlated. These studies suggest that social and cultural factors are important in the etiology of depression, anxiety and eating disorders. Future research that extends these findings across countries will be informative for determining whether these gender role orientation effects are culture-specific.

In summary, these examples of bias and true difference factors demonstrate that a careful examination of sex/gender differences is important for understanding the factors that contribute to psychopathology. It is critical to determine whether reported sex/gender

differences are valid, and which constructs are implicated for each disorder. If a sex/gender difference is found to be valid, further research regarding various true difference hypotheses is warranted which will potentially lead to an enhanced understanding of how to appropriately assess and treat individuals with a particular disorder. Once we have reached this threshold for each type of psychopathology, we can advance our study of complex etiological theories that are sensitive to sex/gender. However, if differential sex/gender ratios are confounded by biased sampling procedures or diagnostic criteria, we will fail to accurately account for sex/gender in our etiological models. We have summarized the literature reviewed here in Table 1. In this table we provide examples of disorders with differential sex/gender rates, possible valid interpretations of these differences, and identify the sex/gender constructs that may be implicated. It should be noted that we did not include disorders in this table for which the research focus has primarily been on bias hypotheses rather than true difference hypotheses (e.g., histrionic personality disorder, somatic symptom disorder). Nonetheless, more work on these disorders is needed once bias has been reduced. As our field moves toward further reducing biases and understanding true differences, we will be closer to the possibility of harnessing sex/gender prevalence ratios to advance our comprehensive etiological models, and to improve treatment and assessment practices for all.

The Current Investigations

Based on the aforementioned concerns and issues, the current article includes three investigations followed by a recommendations section. Investigation 1 is an examination of possible sex/gender sampling and data analytic bias in top psychopathology journals. Investigation 2 is an analysis of changes made to sex/gender ratios between *DSM–IV* and *DSM–5*. Finally, Investigation 3 includes systematic reviews of six selected disorders in an attempt to verify the sex/gender conclusions reached in *DSM–5*.

Investigation 1: Sex/Gender Sampling and Analytic Bias

The goal of Investigation 1 is to analyze potential sex/gender sampling and data analytic bias. Sampling bias is operationalized here as samples of participants where either males or females were not included. Data analytic bias occurs when researchers include males and females in their study but fail to analyze the data by sex/gender. It is important to understand patterns of sampling and analytic bias in psychopathology research in order to better understand what is known, and what remains unknown, because of biased methods. To our knowledge, there have been two previous reviews of possible sex/gender sampling bias in the psychopathology literature. Hartung and Widiger examined articles published from 1988 through 1993 in the *Journal of Abnormal Child Psychology* (*JACP*). They found that more than one-quarter of the studies were confined to one sex, and of those confined to one sex, all but one was a study of boys. Hartung and Widiger (1998) recommended that researchers eliminate sex-biased sampling. In addition, it has been argued by multiple authors that routine analysis of results by sex/gender is necessary (e.g., Crick & Zahn-Waxler, 2003; Hartung & Widiger, 1998).

More recently, Howard et al. (2017) reviewed articles published in two prominent psychiatric journals (i.e., *JAMA Psychiatry* and *British Journal of Psychiatry*) between 2012 and 2015. Of these 819 studies, 88.9% included both males and females and 10.5% were confined to one sex/gender. Of the 728 adult studies that included both males and females, only 20.3% analyzed by sex/gender.

Method

For the current article, we set out to examine sampling and data analysis by sex/gender in two top psychopathology journals (i.e., *JACP* and *Journal of Abnormal Psychology* [*JAP*]) so that we could compare current psychopathology research to the Hartung and Widiger (1998) findings as well as the Howard et al. (2017) findings. We selected *JACP* to be consistent with Hartung and Widiger, and added *JAP* to be inclusive of a major clinical psychology journal focused primarily on adult psychopathology. To allow a direct comparison to these more contemporary reviews, we reanalyzed the articles reviewed by Hartung and Widiger (1998; i.e., number of articles that specified and/or analyzed the sex/gender of participants). The results are shown in Table 2.

Results

First, we examined every publication in *JACP* from 2010 through 2017. Thirty studies were excluded from our analyses because participants were adults only (e.g., parents or teachers) or were meta-analyses, reviews, or corrections. Thus, there were 874 empirical studies of children and adolescents published during this time period (see Table 2). Of these 874 studies, 87.5% included both boys and girls, 8.9% were confined to one sex/gender, and 3.5% did not specify how many participants were males or females. Of the studies that were confined to one sex, 64.1% were studies of boys and 35.9% were studies of girls. Of the 765 studies that reported sex/gender of participants and included both boys and girls, 56.3% analyzed by sex/gender (i.e., analyzed results separately for boys and girls or used sex/gender as an independent, mediator, or moderator variable), 17.3% considered or used sex/gender as a covariate, and 26.4% did not include sex/gender in their analyses.

Next, we examined every article in *JAP* from 2010 through 2017. Sixty-two studies were excluded from our analyses because they were meta-analyses, reviews, or corrections. Thus, 731 empirical studies were published during this time period (see Table 2). Of these 731 studies, 80.0% included both males and females, 16.6% were confined to one sex/gender, and 3.4% did not specify how many participants were males or females. Of the studies that were confined to one sex/gender, 28.9% were studies of males and 71.1% were studies of females. Of the 585 adult studies that reported sex/gender of participants and included both males and females, 41.7% analyzed by sex/gender (i.e., analyzed results separately for males and females or used sex/gender as an independent, mediator, or moderator variable), 13.8% considered or used sex/gender as a covariate, and 44.4% did not include sex/gender in their analyses.

Discussion

There are several important conclusions that can be gleaned from these data. First, it is notable that numerous studies in our

Table 2
Data From Psychopathology Journals Examining Sex/Gender Bias in Sampling and Analyses

Variable	*Journal of Abnormal Child Psychology*, 1988–1993 (Hartung & Widiger, 1998)		*JAMA Psychiatry* and *British Journal of Psychiatry*, 2012–2015 (Howard, Ehrlich, Gamlen, & Oram, 2017)		*Journal of Abnormal Child Psychology*, 2010–2017		*Journal of Abnormal Psychology*, 2010–2017	
	n	%	*n*	%	*n*	%	*n*	%
Sample composition	257	100	814	100	874	100	731	100
Both sexes included	176	68.5	728	89.4	765	87.5	585	80.0
Males only	67	26.1	42	5.2	50	5.7	35	4.8
Females only	1	0.4	44	5.4	28	3.2	86	11.8
Sex not specified	13	5.1	0	0.0	31	3.5	25	3.4
If both sexes included, was sex/gender analyzed?	176	100	728	100	765	100	585	100
No	96	54.5	318	43.7	202	26.4	260	44.4
Covariate only (or considered)	13	7.4	262	36.0	132	17.3	81	13.8
Independent, moderator or mediator	67	38.1	148	20.3	431	56.3	244	41.7

Note. The articles that were analyzed by Hartung and Widiger (1998) were reanalyzed for comparison to newer data. Minor discrepancies between these results and those originally reported by Hartung and Widiger (1998) are due to slightly different methodologies.

recent reviews of *JACP* ($n = 31$) and *JAP* ($n = 25$) did not specify the sex/gender of participants anywhere in the article. Although the percent of studies that did not specify sex was reduced from 5.1% in the earlier JACP review to 3.5% in our later review, this is still problematic. Supplemental data from Howard et al. (2017) indicated that there were no instances of sex/gender not being specified in the two psychiatry journals.

Second, the recent data from *JACP* and *JAP* are similar to those from Howard et al. (2017) and suggest that sampling bias by sex/gender is less of a concern now (see Table 2). Specifically, in *JACP*, the percentage of studies that included both males and females went up from 68.5% to 87.5% over two decades. In addition, the percentage of contemporary studies in *JAP* (80.0%) and the psychiatry journals (89.4%) that included both males and females were comparable to the percentage in *JACP* (87.5%).

