NO. 24-38

IN THE

Supreme Court of the United States

BRADLEY LITTLE, in his official capacity as Governor of the State of Idaho, et al.,

Petitioners,

v.

LINDSAY HECOX, et al.

Respondents.

JOINT APPENDIX
VOLUME 2

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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF IDAHO

LINDSAY HECOX, and JANE DOE with her next friends JEAN DOE and JOHN DOE, Plaintiffs, v. BRADLEY LITTLE, in his official capacity as Governor of the State of Idaho, *et al.*, Defendants.	Case No. 1:20-cv-00184-DCN **EXPERT DECLARATION OF GREGORY A. BROWN, Ph.D. FACSM**

I, Dr. Gregory A. Brown, declare as follows:

Qualifications

1. I serve as Professor of Exercise Science in the Department of Kinesiology and Sport Sciences at the University of Nebraska Kearney. I have served as a tenured (and nontenured) professor at universities since 2002.

2. I teach classes in Exercise Physiology and in Research Methods. I have previously taught courses in Human Anatomy & Physiology and in Sports Nutrition.

3. In August 2002, I received a Doctor of Philosophy degree from Iowa State University, where I majored in Health and Human Performance, with an emphasis in the Biological Bases of Physical Activity. In May 1999, I received a Master of Science degree from Iowa State University, where I majored in Exercise and Sport Science, with an emphasis in Exercise Physiology.

4. I have received many awards over the years, including the Mortar Board Faculty Excellence Honors Award, College of Education Outstanding Scholarship / Research Award, and the College of Education Award for Faculty Mentoring of Undergraduate Student Research.

5. I have authored more than 40 refereed publications and more than 50 refereed presentations in the field of Exercise Science. And I have served as a peer reviewer for over 25 professional journals, including The American Journal of Physiology, the International Journal of Exercise Science, the

Journal of Strength and Conditioning Research, and The Journal of Applied Physiology.

6. My areas of research have included the endocrine response to testosterone prohormone supplements in men and women, the effects of testosterone prohormone supplements on health and the adaptations to strength training in men, the effects of energy drinks on the physiological response to exercise, and assessment of various athletic training modes in males and females. Articles that I have published that are closely related to topics that I discuss in this declaration, and to articles by other researchers that I cite and discuss in this declaration, include:

a. Studies of the effect of ingestion of a testosterone precursor on circulating testosterone levels in young men. Douglas S. King, Rick L. Sharp, Matthew D. Vukovich, Gregory A. Brown, et al., *Effect of Oral Androstenedione on Serum Testosterone and Adaptations to Resistance Training in Young Men: A Randomized Controlled Trial*, JAMA 281: 2020-2028 (1999); G. A. Brown, M. A. Vukovich, et al., *Effects of Anabolic Precursors on Serum Testosterone Concentrations and Adaptations to Resistance Training in Young Men*, INT J SPORT NUTR EXERC METAB 10: 340-359 (2000).

b. A study of the effect of ingestion of that same testosterone precursor on circulating testosterone levels in young women. G. A. Brown, J. C. Dewey, et al., *Changes in Serum Testosterone and Estradiol Concentrations Following Acute Androstenedione Ingestion in Young Women*, HORM METAB RES 36: 62-66 (2004).

c. A study finding (among other things) that body height, body mass, vertical jump height, maximal oxygen consumption, and leg press maximal strength were higher in a group of physically active men than comparably active women, while the women had higher percent body fat. G. A. Brown, Michael W. Ray, et al., *Oxygen Consumption, Heart Rate, and Blood Lactate Responses to an Acute Bout of Plyometric Depth Jumps in College-Aged Men And Women*, J. STRENGTH COND RES 24: 2475-2482 (2010).

d. A study finding (among other things) that height, body mass, and maximal oxygen consumption were higher in a group of male NCAA Division 2 distance runners, while women NCAA Division 2 distance runners had higher percent body fat. Furthermore, these male athletes had a faster mean competitive running speed (~3.44 min/km) than women (~3.88 km/min), even though the men ran 10 km while the women ran 6 km. Katherine Semin, Alvah C. Stahlnecker, Kate A. Heelan, G. A. Brown, et al, *Discrepancy Between Training, Competition and Laboratory Measures of Maximum Heart Rate in NCAA Division 2 Distance Runners*, JOURNAL OF SPORTS SCIENCE AND MEDICINE 7: 455-460 (2008).

7. I attach a copy of my current Professional Vita, which lists my education, appointments, publications, research, and other professional experience. I am also currently providing expert information on a case similar to this one in the state of Connecticut.

8. I have been asked by counsel for defendants in the matter of *Hecox et al. v. Little et al.* to offer my opinions about whether males have inherent

advantages in athletic performance over females, and if so the scale and physiological basis of those advantages, to the extent currently understood by science. I have also been asked to offer my opinion as to whether the sex-based performance advantage enjoyed by males is eliminated if feminizing hormones are administered to male athletes who identify as transgender.

9. The opinions in this declaration are my own, and do not necessarily reflect the opinions of my employer, the University of Nebraska.

10. I have been compensated for my time spent in preparing this declaration at the rate of $150 per hour, and may be further compensated for time spent in subsequent testimony in this action.

Overview

11. Based on my professional familiarity with exercise physiology and my review of the currently available science, including that contained in the sources I cite in this declaration, and the competition results and records presented here, I offer three primary professional opinions:

a. At the level of elite, college, high school, and recreational competition, men or boys have an advantage over comparably aged women or girls, in almost all athletic contests;

b. Biological male physiology and anatomy is the basis for the performance advantage that men or boys have over women or girls, in almost all athletic contests; and

c. Administration of androgen inhibitors and cross-sex hormones to men, or adolescent boys, after

male puberty, and administration of testosterone to women or adolescent girls, after female puberty, does not eliminate the performance advantage of men or adolescent boys over women or adolescent girls in almost all athletic contests.

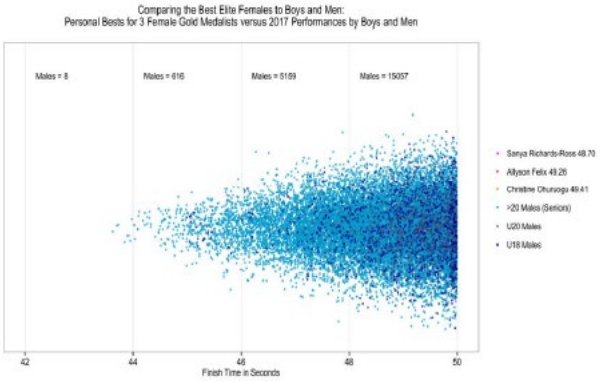
In this declaration, I also provide supporting details, facts, and opinions relating to each of these primary opinions . Each of these opinions is based on my general professional expertise and experience, as well as on particular academic articles, and the competition results and records, that I refer to herein.

12. In short summary, men, and adolescent boys, perform better in almost all sports than women, and adolescent girls, because of their inherent physiological advantages that develop during male puberty. In general, men, and adolescent boys, can run faster, output more physical power, jump higher, and exercise greater physical endurance than women, and adolescent girls.

13. Indeed, while after the onset of puberty males are on average taller and heavier than females, a male performance advantage over females has been measured in weightlifting competitions even between males and females matched for body mass.

14. These performance advantages are also very substantial, such that large numbers of men and even adolescent boys are able to outperform the very top-performing women. To illustrate, Doriane Coleman, Jeff Wald, Wickliffe Shreve, and Richard Clark created the figure below (last accessed on Monday, December 23, 2019 at https://bit.ly/35yOyS4), which shows that the *lifetime best performances* of three female Olympic champions in the 400m event—

including Team USA's Sanya Richards-Ross and Allyson Felix—would not match the performances of literally thousands of boys and men, *just in 2017 alone*, including many who would not be considered top tier male performers:



15. Coleman and Shreve also created the table below (last accessed on Monday, December 23, 2019 at https://bit.ly/37E1s2X), which "compares the number of boys—males under the age of 18—whose results in each event in 2017 would rank them above the single very best elite [adult] woman that year:"

TABLE 1 – World's Best Woman v. Under 18 Boys

Event	Best Women's Result	Best Boys' Result	# of Boys Outperforming
100 Meters	10.71	10.15	124+
200 Meters	21.77	20.51	182
400 Meters	49.46	45.38	285
800 Meters	1:55.16*	1:46.3	201+
1500 Meters	3:56.14	3:37.43	101+
3000 Meters	8:23.14	7:38.90	30
5000 Meters	14:18.37	12:55.58	15
High Jump	2.06 meters	2.25 meters	28
Pole Vault	4.91 meters	5.31 meters	10
Long Jump	7.13 meters	7.88 meters	74
Triple Jump	14.96 meters	17.30 meters	47

16. Coleman and Shreve also created the table below (last accessed on Monday, December 23, 2019 at https://bit.ly/37E1s2X), which compares the number of men—males over 18—whose results in

each event in 2017 would have ranked them above the very best elite woman that year.

TABLE 2 – World's Best Woman v. Number of Men Outperforming

Event	Best Women's Result	Best Men's Result	# of Men Outperforming
100 Meters	10.71	9.69	2,474
200 Meters	21.77	19.77	2,920
400 Meters	49.46	43.62	4,341
800 Meters	1:55.16*	1:43.10	3,992+
1500 Meters	3:56.14	3:28.80	3,216+
3000 Meters	8:23.14	7:28.73	1307+
5000 Meters	14:18.37	12:55.23	1,243
High Jump	2.06 meters	2.40 meters	777
Pole Vault	4.91 meters	6.00 meters	684
Long Jump	7.13 meters	8.65 meters	1,652
Triple Jump	14.96 meters	18.11 meters	969

17. These advantages result, in large part (but not exclusively), from higher testosterone concentrations in men, and adolescent boys, after the onset of male puberty. Higher testosterone levels cause men, and adolescent boys, to develop more muscle mass, greater muscle strength, less body fat, higher bone mineral density, greater bone strength, higher hemoglobin concentrations, larger hearts and larger coronary blood vessels, and larger overall statures than women, and adolescent girls. In addition, maximal oxygen consumption (VO2max), which correlates to ~30-40% of success in endurance sports, is higher in both elite and average men and boys than in comparable women and girls when measured in regards to absolute volume of oxygen consumed and when measured relative to body mass. Testosterone is also associated with increased aggressiveness, which may offer competitive advantages for men over women.

18. Although androgen deprivation may modestly decrease some physiological advantages that men and adolescent boys have over women and adolescent girls, it cannot fully eliminate those physiological advantages once an individual has passed through

male puberty. For example, androgen deprivation does not reduce bone size, does not alter bone structure, and does not decrease lung volume or heart size. Nor does androgen deprivation in adult men completely reverse the increased muscle mass acquired during male puberty.

19. In this declaration, I present, in the headings marked with Roman numerals, certain of my opinions about sex-based differences in human physiology and the impact of those differences on the athletic performance of men and women. For each of these opinions, I then provide a brief overview, and a non-exhaustive summary of studies published in science journals or other respected sources that support and provide in part the basis of my opinion, also quoting relevant findings of each article.

