March 1, 2023

Beth Oller, MD, FAAFP

Testimony in Opposition of SB 180

To the Kansas State House of Representatives Health and Human Services Committee:

Thank you for the opportunity to speak to you today, albeit virtually. I am providing testimony virtually because I am working today, seeing patients and caring for my community. I am a board certified Family Physician who has practiced in a rural-underserved community in Kansas for the past 12 years. I practice full-scope family medicine, meaning that I deliver babies, cover the ER, care for patients in the hospital, see patients in the clinic, see patients in the nursing home, in hospice care and in their home, and provide gender affirming medical care. My husband is also a Family Physician practicing in our community, and we are the parents of four children. As a medical professional with twelve years of post-secondary education as well as 12 years of clinical practice I have the experience and scientific background to speak to this issue. While the issues I take with this proposed bill as a physician and a woman are many, the first offense is in the title of the bill itself. This is in no way a women's bill of rights. Nothing in this bill defines or protects my rights as a woman, but it does fixate on the genitalia and reproductive capacity of myself and my patients. This bill, and bills like it do the opposite of protecting me or my patients, it will cause harm. The inaccuracies in the bill, but more the fact that this bill has been introduced and passed a branch of the legislature, is an embarrassment to me as a Kansan. Though those who introduced this bill have a poor understanding of the science of gender or sex I hope that by providing information today others in the legislature will take the opportunity to educate themselves and set a better example.

For decades scientists and physicians have agreed that there is no sufficient way to define what makes someone a woman, and that there is a myriad of variation. No true physician or scientist would claim to be able to distill the intricacies of this into a simple binary. Now I know what authors of this bill and supporters want to hear, and what makes them comfortable. They want to hear that biological sex is black and white, that there is a simple gender binary, however we know that this is simply not the case. Gender is not binary, but is a spectrum of biological, mental and emotional traits that exist along a continuum. The idea of a gender binary is not scientifically or medically correct. Gender can't be binary, because it is a personal identity and socially constructed. Sex, which refers to one's biological characteristics, also exists as a spectrum, because intersex people exist. We cannot erase or overlook their existence because it doesn't fit into the picture of a binary that many people prefer. A person's sex can be female, male, or intersex, which can present in many different biologic combinations. Biology, endocrinology, physiology, genetics, neuroscience and reproductive science have confirmed that both biological sex and gender exist as a spectrum, and this science cannot be ignored because someone wants to legislate a binary or because it makes people more comfortable.

Now it is true that sex and gender do tend to be bimodal, but not binary. This means that sex characteristics do tend to cluster into those associated with people that we conventionally call 'female' or 'male.' But there are many, many examples where this isn't the case. Perhaps the simplest way to

begin to explain this is to discuss that in our bodies there are at least ten different biological markers of 'sex': chromosomes, gonads, hormones, secondary sex characteristics, external genitalia, internal genitalia, gene expression, brain structure and hormone receptor sensitivity. None of the ten is strictly dichotomous, and the different markers do not always align.

Biological differences are not immutable as is alleged in the first Whereas clause. Organs are removed, change over time, change with medications, with age and with environmental factors. If you would like to be literal, we are not unique when it comes to reproductive biology as embryos, as we all start out with the same rudimentary reproductive tract regardless of chromosomes or genes. Many of those who the authors of this bill would define as female cannot become pregnant, produce ova, give birth or breastfeed, and many they would define as male cannot fertilize an ovum. Many intersex persons have testicular and ovarian cells present at the same time but produce no gametes.

Intersex is not a social construct or a gender identity. It is a biological configuration where a body has both male and female features, making it difficult to determine sex based on chromosomes or by examining external or internal sexual organs. It is estimated that babies with intersex traits account for up to 2% of live births, which may not seem like that many, but ask yourself this; do you know someone with red hair? I would wager that you do, and red heads make up 2% of the population. Now as a mother of two red heads and a physician I am very aware of how many people 2% represents. And this 2% of persons deserve to be seen and acknowledged. Intersex persons break the male/female binary and prove that sex exists as a spectrum of biological traits, a mosaic of traits, that present along a continuum. The biology can be complex but I would like to briefly explain why even chromosomes cannot easily define biological sex.