Finally, even when studies contained both males and females, it was not infrequent for sex/gender to be excluded from the analyses altogether or only included as a covariate. In *JACP* the percentage of studies that included sex/gender as a primary variable in the analyses went up from 38.1% to 56.3% over two decades. However, in the recent reviews of adult journals, the rates were lower than 56.2%. Specifically, the percentage of studies that included sex/gender as a primary variable in JAP was 41.7% and the percentage in the psychiatry journals was 20.3%.

Overall, there have been some improvement in terms of including males and females in research; however, researchers do not always specify the sex/gender of participants and do not consistently conduct analyses to determine whether the effects vary by sex/gender. Thus, we agree with the Howard et al. (2017) conclusion, "We have found that most mental health research largely ignores sex (and gender) differences; this sex-neutral and gender-neutral approach is biased, it risks undermining scientific validity and efficiency, and it could contribute to a failure of health providers to deliver gender-sensitive mental health treatments and services, to the detriment of both men and women" (p. 10). Even if we include sufficient numbers of males and females but fail to run analyses by sex/gender, our findings will be less generalizable to either group than if we had studied only one sex/gender. Essentially, we are "watering down" our findings by including both males and females but not analyzing the data separately. Data analytic bias by sex/gender is currently a significant concern.

Investigation 2: Sex/Gender Ratios in *DSM–5*

With the issue of sampling bias in mind, we move to Investigations 2 and 3, in which we will explore *DSM–5*'s handling of sex/gender information. Because of the importance of understanding sex/gender constructs in psychopathology, and the importance of the *DSM* to mental health research, Investigation 2 will explore sex/gender ratios as presented in the *DSM–5*.[2] Hartung and Widiger (1998) completed a similar task as related to *DSM–IV*; the goal of Investigation 2 is to examine changes to sex/gender information between the two versions of the *DSM*.

Method

We analyzed 121 *DSM–5* disorders for the purposes of the current article (see Tables 3–12). Our aim was to examine every major disorder in the *DSM–5*. We included every major disorder but excluded some variations of disorders. Specifically, we excluded disorders for three reasons. First, we eliminated all provisional, other-specified, unspecified, and due-to-a-medical-condition iterations of the major disorder categories in an effort to focus primarily on the disorder proper (e.g., we included all major personality disorders, but not personality change due to a medical condition, other specified personality disorder, or unspecified personality disorder). Second, in

[2] It will be important to examine the new *International Classification of Diseases, 11th Edition* (*ICD-11*; World Health Organization, 2018) with regard to sex/gender information; however, the *ICD-11* had only released its draft version at the time of this writing.

Table 3
Sex/Gender Information for Neurodevelopmental Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Intellectual disability (formerly mental retardation)	1.5M:1F	1.2–1.6M:1F	Changed
Language disorder (formerly expressive or mixed language disorder)	M > F	No information	Removed
Speech sound disorder (formerly phonological disorder)	M > F	No information	Removed
Childhood-onset fluency disorder (formerly stuttering)	3M:1F	No information	Removed
Social (pragmatic) communication disorder (new to *DSM-5*)	NA	No information	NA
Autism spectrum disorder (formerly autistic disorder, Rett's disorder, childhood disintegrative disorder, and Asperger's disorder)	4–5M:1F (autistic disorder)	4M:1F	Changed
Attention-deficit/hyperactivity disorder	4–9M:1F	1.6–2M:1F	Changed
Specific learning disorder, with impairment in reading (formerly reading disorder)	1.5–4M:1F	2–3M:1F	Changed
Specific learning disorder, with impairment in mathematics (formerly mathematics disorder)	No information	2–3M:1F	Added
Specific learning disorder, with impairment in written expression (formerly disorder of written expression)	No information	2–3M:1F	Added
Developmental coordination disorder	No information	2–7M:1F	Added
Stereotypic movement disorder	M > F	No information	Removed
Tourette's disorder	1.5–3M:1F	2–4M:1F	Changed
Persistent (chronic) motor or vocal tic disorder (formerly chronic motor or vocal tic)	No information	2–4M:1F	Added

Note. M = male; F = female.

the substance-related disorders section, we excluded the new iterations of withdrawal and intoxication disorders, and instead focused on the major disorder categories (e.g., alcohol use disorder, cannabis use disorder). Third, we eliminated disorders in the *DSM–5* Other Mental Disorders, Medication-Induced Movement Disorders and Other Adverse Effects of Medication, Other Conditions That May Be a Focus of Clinical Attention, and Conditions for Further Study sections.

With these guidelines in place, we analyzed the sex/gender information of 121 major *DSM–5* disorders. Of these disorders, 82.6% (n = 100) included accompanying sex/gender information. Hartung and Widiger (1998) analyzed data for 125 *DSM–IV* disorders; 81% of which included information about sex/gender. The goal of Investigation 2 was to examine the consistencies and changes between sex/gender information in the two most recent editions of the *DSM*. To this end, we first examined developmental trends by sex/gender in psychopathology as noted in *DSM–IV* and *DSM–5*, and then examined changes to sex/gender ratios for all 121 disorders.

Results

Sex/gender changes across development. One issue that emerged from analysis of the *DSM–IV* (Hartung & Widiger, 1998) was the change in prevalence rates of psychological disorders from early childhood to adulthood. In the toddler years, psychological disorders were equally common in boys and girls (Keenan & Shaw, 1994), whereas, in preschool and elementary school, boys showed more psychopathology than girls (Crick & Zahn-Waxler, 2003; Hartung & Widiger, 1998; Zahn-Waxler et al., 2008). In adolescence and adulthood, as the emphasis turns toward internalizing disorders, in which more women than men are impacted, the overall rates of psychopathology were more evenly distributed between women and men (Hartung & Widiger, 1998; Zahn-Waxler et al., 2008). Our analysis of *DSM–5* sex/gender ratios resulted in largely the same conclusion. When considering *DSM–5* disorders with a reported differential sex/gender prevalence ratio, we found that of those disorders traditionally first diagnosed in childhood, 89% showed a male preponderance. In contrast, of the disorders traditionally diagnosed after childhood, 57% showed a male preponderance. Thus, the overall developmental trends noted by Hartung and Widiger remained evident vis-à-vis the reported *DSM–5* ratios.

In addition to outlining the developmental trends, we also outlined the five major types of changes to sex/gender ratios made between editions of the *DSM*. Tables 3 through 12 list the sex/gender ratio information provided for the 121 *DSM–5* disorders, as well as how that information has changed since *DSM–IV*, if applicable. As can be seen, changes in sex/gender information fall broadly into five categories, described below with examples provided.

Sex/gender information not included in *DSM–IV* but added in *DSM–5*. For 10 disorders (8.3%), sex/gender information was added to the *DSM–5* that was not previously included in *DSM–IV*. As specific examples, sex/gender information was not presented in *DSM–IV* for brief psychotic disorder, posttraumatic stress disorder (PTSD), and acute stress disorder, but in *DSM–5* these disorders are reported to be more common in women. In contrast, in *DSM–IV* the sex/gender ratio for reading disorder was thought to be 1.5 to 4 times more common in boys than girls, but there was no estimate for mathematics disorder or disorder of written expression. In *DSM–5*, these disorders are now grouped as specific

Table 4
Sex/Gender Information for Schizophrenia Spectrum Disorders and Other Psychotic Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Delusional disorder	M = F	M = F (M > F jealous type)	Changed
Brief psychotic disorder	No information	2F:1M	Added
Schizophreniform disorder	No information	No information	No change
Schizophrenia	M = F	M > F	Changed
Schizoaffective disorder	F > M	F > M	No change

Note. M = male; F = female.