20. In particular, in addition to the article by Coleman and Schreve that I discuss above, I cite twenty-two articles published in scientific journals. I provide capsule summaries of those articles below. These studies form part of the basis of the opinions I set forth in this declaration, which are also informed by my general professional expertise and experience. In support of the opinions I offer, I expect to explain and testify concerning the findings and conclusions of these articles that I detail in this declaration. I expect to use any or all of the tables and charts that I have reproduced in this declaration, as well as any other tables or charts contained in the articles I reference, to present and explain my opinions to the court.

a. The first resource I cite is David J. Handelsman, Angelica L. Hirschberg, et al., *Circulating Testosterone as the Hormonal Basis of*

Sex Differences in Athletic Performance, 39:5 ENDOCRINE REVIEWS 803 (2018). This article correlates data about performance differences between males and females with data from over 15 liquid chromatography-mass spectrometry studies of circulating testosterone in adults, as a function of age. The authors conclude, among other things, that "[f]rom male puberty onward, the sex difference in athletic performance emerges as circulating concentrations rise as the testes produce 30 times more testosterone than before puberty, resulting in men having 15- to 20-fold greater circulating testosterone than children or women at any age." (804)

b. The second resource I cite is Valérie Thibault, Marion Guillaume, et al., *Women & Men in Sport Performance: The Gender Gap Has Not Evolved Since 1983*, 9 J. OF SPORTS SCIENCE & MEDICINE 214 (2010). This article analyzes results from 82 athletic events since the beginning of the modern Olympic era, and concludes in part that while a wide sex-based performance gap existed before 1983, due to a likely combination of physiological and non-physiological reasons, the sex-based performance gap stabilized in 1983, at a mean difference of 10.0 % ± 2.94 between men and women for all events. (214)

c. The third resource I cite is Beat Knechtle, Pantelis T. Nikolaidis, et al., *World Single Age Records in Running from 5 km to Marathon*, 9 FRONTIERS IN PSYCHOLOGY 1 (2013). This article analyzes results from a study of the relationship between performance and age in races of several lengths, and reports in part that "[i]n all races

[studied], women were significantly slower than men." (7)

d. The fourth resource I cite is Romuald Lepers, Beat Knechtle, et al., *Trends in Triathlon Performance: Effects of Sex & Age*, 43 SPORTS MED 851 (2013). This article analyzes results from various triathlon events over the course of about 15 years, and reports in part a sex-based performance gap between the sexes of no less than 10% in every component event, with this sex-based performance gap increasing with age.

e. The fifth resource I cite is Espen Tønnessen, Ida Siobhan Svendsen, et al., *Performance Development in Adolescent Track & Field Athletes According to Age, Sex, and Sport Discipline*, 10:6 PLOS ONE 1 (2015). This article analyzes the 100 all-time best Norwegian male and female track and field results (in persons aged 11 to 18) from the 60m and 800m races, and the long jump and high jump events. The results show that sex-specific differences that arise during puberty significantly affect event results, with males regularly outperforming females after age 12.

f. The sixth resource I cite is David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 CLINICAL ENDOCRINOLOGY 68 (2017). This article analyzes results from a secondary quantitative analysis of four published sources that report performance measures in swimming meets, track and field events, and hand-grip strength. The results show in part that the onset and tempo of sex-based performance

divergence were very similar for all performance measures, and that this divergence closely paralleled the rise of circulating testosterone in adolescent boys.

g. The seventh article I cite is Moran Gershoni & Shmuel Pietrokovski, *The landscape of sex-differential transcriptome and its consequent selection in human adults*, 15 BMC BIOL 7 (2017). This article details the results of an evaluation of the differences in genetic expression between men and women. The results show that in humans, out of 18,670 protein coding genes that were evaluated, over 6,500 are differentially expressed based on the sex of the person. The main relevance of this article to the case at hand is to help illustrate that the differences between males and females cannot be eliminated by reducing testosterone and increasing estrogen concentrations in a biological male.

h. The eighth article I cite is K. M. Haizlip, et al., *Sex-based differences in skeletal muscle kinetics and fiber-type composition*, 30 PHYSIOLOGY (BETHESDA) 30 (2015). This is a review article summarizing the findings of 56 other articles evaluating the differential expression of genes in skeletal muscles in males and females and how these differences in gene expression influence (among many things) muscle mass, muscle fiber type, and muscle function. The main relevance of this article to the case at hand is to help illustrate that the current scientific evidence indicates that the genetic differences in skeletal muscle size and function between males and females that give males an athletic performance advantage cannot be eliminated by reducing testosterone and

increasing estrogen concentrations in a biological male.

i. The ninth, tenth, and eleventh resources I cite are Konstantinos D. Tambalis, et al., *Physical fitness normative values for 6-18-year-old Greek boys and girls, using the empirical distribution and the lambda, mu, and sigma statistical method*, 16 EUR J SPORT SCI 736 (2016). Mark J. Catley & G. R. Tomkinson, *Normative health-related fitness values for children: analysis of 85347 test results on 9-17-year-old Australians since 1985*, 47 BR J SPORTS MED 98 (2013).Grant R. Tomkinson, et al., *European normative values for physical fitness in children and adolescents aged 9-17 years: results from 2 779 165 Eurofit performances representing 30 countries*, 52 BR J SPORTS MED 1445 (2018). Individually and combined these articles illustrate that boys as young as six years old perform better than comparable age matched girls in health related measures of physical fitness including strength, speed, endurance, and jumping ability. These advantages in health related measures of fitness translate to improved athletic performance in boys when compared to girls likely before and certainly during and after puberty.

j. The twelfth and thirteenth resources I cite are Daniel M. Fessler, et al., *Sexual dimorphism in foot length proportionate to stature*, 32 ANN HUM BIOL 44 (2005). Roshna E. Wunderlich & P. R. Cavanagh, *Gender differences in adult foot shape: implications for shoe design*, 33 MED SCI SPORTS EXERC 605 (2001). These articles evaluate and describe the differences in the feet of men and women, particularly noting that

the differences between the sexes are not just a matter of stature but also include morphological traits that can influence runner performance.

k. The fourteenth, fifteenth, and sixteenth resources I cite are Daichi Tomita, et al., *A pilot study on the importance of forefoot bone length in male 400-m sprinters: is there a key morphological factor for superior long sprint performance?*, 11 BMC RES NOTES 583 (2018). Hiromasa Ueno, et al., *The Potential Relationship Between Leg Bone Length and Running Performance in Well-Trained Endurance Runners*, 70 J HUM KINET 165 (2019). Hiromasa Ueno, et al., *Association between Forefoot Bone Length and Performance in Male Endurance Runners*, 39 INT J SPORTS MED 275 (2018). Building upon the information from Fessler (2005) and Wunderlich (2001), these studies collectively illustrate that the length of the bones in the foot and lower leg can contribute to successful competitive running performance, which likely gives men a performance advantage over women in running due to the differences in lower limb sizes described by Fessler et al. (2005) and Wunderlich and Cavanaugh (2001).

l. The seventeenth resource I cite is Louis Gooren, *The Significance of Testosterone for Fair Participation of the Female Sex in Competitive Sports*, 13 ASIAN J. OF ANDROLOGY 653 (2011). This article highlights specific research that indicates pubertal testosterone increases result in significant physiological advantages for men and adolescent boys, compared to women and adolescent girls, after the onset of male puberty.

m. The eighteenth resource I cite is Taryn Knox, Lynley C. Anderson, et al., *Transwomen in Elite Sport: Scientific & Ethical Considerations*, 45 J. MED ETHICS 395 (2019). This article confirms from available science that higher testosterone levels provide an all-purpose benefit in sport, and that the current International Olympic Guidelines rule requiring males who identify as transgender to keep testosterone levels under 10 nmol/L for one year does not eliminate (or even come close to eliminating) the performance advantage of their male physiology.

n. The nineteenth resource I cite is Louis J. G. Gooren & Mathijs C. M. Bunck, *Transsexuals & Competitive Sports*, 151 EUROPEAN J. OF ENDOCRINOLOGY 425 (2004). This article analyzes results from a study that compared pretreatment physiological measurements in 17 female-to-male transsexuals with the measurements after one year of cross-sexual treatment in 19 male-to-female transsexuals undergoing sex reassignment therapy. The results in part confirmed that androgen deprivation in male-to-female transsexuals decreases muscle mass to some extent but does not eliminate the male muscular advantage and does not reverse certain other effects of androgenization that had occurred during male puberty.

o. The twentieth resource I cite is Anna Wiik et al., *Muscle Strength, Size, and Composition Following 12 Months of Gender-affirming Treatment in Transgender Individuals*, J. CLIN. METAB., 105(3):e805-e813 (2020). This article analyzes the impact of (a) suppression of

endogenous hormones and (b) hormone replacement therapy on metrics of transgender individuals including strength, muscle size, and radiological density. After 12 months, strength in male-to-female subjects did not decrease, and muscle volume remained higher in male-to-female subjects than in female-to-male subjects after the latter subjects had undergone 12 months of testosterone injections.

p. The twenty-first resource I cite is Miranda Scharff et al., *Change in Grip Strength in Trans People and Its Association with Lean Body Mass and Bone Density*, ENDOCRINE CONNECTIONS (2019) 8, 1020-1028. This article measured grip strength and multiple parameters of lean body mass and bone density in both male-to-female and female-to-male populations across their first year of hormone therapy. After 12 months, "the median grip strength in [male-to-female] subjects still [fell] into the 95th percentile for age-matched females."

q. The twenty-second resource I cite is Johanna Harper. *Race Times for Transgender Athletes*. J Sporting Cultures and Identities 6 (2019) 1. This article is oft cited as evidence supporting a lack of performance advantage for male-to-female transgender athletes. Herein I provide a critique of the methodological shortcomings of this study for the purpose of demonstrating the extreme lack of scientific validity or reliability of the results.

21. I explain my opinions and the results of these studies in more detail below.

Opinions

I. Biological men or boys have an advantage over women or girls, in almost all athletic contests.

22. As one team of researchers has recently written, "Virtually all elite sports are segregated into male and female competitions. The main justification is to allow women a chance to win, as women have major disadvantages against men who are, on average, taller, stronger, and faster and have greater endurance due to their larger, stronger, muscles and bones as well as a higher circulating hemoglobin level." David J. Handelsman, Angelic L. Hirschberg, et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39:5 ENDOCRINE REVIEWS 803 (2018).

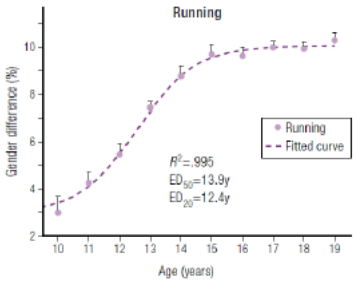
23. In fact, biological men, and adolescent boys, substantially outperform comparably aged women, and adolescent girls, in competitions involving running speed, swimming speed, cycling speed, jumping height, jumping distance, and strength (to name a few, but not all, of the performance differences). These performance advantages for men, and adolescent boys, are inherent to the biological differences between the sexes and are not due to social or cultural factors, as evidenced by minimal to no change in the percentage differences between males and females in world class and record setting performances in the past 40 years. In addition, a number of studies indicate that males' athletic advantages over females begin before puberty, and may be apparent as early as six years of age.

24. I highlight below key findings about male performance advantages from eighteen studies or datasets.

A. David J. Handelsman, Angelica L. Hirschberg, et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39:5 ENDOCRINE REVIEWS 803 (2018):

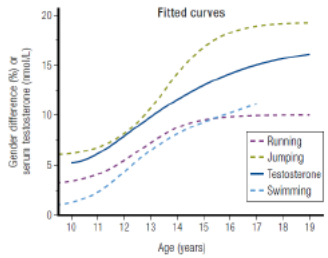
25. The Handelsman et al. (2018) authors demonstrate a consistent pattern of divergence of athletic performance, in favor of males, across the years of puberty and strongly correlating to increasing testosterone levels in adolescent males. The pattern is observed in events exercising a variety of muscle systems. In sum, the Handelsman et al. (2018) authors report: "Corresponding to the endogenous circulating testosterone increasing in males after puberty to 15 to 20 nmol/L (sharply diverging from the circulating levels that remain <2 nmol/L in females), male athletic performances go from being equal on average to those of age-matched females to 10% to 20% better in running and swimming events, and 20% better in jumping events." (812)

26. Taken from Handelsman's Figure 1, the chart below indicates "sex differences in performance (in percentage) according to age (in years) in running events, including 50m to 2 miles." (813)



27. Taken from Handelsman's Figure 1, the chart below indicates "sex differences in performance (in percentage) according to age (in years) … in jumping events, including high jump, pole vault, triple jump, long jump, and standing jump." (813)

28. Taken from Handelsman's Figure 1, the chart below indicates "a fitted sigmoidal curve plot of sex differences in performance (in percentage) according to age (in years) in running, jumping, and swimming events, as well as the rising serum testosterone concentrations from a large dataset of serum testosterone of males. Note that in the same dataset, female serum testosterone concentrations did not change over those ages, remaining the same as in prepubertal boys and girls. Data are shown as mean and SEM of the pooled sex differences by age." (813)



29. These authors also note the significance, for athletic competition, of the subjective nature of

"gender identity" in current understanding: "Prompted by biological, personal, and societal factors, volitional expression of gender can take on virtually any form limited only by the imagination, with some individuals asserting they have not just a single natal gender but two genders, none, a distinct third gender, or gender that varies (fluidly) from time to time…." For this reason, the authors conclude: "[I]f gender identity were the basis for eligibility for female sports, an athlete could conceivably be eligible to compete at the same Olympics in both female and male events. These features render the unassailable personal assertion of gender identity incapable of forming a fair, consistent sex classification in elite sports." (804)

B. Valérie Thibault, Marion Guillaume, et al., *Women & Men in Sport Performance: The Gender Gap has not Evolved Since 1983*, 9 J. OF SPORTS SCIENCE &MEDICINE 214 (2010):

30. The Thibault et al. (2010) authors note that there was a large but narrowing sex-based performance gap between men's and women's Olympic athletic performances before 1983, which could hypothetically be attributed to a combination of social, political, or other non-physiological reasons, in addition to physiological reasons. However, "the gender gap in Olympic sport performance has been stable since 1983" (219) "at a mean difference of 10.0% ± 2.94 between men and women for all [Olympic] events." (222)

31. Since then, even when performances improve, the "progressions are proportional for each gender." (219-20)

32. The results of this study "suggest that women's performances at the high level will never match those of men" (219) and that "women will not run, jump, swim or ride as fast as men." (222) The authors conclude that this gap, now stable for 30+ years, is likely attributable to physiology, and thus that "[s]ex is a major factor influencing best performances and world records." (222)