XX individuals, or those conventionally defined as female, can present with male gonads, and XY individuals, or those conventionally defined as male can have ovaries. How? Because development begins with complex genetic signals in a small group of cells called the bipotential primordium and a gene called *SRY*. A newly fertilized embryo initially develops without any indication of its sex. At around five weeks a group of cells clump together to form the bipotential primordium. These cells are neither male or female but have the potential to turn into testes, ovaries or neither. After the primordium forms, *SRY*, a gene on the Y chromosome, might be activated (of note this gene was discovered in 1990 thanks to the participation of intersex XX males and XY females). We do not understand everything about the *SRY* gene, but we do know that it plays a role in pushing the primordium toward male gonads, but it is not a simple on/off switch, it is a precisely timed start signal. A group of cells must all express *SRY* at the right time. Without that occurring, the embryo will make female gonads, or something in between. But there is still more. While brief, coordinated *SRY*-activation initiates the process of male-sex differentiation, genes like *DMRT1* and *FOXL2* maintain certain sexual characteristics during adulthood. If these genes stop functioning, gonads can change and exhibit characteristics of the opposite sex. Without these constantly active players certain components of your biological sex can change (thus as I stated above, are not immutable). However, *SRY*, *DMRT1* and *FOXL2* aren't directly involved with other aspects of biological sex. Secondary sex characteristics like the penis, vagina, appearance, and behavior arise much later from hormones, environment, experience and the interaction of genes. Then there is the issue of hormones. All humans possess levels of estrogen, progesterone and testosterone, and differences between these levels are not as different between sexes as popularly thought. During infancy and prepubescence these hormones are in a biopotential range, with no marked sex differences. Through puberty certain sex hormones become weighted

toward one end of a spectrum, but in developed adults' estrogen and progesterone levels are on average similar between males and nonpregnant females. The measurements of sex hormones in any one individual vary wildly across the range of 'average' values.

In medicine we refer to DSD's or differences in sexual development, and I'll discuss a few. There are individuals born with only 45 chromosomes, X0 or only one X chromosome. This is called Turner syndrome, and it affects 1 in every 2,000 baby girls. Most persons with Turner syndrome are infertile, most do not produce oocytes, and some do not have detectible ovaries. Most persons with Turner syndrome have monosomy, meaning a complete absence of an X chromosome, however some have mosaicism where some cells in the body have two complete copies of the X chromosome and others have only one copy. Some have X chromosome changes where there are changed or missing parts of one of the X chromosomes, and some even have Y chromosome material, where some cells have one copy of the X chromosome and other cells have one copy of the X chromosome and some Y chromosome material. Are these people women? See the complexity even with one DSD?