Table 5
Sex/Gender Information for Bipolar and Related Disorders and Depressive Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Bipolar I disorder	M = F	1.1M:1F	Changed
Bipolar II disorder	F > M	F > M (possibly clinical samples only)	Changed
Cyclothymic disorder	M = F	M = F	No change
Disruptive mood dysregulation disorder (new to *DSM-5*)	NA	M > F	NA
Major depressive disorder	2F:1M	1.5–3F:1M	Changed
Persistent depressive disorder (formerly dysthymic disorder)	2–3F:1M	No information	Removed
Premenstrual dysphoric disorder (new to *DSM-5*)	NA	F only	NA

Note. M = male; F = female.

learning disorders that are estimated to be 2 to 3 times more common in boys than in girls.

Sex/gender information included in *DSM–IV* but removed from *DSM–5*. For 11 disorders (9.1%), sex/gender information that was included in *DSM–IV* was removed from *DSM–5*. As a specific example, in *DSM–IV* the communication disorders were reported to be more common in boys than girls. However, the communication disorders section in *DSM–5* does not include any sex/gender information. Likewise, adjustment disorders were reported to have an equal sex/gender ratio in *DSM–IV*, but *DSM–5* does not list any sex/gender information. There is no explanation provided for these changes.

Sex/gender information changed from *DSM–IV* to *DSM–5*. For 48 disorders (39.7%), sex/gender information was changed (slightly to markedly) from *DSM–IV* to *DSM–5*. As one example, in *DSM–IV*, ODD was reported simply to be more common in boys than girls; however, in *DSM–5*, the sex/gender ratio was more specific (1.4:1 in favor of boys in childhood but no sex/gender differences in adolescence and adulthood). Also, in *DSM–IV*, major depressive disorder (MDD) was reported to be 2 times more common in females than in males, whereas in *DSM–5* the disorder was reported to be 1.5 to 3 times more common in females. Likewise, in *DSM–IV* schizophrenia was reported to occur equally in males and females; whereas in *DSM–5* it was reported to occur more frequently in males than females.

Sex/gender information unchanged from *DSM–IV* to *DSM–5*. For 41 disorders (33.9%), there were no changes in sex/gender information from *DSM–IV* to *DSM–5*. This lack of change across the two *DSM* versions falls into three overall categories: (a) the lack of sex/gender information in *DSM–IV* and *DSM–5* is consistent (e.g., schizophreniform disorder, reactive attachment disorder), (b) the sex/gender information included in *DSM–IV* and *DSM–5* is consistent (e.g., conduct disorder, somatic symptom disorder, generalized anxiety disorder, antisocial personality disorder, borderline personality disorder), and (c) the disorder in question is considered to be male-specific or female-specific (this is the case for 7 disorders; e.g., erectile disorder, female orgasmic disorder). As one example of unchanged sex/gender ratios, in *DSM–IV* elimination disorders were considered more common in boys but no specific ratio was provided. Surprisingly, there again was no specific ratio provided in *DSM–5* despite two decades of additional research, including at least one nationally representative epidemiological diagnostic study of enuresis in the United States (i.e., Shreeram, He, Kalaydjian, Brothers, & Merikangas, 2009).

Table 6
Sex/gender Information for Anxiety Disorders, Obsessive-Compulsive and Related Disorders, and Trauma- and Stressor-Related Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Separation anxiety disorder	F > M	F > M	No change
Selective mutism	F > M	M = F	Changed
Specific phobia	F > M	2F:1M	Changed
Social anxiety disorder (formerly social phobia)	F > M	1.5–2.2F:1M	Changed
Panic disorder	2–3F:1M	2F:1M	Changed
Agoraphobia	F > M	2F:1M	Changed
Generalized anxiety disorder	2F:1M	2F:1M	No change
Obsessive compulsive disorder	M = F	M > F child; F > M adult	Changed
Body dysmorphic disorder	M = F	F > M	Changed
Hoarding disorder (new to *DSM-5*)	NA	M > F	NA
Trichotillomania	F > M	10F:1M	Changed
Excoriation disorder (new to *DSM-5*)	NA	3F:1M	NA
Reactive attachment disorder	No information	No information	No change
Disinhibited social engagement disorder (formerly reactive attachment disorder, disinhibited type)	No information	No information	No change
Posttraumatic stress disorder	No information	F > M	Added
Acute stress disorder	No information	F > M	Added
Adjustment disorder	M = F	No information	Removed

Note. M = male; F = female.

Table 7
Sex/Gender Information for Dissociative Disorders and Somatic Symptom and Related Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Dissociative identity disorder	3–9F:1M	1.6M:1.4F	Changed
Dissociative amnesia	No information	2.6F:1M	Added
Depersonalization/derealization disorder (formerly depersonalization disorder)	No information	M = F	Added
Somatic symptom disorder (formerly somatization disorder and pain disorder)	F > M	F > M	No change
Illness anxiety disorder (formerly hypochondriasis)	M = F	M = F	No change
Conversion disorder	2–10F:1M	2–3F:1M	Changed
Factitious disorder	M > F	No information	Removed

Note. M = male; F = female.

New disorders in *DSM–5*. Among the disorders analyzed for this study, 11 disorders (9.1%) were new to *DSM–5*. Of these 11 disorders, eight (72.7%) were listed with accompanying sex/gender information (e.g., disruptive mood dysregulation disorder [DMDD], hoarding disorder, excoriation, binge eating disorder), whereas three lacked this information (e.g., social [pragmatic] communication disorder [SPCD], REM sleep behavior disorder). SPCD included symptoms that overlap substantially with autism spectrum disorder (ASD; APA, 2013). Despite the connection between the symptoms of SPCD and ASD, and the well-established male preponderance in ASD, sex/gender is not mentioned at all in the new SPCD section. In contrast, DMDD is a new disorder to *DSM–5* that was added and includes sex/gender information.

Discussion

In summary, we found that 17.4% of disorders ($n = 21$) in the *DSM–5* did not include any mention of sex/gender. Moreover, we found that for 11 disorders sex/gender information that appeared in the *DSM–IV* was removed from *DSM–5* and was not replaced with updated information. There was at least one instance when new, high-quality epidemiological studies of sex/gender ratios existed (i.e., enuresis), but these new data were not included in *DSM–5*. Thus, these examples may illustrate the need for improved consistency in terms of reporting sex/gender information in the *DSM*. To test this contention, we conducted several systematic reviews to evaluate the accuracy of the *DSM–5* sex/gender ratios.

Investigation 3: Systematic Reviews of Sex/Gender in Psychopathology

Investigation 3 is an examination of the sex/gender conclusions as presented in *DSM–5* via systematic reviews of the literature. Specifically, we compare the conclusions in *DSM–5* to the prevalence literature on six distinct disorders.

Table 8
Sex/Gender Information for Feeding and Eating Disorders, Elimination Disorders, and Sleep-Wake Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Pica	No information	No information	No change
Rumination disorder	M > F	No information	Removed
Avoidant/restrictive food intake disorder (formerly feeding disorder)	M = F	M = F, but M > F with ASD	Changed
Anorexia nervosa	> 9F:1M	10F:1M	Changed
Bulimia nervosa	> 9F:1M	10F:1M	Changed
Binge-eating disorder (new to *DSM-5*)	NA	2F:1M	NA
Encopresis	M > F	M > F	No change
Enuresis	M > F	M > F	No change
Insomnia disorder	F > M	1.4F:1M	Changed
Hypersomnolence disorder (formerly primary hypersomnia)	3M:1F	M = F	Changed
Narcolepsy	M = F	Possibly M > F	Changed
Obstructive sleep apnea hypopnea (formerly included in breathing-related sleep disorder)	8M:1F	M = F in children; 2–4M:1F in adults	Changed
Central sleep apnea (formerly included in breathing-related sleep disorder)	8M:1F	At least 2–4M:1F	Changed
Sleep-related hypoventilation (formerly included in breathing-related sleep disorder)	8M:1F	Related to comorbidity	Changed
Circadian rhythm sleep-wake disorder	No information	No information	No change
Non-REM sleep arousal disorder (formerly sleepwalking disorder and sleep terror disorder)	M = F	M > F in children and M = F in adults for terror; F > M in children and M > F in adults for sleepwalking	Changed
Nightmare disorder	2–4F:1M	F > M	Changed
REM sleep behavior disorder (new to *DSM-5*)	NA	No information	NA
Restless leg syndrome (new to *DSM-5*)	NA	1.5–2F:1M	NA

Note. M = male; F = female.