33. Breaking these performance advantages out by event, the authors report the following sex-based performance gaps in Olympic sport competitions since 1983:

a. "The gender gap ranges from 5.5% (800-m freestyle, swimming) to 36.8% (weightlifting)." (222)

b. Olympic world records in running events indicate that men perform "10.7% (± 1.85)" better than women since gender gap stabilization. (217)

c. Olympic world records in jumping events indicate that men perform "17.5% (± 1.11)" better than women since gender gap stabilization. (217)

d. Olympic world records in swimming events indicate that men perform "8.9 % (± 1.54)" better than women since gender gap stabilization. (218)

e. Olympic world records in cycling sprint events indicate that men perform "6.95% (± 0.16)" better than women since gender gap stabilization. (219)

f. Olympic world records in weightlifting events indicate that men perform "36.8% (± 6.2)" better than women since gender gap stabilization. Note that the Olympics first introduced women's weightlifting events in 1998, and "no breakpoint date has been detected yet." (219)

34. "The top ten performers' analysis reveals a similar gender gap trend with a stabilization in 1982 at 11.7%" when averaged across all events. (222)

C. Beat Knechtle, Pantelis T. Nikolaidis, et al., *World Single Age Records in Running from 5 km to Marathon*, 9 FRONTIERS IN PSYCHOLOGY 1 (2013):

35. A comparison of performances in races of a variety of distances showed that "[i]n all races, women were significantly slower than men. The estimated sex differences … were increasing" as race distances increased from 8 km.[1]

D. Romuald Lepers, Beat Knechtle, et al., *Trends in Triathlon Performance: Effects of Sex & Age*, 43 SPORTS MED 851 (2013):

36. Based on data from a variety of elite triathlon and ultra-triathlon events spanning 22 years, the Lepers et al. (2013) authors reported that "elite males appear to run approximately 10–12 % faster than elite females across all endurance running race distances up to marathon, with the sex difference narrowing as the race distance increases. However, at distances

[1] Throughout this declaration, in the interest of readability I have omitted internal citations from my quotations from the articles I cite. The sources cited by these authors may of course be found by reference to those articles.

greater than 100 km, such as the 161-km ultramarathon, the difference seems even larger, with females 20–30 % slower than males." (853)

37. Lepers and Knechtle Table 1 below shows the "[m]ean sex differences in time performance for swimming, cycling, running and total time at different national and international triathlons." (854)

Event	Sex difference in time performance (%)			
	Swim	Cycle	Run	Total
Short distance (1.5–40–10 km): [30, 79]				
Zurich (Switzerland) from 2000 to 2010				
Top five elite overall	15.2	13.4	17.1	14.8
Top five AG, from 18 to 54 years	18.5	15.5	18.5	17.1
World Championship from 2009 to 2011				
Top ten AG, from 18 to 64 years	13.3	10.7	7.5	12.0
Half Ironman (1.9–90–21 km): [31, 79]				
Rapperswil (Switzerland) from 2007 to 2010				
Top five elite overall	14.1	12.3	12.5	12.6
Top five AG, from 18 to 54 years	22.3	16.4	19.2	17.6
World Championship from 2009 to 2011				
Top ten AG, from 18 to 64 years	12.4	11.2	14.5	12.6
Off-road triathlon (1.5–30–10 km): [9]				
World championship (Maui, USA) from 2007 to 2009				
Top ten elite overall	12.4	19.6	18.4	18.2
Ironman (3.8–180–42 km): [2, 32, 34]				
World championship (Kona, Hawaii, USA) from 1988 to 2007				
Top ten elite overall	9.8	12.7	13.3	12.6
Top ten AG, from 18 to 64 years	12.1	15.4	18.2	15.8
Zurich (Switzerland) from 1995 to 2010				
Top ten elite overall	14.0	13.2	18.2	14.9

38. "[F]or ultratriathlons, it has been shown that with increasing length of the event, the best females became relatively slower compared with the best males. Indeed, if the world's best performances are considered, males were 19 % faster than the females in both Double and Triple Ironman distance, and 30 % faster in the Deca-Ironman distance." (854)

39. "The average sex difference in swimming performance during triathlon for race distances between 1.5 and 3.8 km ranged between approximately 10 and 15 % for elite triathletes." (854)

40. Lepers and Knechtle Table 2 below shows the "[m]ean percentage differences in times for swimming, cycling, running and total event between

the top ten females and males … in 2012 at four international triathlons:" (855)

Event	Sex difference in performance in top ten athletes in 2012 (mean ± SD)			
	Swim	Cycle	Run	Total
Hawaii Ironman Triathlon (3.8–180–42 km)	14.1 ± 7.9	13.1 ± 2.3	7.3 ± 2.9	11.3 ± 0.5
Olympics Triathlon (1.5–40–10 km) with drafting	11.8 ± 2.0	11.3 ± 0.6	14.7 ± 0.8	14.1 ± 7.9
Hy-Vee Triathlon (1.5–40–10 km) without drafting	8.6 ± 4.8	10.2 ± 3.5	8.6 ± 4.4	9.3 ± 0.5
World Championship Off-Road Triathlon (1.5–30–10 km)	15.2 ± 15.5	22.6 ± 4.4	15.1 ± 6.7	17.3 ± 2.9

41. "[T]he sex difference in performance between the best male and female ultraswimmers is more generally close to 11–12 %, which corresponds to values observed for swimming in triathlon." (855)

42. "Sex differences in triathlon cycling vary from 12 to 16% according to the level of expertise of participating triathletes for road-based triathlons." (855)

43. "In track cycling, where females are generally weaker than males in terms of power/weight ratios, the performance gap between males and females appears to be constant (<11 %) and independent of the race distance from 200 to 1,000 m." (855)

44. "In ultra-cycling events, such as the 'Race Across America,' sex difference in performance was around 15 % among top competitors. Greater muscle mass and aerobic capacity in males, even expressed relative to the lean body mass, may represent an advantage during long-distance cycling, especially on a relatively flat course such as Ironman cycling, where cycling approximates to a non-weight-bearing sport. Indeed, it has been shown that absolute power output (which is greater for males than for females) is associated with successful cycling endurance performance because the primary force inhibiting

forward motion on a flat course is air resistance." (855-56)

45. "Interestingly, for elite triathletes, the sex difference in mountain bike cycling during off-road triathlon (<20 %) is greater than cycling sex differences in conventional road-based events. Mountain biking differs in many ways from road cycling. Factors other than aerobic power and capacity, such as off-road cycling economy, anaerobic power and capacity, and technical ability might influence off-road cycling performance. Bouts of high-intensity exercise frequently encountered during the mountain biking leg of off-road triathlon (lasting <1 h 30 min for elite males and <2 h for elite females) can result from (1) having to overcome the constraints of gravity associated with steep climbs, (2) variable terrain necessitating wider tires and thus greater rolling resistance, and (3) isometric muscle contractions associated with the needs of more skilled bike-handling skills, not so often encountered in road cycling. However, in particular, lower power-to-weight ratios for female than for male triathletes inevitably leave them at a disadvantage during steep climbs." (856)

46. "During the 1988–2007 period, the top ten elite males have run the Hawaii Ironman marathon on average 13.3 % faster than the top ten females." (856)

E. Espen Tønnessen, Ida Siobhan Svendsen, et al., *Performance Development in Adolescent Track & Field Athletes According to Age, Sex & Sport Discipline*, 10:6 PLoS ONE 1 (2015):

47. While both sexes increase performance across the teen years, the Tønnessen et al. (2015) authors found performance advantages for male athletes associated with the onset of puberty and becoming increasingly larger across the years of puberty, in a chronological progression that was closely similar across diverse track and field events.

48. "The current results indicate that the sex difference evolves from < 5% to 10–18% in all the analyzed disciplines from age 11 to 18 yr. The gap widens considerably during early adolescence before gradually stabilizing when approaching the age of 18. This evolution is practically identical for the running and jumping disciplines. The observed sex differences at the age of 18 are in line with previous studies of world-class athletes where a sex difference of 10–12% for running events and ~19% for jumping events has been reported." (8)

49. "Male and female athletes perform almost equally in running and jumping events up to the age of 12. Beyond this age, males outperform females. Relative annual performance development in females gradually decreases throughout the analyzed age period. In males, annual relative performance development accelerates up to the age of 13 (for running events) or 14 (for jumping events) and then gradually declines when approaching 18 years of age. The relative improvement from age 11 to 18 was twice as high in jumping events compared to running events. For all of the analyzed disciplines, overall improvement rates were >50% higher for males than for females. The performance sex difference evolves from < 5% to 10-18% in all the analyzed disciplines from age 11 to 18 yr." (1)

50. "Recent studies of world-class athletes indicate that the sex difference is 10–12% for running events and ~19% for jumping events." (2)

51. Tønnessen and Svendsen's Table 1 below shows the "[e]xpected progressions in running and jumping performance for 11-18 [year] old males and females," as deduced from "[t]he 100 all-time best Norwegian male and female 60-m, 800-m, long jump and high jump athletes in each age category . . . ." (1, 4)

Table 1. Expected progressions in running and jumping performance for 11–18 yr old males and females.

Age (yr)	60 m		800 m		Long Jump		High Jump	
	Boys Progression (s and %)	Girls Progression (s and %)	Boys Progression (s and %)	Girls Progression (s and %)	Boys Progression m (%)	Girls Progression m (%)	Boys Progression m (%)	Girls Progression m (%)
11–12	-0.35 (4.1)	-0.35 (4.0)	-6.4 (4.4)	-7.3 (4.8)	+0.35 (7.4)	+0.36 (7.9)	+0.11 (7.4)	+0.10 (7.2)
12–13	-0.48 (5.8)	-0.25 (2.9)	-8.7 (6.2)	-5.5 (3.8)	+0.43 (8.6)	+0.30 (6.0)	+0.12 (7.9)	+0.09 (6.3)
13–14	-0.29 (3.7)	-0.16 (2.0)	-5.9 (4.5)	-3.6 (2.6)	+0.50 (9.0)	+0.21 (4.1)	+0.13 (8.1)	+0.06 (3.6)
14–15	-0.10 (1.3)	-0.02 (0.2)	-5.2 (4.1)	-2.2 (1.6)	+0.34 (5.6)	+0.13 (2.4)	+0.08 (4.3)	+0.04 (2.4)
15–16	-0.17 (2.3)	-0.08 (1.0)	-3.2 (2.7)	-1.6 (1.2)	+0.28 (4.4)	+0.10 (1.8)	+0.07 (3.6)	+0.03 (1.8)
16–17	-0.10 (1.4)	-0.07 (0.8)	-2.3 (1.9)	-1.5 (1.2)	+0.19 (2.9)	+0.06 (1.1)	+0.05 (2.5)	+0.01 (0.6)
17–18	-0.05 (0.7)	-0.02 (0.2)	-1.5 (1.4)	-0.6 (0.4)	+0.17 (2.5)	+0.02 (0.4)	+0.04 (1.9)	+0.01 (0.5)

Data are mean (standard deviation) for top 100 Norwegian male and female performers in each discipline.

52. Tønnessen and Svendsen's Table 2 below shows the "[s]ex ratio in running and jumping performance for 11-18 [year] old males and females," as deduced from "[t]he 100 all-time best Norwegian male and female 60-m, 800-m, long jump and high jump athletes in each age category . . . ." (1, 6)

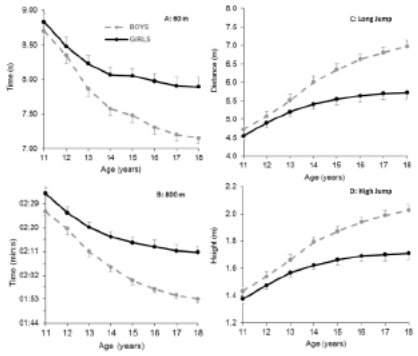
Table 2. Sex ratio in running and jumping performance for 11–18 yr old males and females.

	60 m	800 m	Long Jump	High Jump
11	0.99	0.95	0.96	0.97
12	0.98	0.96	0.97	0.96
13	0.96	0.93	0.94	0.95
14	0.94	0.92	0.90	0.90
15	0.93	0.89	0.87	0.89
16	0.92	0.88	0.85	0.87
17	0.91	0.87	0.84	0.85
18	0.91	0.86	0.82	0.84

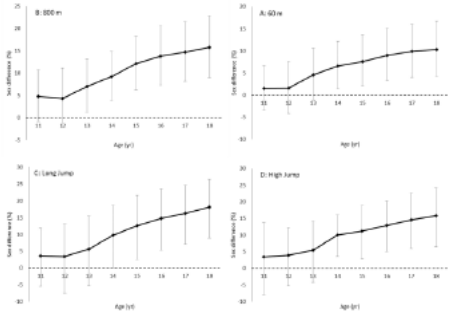
Data are calculated from mean results of top 100 Norwegian male and female performers in each discipline.