Some XX persons are born with two uteruses, or two vaginas, which are only two of the seven types of Mullerian duct anomalies or unusual configurations of the sexual organs. Over 100 million XX persons have some type of Mullerian anomaly, such as being born with internal testicles, being born with one ovary, or no ovaries. An XX embryo with an *SRY* gene will develop as a phenotypic male, while XY embryos lacking the *SRY* gene will develop as phenotypic females. There is 45,X/46,XY also called XY mosaicism which has variable clinical manifestations ranging from ambiguous genitalia to phenotypically normal genitalia of either sex and either male or female gonads. 46,XY DSD entails cases where the chromosomes are 46,XY but the testes don't develop, the hormones are not produced or the body does not respond or only partially responds to the hormones. One of these is complete androgen insensitivity syndrome where the external genitalia will appear female but there is no uterus and internal testes. Partial androgen insensitivity has the same karyotype of 46,XY but can have external anatomy that appears female or male, or have features of both. 5-alpha-reductase deficiency also has the 46,XY karyotype but genital ambiguity. 46,XX DSD occurs in congenital adrenal hyperplasia, so female fetuses are exposed to excess male hormone due to a deficiency of the enzyme 21-hydroxylase and become masculinized and develop testes. Congenital adrenal hyperplasia can also affect XY individuals and is the most common cause of ambiguous genitalia in newborns affection about 1 in 15,000 newborns. There also exist persons with 46,XX/XY; 47,XXX also called Trisomy X; 47,XXY also called Klinefelter syndrome; 47,XYY with normal phenotype; 48,XXXX; 48,XXXY; 48,XXYY; 49,XXXXY; 49,XXXXX, XX male syndrome, XX gonadal dysgenesis (no functional ovaries are present to induce puberty in a female with a normal XX karyotype), and XY gonadal dysgenesis (where the reproductive tissue or gonads are replaced by non-reproductive fibrous tissue during prenatal development, thus the gonads are not functional). There is also a condition called Mayer-Rokitansky-Kuster-Hauser Syndrome, or MRKH where a person is born with an underdeveloped vagina and uterus, but functioning ovaries and XX chromosomes. This affects 1 in every 4,500 XX persons, which is nearly a million persons-are they women if they don't have a vagina or a uterus?

As my final example I would like to discuss XY gonadal dysgenesis, otherwise known as Swyer Syndrome. Persons have XY or a 'male' chromosome pattern, but develop female reproductive organs, including a uterus and vagina. However they lack ovaries, and develop streak gonads which is where non-reproductive fibrous tissue replaces the gonads during development thus the gonads are not functional and can't produce gametes. So how do we classify this person, define their sex? If you say by

chromosomes, then they are XY and would thus define as male. If by external genitals, then they have a vagina and would thus define as female. If you say by gonads they have underdeveloped gonads, so you literally cannot define sex based on this. And if you say by gametes they produce no gametes, so the sex is also undefined. So, which one do you use? How are you going to classify them based on this bill? Do they get the rights and protections this bill claims, or not?

This debate is not new, however as I physician it is alarming that those in legislatures and not those interacting and caring for patients see themselves fit to make judgements regarding these issues. While you can attempt to make a so-called standard for legal classification here, you cannot legislate away science. The idea that gender or sex are binary harms everyone by stigmatizing traits and persons who lie outside of what society considers normal. To prevent these harms, and to change attitudes and social structures we need both education like that I am giving you today, and policy changes, but this bill is the opposite of those policy changes that are needed. We need to recognize that we are all complex beings who cannot be defined easily by genitalia, gender, sex, chromosomes, or any other simple categorization. This bill is unnecessary, inaccurate and an overstep of government. It does nothing to make me, my daughters or my patients safer but does state to a group of persons already at greater risk of violence and discrimination that their existence is not valid, and that they do not matter. I urge you to use common sense and look to what is best for our state and your constituents and vote no on this bill.

I will be happy to take questions at the appropriate time, but also to send additional information and resources to anyone who is interested and have provided my contact information with my testimony as well as links to resources.

Beth Oller, MD, FAAFP

Email: bethollermd@gmail.com

Cell: (316) 841-5576

https://www.sciencedirect.com/science/article/abs/pii/S0031938409003205?via%3Dihub

https://psycnet.apa.org/doiLanding?doi=10.1037%2Famp0000307

https://journals.physiology.org/doi/full/10.1152/physrev.00009.2006

https://link.springer.com/article/10.1007/s00018-014-1703-3

https://www.clinicalkey.com/#!/content/journal/1-s2.0-S0168952508002904

https://www.nature.com/articles/346240a0

https://onlinelibrary.wiley.com/doi/abs/10.1002/9780470015902.a0005943.pub2

https://childrensnational.org/visit/conditions-and-treatments/diabetes-hormonal-disorders/differences-in-sex-development

https://cadehildreth.com/gender-spectrum/https://cadehildreth.com/intersex/