Table 9
Sex/Gender Information for Sexual Dysfunctions, Paraphilic Disorders, and Gender Dysphoria

Disorder	*DSM-IV*	*DSM-5*	Update
Delayed ejaculation (formerly male orgasmic disorder)	M only	M only	No change
Erectile disorder	M only	M only	No change
Female orgasmic disorder	F only	F only	No change
Female sexual interest/arousal disorder	F only	F only	No change
Genito-pelvic pain/penetration disorder (formerly vaginismus and dyspareunia)	F only	F only	No change
Male hypoactive sexual desire disorder (formerly hypoactive sexual desire disorder)	M only	M only	No change
Premature ejaculation	M only	M only	No change
Voyeuristic disorder	M > F	3M:1F	Changed
Exhibitionistic disorder	M > F	M > F	No change
Frotteuristic disorder	M > F	M > F	No change
Sexual masochism disorder	20M:1F	M > F	Changed
Sexual sadism disorder	M > F	M > F	No change
Pedophilic disorder	M > F	M > F	No change
Fetishistic disorder	M > F	M > F	No change
Transvestic disorder	M > F	M > F	No change
Gender dysphoria (formerly gender identity disorder)	5M:1F in children; 2–3M:1F in adults	2–4.5M:1F in children; M = F in adolescents; 1–6.1M:1F in adults	Changed

Note. M = male; F = female. Most disorder names in the paraphilic category were changed slightly from *DSM-IV* to *DSM-5*, but specifics are not noted here.

Method

It is beyond the scope of this article to conduct systematic reviews of sex/gender information for all 121 disorders (although, this should be a goal for the field). Thus, we conducted systematic reviews of epidemiological studies for six disorders. Specifically, we picked two relatively high-prevalence, well-studied disorders: ADHD and MDD; two relatively low-prevalence, and potentially understudied disorders: childhood-onset fluency disorder (stuttering) and dissociative identity disorder (DID); and two that caught our attention because statements in the *DSM–5* challenged assumptions we had: DMDD (because it is a newly classified disorder, but the *DSM–5* includes a statement about the likely preponderance of boys), and selective mutism (SM; because the *DSM–5* lists an equal sex/gender ratio). These six disorders were not selected randomly, and therefore the outcomes of these six reviews cannot necessarily be extrapolated to the other 115 disorders. Regardless, these reviews provide a glimpse into some accuracies and inaccuracies in the *DSM–5*.

For these six disorders, we conducted systematic reviews with the following parameters. We searched *PsycINFO* and *PubMed* to

Table 10
Sex/Gender Information for Disruptive, Impulse-Control, and Conduct Disorders and Substance-Related and Addictive Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Oppositional defiant disorder	M > F	1.4M:1F in children; M = F in adolescents and adults	Changed
Intermittent explosive disorder	M > F	M > F or M = F	Changed
Conduct disorder	M > F	M > F	No change
Pyromania	M > F	M > F	No change
Kleptomania	F > M	3F:1M	Changed
Alcohol use disorder	M > F	2.5M:1F	Changed
Cannabis use disorder	M > F	1.3M:1F in adolescents; 2.8M:1F in adults	Changed
Phencyclidine use disorder	2M:1F	3M:1F	Changed
Other hallucinogen use disorder	3M:1F	1.5F:1M in adolescents; 2M:1F in adults	Changed
Hallucinogen persisting perception disorder (new to *DSM-5*)	NA	No information	NA
Inhalant use disorder	3–4M:1F	M > F in adults; M = F in adolescents	Changed
Opioid use disorder	3–4M:1F	3M:1F for heroin; 1.5M:1F for other opioids	Changed
Sedative, hypnotic, or anxiolytic use disorder	F > M	2F:1M in adolescents; M > F in adults	Changed
Stimulant use disorder			Changed
Amphetamine-type stimulants	1–4M:1F	3F:1M in adolescents; M = F in adults	
Cocaine	M = F	4M:1F	
Tobacco use disorder	M > F	1.2M:1F	Changed
Gambling disorder (formerly pathological gambling disorder)	2M:1F	3M:1F	Changed

Note. M = male; F = female. This table does not include related withdrawal disorders, because to have a withdrawal disorder one must also have the related use disorder. This table does not include related intoxication disorders, because no gender differences are presented for these disorders specifically. Most disorder names were changed slightly from *DSM-IV* to *DSM-5*, but specifics are not noted here.

Table 11
Sex/Gender Information for Neurocognitive Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Delirium	F > M	No information	Removed
Major or mild neurocognitive disorder due to Alzheimer's disease	F > M	No information	Removed
Major or mild frontotemporal neurocognitive disorder (new to *DSM-5*)	NA	M > F for two variants; F > M for one variant	NA
Major or mild neurocognitive disorder with Lewy Bodies (new to *DSM-5*)	NA	1.5M:1F	NA
Major or mild vascular neurocognitive disorder	M > F	M > F	No change
Major or mild neurocognitive disorder due to traumatic brain injury	M > F	1.5M:1F	Changed
Major or mild neurocognitive disorder due to HIV infection	No information	No information	No change
Major or mild neurocognitive disorder due to Prion diseases	No information	No information	No change
Major or mild neurocognitive disorder due to Parkinson's disease	No information	M > F	Added
Major or mild neurocognitive disorder due to Huntington's disease	M = F	No information	Removed

Note. M = male; F = female. Some disorder names were changed from *DSM-IV* to *DSM-5*, but specifics are not noted here.

ensure coverage of both psychology and psychiatry. Second, we restricted all searches to English language articles. Next, we used a series of four steps to narrow our searches (see Figure 1). At the first step, we searched by the name of the disorder in the title (see online supplemental material). At the second step, we searched by sex/gender terms in all text to ensure that we were limiting to studies that mentioned sex/gender. At the third step, we searched by prevalence terms in the title to find epidemiological and/or community-based studies. Finally, at the fourth step we searched by meta-analysis or review terms in the title to find reviews of prevalence or epidemiological studies. All search terms were entered into the database thesaurus to look for similar terms, and final search terms were approved by a university librarian. The specific results of our six searches are shown in the online supplemental material.

Our decision to discuss studies herein was also systematic. If we found meta-analyses or systematic reviews of prevalence or epidemiological studies for any of these six disorders, then we only discussed these studies. We considered these studies to be the highest level, or most comprehensive type, of analysis. Furthermore, any worldwide meta-analysis or review superseded studies from just one country. If we did not find a meta-analysis or systematic review of prevalence studies, we instead reviewed and discussed all individual prevalence or epidemiological studies. In addition, we initially limited the publication date to 2012 or earlier (as the *DSM–5* was published in 2013) to examine literature that was available at the time the *DSM–5* was being prepared. However, in an effort to provide readers with current information, we also expanded our full search to 2018 and separately discussed any more recent meta-analyses or systematic reviews of prevalence or epidemiological studies that emerged.

Results

ADHD. We conducted a systematic review of the prevalence of ADHD by sex/gender (Figure 1 and online supplemental material). Our search resulted in two worldwide meta-analyses of prevalence rates of ADHD (i.e., Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007; Willcutt, 2012). Willcutt (2012) will be reviewed here because it included sex/gender ratios whereas Polanczyk et al. reported that gender was not included in their metaregression because fewer than 50% of studies in their analysis provided data disaggregated by sex/gender.