53. Tønnessen and Svendsen's Figure 1 below shows "[p]erformance development from age 11 to 18 in running and jumping disciplines. Data are mean ±

[standard deviation] for 60 m, 600 m, long jump, and high jump for top 100 Norwegian male and female performers in each discipline." (4)



54. Tønnessen and Svendsen's Figure 3 below shows the "[s]ex difference for performance in running and jumping disciplines from age 11 to 18. Data are mean and 95% [confidence intervals] for 60 m, 600 m, long jump, and high jump for top 100 Norwegian male and female performers in each discipline:" (6)



55. As for the 60m race, the tables and charts above illustrate:

a. "[B]oys improve 0.3–0.5 [seconds] over 60 m sprint each year up to the age of 14 [years] (very large to nearly perfect annual effect), 0.1–0.2

[seconds] annually from 14 to 17 [years] (moderate to large annual effect), and 0.05 [seconds] from age 17 to 18 [years] (moderate effect). Relative annual improvement peaks between 12 and 13 [years] (5.8%; nearly perfect effect), and then gradually declines to 0.7% between age 17 and 18 [years] (moderate effect)." (3)

b. "On average, boys improve their 60 m performance by 18% from age 11 to 18 [years]. Girls improve 0.35 [seconds] over 60 m from age 11 to 12 [years] (4%; very large effect). Then, absolute and relative annual improvement gradually slows and almost plateaus between age 14 and 15 (0.02 s; 0.2%; trivial effect). From age 15 to 17, annual improvement increases somewhat to 0.07–0.08 [seconds] (~1%; moderate effect) before plateauing again between age 17 and 18 (0.02 s; 0.2%; trivial effect). In total, girls improve their 60-m performance by 11% from age 11 to 18 [years]…. [T]he sex difference for 60 m sprint evolves from 1.5% at age 11 to 10.3% at the age of 18…. [T]he sex ratio for 60 m running performance develops from 0.99 at age 11 to 0.91 at age 18." (4-5)

56. As for the 800m race, the tables and charts above illustrate:

a. "[B]oys improve 6–9 [seconds] over 800 m each year up to age 14 [years] (very large to nearly perfect annual effect). Relative annual improvement peaks between age 12 and 13 (6.2%; nearly perfect effect), then gradually decreases to

1.5 [seconds] between age 17 and 18 (1.4%; moderate effect)." (5)

b. "On average, boys enhance their 800-m performance by 23% from age 11 to 18. For girls, both absolute and relative annual performance development gradually decreases across the analysed age stages. The improvement is slightly above 7 [seconds] between age 11 and 12 [years] (4.8%: very large effect), decreasing to only 0.6 [seconds] from age 17 to 18 (0.4%; small effect)…. [G]irls enhance their 800-m performance by 15% from age 11 to 18. The 800 m performance sex difference evolves from 4.8% at the age of 11 to 15.7% at the age of 18…. [T]he sex ratio for 800 m running performance develops from 0.95 at age 11 to 0.86 at age 18." (5)

57. As for the long jump, the tables and charts above illustrate:

a. "[A]nnual long jump improvement among boys gradually increases from 35 cm between age 11 and 12 [years] (7.4%; very large effect) to 50 cm between age 13 and 14 (9%; very large effect). Both absolute and relative annual development then gradually falls to 17 cm between age 17 and 18 (2.5%; moderate effect)." (5)

b. "[B]oys, on average, improve their long jump performance by 48% from age 11 to 18 yr. For girls, both absolute and relative annual performance enhancement gradually falls from age 11 to 12 [years] (36 cm; 7.9%; very large effect) until nearly plateauing between 17 and 18 [years] (2 cm; 0.4%; trivial effect). Overall, girls typically improve their long jump performance by 26%

> throughout the analysed age stages. The sex difference in long jump evolves from 3.6% at the age of 11 to 18% at the age of 18…. [T]he sex ratio for long jump performance develops from 0.96 at age 11 to 0.82 at age 18." (5)

58. As for the high jump, the tables and charts above illustrate:

> a. "[B]oys improve their high jump performance by 11–13 cm each year up to the age of 14 (7–8%; very large annual effects). Both absolute and relative annual improvement peaks between age 13 and 14 (13 cm; 8.1%; very large effect), then gradually decreases to 4 cm from age 17 to 18 (1.9%; moderate annual effect)." (6)

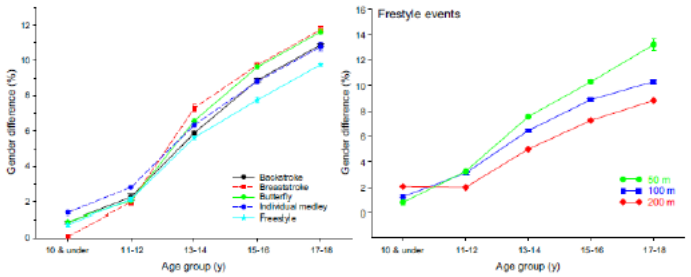
> b. "Overall, boys improve their high jump performance by, on average, 41% from age 11 to 18. For girls, both absolute and relative annual improvement decreases from 10 cm from age 11 to 12 [years] (7.2%; very large effect) until it plateaus from age 16 (1 cm; ~0.5%; small annual effects). Overall, girls typically improve their high jump performance by 24% from age 11 to 18. The sex difference in high jump performance evolves from 3.5% at the age of 11 to 16% at the age of 18…. [T]he sex ratio for high jump performance develops from 0.97 at age 11 to 0.84 at age 18." (6-7)

F. David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 CLINICAL ENDOCRINOLOGY 68 (2017):

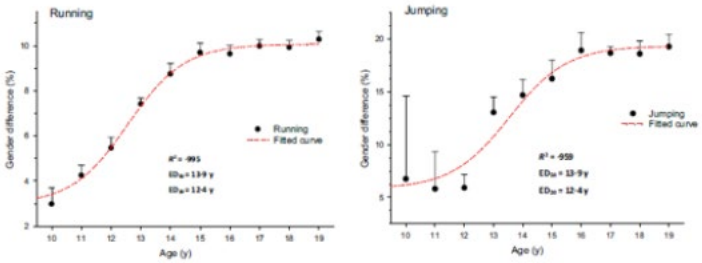
59. Analyzing four separate studies, Handelsman (2017) found very closely similar trajectories of

divergence of athletic performance between the sexes across the adolescent years, in all measured events.

60. As illustrated by Figure 1 of Handelsman (2017) below, study results showed that "[i]n swimming performance, the overall gender differences were highly significant . . . ." (69)

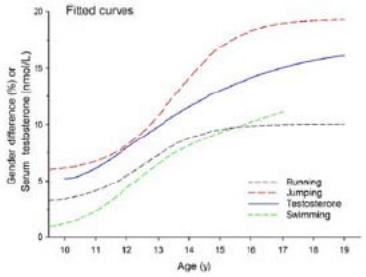


61. As illustrated by Figure 2 of Handelsman (2017) below, "[i]n track and field athletics, the effects of age on running performance showed that the prepubertal differences of 3.0% increased to a plateau of 10.1% with an onset (ED20) at 12.4 years and reaching midway (ED50) at 13.9 years. For jumping, the prepubertal difference of 5.8% increased to 19.4% starting at 12.4 years and reaching midway at 13.9 years." (70)



62. As also illustrated in Figure 2 of Handelsman (2017), the author found a strong correlation between the increasing male performance advantage and

blood serum testosterone levels, and reported: "The timing of the male advantage in running, jumping and swimming was similar [across events] and corresponded to the increases in serum testosterone in males." (70)



G. Moran Gershoni & Shmuel Pietrokovski, *The landscape of sex-differential transcriptome and its consequent selection in human adults*, 15 BMC BIOL 7 (2017):

63. The authors of this article evaluated "18,670 out of 19,644 informative protein-coding genes in men versus women" (2) and reported that "there are over 6500 protein-coding genes with significant S[ex-]D[ifferential]E[xpression] in at least one tissue. Most of these genes have SDE in just one tissue, but about 650 have SDE in two or more tissues, 31 have SDE in more than five tissues, and 22 have SDE in nine or more tissues." (2) Some examples of tissues identified by these authors that have SDE genes include breast mammary tissue, skeletal muscle, skin, thyroid gland, pituitary gland, subcutaneous adipose, lung, and heart left ventricle. Based on these observations the authors state "As expected, Y-linked genes that are normally carried only by men show SDE in many tissues." (3) This evaluation of SDE in protein coding

genes helps illustrate that the differences between men and women are intrinsically part of the chromosomal and genetic makeup of humans which can influence many tissues that are inherent to the athletic competitive advantages of men compared to women.

H. K. M. Haizlip, et al., *Sex-based differences in skeletal muscle kinetics and fiber-type composition*, 30 PHYSIOLOGY (BETHESDA) 30 (2015):

64. In a review of 56 articles on the topic of sex-based differences in skeletal muscle, the authors state that "More than 3,000 genes have been identified as being differentially expressed between male and female skeletal muscle []." (30) Furthermore, the authors state that "Overall, evidence to date suggests that skeletal muscle fiber-type composition is dependent on species, anatomical location/function, and sex." (30) The differences in genetic expression between males and females influence the skeletal muscle fiber composition (i.e. fast twitch and fast twitch sub-type and slow twitch), the skeletal muscle fiber size, the muscle contractile rate, and other aspects of muscle function that influence athletic performance. As the authors review the differences in skeletal muscle between males and females they conclude "Additionally, all of the fibers measured in men have significantly larger cross-sectional areas (CSA) compared with women []." (31) The authors also explore the effects of thyroid hormone, estrogen, and testosterone on gene expression and skeletal muscle function in males and females. One major conclusion by the authors is that "The complexity of skeletal

muscle and the role of sex adding to that complexity cannot be overlooked." (37).

I. Konstantinos D. Tambalis, et al., Physical fitness normative values for 6-18-year-old Greek boys and girls, using the empirical distribution and the lambda, mu, and sigma statistical method, 16 EUR J SPORT SCI 736 (2016). Mark J. Catley & G. R. Tomkinson, Normative health-related fitness values for children: analysis of 85347 test results on 9-17-year-old Australians since 1985, 47 BR J SPORTS MED 98 (2013). Grant R. Tomkinson, et al., *European normative values for physical fitness in children and adolescents aged 9-17 years: results from 2 779 165 Eurofit performances representing 30 countries.* 52 Br J Sports Med. 1445 (2018):

65. The purpose in citing these sources is to illustrate that males possess physical fitness traits that likely provide an advantage in athletic performance, that these male advantages may be apparent in children starting as young as six years of age, and in agreement with previously cited sources the differences become more apparent at the onset of puberty.

66. Tambalis et al. (2016) states that "based on a large data set comprising 424,328 test performances" (736) using standing long jump to measure lower body explosive power, sit and reach to measure flexibility, timed 30 second sit ups to measure abdominal and hip flexor muscle endurance, 10 X 5 meter shuttle run to

evaluate speed and agility, and multi-stage 20 meter shuttle run test to estimate aerobic performance (738) "For each of the fitness tests, performance was better in boys compared with girls ($p < 0.001$), except for the S[it and] R[each] test ($p < 0.001$)." (739) In order to illustrate that the findings of Tambalis (2016) are not unique to children in Greece, the authors state "Our findings are in accordance with recent studies from Latvia [ ] Portugal [ ] and Australia [Catley & Tomkinson (2013)].(744)

67. Catley & Tomkinson (2013) observed that "Boys consistently scored higher than girls on health-related fitness tests, except on the sit-and-reach test, with the magnitude of the differences typically increasing with age and often accelerating from about 12 years of age. Overall, the magnitude of differences between boys and girls was large for the 1.6 km run, 20 m shuttle run, basketball throw and push-ups; moderate for the 50-m sprint, standing broad jump and sit-and-reach; and small for sit-ups and hand-grip strength." (106)

68. Evaluating performance on the "Eurofit tests (measuring balance, muscular strength, muscular endurance, muscular power, flexibility, speed, speed-agility and cardiorespiratory fitness)" in "2,779,165 results on children and adolescents [ages 9-17 years] from 30 European countries" Tomkinson et al. (2018) observed that "On average, boys performed substantially better than girls at each age group on muscular strength (E[ffect]S[ize]: large), muscular power (E[ffect]S[ize]: large), muscular endurance (E[ffect]S[ize]: moderate to large), speed-agility (E[ffect]S[ize]: moderate) and C[ardio]R[espiratory] F[itness] (E[ffect]S[ize]: large) tests, with the

magnitude of the sex-specific differences increasing with age and accelerating from about 12 years"" (1451). Given the number of subjects analyzed and that the data represent 30 different European countries, these findings particularly highlight the sex related differences in athletic performance potential between boys and girls both before and during adolescence.

J. Daniel M. Fessler, et al., *Sexual dimorphism in foot length proportionate to stature*, 32 ANN HUM BIOL 44 (2005). Roshna E. Wunderlich & P. R. Cavanagh, *Gender differences in adult foot shape: implications for shoe design*, 33 MED SCI SPORTS EXERC (2001):

69. Combined, these two articles evaluate and demonstrate clear differences in the foot length and structure of men and women. Of relevance to the case at hand is that to the best of my knowledge, no data are available demonstrating that male-to-female transgender hormone or surgical treatment alters the inherent sex related difference in foot structure.