Willcutt (2012) conducted a meta-analysis that included 86 independent samples of children and 11 independent samples of adults. Willcutt noted a range of sex/gender ratios of ADHD that varied based on age, ADHD subtype, and rater. For example, the male-to-female ratio for ADHD-combined type as rated by parents was 2.6:1, the ratio for ADHD-inattentive type as rated by parents and teachers together was 2.1:1, the ratio for 6- to 12-year-olds with any presentation of ADHD is 2.3:1, and the ratio for adults with any subtype was 1.6:1. Moreover, because this was a worldwide study that included many developmental levels, the conclu-

Table 12
Sex/Gender Information for Personality Disorders

Disorder	*DSM-IV*	*DSM-5*	Update
Paranoid personality disorder	M > F	M > F	No change
Schizoid personality disorder	M > F	M > F	No change
Schizotypal personality disorder	M > F	M > F	No change
Antisocial personality disorder	M > F	M > F	No change
Borderline personality disorder	3F:1M	3F:1M	No change
Histrionic personality disorder	F > M or M = F	F > M or M = F	No change
Narcissistic personality disorder	1–3M:1F	1–3M:1F	No change
Avoidant personality disorder	M = F	M = F	No change
Dependent personality disorder	F > M or M = F	F > M or M = F	No change
Obsessive-compulsive personality disorder	2M:1F	2M:1F	No change

Note. M = male; F = female.

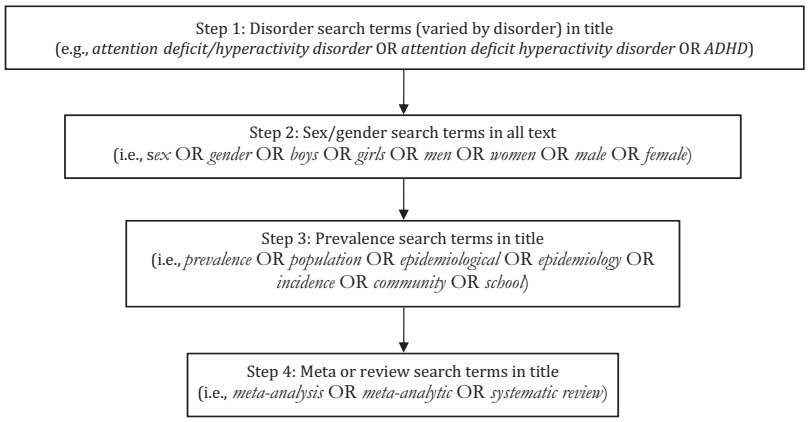

Figure 1. Systematic review search terms by step.

sions are applicable across cultures, and consistently show a decrease in prevalence across development. Thus, the *DSM–5* conclusion that the sex/gender ratio for ADHD is "approximately 2:1 in children and 1.6:1 in adults" (APA, 2013, p. 63) is an evidence-based conclusion.

MDD. Second, we conducted a systematic review of MDD prevalence by sex/gender (Figure 1 and online supplemental material). Our search yielded one study, Ferrari et al. (2013), that met our criteria for a worldwide meta-analysis or systematic review of prevalence/epidemiological studies (and was flagged in our 2012 search because of its online publication date). Ferrari and colleagues explored the global prevalence of MDD via 116 studies. They found that the worldwide prevalence rate for major depressive disorder (across 105 studies) in women was 5.8% and 3.5% in men. This was a female-to-male ratio of 1.66:1 (Ferrari et al., 2013). In addition, when only a *DSM*- or *ICD*-based diagnostic tool was used (94 studies), the female-to-male ratio was 1.74:1.

In our effort to include more recent research, we expanded the search to include studies published through 2018, and one study, Salk, Hyde, and Abramson (2017), fit our criteria as a worldwide meta-analysis or systematic review. The Salk et al. paper included two meta-analyses of nationally representative samples (one for MDD which included 65 papers, and a second for depressive symptoms which included 95 papers). Salk et al. (2017) concluded that MDD is more common in women than men. Specifically, "Effect sizes ranged from *OR* = 1.71 to *OR* = 3.02, with *ORs* >2.0 during adolescence and *ORs* between 1.71 and 2.02 in adulthood" (p. 805). Because this was a worldwide study with attention given to developmental trends, the conclusions are applicable across cultures, and show a consistent sex/gender divergence beginning in adolescence. Regarding the sex/gender ratio of MDD, the *DSM–5* states "Females experience 1.5- to 3-fold higher rates than males beginning in early adolescence" (APA, 2013, p. 165). Thus, based on Ferrari et al. (2013) and Salk et al. (2017), the *DSM–5* conclusions on MDD are almost perfectly in line with the data.

Childhood-onset fluency disorder. Next, we conducted a systematic review of the prevalence of childhood-onset fluency disorder by sex/gender (stuttering; Figure 1 and online supplemental material). As was noted above, two relatively high-prevalence, well-researched disorders—ADHD and MDD—have accurate, evidence-based sex/gender information included in the *DSM–5*. Stuttering has perhaps been studied to a lesser degree, and therefore serves as an interesting point of comparison. In addition, the *DSM–IV* listed the male-to-female ratio for stuttering as 3:1, whereas the *DSM–5* fails to mention sex/gender. Our search resulted in two international reviews of epidemiological studies of stuttering: Craig and Tran (2005) and Yairi and Ambrose (2013; although published in 2013, it appeared in our search because of its online publication date).

The review study by Craig and Tran (2005) summarized epidemiological studies of stuttering published in the prior 50 years. They concluded that the male-to-female ratio ranged from 1.4:1 to 4:1 depending on age. Likewise, Yairi and Ambrose (2013) summarized five prevalence studies with sex/gender data available (published between 2001 and 2011), and reported male-to-female ratios of 0.66:1, 2.6:1, 4.6:1, 2.3:1, and 2.47:1 (this 2.47:1 ratio is based on a U.S. study of 119,000 participants; Boyle et al., 2011). Thus, the data are clear; the male preponderance is evident and relatively consistent in several population-based studies. All of these data were available to the *DSM–5* Neurodevelopmental Disorders work group, and yet no sex/gender information is present in the childhood-onset fluency disorder section. It is not clear why sex/gender would have been left out of *DSM–5*. This omission is especially puzzling given that the sex/gender ratio provided in *DSM–IV* was accurate (i.e., 3:1 male-to-female).

Dissociative identity disorder. As our fourth systematic review we examined DID (Figure 1 and online supplemental material). This disorder has a lower prevalence rate and is not as well studied as ADHD and MDD. Nonetheless, very specific DID sex/gender information is presented in *DSM–5* (i.e., 1.6% prevalence rate in males and 1.4% prevalence rate in females). Our search yielded one epidemiological diagnostic study (i.e., Johnson, Cohen, Kasen, & Brook, 2006). There were 658 participants (mean age 33) in this community-based longitudinal follow-up study in the United States. Participants were administered a semistructured clinical interview, and the prevalence of DID was reported to be 1.5%. The authors went on to report that the prevalence in men was 1.6% and in women was 1.4%, but that "sex differences in the prevalence of dissociative disorders were not statistically significant" (Johnson et al., 2006, p. 135). Thus, in this study, the

male-to-female ratio for DID was 1:1, and yet the *DSM–5* reported sex/gender prevalence rates of 1.6 males to 1.4 females. This implies that the sex/gender difference is significant because the default in the *DSM* is to introduce a specific ratio only when there is a significant difference.

Disruptive mood dysregulation disorder. Our fifth systematic review of sex/gender prevalence pertains to DMDD (Figure 1 and online supplemental material). This disorder is new to *DSM–5*, and we found it curious that this new disorder included sex/gender information (i.e., "rates are expected to be higher in males and school-age children than in females and adolescents;" APA, 2013, p. 157) when some other new disorders did not. Our search resulted in one study that we review here. This study, Brotman et al. (2006), was an epidemiological diagnostic study carried out in the United States (i.e., Great Smoky Mountains Study). In this study, there were 1,420 participants between the ages of 9 and 19 years. Parents and children were administered a semistructured clinical interview and the prevalence of severe mood dysregulation (now DMDD) was 3.3%. For boys, the prevalence was 10.1% and for girls, the lifetime prevalence was 3.2%. Thus, based on Brotman et al. (2006), the ratio of boys to girls with this disorder is approximately 3:1. Given that this study was available at the time *DSM–5* was being prepared, we agree with the *DSM* conclusion that "a male preponderance appears to be supported" (APA, 2013, p. 158).