70. Fessler et al. (2005) observes that "female foot length is consistently smaller than male foot length" (44) and conclude that "proportionate foot length is smaller in women"(51) with an overall conclusion that "Our analyses of genetically disparate populations reveal a clear pattern of sexual dimorphism, with women consistently having smaller feet proportionate to stature than men." (53)

71. Wunderlich & Cavanaugh (2001) observe that "a foot length of 257 mm represents a value that is … approximately the 20th percentile men's foot lengths

and the 80th percentile women's foot lengths." (607) and "For a man and a woman, both with statures of 170 cm (5 feet 7 inches), the man would have a foot that was approximately 5 mm longer and 2 mm wider than the woman" (608). Based on these, and other analyses, they conclude that "female feet and legs are not simply scaled-down versions of male feet but rather differ in a number of shape characteristics, particularly at the arch, the lateral side of the foot, the first toe, and the ball of the foot." (605)

K. Daichi. Tomita, et al., *A pilot study on the importance of forefoot bone length in male 400-m sprinters: is there a key morphological factor for superior long sprint performance?*, 11 BMC RES NOTES 583 (2018). Hiromasa Ueno, et al., *The Potential Relationship Between Leg Bone Length and Running Performance in Well-Trained Endurance Runners*, 70 J HUM KINET 165 (2019). Hiromasa Ueno, et al., *Association between Forefoot Bone Length and Performance in Male Endurance Runners*, 39 INT J SPORTS MED 275 (2018):

72. As men have longer feet and legs than women as part of their overall larger body stature, collectively these articles build upon the work of Fessler et al. (2005) and Wunderlich & Cavanaugh (2001) by providing some evidence that "morphological factors such as long forefoot bones may play an important role in achieving superior long sprinting performance" (Tomito, 583), "longer forefoot bones may be advantageous for achieving higher running performance in endurance runners" (Ueno

2018, 275)" and "the leg bone length, especially of the tibia, may be a potential morphological factor for achieving superior running performance in well-trained endurance runners." (Ueno 2019, 165)

L. International Weightlifting Federation "World Records"

73. I accessed weightlifting records as posted by the International Weightlifting Federation at https://www.iwf.net/results/world-records/. The records collected below are as of November 1, 2019.

74. As the chart below illustrates, junior men's and women's world records (age 15-20) for clean and jerk lifts indicate that boys or men perform better than girls or women even when they are matched for body mass. Similar sex differences can be found for the snatch event on the International Weightlifting Federation website.

Junior Men's and Women's World Records (ages 15-20) for Clean and Jerk			
Men's weight (kg)	Record (kg)	Women's weight (kg)	Record (kg)
56	171	58	142
62	183	63	147
69	198	69	157
77	214	75	164
85	220	90	160
94	233	+90	193

M. Selected Results from the 2019 NCAA Division 1 and Division 2 Track & Field Championships

75. I accessed the results for the NCAA 2019 Division 1 Track and Field Championships at https://www.flotrack.org/results/6515701-2019-D1-ncaa-outdoorchampionships/26635 on May 14, 2020. I also accessed the results for the NCAA Divisions 2 Track and Field Championships at http://leonetiming

.com/2019/Outdoor/NCAAD2/Results.htm on May 14, 2020.

76. A shown in the table below, in this small sampling of Track & Field events at the elite collegiate level of Division 1, the men's eighth place finisher and often all 24 men's qualifiers, outperformed the first place women's athlete in the same event. Furthermore, at the Division 2 level, which is arguably a less elite level of performance than Division 1, in most (if not all) events, the top eight men's finishers outperformed the first place division 1 woman in the same event.

Comparison of selected performance in Men's and Women's events in the 2019 NCAA Division 1 and Division 2 Track and Field Championships.		
100 meter run (seconds)		
D1 Women	D1 Men	D2 Men
10.75	9.86	10.17
10.95	9.93	10.22
10.98	9.97	10.32
11.00	10.01	10.38
11.02	10.06	10.47
11.04	10.06	10.48
11.12	10.12	10.53
11.65	10.12	FS
D1 Men's slowest time in 100 m prelims: 10.67 (23rd place; 24th place DNS)		
D1 Women's fastest time in 100 m prelims: 10.99		
1500 m run (minutes: seconds)		
D1 Women	D1 Men	D2 Men
4:05.98	3:41.39	3:58.24
4:06.27	3:41.39	3:58.74
4:11.96	3:42.14	3:58.90
4:13.02	3:42.29	3:59.02
4:13.57	3:42.32	3:59.47
4:13.62	3:42.73	3:59.55
4:14.30	3:42.77	3:59.65
4:14.73	3:42.81	3:59.93
D1 Men's slowest time in 1500 m prelims: 3:53.53 (24th place)		
D1 Women's fastest time in 1500 m prelims: 4:12.02		
10,000 m run (minutes: Seconds)		
D1 Women	D1 Men	D2 Men
33:10.84	29:16.60	30:12.3
33:11.56	29:18.10	30:59.78

33:17.81	29:19.85	31:05.87
33:20.68	29:19.93	31:07.37
33:20.70	29:20.73	31:11.07
33:25.91	29:25.35	31:13.39
33:32.80	29:26.34	31:14.69
33:34.20	29:30.88	31:18.75
D1 Men's slowest time in 10,000 m prelims: 31:20.16 (24th place)		
Long Jump (meters)		
D1 Women	D1 Men	DII Men
6.84	8.2	8.16
6.71	8.18	8.08
6.63	8.12	7.96
6.55	8.05	7.86
6.49	8.00	7.79
6.44	7.88	7.72
6.43	7.87	7.72
6.40	7.83	7.71
D1 Men's 21st place longest jump 7.38 m (22nd foul, 23rd & 24th DNS)		
Shot Put (meters) Note that men use 7.26 kg (16 lbs.) shot, women use 4 kg (8.82 lbs.) shot		
D1 Women	D1 Men	D II Men
18.14	21.11	21.47
18.11	20.77	19.58
17.88	20.31	18.71
17.67	19.89	18.62
17.46	19.73	18.43
17.24	19.65	18.34
17.13	19.65	18.30
16.94	19.52	18.03
D1 Men's 23rd place longest put 16.90 m (24th Foul)		

II. Biological male physiology is the basis for the performance advantage that men, or adolescent boys, have over women, or adolescent girls, in almost all athletic contests.

77. Common observation and knowledge tell us that, across the years of puberty, boys experience distinctive physical developments that largely explain the performance advantages I have detailed above. These well-known physical developments have now also been the subject of scientific measurement and study.

78. At the onset of male puberty the testes begin to secrete greatly increased amounts of testosterone. Testosterone is the primary "androgenic" hormone. It causes the physical traits associated with males such

as facial and body hair growth, deepening of the voice, enlargement of the genitalia, increased bone mineral density, increased bone length in the long bones, and enhanced muscle growth (to name just a few of testosterone's effects). The enhanced muscle growth caused by testosterone is the "anabolic" effect often discussed when testosterone is called an anabolic steroid.

79. Women lack testes and instead have ovaries, so they do not experience similar increases in testosterone secretion. Instead, puberty in women is associated with the onset of menstruation and increased secretion of "estrogens." Estrogens, most notably estradiol, cause the feminizing effects associated with puberty in women which include increased fat tissue growth in the hips, thighs, and buttocks, development of the mammary glands, and closure of the growth plates in long bones. The smaller amount of muscle growth typically seen in women during puberty explains in part the athletic performance gap between men, and boys after the onset of puberty, and women and girls.

A. Handelsman, Hirschberg, et al. (2018):

80. In addition to documenting objective performance advantages enjoyed by males as I have reviewed above, Handelsman and his co-authors also detail physiological differences caused by male puberty—and by developments during puberty under the influence of male levels of testosterone in particular—that account for those advantages. These authors state: "The striking male postpubertal increase in circulating testosterone provides a major, ongoing, cumulative, and durable physical advantage

in sporting contests by creating larger and stronger bones, greater muscle mass and strength, and higher circulating hemoglobin as well as possible psychological (behavioral) differences. In concert, these render women, on average, unable to compete effectively against men in power-based or endurance-based sports." (805)

81. First, Handelsman et al. explain that all of these physiological differences appear to be driven by male levels of circulating testosterone. "The available, albeit incomplete, evidence makes it highly likely that the sex difference in circulating testosterone of adults explains most, if not all, of the sex differences in sporting performance. This is based on the dose-response effects of circulating testosterone to increase muscle mass and strength, bone size and strength (density), and circulating hemoglobin, each of which alone increases athletic capacity, as well as other possible sex dichotomous, androgen-sensitive contributors such as mental effects (mood, motivation, aggression) and muscle myoglobin content. These facts explain the clear sex difference in athletic performance in most sports, on which basis it is commonly accepted that competition has to be divided into male and female categories." (823)

82. "Prior to puberty, levels of circulating testosterone as determined by LC-MS are the same in boys and girls . . . . They remain lower than 2 nmol/L in women of all ages. However, from the onset of male puberty the testes secrete 20 times more testosterone resulting in circulating testosterone levels that are 15 times greater in healthy young men than in age-similar women." (806) "[T]he circulating testosterone of most women never reaches consistently >5 nmol/L,

a level that boys must sustain for some time to exhibit the masculinizing effects of male puberty." (808)

83. "The characteristic clinical features of masculinization (e.g., muscle growth, increased height, increased hemoglobin, body hair distribution, voice change) appear only if and when circulating testosterone concentrations rise into the range of males at mid-puberty, which are higher than in women at any age even after the rise in circulating testosterone in female puberty." (810)

84. "[The] order-of-magnitude difference in circulating testosterone concentrations is the key factor in the sex difference in athletic performance due to androgen effects principally on muscle, bone, and hemoglobin." (811)

85. "Modern knowledge of the molecular and cellular basis for androgen effects on skeletal muscle involves effects due to androgen (testosterone, DHT) binding to the AR that then releases chaperone proteins, dimerizes, and translocates into the nucleus to bind to androgen response elements in the promoter DNA of androgen-sensitive genes. This leads to increases in (1) muscle fiber numbers and size, (2) muscle satellite cell numbers, (3) numbers of myonuclei, and (4) size of motor neurons. Additionally, there is experimental evidence that testosterone increases skeletal muscle myostatin expression, mitochondrial biogenesis, myoglobin expression, and IGF-1 content, which may augment energetic and power generation of skeletal muscular activity." (811)

86. **Muscle mass** is perhaps the most obvious driver of male athletic advantage. "On average,

women have 50% to 60% of men's upper arm muscle cross-sectional area and 65% to 70% of men's thigh muscle cross-sectional area, and women have 50% to 60% of men's upper limb strength and 60% to 80% of men's leg strength. Young men have on average a skeletal muscle mass of >12 kg greater than age-matched women at any given body weight. Whereas numerous genes and environmental factors (including genetics, physical activity, and diet) may contribute to muscle mass, the major cause of the sex difference in muscle mass and strength is the sex difference in circulating testosterone." (812)

87. "Dose-response studies show that in men whose endogenous testosterone is fully suppressed, add-back administration of increasing doses of testosterone that produce graded increases in circulating testosterone causes a dose-dependent (whether expressed according to testosterone dose or circulating levels) increase in muscle mass (measured as lean body mass) and strength. Taken together, these studies prove that testosterone doses leading to circulating concentrations from well below to well above the normal male range have unequivocal dose-dependent effects on muscle mass and strength. These data strongly and consistently suggest that the sex difference in lean body mass (muscle) is largely, if not exclusively, due to the differences in circulating testosterone between men and women. These findings have strong implications for power dependent sport performance and largely explain the potent efficacy of androgen doping in sports." (813)

88. "Muscle growth, as well as the increase in strength and power it brings, has an obvious performance enhancing effect, in particular in sports

that depend on strength and (explosive) power, such as track and field events. There is convincing evidence that the sex differences in muscle mass and strength are sufficient to account for the increased strength and aerobic performance of men compared with women and is in keeping with the differences in world records between the sexes." (816)

89. Men and adolescent boys also have distinct athletic advantages in **bone size, strength, and configuration**.

90. "Sex differences in height have been the most thoroughly investigated measure of bone size, as adult height is a stable, easily quantified measure in large population samples. Extensive twin studies show that adult height is highly heritable with predominantly additive genetic effects that diverge in a sex-specific manner from the age of puberty onwards, the effects of which are likely to be due to sex differences in adult circulating testosterone concentrations." "Men have distinctively greater bone size, strength, and density than do women of the same age. As with muscle, sex differences in bone are absent prior to puberty but then accrue progressively from the onset of male puberty due to the sex difference in exposure to adult male circulating testosterone concentrations." (818)

91. "The earlier onset of puberty and the related growth spurt in girls as well as earlier estrogen-dependent epiphyseal fusion explains shorter stature of girls than boys. As a result, on average men are 7% to 8% taller with longer, denser, and stronger bones, whereas women have shorter humerus and femur cross-sectional areas being 65% to 75% and 85%,

respectively, those of men. These changes create an advantage of greater bone strength and stronger fulcrum power from longer bones." (818)

92. **Male bone geometry** also provides mechanical advantages. "The major effects of men's larger and stronger bones would be manifest via their taller stature as well as the larger fulcrum with greater leverage for muscular limb power exerted in jumping, throwing, or other explosive power activities." (818) Further, "the widening of the female pelvis during puberty, balancing the evolutionary demands of obstetrics and locomotion, retards the improvement in female physical performance, possibly driven by ovarian hormones rather than the absence of testosterone." (818)

93. Beyond simple performance, the greater density and strength of male bones provides higher protection against stresses associated with extreme physical effort: "[S]tress fractures in athletes, mostly involving the legs, are more frequent in females with the male protection attributable to their larger and thicker bones." (818)

94. In addition to advantages in muscle mass and strength, and bone size and strength, men and adolescent boys have **greater hemoglobin** levels in their blood as compared to women and girls, and thus a greater capability to transport oxygen within the blood, which then provides bioenergetic benefits. "It is well known that levels of circulating hemoglobin are androgen-dependent and consequently higher in men than in women by 12% on average…. Increasing the amount of hemoglobin in the blood has the biological effect of increasing oxygen transport from lungs to

tissues, where the increased availability of oxygen enhances aerobic energy expenditure." (816) "It may be estimated that as a result the average maximal oxygen transfer will be ~10% greater in men than in women, which has a direct impact on their respective athletic capacities." (816)

B. Louis Gooren, *The Significance of Testosterone for Fair Participation of the Female Sex in Competitive Sports*, 13 Asian J. of Andrology 653 (2011):

95. Gooren et al. like Handelsman et al., link male advantages in height, bone size, muscle mass, strength, and oxygen carrying capacity to exposure to male testosterone levels: "Before puberty, boys and girls hardly differ in height, muscle and bone mass. Pubertal testosterone exposure leads to an ultimate average greater height in men of 12–15 centimeters, larger bones, greater muscle mass, increased strength and higher hemoglobin levels." (653)

C. Thibault, Guillaume, et al. (2010):

96.In addition to the testosterone-linked advantages examined by Handelsman et al. (2018), Thibault et al. note sex-linked differences in body fat as impacting athletic performance: "Sex has been identified as a major determinant of athletic performance through the impact of height, weight, body fat, muscle mass, aerobic capacity or anaerobic threshold as a result of genetic and hormonal differences []." (214)

D. Taryn Knox, Lynley C. Anderson, et al., *Transwomen in Elite Sport: Scientific & Ethical Considerations*, 45 J. MED ETHICS 395 (2019):

97. Knox et al. analyze specific testosterone-linked physiological differences between men and women that provide advantages in athletic capability, and conclude that "[E]lite male athletes have a performance advantage over their female counterparts due to physiological differences." (395) "Combining all of this information, testosterone has profound effects on key physiological parameters that underlie athletic performance in men. There is substantial evidence regarding the effects on muscle gain, bone strength, and the cardiovascular and respiratory system, all of which drive enhanced strength, speed and recovery. Together the scientific data point to testosterone providing an all-purpose benefit across a range of body systems that contribute to athletic performance for almost all sports." (397-98)

98. "It is well recognised that testosterone contributes to physiological factors including body composition, skeletal structure, and the cardiovascular and respiratory systems across the life span, with significant influence during the pubertal period. These physiological factors underpin strength, speed and recovery with all three elements required to be competitive in almost all sports. An exception is equestrian, and for this reason, elite equestrian competition is not gender-segregated. As testosterone underpins strength, speed and recovery, it follows that testosterone benefits athletic performance." (397)

99. "High testosterone levels and prior male physiology provide an all-purpose benefit, and a substantial advantage. As the IAAF says, 'To the best of our knowledge, there is no other genetic or

biological trait encountered in female athletics that confers such a huge performance advantage.'" (399)

100. These authors, like others, describe sex-linked advantages relating to **bone size and muscle mass**. "Testosterone also has a strong influence on bone structure and strength. From puberty onwards, men have, on average, 10% more bone providing more surface area. The larger surface area of bone accommodates more skeletal muscle so, for example, men have broader shoulders allowing more muscle to build. This translates into 44% less upper body strength for women, providing men an advantage for sports like boxing, weightlifting and skiing. In similar fashion, muscle mass differences lead to decreased trunk and lower body strength by 64% and 72%, respectively in women. These differences in body strength can have a significant impact on athletic performance, and largely underwrite the significant differences in world record times and distances set by men and women." (397)

101. Knox et al. also identify the relatively higher percentage of **body fat** in women as both inherently sex-linked, and a disadvantage with respect to athletic performance. "Oestrogens also affect body composition by influencing fat deposition. Women, on average, have higher percentage body fat, and this holds true even for highly trained healthy athletes (men 5%–10%, women 8%–15%). Fat is needed in women for normal reproduction and fertility, but it is not performance enhancing. This means men with higher muscle mass and less body fat will normally be stronger kilogram for kilogram than women." (397)

102. Knox et al. detail the relative performance disadvantage arising from the oestrogen-linked **female pelvis shape**: "[T]he major female hormones, oestrogens, can have effects that disadvantage female athletic performance. For example, women have a wider pelvis changing the hip structure significantly between the sexes. Pelvis shape is established during puberty and is driven by oestrogen. The different angles resulting from the female pelvis leads to decreased joint rotation and muscle recruitment ultimately making them slower." (397)

103. "In short, higher testosterone levels lead to larger and stronger bones as well as more muscle mass providing a body composition-related performance advantage for men for almost all sports. In contrast, higher oestrogen levels lead to changes in skeletal structure and more fat mass that can disadvantage female athletes, in sports in which speed, strength and recovery are important." (397)

104. Knox et al. break out multiple sex-linked contributions to a male advantage in **oxygen intake and delivery**, and thus to energy delivery to muscles. "Testosterone also influences the cardiovascular and respiratory systems such that men have a more efficient system for delivering oxygen to active skeletal muscle. Three key components required for oxygen delivery include lungs, heart and blood haemoglobin levels. Inherent sex differences in the lung are apparent from early in life and throughout the life span with lung capacity larger in men because of a lower diaphragm placement due to Y-chromosome genetic determinants. The greater lung volume is complemented by testosterone-driven **enhanced**

alveolar multiplication rate during the early years of life." (397)

105. "Oxygen exchange takes place between the air we breathe and the bloodstream at the alveoli, so more alveoli allows more oxygen to pass into the bloodstream. Therefore, the greater lung capacity allows more air to be inhaled with each breath. This is coupled with an improved uptake system allowing men to absorb more oxygen. Once in the blood, oxygen is carried by haemoglobin. Haemoglobin concentrations are directly modulated by testosterone so men have higher levels and can carry more oxygen than women. Oxygenated blood is pumped to the active skeletal muscle by the heart. The left ventricle chamber of the heart is the reservoir from which blood is pumped to the body. The larger the left ventricle, the more blood it can hold, and therefore, the more blood can be pumped to the body with each heartbeat, a physiological parameter called 'stroke volume'. The female heart size is, on average, 85% that of a male resulting in the stroke volume of women being around 33% less. Putting all of this together, men have a much more efficient cardiovascular and respiratory system, with testosterone being a major driver of enhanced aerobic capacity." (397)

E. Lepers, Knechtle, et al. (2013):

106. Lepers et al. point to some of these same physiological differences as explaining the large performance advantage they found for men in triathlon performance. "Current explanations for sex differences in [maximal oxygen uptake] among elite athletes, when expressed relative to body mass, provide two major findings. First, elite females have

more (<13 vs. <5 %) body fat than males. Indeed, much of the difference in [maximal oxygen uptake] between males and females disappears when it is expressed relative to lean body mass. Second, the hemoglobin concentration of elite athletes is 5–10 % lower in females than in males." (853)

107. "Males possess on average 7–9 % less percent body fat than females, which is likely an advantage for males. Therefore, it appears that sex differences in percentage body fat, oxygen-carrying capacity and muscle mass may be major factors for sex differences in overall triathlon performance. Menstrual cycle, and possibly pregnancy, may also impact training and racing in female athletes, factors that do not affect males." (853)

F. Tønnessen, Svendsen, et al. (2015):

108. Tønnessen et al. likewise point to some of the same puberty and testosterone-triggered physiological differences discussed above to explain the increasing performance advantage of boys across the adolescent years, noting that "[T]here appears to be a strong mechanistic connection between the observed sex-specific performance developments and hormone-dependent changes in body composition during puberty." (7) "Beyond [age 12], males outperform females because maturation results in a shift in body composition. Our results are in line with previous investigations exploring physical capacities such as [maximal oxygen uptake] and isometric strength in non-competitive or non-specialized adolescents." (7)

109. "[S]ex differences in physical capacities (assessed as [maximal oxygen uptake] or isometric

strength in the majority of cases) are negligible prior to the onset of puberty. During the adolescent growth spurt, however, marked sex differences develop. This can primarily be explained by hormone dependent changes in body composition and increased red blood cell mass in boys." (2)

110. "Sexual dimorphism during puberty is highly relevant for understanding sex-specific performance developments in sports. The initiation of the growth spurt in well-nourished girls occurs at about 9–10 yrs of age. Age at peak height velocity (PHV) and peak weight velocity (PWV) in girls is 11–12 and 12–13 yrs, respectively, with an average 7–9 cm and 6–9 kg annual increase. The growth spurt and PHV in girls occurs approximately 2 years earlier than for boys. However, the magnitude of the growth spurt is typically greater in boys, as they on average gain 8–10 cm and 9–10 kg annually at PHV and PWV, respectively. Girls experience an escalation in fat mass compared to boys. Fat free mass (FFM) (also termed lean muscle mass) is nearly identical in males and females up to the age of 12–13 yrs. FFM plateaus in females at 15–16 years of age, but continues increasing in males up to the age of 19–20 yrs. On average, boys and girls increase their FFM by 7.2 and 3.5 kg/year^{-1}, respectively, during the interval near peak height velocity. Corresponding estimates for changes in absolute fat mass are 0.7 and 1.4 kg/year^{-1}, while estimates for relative fatness are -0.5% and +0.9%/year^{-1} in boys and girls, respectively." (2)

111. "During puberty, boys begin to produce higher levels of circulating testosterone. This affects the production of muscle fibers through direct stimulation of protein synthesis. Higher testosterone

levels result in more muscle mass, which in turn facilitates greater power production and more advantageous ground reaction forces during running and jumping. Adolescent weight gain in boys is principally due to increased height (skeletal tissue) and muscle mass, while fat mass remains relatively stable. In contrast, during puberty girls begin to produce higher levels of circulating estrogen and other female sex hormones. Compared to their male counterparts, they experience a less pronounced growth spurt and a smaller increase in muscle mass, but a continuous increase in fat mass, thereby lowering the critical ratio between muscular power and total body mass." (7)

112. "The relatively greater progress in jumping exercises can also be explained by growth and increased body height during puberty. The increase in body height means that the center of gravity will be higher, providing better mechanical conditions for performance in jumping events." (8)

G. Louis J. G. Gooren & Mathijs C. M. Bunck, *Transsexuals & Competitive Sports*, 151 EUROPEAN J. OF ENDOCRINOLOGY 425 (2004):

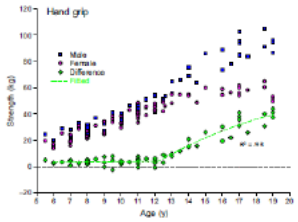
113. In their study of performance of transsexual athletes, Louis et al. note that "[b]efore puberty, boys and girls do not differ in height, muscle and bone mass. Recent information shows convincingly that actual levels of circulating testosterone determine largely muscle mass and strength." (425) "Testosterone exposure during puberty leads ultimately to an average greater height

in men of 12–15 cm, larger bones and muscle mass, and greater strength." (425)

H. Handelsman (2017):

114. Handelsman (2017) notes the existence of a "stable and robust" performance gap between males and females, with no narrowing "over more than three decades" (71), observing that "[i]t is well known that men's athletic performance exceeds that of women especially in power sports because of men's greater strength, speed and endurance. This biological physical advantage of mature males forms the basis for gender segregation in many competitive sports to allow females a realistic chance of winning events. This physical advantage in performance arises during early adolescence when male puberty commences after which men acquire larger muscle mass and greater strength, larger and stronger bones, higher circulating haemoglobin as well as mental and/or psychological differences. After completion of male puberty, circulating testosterone levels in men are consistently 10-15 times higher than in children or women at any age." (68)

115. To illustrate, Figure 3 of Handelsman (2017) below indicates, "the age trends in hand-grip strength showed a difference in hand-grip strength commencing from the age of 12.8 years onwards (Figure 3). Prior to the age of 13 years, boys had a marginally significant greater grip strength than girls ($n=45$, $t=2.0$, $P=.026$), but after the age of 13 years, there was a strong significant relationship between age and difference in grip strength ($n=18$, $r=.89$, $P<.001$)." (70)