Selective mutism. Lastly, we conducted a systematic review of the literature on sex/gender differences in SM prevalence (Figure 1 and online supplemental material). SM caught our attention because the *DSM–IV* reported it to be more common in girls than boys, but *DSM–5* stated that it "does not seem to vary by sex" (APA, 2013, p. 196). Our search yielded four studies that will be reviewed here (i.e., Karakaya et al., 2008; Kopp & Gillberg, 1997; Kumpulainen, Räsänen, Raaska, & Somppi, 1998; Sharkey & McNicholas, 2012); these studies were conducted in Turkey, Sweden, Finland, and Ireland, respectively. These studies screened for SM rather than formally diagnosing it, but because our search did not produce an epidemiological diagnostic study we chose to aggregate data from these four screening studies. Across these four studies, 90,564 participants from community- or school-based samples were screened for SM, and 84 met study criteria. Of the 84 participants with SM, 51 were girls and 33 were boys; the ratio of females to males with SM was approximately 1.5:1 in these four studies. The data available at the time *DSM–5* was being prepared suggested a female preponderance of SM; meaning that the *DSM–5* conclusion that SM is equally common in boys and girls was not consistent with the existing literature.

Discussion

In the preceding sections we systematically reviewed the prevalence literature for six individual disorders and compared the resulting data to *DSM–5*. Based on these analyses, we conclude that the inclusion and reporting of sex/gender information across disorders in the *DSM–5* was not consistent. For the two most well-understood disorders that we examined (i.e., ADHD and MDD), sex/gender information in the *DSM–5* was accurate and appropriately detailed. However, for disorders that are less well-studied, data in the *DSM–5* were inconsistent, and at times erroneous. For one such disorder included in our review, accurate sex/gender information (i.e., DMDD) was reported in *DSM–5*. However, for the other three understudied disorders, inaccurate sex/gender information was provided in *DSM–5*. Specifically, for childhood-onset fluency disorder, a documented sex/gender difference was not reported in *DSM–5*; for DID a differential sex ratio was reported in *DSM–5* when in fact the sex/gender difference was nonsignificant (Johnson et al., 2006); and for SM no sex/gender difference was reported in *DSM–5* when the data supported a female preponderance. Thus, we conclude that the authors of *DSM–5* were inconsistent in terms of making empirically supported conclusions about sex/gender differences in prevalence rates. Although our selection of these six disorders was not random, our documentation of inconsistencies and errors is nevertheless concerning.

Discussion and Recommendations

Across our three investigations, we found that there is significant room for improvement regarding what is known about sex/gender in psychopathology. Because of this, we offer several recommendations that may enhance this understanding. Although some of these recommendations have been made elsewhere, we consolidate and reemphasize them here. Also, while our recommendations are specific to sex/gender constructs, many of these suggestions could be extended to race and ethnicity constructs. Our recommendations, discussed in detail below, include (a) enhanced consideration of sex/gender issues in future editions of the *DSM*, (b) representative samples and clear sample descriptions, (c) accurate use of sex/gender terminology, (d) consistent analysis by sex/gender, and (e) increased output of, and funding for, epidemiological studies, systematic reviews and meta-analyses.

Enhanced Consideration of Sex/Gender in Future Editions of the *DSM*

We appreciate that revising and updating the *DSM* is a hugely complex process, and therefore understand that our recommendations present an additional burden on the next task force. Nevertheless, it is our contention that with some additional structure, the sex/gender information in the *DSM* could be presented in a more consistent manner. First, in the course of reviewing the *DSM–5* for the purposes of the current study, sex information was present for 83% of disorders. We recommend that 100% of disorders mention sex/gender, even if it is to say that no conclusions have yet been reached or that only one biological sex suffers from a particular disorder. Second, we recommend that every disorder include a sex/gender section, and that this subsection contain all relevant sex/gender prevalence rates or ratios. Similarly, when the *DSM* provides "peripheral" sex/gender information, we recommend that it is not portrayed as a prevalence rate or ratio. For example, in the *Prevalence* subsection of major or mild neurocognitive disorder due to traumatic brain injury, the *DSM–5* states "Males account for 59% of TBIs in the United States" (APA, 2013, p. 625). The placement of this statement in the prevalence subsection implies a 1.5:1 male-to-female ratio for neurocognitive disorder but is simply peripheral information about TBI. Third, it is recommended that the next *DSM* task force make adequate funding available to the Gender and Cross-Cultural and Issues Study Group. The chair of this study group for *DSM–5* reported that they did not have

funds to support the project (K. A. Yonkers, personal communication, May 27, 2016). Fourth, we recommend separating this study group into two entities: one focused on sex/gender, and the other on cross-cultural matters in order to give each topic full consideration. Next, we observed that the *Gender and Cross-Cultural and Issues* study group appeared to consist of more men than women (an approximately 4:1 M:F ratio). We recommend equitable representation across sex/gender and race/ethnicity, especially in study groups tasked with examining these issues.

Finally, to make the inclusion of sex/gender information in the next iteration of the *DSM* more scientific and systematic, the *DSM* task force could benefit from establishing guidelines for how much and what type of research is needed to conclude that the available sex/gender information is robust enough to be included. To this end, and based on what we learned from conducting six systematic reviews, we have designed a rubric for determining whether sex/gender prevalence data is strong enough to warrant inclusion in the *DSM* (see Table 13). Modeled loosely after the Chambless et al. (1996) rubric for rating various treatments as evidence-based, this method may help future *DSM* work groups more systematically examine the literature.

As applied to the six disorders for which we conducted systematic reviews above, ADHD and MDD data would fall at the highest level (Level 1, strong evidence, as both had a worldwide meta-analysis of epidemiological studies), and indeed this is the level of reporting found in the *DSM–5*. Likewise, for childhood-onset fluency disorder, our systematic review would place the differential sex/gender ratio at Level 1, as two systematic reviews of epidemiology emerged. Specifically, there is strong evidence to conclude a male preponderance of stuttering, but the *DSM–5* fails to report this information. As for DID, the literature would qualify for Level 3 (adequate evidence; based on one epidemiological diagnostic study). In this case we recommend reporting vague information rather than the very specific percentages listed in *DSM–5*. Next, DMDD is a new disorder to *DSM–5*, but nonetheless the literature on this disorder qualifies for Level 3 (with one epidemiological diagnostic study). Thus, the *DSM–5* conclusion about a likely male preponderance is appropriate. Finally, the literature on SM falls at Level 3 as there are four epidemiological screening studies; we would recommend reporting vague information about the female preponderance rather than stating that there is no difference by sex/gender as is done in *DSM–5*.

Representative Samples and Clear Sample Descriptions

In addition to recommendations to the next *DSM* task force, we offer recommendations to psychopathology researchers, journal editors, and funding agencies. We recommend that researchers include both males and females in their studies when the disorder occurs in both sexes, and that sample descriptions are clear and unambiguous in terms of sex/gender data. As stated above, in a review of two top psychopathology journals from 2010 through 2017, 58 studies did not report participant sex/gender anywhere in the title, abstract, or participants section. In addition, 12.4% of studies published during this period were confined to one sex/gender. We join many others in calling for researchers, journal editors, and funding agencies to ensure that males and females are adequately represented (Day et al., 2017; Hartung & Widiger, 1998; Heidari et al., 2015; Howard et al., 2017; Leopold et al., 2014; Mazure & Jones, 2015; McGregor, Markowitz, Forrester, & Shader, 2017; Nowatzki & Grant, 2011). As Leopold et al. (2014) stated, "This is not just a semantic issue. It is a health issue, both for women and men. Women have been underrepresented in med-

Table 13
Rubric for Determining Whether There is Sufficient Sex/Gender Data to Include Differential Sex Ratios in the DSM

Level of confidence	What is required?	What to report?
Level 1: Strong evidence	1 meta-analysis or systematic review OR ≥ 4 epidemiological diagnostic studies from at least 3 independent research teams	Report very specific information (e.g., 2.3:1 ratio in children and 2.7:1 ratio in adolescents and adults)
Level 2: Moderate evidence	2–3 epidemiological diagnostic studies OR ≥ 6 epidemiological screening studies from at least 2 independent research teams	Report specific information (e.g., a 3:1 ratio).
Level 3: Adequate evidence	1 epidemiological diagnostic study OR 3–5 epidemiological screening OR ≥ 6 clinical diagnostic studies from at least 2 independent research teams	Report vague information (e.g., M > F) but may qualify it (e.g., likely a 2–3:1 ratio)
Level 4: Preliminary evidence	2 epidemiological screening studies OR 3–5 clinical diagnostic studies	Report only vague information (e.g., M > F)
Level 5: Inadequate evidence	1 epidemiological screening study OR 1–2 clinical diagnostic studies OR any number of clinical screening studies	Report that there is not enough evidence to make a conclusion about sex/gender

Note. M = male; F = female. We recommend systematic reviews and data aggregation and weighting for each disorder before any conclusion be included in the *DSM*. Researchers should also note whether these conclusions are based on studies from many countries, or just one. Meta-analysis or systematic review = studies were systematically selected using specific search criteria with literature databases; inclusion criteria were well-defined to select high-quality epidemiological diagnostic studies; Epidemiological diagnostic study = participants were randomly selected from the community or an entire birth cohort or cross-sectional group was included; methodology included gold-standard diagnostic strategies (e.g., structured or semi-structured clinical interviews); Epidemiological screening study = participants were randomly selected from the community or an entire birth cohort or cross-sectional group was included; methodology did not include gold-standard diagnostic strategies (e.g., rating scales only); Clinical diagnostic study = participants presented to a clinic for assessment and/or treatment or were recruited from the community based on specific symptom presentations; methodology included gold-standard diagnostic strategies (e.g., structured or semistructured clinical interviews); Clinical screening study = participants presented to a clinic for assessment and/or treatment or were recruited from the community based on specific symptom presentations; methodology did not include gold-standard diagnostic strategies (e.g., rating scales only)

ical research, and therefore the evidence that drives their care is less robust" (p. 391). Furthermore, sex/gender similarities should be considered as important and interesting as sex/gender differences and should be treated as such in articles (Evans & Reynolds, 2015; Rutter et al., 2003). Specifically, a null finding or small effect size with regard to sex/gender data is equally important when the goals are a clear understanding of the etiology of psychopathology (Rutter et al., 2003) and reliable and valid assessment and treatment strategies across sex/gender.

We recommend that all psychopathology journals include this as an instruction to their authors as is done in the *Journal of the American Medical Association* (*JAMA*) *Psychiatry* and the *Journal of Clinical Child and Adolescent Psychology* (*JCCAP*). For example, *JAMA Psychiatry* specifies in its online Instructions for Authors that "the sex distribution of study participants or samples should be reported in the Results section" and "the term *sex* should be used when reporting biological factors and *gender* should be used when reporting gender identity or psychosocial/cultural factors." In Table 2 it is evident that these instructions have been effective, as all studies from this journal identified by Howard et al. (2017) reported the sex/gender of participants. Likewise, the National Institutes of Health (NIH) recently clarified their position regarding the consideration of biological sex in NIH-funded research (National Institutes of Health, 2015). Their contention is that "just like randomization, blinding, sample-size calculations, and other basic design elements, consideration of sex is a critical component of rigorous design. Failure to account for sex as a biological variable may undermine the rigor, transparency, and generalizability of research findings" (p. 1). Further, new so-called SAGER guidelines (Sex and Gender Equity in Research; Heidari et al., 2015) aim in part to help researchers use the terms sex and gender appropriately. The SAGER guidelines are also useful in helping researchers and journal editors ensure that sex/gender constructs are appropriately discussed within each section of an article. We echo the importance of the steps taken by the NIH and the SAGER guidelines and call on psychopathology researchers and journal editors alike to be cognizant of sex and gender as important variables in all stages of research.

Accurate Use of Sex/Gender Terminology

As has been covered in this article, the terms *sex* and *gender* are often conflated in human research. We recommend that psychopathology researchers take steps to avoid this common problem. Our recommendations on how to do so are outlined below.

How should researchers measure sex/gender constructs? Although researchers usually do not specify exactly how a sex/gender item was worded, it is our assumption that most researchers ask "What is your gender?" or "What is your sex?" with categorical response choices of *male* and *female*. Thus, when differential sex and/or gender prevalence information is included, it is unclear whether biological sex or gender identity is being reported. Wadsworth, Morgan, Hayes-Skelton, Roemer and Suyemoto (2016, p. 83) proposed the following questions and response options: "(a) What is your *biological sex*? (male, female, intersex, not listed [please specify]); (b) What is your *gender identity*? (male, female, transgender, non-binary/fluid-queer/gender queer, not listed [please specify]); (c) What is your *sexual orientation*? (asexual, bisexual, gay or lesbian, heterosexual, queer, pansexual, not listed [please specify])." This level of detail would allow researchers to more accurately operationalize sex/gender constructs. It is also worth noting that some participants may not feel comfortable marking any of the categories above, and others may prefer to mark more than one; certainly, these items and response options are open to empirical study and debate over time.

There are many reasons to begin asking multiple and more specific questions. First, we want all of our participants to feel included in our studies and not to experience demographic forms as insensitive (Westbrook & Saperstein, 2015). Second, in describing our samples, it is useful to comment on gender identity and sexual orientation in addition to age, biological sex, race, and ethnicity. Third, making a distinction between biological sex and gender identity may be important for helping us understand differential sex/gender ratios and for delineating comprehensive models of etiology. Finally, marginalized groups in our society (e.g., racial and ethnic minorities, gender and sexual orientation minorities) are at increased risk for some types of psychopathology (Fergusson, Horwood, & Beautrais, 1999; Nguyen, Huang, Arganza, & Liao, 2007). Thus, we hope that as a field we will eventually develop a better understanding of differential prevalence ratios based on gender identity and sexual orientation.

We recognize that it might seem cumbersome to ask multiple questions about sex and gender, and that researchers will frequently not have large enough samples to analyze data separately for gender and sexual orientation minorities. However, social science researchers routinely include separate questions for race and ethnicity because these are understood to be different constructs (Wadsworth, Morgan, Hayes-Skelton, Roemer, & Suyemoto, 2016). Researchers should do the same for sex/gender constructs. It is possible that this could lead to a cascade of 'identity' items on every demographics form, but we believe that researchers can be both inclusive of sex/gender constructs and concise on their demographics forms if they focus on the most important sex/gender constructs in their particular studies. To this end, we offer the following guidelines:

Which constructs should researchers measure based on the goals of a study? Given the balance that researchers must strike between inclusion and brevity, our recommendations vary depending on the goals and hypotheses of a particular study. First, if researchers are measuring and reporting sex/gender constructs for descriptive purposes and do not have any hypotheses that are specific to sex/gender, then we recommend they measure biological sex. The reason we suggest biological sex is that it is the only sex/gender construct that can be measured accurately with one question.

Second, if researchers have hypotheses about gender identity, we recommend measuring gender identity in addition to biological sex. Researchers should consider framing their hypotheses, and conducting their analyses, in a manner that will allow examination of the intersection of biological sex and gender identity. Our recommendation to examine both biological sex and gender identity is based on the premise that the intersection of these two constructs is particularly meaningful in our society. That is, whether one's gender identity matches their biological sex is probably more important for predicting stigma and psychological adjustment than gender identity alone. For example, if we study individuals with a female gender identity, we would expect there to be significant differences in the social experiences of biological females who identity as female versus biological males who iden-

tify as female. Our proposal to consider the intersection of biological sex and gender identity is similar to the two-question method proposed by Tate, Ledbetter, and Youssef (2013); however, they suggested asking about gender assigned at birth rather than biological sex.