116. Handelsman (2017) in particular focuses on the correlation between the development of this performance gap and the progress of male adolescence and circulating testosterone levels in boys. "The strength of the present study is that it includes a wide range of swimming as well as track and field running and jumping events as well as strength for nonathletes for males and females across the ages spanning the onset of male puberty. The similar timing of the gender divergence in each of these settings to that of the rise in circulating testosterone to adult male levels strongly suggests that they all reflect the increase in muscular size and strength although the impact of other androgen-dependent effects on bone, haemoglobin and psychology may also contribute." (71-72)

117. "In this study, the timing and tempo of male puberty effects on running and jumping performance were virtually identical and very similar to those in swimming events. Furthermore, these coincided with the timing of the rise in circulating testosterone due to male puberty. In addition to the strikingly similar timing and tempo, the magnitude of the effects on performance by the end of this study was 10.0% for running and 19.3% for jumping, both consistent with the gender differences in performance of adult athletes previously reported to be 10%-12% for running and 19% for jumping." (71)

118. "In the swimming events, despite the continued progressive improvements in individual male and female event records, the stability of the gender difference over 35 years shown in this study suggests that the gender differences in performance are stable and robust." (71)

119. "The similar time course of the rise in circulating testosterone with that of the gender divergences in swimming and track and field sports is strongly suggestive that these effects arise from the increase in circulating testosterone from the start of male puberty." (71) "It is concluded that the gender divergence in athletic performance begins at the age of 12-13 years and reaches adult plateau in the late teenage years. Although the magnitude of the divergence varies between athletic skills, the timing and tempo are closely parallel with each other and with the rise in circulating testosterone in boys during puberty to reach adult male levels." (72)

120. Handelsman (2017) notes several specific physiological effects of male levels of circulating testosterone that are relevant to athletic performance:

a. "Adult male circulating testosterone also has marked effects on bone development leading to longer, stronger and denser bone than in age-matched females." (71)

b. "A further biological advantage of adult male circulating testosterone concentrations is the increased circulating haemoglobin. Men have ~10 g/L greater haemoglobin than women with the gender differences also evident from the age of 13-14 years." (71)

121. Handelsman (2017) also observes that "exposure to adult male testosterone concentrations is likely to produce some mental or psychological effects. However, the precise nature of these remains controversial and it is not clear whether, or to what extent, this contributes to the superior elite sporting performance of men in power sports compared with the predominant effects on muscle mass and function." (71)

I. Centers for Disease Control & Prevention, "National Health Statistics Reports Number 122," CDC (2018):

122. To obtain data on height, weight, and body mass differences between men and women, I accessed the "National Health Statistics Reports Number 122" published by the Centers for Disease Control & Prevention, at https://www.cdc.gov/nchs/data/nhsr/nhsr122-508.pdf, which is based on data through 2016.

123. The average height for a U.S. adult man is 5 feet 9 inches and for a U.S. adult woman the average height is 5 feet 4 inches. (3)

124. The average weight for a U.S. adult man is 197.8 lbs. and for a U.S. adult woman the average weight is 170.5 lbs. (6)

125. The average body mass index for a U.S. adult man is 29.1 kg/m2, and the average body mass index for a U.S. adult woman is 29.6 kg/m2. (3)

III. Administration of cross-sex hormones to men, or adolescent boys, after male puberty does not eliminate their performance advantage over women, or adolescent girls, in almost all athletic contests.

126. At the collegiate level, the "NCAA Policy on Transgender Student-Athlete Participation" requires only that such males be on unspecified and unquantified "testosterone suppression treatment" for "one calendar year" prior to competing in women's events.

127. Studies have demonstrated that hormone administration of testosterone suppression does not eliminate the physical advantages males have over females in athletics. Although such studies have not focused specifically on elite athletes, there is no scientific evidence or principle suggesting that the effects of hormone administration of testosterone suppression on elite athletes should be different than they are in the general population.

128. It is obvious that some effects of male puberty that confer advantages for athletic performance—in particular bone size and configuration—cannot be reversed once they have occurred.

129. In addition, some studies have now determined that other physiological advantages conferred by male puberty are also not fully reversed by later hormonal treatments associated with gender transition. Specifically, studies have shown that the effects of puberty in males including increased muscle mass, increased bone mineral density, increased lung size, and increased heart size, are not completely

reversed by suppressing testosterone secretion and administering estrogen during gender transition procedures in males.

130. For example, suppressing testosterone secretion and administering estrogen in post pubescent males does not shrink body height to that of a comparably aged female, nor does it reduce lung size or heart size. Indeed, while testosterone suppression and estrogen administration reduce the size and density of skeletal muscles, the muscles remain larger than would be expected in a typical female even when matched for body height or mass. A general tenet of exercise science is that larger muscles are stronger muscles due to larger muscles containing more contractile proteins. Thus, while gender transition procedures may impair a male's athletic potential, in my opinion it is still highly unlikely to be reduced to that of a comparably aged and trained female due to these physiological factors.

131. Supporting my opinion in this regard, at least two recent prospective studies involving substantial numbers of subjects have found that measured strength did not decrease, or decreased very little, in male-to-female subjects after a full year of hormone therapy including testosterone suppression, leaving these populations with a large strength advantage over baseline female strength.

132. I review relevant findings in more detail below.

A. Handelsman, Hirschberg, et al. (2018):

133. Handelsman et al. (2018) note that in "transgender individuals, the developmental effects of adult male circulating testosterone concentrations

will have established the sex difference in muscle, hemoglobin, and bone, some of which is fixed and irreversible (bone size) and some of which is maintained by the male circulating testosterone concentrations (muscle, hemoglobin)." (824)

134. "[D]evelopmental bone effects of androgens are likely to be irreversible." (818)

135. With respect to muscle mass and strength, Handelsman et al. (2018) observe that suppression of testosterone in males to levels currently accepted for transgender qualification to compete in women's events will still leave those males with a large strength advantage. "Based on the established dose-response relationships, suppression of circulating testosterone to <10 nmol/L would not eliminate all ergogenic benefits of testosterone for athletes competing in female events. For example, according to the Huang *et al.* [] study, reducing circulating testosterone to a mean of 7.3 nmol/L would still deliver a 4.4% increase in muscle size and a 12% to 26% increase in muscle strength compared with circulating testosterone at the normal female mean value of 0.9 nmol/L. Similarly, according to the Karunasena *et al.* [] study, reducing circulating testosterone concentration to 7 nmol/L would still deliver 7.8% more circulating hemoglobin than the normal female mean value. Hence, the magnitude of the athletic performance advantage in DSD athletes, which depends on the magnitude of elevated circulating testosterone concentrations, is considerably greater than the 5% to 9% difference observed in reducing levels to <10 nmol/L." (821)

B. Gooren (2011):

136. In addition to noting that the length and diameter of bones is unchanged by post-pubertal suppression of androgens (including testosterone) (653), Gooren found that "[i]n spite of muscle surface area reduction induced by androgen deprivation, after 1 year the mean muscle surface area in male-to-female transsexuals remained significantly greater than in untreated female-to-male transsexuals." (653) "Untreated female-to-male transsexuals" refers to biological females, who will have hormonal levels ordinarily associated with women.

137. As I have explained above, greater muscle surface area translates into greater strength, assuming comparable levels of fitness.

C. Knox, Anderson, et al. (2019):

138. In their recent article, Knox et al. reviewed the physiological effects of reducing circulating testosterone levels below 10nmol/L, the level current accepted by the International Olympic Committee (IOC) (2015) guidelines as adequate to permit males to enter as women in Olympic competition.

139. Knox et al. note the unarguable fact that 10nmol/L is a far higher level of circulating testosterone than occurs in women, including elite women athletes. "Transwomen [meet IOC guidelines] to compete with testosterone levels just under 10 nmol/L. This is more than five times the upper testosterone level (1.7 nmol/L) of healthy, premenopausal elite ciswomen athletes. Given that testosterone (as well as other elements stemming from Y-chromosome-dependent male physiology)

provides an all-purpose benefit in sport, suggests that transwomen have a performance advantage." (398)

140. As to **bone strength**, Knox et al. report that a "recent meta-analysis shows that hormone therapy provided to transwomen over 2 years maintains bone density so bone strength is unlikely to fall to levels of cis-women, especially in an elite athlete competing and training at high intensity. Increased bone strength also translates into protection against trauma, helping with recovery and prevention of injury." (398)

141. Based on a review of multiple studies, Knox et al. report that, in addition to bone size, configuration, and strength, "hormone therapy will not alter … **lung volume or heart size** of the transwoman athlete, especially if [that athlete] transitions postpuberty, so natural advantages including joint articulation, stroke volume and maximal oxygen uptake will be maintained." (398)

142. With respect to **muscle mass and strength**, Knox et al. found that "healthy young men did not lose significant muscle mass (or power) when their circulating testosterone levels were reduced to 8.8 nmol/L (lower than the IOC guideline of 10 nmol/L) for 20 weeks. Moreover, retention of muscle mass could be compensated for by training or other ergogenic methods. In addition, the phenomenon of muscle memory means muscle mass and strength can be rebuilt with previous strength exercise making it easier to regain muscle mass later in life even after long intervening periods of inactivity and mass loss." (398)

143. Indeed, Knox et al. observe that oestradiol—routinely administered as part of hormone therapy for transwomen—is actually known to *increase* muscle mass, potentially providing an *additional* advantage for these athletes over women. "While testosterone is the well-recognised stimulator of muscle mass gain, administration of oestradiol has also been shown to activate muscle gain via oestrogen receptor-ß activation. The combination of oestradiol therapy and a baseline testosterone of 10 nmol/L arguably provides transwomen athletes with an added advantage of increased muscle mass, and therefore power." (398)

144. Summing up these facts, Knox et al. observe: "A transwoman athlete with testosterone levels under 10 nmol/L for 1 year will retain at least some of the physiological parameters that underpin athletic performance. This, coupled with the fact that [under IOC rules] transwomen athletes are allowed to compete with more than five times the testosterone level of a cis-woman, suggests transwomen have a performance advantage." (398) Indeed, considering the magnitude of the advantages involved, Knox et al. conclude that the physiological advantages resulting from male puberty that are not negated by post-pubertal hormonal therapy "provide a strong argument that transwomen have an intolerable advantage over cis-women." (399)

D. Gooren & Bunck (2004):

145. Measuring the concrete significance of the fact that bone size and configuration cannot be changed after puberty, Gooren and Bunk reported that "[Male-to-female transsexuals] were on average

10.7 cm taller (95% CI 5.4–16.0 cm) than [female-to-male transsexuals] (7)." (427)

146. With respect to muscle mass, Gooren and Bunk reported what other authors have since described in more detail: "After 1 year of androgen deprivation, mean muscle area in [male-to-female transsexuals] had decreased significantly but remained significantly greater than in [female-to-male transsexuals] before testosterone treatment." (427) To be clear, female-to-male transsexuals "before testosterone treatment" are biological females with natural female hormone levels.

> "The conclusion is that androgen deprivation in [male-to-female transsexuals] increases the overlap in muscle mass with women but does not reverse it, statistically." (425) In other words, for the overall sample of 19 male-to female transsexuals, before ("306.9 ± 46.5 cm^2") and after ("277.8 ± 37.0 cm^2") 1 year of cross-sex hormone administration these subjects had statistically significantly more muscle mass than the 17 untreated females ("238.8 ± 33.1 cm^2") (427). Before treatment, an unstated number of male-to-female transsexuals on the low end of the range for muscle mass in this sample were similar to an unstated number of untreated females on the high end of the range for muscle mass. As the muscle mass decreased in male-to-female transsexuals due to cross-sex hormone treatment there were an unstated number of male-to-female subjects whose muscle mass was similar to the untreated women on the high end of the range for muscle mass. But, the overlap in muscle mass between male-to-female and untreated female

subjects was insufficient to alter the statistical analysis.

147. Gooren and Bunk provide an insightful conclusion regarding whether it is fair for male-to-female transgender individuals to compete with biological females "The question of whether reassigned M–F can fairly compete with [biological] women depends on what degree of arbitrariness one wishes to accept". (425)

E. Wiik et al. (2020):

148. Taking measurements one month after start of testosterone-suppression in male-to-female subjects, and again 3 and 11 months after start of feminizing hormone replacement therapy in these subjects, Wiik et al. found that total lean tissue (i.e. primarily muscle) did not decrease significantly across the entire period. And even though they observed a small decrease in thigh muscle mass, they found that isometric strength levels measured at the knee "were maintained over the [study period]." (e808) "At T12 [the conclusion of the one-year study], the absolute levels of strength and muscle volume were greater in [male-to-female subjects] than in [female-to-male subjects] and CW [women who had not undergone any hormonal therapy]." (e808)

149. While female-to-male subjects "experienced robust changes in lower-limb muscle mass and strength" after 11 months of testosterone injection (e812), even after the female-to-male subjects had undergone testosterone injection, and the male-to-female subjects had undergone testosterone suppression and feminizing hormone replacement therapy, the male-to-female subjects

"still had larger muscle volumes and quadriceps area" (e811).