Similar to Tate et al. (2013), we propose five sex/gender groups. Our categories include (a) cisgender females (i.e., biological females who identify as female), (b) cisgender males (i.e., biological males who identify as male), (c) noncisgender females (i.e., transgender females or intersex individuals who identify as female), (d) noncisgender males (i.e., transgender males or intersex individuals who identify as male), and (e) nonbinary/gender-queer (i.e., individuals who do not subscribe to a binary gender identity). The nonbinary group could be further separated by biological sex depending on the research question.

Third, if researchers have hypotheses about whether societal gender roles or biological sex are implicated in potential differences, then we recommend measuring biological sex and gender role orientation (i.e., add a measure of masculinity and femininity).[3] Fourth, if researchers are interested in examining psychopathology among gender and sexual minorities, we recommend measuring biological sex, gender identity, and sexual orientation. Given likely power issues in smaller studies, psychopathology researchers may need to begin by comparing cisgender heterosexual individuals to a combined group of individuals with sexual and gender minority status (i.e., intersex individuals, noncisgender individuals, and nonheterosexual individuals). In larger studies it would be ideal to separate all of these groups.

Consistent Analysis by Sex/Gender

In addition to asking accurate questions and using precise language, it is also important to give analytic attention to these variables. First, we recommend that researchers disaggregate results by sex and/or gender. This becomes particularly salient when other research teams conduct meta-analyses or a review of the literature. Specifically, we recommend, as others have (Clayton & Tannenbaum, 2016; Day et al., 2017; Heidari et al., 2015; Nowatzki & Grant, 2011), that even if a particular study does not have adequate power to analyze by sex/gender, the sex/gender data should still be reported separately so that other research teams can understand the sex/gender breakdown of the data, examine effect sizes, and use the separate data in meta-analyses.

Second, we recommend that researchers avoid data analytic bias by considering relevant sex and gender constructs as important variables in their analytic models. Our reviews of the *Journal of Abnormal Psychology* and the *Journal of Abnormal Child Psychology*, as well as the Howard et al. (2017) analysis of *JAMA Psychiatry* and the *British Journal of Psychiatry* suggest that the field of psychopathology is making significant progress in terms of avoiding sampling bias by more consistently including both males and females in research studies. However, at the analytic level, progress is more limited. Researchers are not consistently considering sex/gender constructs as independent variables (see Table 2). Thus, it is our recommendation that researchers consistently consider sex and gender constructs as independent variables in studies of psychopathology. In addition, when sex/gender is analyzed, it is important to include effect sizes in the results and tables so that the magnitude of the effect can be evaluated (Clayton & Tannenbaum, 2016).

Furthermore, although covarying sex may be better than ignoring it altogether, it is insufficient for determining whether the underlying causes of a disorder are the same across sexes; nor does it demonstrate whether the same assessment tools and treatment strategies are effective across sexes. Thus, we argue that progress will be maximized if relevant sex/gender constructs are considered as independent variables. If there are specific hypotheses regarding differential outcomes, relevant sex and gender variables should be included in the primary analyses of a study. However, if the research team does not have a priori hypotheses, we recommend that sex/gender be analyzed in an exploratory fashion. Thus, rather than including sex/gender variables in preliminary analyses as possible covariates, they should be included in primary or exploratory analyses.

As Leopold et al. (2014) recommended, researchers should "design studies that are sufficiently powered to answer research questions for both males and females" (p. 392). If researchers have sufficient power to analyze results by sex/gender, this will be optimally informative for generalizing the results. However, it may not always be possible to obtain sufficient numbers of males or females, especially if a disorder affects one group more frequently. Even in cases of large samples, cell sizes for the minority sex and/or for gender and sexual minorities may still be insufficient. In these cases, researchers should attempt to analyze results by sex/gender, but, given a lack of statistical significance, should calculate and report effect sizes and clearly acknowledge power limitations so that null results are not misinterpreted to indicate no sex/gender differences. Finally, we recommend that authors routinely comment on lack of power for analyzing sex/gender in the limitations section as is often done with race/ethnicity.

Increased Epidemiological Studies, Systematic Reviews, and Meta-Analyses

We recommend that researchers and funding agencies continue to conduct and support high-quality, large-scale epidemiological studies, systematic reviews, and meta-analyses in which sex/gender is considered. These types of studies are particularly important for elucidating sex/gender prevalence rates and ratios, and informing the *DSM* task force, and the research and clinical community, about sex/gender in each disorder. It is worth noting that in our systematic reviews it was not infrequent that we found large-scale epidemiological studies that did not separate prevalence rates for males versus females. Epidemiological studies play a vital role in our understanding of prevalence rates, especially with regard to understanding the nuanced differences in prevalence rates by sex/gender. However, as Feigin and Howard (2008) argued, "there is a recent worrisome trend to downplay the importance of epidemiological studies, especially non-experimental epidemiological studies. Some academicians and medical research funding institutions tend to consider non-experimental epidemiological studies as . . . non-exciting research and indicate their preferences for clinical trials" (p.

[3] The best way to measure gender role orientation is unclear in the literature. See Wood and Eagly (2015) for a discussion of issues to be considered when conducting research on gender identity and gender role orientation.

1). In addition, international epidemiological studies are important, as they can disentangle true biological sex differences from cultural gender differences, as are epidemiological studies that examine sex/gender from a developmental perspective (e.g., Salk et al., 2017). Thus, we recommend renewed research efforts and funding avenues toward this end, as well as a reexamination of existing epidemiological data sets with an eye toward sex/gender constructs that may have been ignored initially.

We also recommend additional meta-analyses and systematic reviews of new and existing epidemiological studies for each disorder with a focus on understudied disorders where these types of studies have not yet been carried out (Willcutt, 2012 and Salk et al., 2017 serve as excellent examples). Meta-analysis can serve as a tool to better understand the magnitude of the relation between sex/gender and psychopathology. Meta-analytic procedures will be made easier when researchers of individual studies publish sex/gender data separately as suggested above. Moreover, systematic reviews are a good way to summarize the results of a body of literature, especially when the statistical method used in a meta-analysis is not feasible. We call for psychopathology researchers to conduct more meta-analyses and/or systematic reviews of sex/gender in an effort to enhance our understanding of mental illness and increase the availability of this information prior to the development and publication of the next iteration of the *DSM*.

Conclusions

We have reviewed issues that complicate our understanding of sex/gender in psychopathology and have provided recommendations for future research. Although we point out terminology issues and methodological biases that may contribute to differential sex/gender prevalence ratios, we expect that, ultimately, there will be true differences in the rates of disorders across sex/gender constructs. As Hartung and Widiger (1998) stated, "The intent of this review of potential biases and errors in the estimates of differential sex prevalence rates is not to suggest that no differential sex prevalence rates actually exist" (p. 262). On the contrary, several recent studies have demonstrated that some sex/gender differences in psychopathology are the result of true differences (e.g., Arnett et al., 2015; Eaton et al., 2012). However, for disorders that show a differential sex/gender prevalence ratio, researchers should conduct careful research to rule out biased sampling, analyses, and diagnostic criteria as explanations for the difference. Once we have established that true differences exist, we can begin to examine which factors contribute to these differences (e.g., genetics, biology, culture). This, in turn, will allow us to develop multifactorial etiological models that explain the differences and assessment and treatment methods that are effective across various sex and gender constructs. In summary, our continued attention to precise terminology, accurate measurement, and the reduction of biases will allow us to more precisely measure sex/gender with respect to the prevalence rates and underlying causes of psychopathology, and enhance the effectiveness of our assessment and treatment methods.

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