150. In other words, biologically male subjects remained stronger than biologically female subjects after undergoing a year of testosterone suppression, and even remained stronger than biologically female subjects who had undergone 11 months of testosterone-driven "robust" increases in muscle mass and strength. I note that outside the context of transgender athletes, the testosterone-driven increase in strength enjoyed by these female-to-male subjects would constitute a disqualifying doping violation under all league anti-doping rules with which I am familiar.

F. Scharff et al. (2019):

151. Scharff et al. measured grip strength in a large cohort of male-to-female subjects from before the start of hormone therapy through one year of hormone therapy. The hormone therapy included suppression of testosterone to less than 2 nml/L "in the majority of the transwomen," (1024), as well as administration of estradiol (1021). These researchers observed a small decrease in grip strength in these subjects over that time, but mean grip strength of this group remained far higher than mean grip strength of females—specifically, "After 12 months, the median grip strength of transwomen [male-to-female subjects] still falls in the 95th percentile for age-matched females." (1026)

152. As further evidence that male-to-female transgender treatment does not negate the inherent athletic performance advantages of a post-pubertal male, I present race times for the well-publicized

sports performance of Cece Telfer. In 2016 and 2017 Cece Telfer competed as Craig Telfer on the Franklin Pierce University men's track team being ranked 200th and 390th (respectively) against other NCAA Division 2 men and did not qualify for the National Championships in any events. Cece Telfer did not compete in the 2018 season while undergoing male-to-female transgender treatment (per NCAA policy). In 2019 Cece Telfer competed on the Franklin Pierce University women's team, qualified for the NCAA Division 2 Track and Field National Championships, and placed 1st in the women's 400 meter hurdles and placed third in the women's 100 meter hurdles. (for examples of the media coverage of this please see https://www.washingtontimes.com/news/2019/jun/3/cece-telfer-franklin-pierce-transgenderhurdler-wi/ last accessed May 29, 2020. https://www.newshub.co.nz/home/sport/2019/06/athletics-transgender-woman-cece-telfer-whopreviously-competed-as-a-man-wins-ncaa-track-championship.html last accessed May 29, 2020.)

153. The table below shows the best collegiate performance times from the combined 2015 and 2016 seasons for Cece Telfer when competing as a man (Craig Telfer) in men's events, and the best collegiate performance times from the 2019 season when competing as a woman in women's event. Comparing the times for the running events (in which male and female athletes run the same distance) using a two tailed paired sample test there is no statistical difference (P=0.51) between the times. Calculating the difference in time between the male and female times for the best performances in the same running events and dividing that difference by the male

performance times, as a female Cece Telfer performed an average of 0.22% *faster* as a female. (Comparing the performance for the hurdle events (marked with H) is of questionable validity due to differences between men's and women's events in hurdle heights and spacing, and distance for the 110m vs. 100 m.) While this is simply one example, and does not represent a controlled experimental analysis, this information provides some evidence that male-to-female transgender treatment does not negate the inherent athletic performance advantages of a post-pubertal male. (these times were obtained from https://www.tfrrs.org/athletes/6994616/Franklin_Pierce/CeCe_Telfer.html and https://www.tfrrs.org/athletes/5108308.html, last accessed May 29, 2020)

As Craig Telfer (male athlete)		As Cece Telfer (female athlete)	
Event	Time (seconds)	Event	Time (seconds)
55	7.01	55	7.02
60	7.67	60	7.63
100	12.17	100	12.24
200	24.03	200	24.30
400	55.77	400	54.41
55 H †	7.98	55 H†	7.91
60 H †	8.52	60 H†	8.33
110 H†	15.17	100 H†	13.41*
400 H‡	57.34	400 H‡	57.53**

* women's 3rd place, NCAA Division 2 National Championships
** women's 1st place, NCAA Division I2 National Championships
† men's hurdle height is 42 inches with differences in hurdle spacing between men and women
‡ men's hurdle height is 36 inches, women's height is 30 inches with the same spacing between hurdles

G. Johanna Harper. (2015):

154. This article is oft cited as evidence supporting a lack of performance advantage for male-to-female transgender athletes (*for an example see the Expert Declaration by Joshua D. Safer, MD, FACP, FACE. Case 1:20-cv-00184-CWD Document 22-9, point 51*). This article purports to show that male-to-female transgender distance runners do not retain post-pubertal athletic advantages over biological

females. However, this paper has numerous methodical shortcomings rendering the data and conclusions to be of little to no scientific validity. Herein I provide a detailed critique of a number of the methodical shortcomings of this paper.

155. Of major concern is that the paper does not mention any type of approval from a research ethics committee, documentation of informed consent from the participants, or otherwise state that the study was conducted in accordance with the ethical principles of the World Medical Association Declaration of Helsinki, which raises the specter of overall ethical concerns with this paper (This may simply be an oversight on the part of the journal in not requiring such a statement, but such an oversight is very unusual given the publication date of 2015). As the data were gathered with the intent of contributing to the scientific knowledge, and there was interaction between the researcher and the subjects with exchange of identifiable and sensitive information, Institutional Review Board approval and documentation of consent are necessary for this type of project.

156. The author states that "The first problem is how to formulate a study to create a meaningful measurement of athletic performance, both before and after testosterone suppression. No methodology has been previously devised to make meaningful measurements." (2) This statement is not correct as there are innumerable publications with validated methodology for comparing physical fitness and/or athletic performance between people of different ages, sexes (some of which have previously been discussed), medical conditions, and before and after medical

treatment, any of which could easily have been used with minimal or no adaptation for the purposes of this study (many even before the initiation of the Harper study, which apparently started in 2006).

157. The overall methods as explained within the manuscript are of limited scientific validity and reliability, starting with subject recruitment. The author states "The collection process consisted of seeking out female transgender distance runners, mostly online, and then asking them to submit race times. Even in 2014 few people are open about being transgender, so the submission of race times represented a large leap of faith for the participants." (3) There is no further information regarding how the subjects were recruited (i.e. sampling techniques). Furthermore, based on this description of sampling techniques there is no way to know if these 8 subjects are in any way representative of any population of men, women, or transgender individuals, and especially the overall transgender distance running population. For example, what websites were used to identify possible subjects? How were the subjects solicited to participate? Was any compensation or coercion offered to the subjects? What inclusion or exclusion criteria were used in subject selection? How were the subjects who were not recruited online identified and enrolled into the research? How many were recruited online vs. not online? Furthermore, no indication is given if the subjects have undergone only hormone treatment, surgical treatment, or both. Furthermore, there is no indication of any verification of testosterone concentrations, compliance with hormone treatments, or other relevant endocrine or transgender treatment information. Lastly, no

descriptive data are provided for the subjects' body height, body mass, or other relevant anthropometric characteristics.

158. Similar to the sampling techniques the methods for collecting race times are lacking in validity, reliability, or detailed description. The author states "Race times from eight transgender women runners were collected over a period of seven years and, when possible, verified." And "When possible, race times were then verified using online services listing race results. For six of the eight runners, online checking made it possible to verify approximately half of the submitted times. Two of the subjects, runners three and four, would only participate anonymously, creating an ethical dilemma over the use of their times, versus respect their privacy." (3) No further information regarding which race times were verified is presented, thus the verified race times could be only pre-transition, only post transition, all coming from 3 of the subjects, or some combination thereof. The validity and reliability of self-reported data are overall very questionable, which the author acknowledges by stating "The times submitted by the eight runners were self-selected and self-reported. The self-reporting by the subjects certainly affects the strength of the findings. As mentioned previously, almost half of the race times were double checked by the author for accuracy. None of the subjects incorrectly reported any result" (6). However, verifying "almost half" of the race times does not validate the other "almost half." The author does not state which race times the runners were asked to self-report (i.e. these could have been the slowest times as a man and the fastest times as a

woman, or vice versa. Or the reported races time could be some form of non-representative sample of the subjects' race times). As some of the data represent a span of 29 years between reported race times, and the mean time between reported race times is 7.3 ± 8.4 years the accuracy of the non-verified self-reported race times are very questionable [The means ± sd are not presented in the paper; they were calculated by the author of this declaration]. The author further states that only three of the pairs of race times "were run over the same course within three years' time and represent the best comparison points" (5) (i.e. Runner No. 4 provided one pair of pre-post transition 5K times, Runner No. 6 provided one pair of pre-post transition 10K times, and Runner No 6 provided one pair of pre-post transition Half-marathon times). Runner No 4 was one of the previously described "ethical dilemma" (3) subjects with no verified race times. Once again, it is not stated if any of "the best comparison points" (5) represents verified data. Furthermore, while the race may have been run over the same course, no mention of environmental conditions for the comparison performance is made. To put this in perspective, the 2018 Boston Marathon was run in rain and headwinds resulting in a men's winning time of 2:15:54 (the slowest time since 1976) and a women's winning time of 2:39:54 (the slowest time for a women's winner since 1978). To help further illustrate the challenges in year to year comparison of race time that may be exacerbated by weather, in 2017 the men's winning time for the Boston Marathon was 2:09:37 and the women's winning time was 2:21:52.

159. The author notes that "both runner two and runner six reported stable training patterns over this time range" (5), but once again, there is no indication of how these data were collected or verified. Furthermore, what does a "stable training pattern mean"? Is it mileage, or pace, or combination of training techniques? This also further illustrates the methodological weaknesses in the study as runner two did not provide times for the "same course within three years' time", which, to quote the author "represent the best comparison points".

160. There is no experimental control for, or mention of, habitual nutrition, pre-event or during-event nutrition, any which (especially hydration and carbohydrate intake) can have a major impact on the outcome of endurance competition.

161. The description of the statistical analysis is insufficient. The author states that "Two tailed t tests were run on both the mean and peak AGs." (5) This is an ambiguous statement. Typically an author would report what kind of t-test was performed. Were these paired sample t-tests, independent sample t-tests, or one-sample t-tests?

162. Despite these methodological shortcomings, the author makes some insightful statements in the discussion. In the discussion section of the paper the author states "Transgender women are taller and larger, on average, than 46,XX women [], and these differences probably would result in performance advantages in events in which height and strength are obvious precursors to success" (7). The author further reasonably states that "It should be noted that this conclusion only applies to distance

running and the author makes no claims as to the equality of performances, pre and post gender transition, in any other sport. As such, the study cannot, unequivocally, state that it is fair to allow transgender women to compete against 46,XX women in all sports…" to which the author adds "…although the study does make a powerful statement in favor of such a position."(8) This latter statement cannot be supported based on the data contained in this paper or any presently known research.

Conclusion

163. Once again, based on my professional familiarity with exercise physiology and my review of the currently available science, including that contained in the sources I cite and summarize in this declaration, and the competition results and records presented here, I offer three primary professional opinions:

a. At the level of elite, sub elite, high school, and recreational competition, men or boys have an advantage over comparably aged women or girls, in almost all athletic contests;

b. Biological male physiology and anatomy is the basis for the performance advantage that men or boys have over women or girls, in almost all athletic contests; and

c. Administration of androgen inhibitors and cross-sex hormones to men, or adolescent boys, after male puberty, and administration of testosterone to women or adolescent girls, after female puberty, does not eliminate the performance advantage of men or adolescent boys

over women or adolescent girls in almost all athletic contests.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 3rd day of June, 2020.

/s/ Gregory A. Brown
Professor Gregory A. Brown, Ph.D.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on June 4, 2020, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system which sent a Notice of Electronic Filing to the following persons:

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Academic Preparation

Doctor of Philosophy, Iowa State University. August 2002 -- Major in Health and Human Performance, Emphasis in the Biological Bases of Physical Activity, dissertation title: "Androgenic supplementation in men: Effects of age, herbal extracts, and mode of delivery."

Master of Science, Iowa State University, May 1999 -- Major in Exercise and Sport Science, Emphasis in Exercise Physiology, thesis title: "Oral anabolic-androgenic supplements during resistance training: Effects on glucose tolerance, insulin action, and blood lipids."

Bachelor of Science, Utah State University, June 1997 -- Major in Physical Education, Emphasis in Pre-physical Therapy.

Awards

College of Education Outstanding Faculty Teaching Award. University of Nebraska at Kearney 2019

Mortar Board Faculty Excellence Honors. Xi Phi Chapter, University of Nebraska at Kearney, Honored in 2006, 2007, 2008, 2012, 2013, 2015, and 2019

Profiled in New Frontiers, the University of Nebraska Kearney annual publication highlighting excellence in research, scholarship, and creative activity. 2009, 2017

College of Education Outstanding Scholarship / Research Award. University of Nebraska at Kearney 2009, 2014

College of Education Award for Faculty Mentoring of Undergraduate Student Research University of Nebraska at Kearney, 2007, 2010, & 2013

"Pink Tie" award from the Susan G. Komen Nebraska Affiliate, for outstanding service to the Central Nebraska Race for the Cure, 2013

Star Reviewer for the American Physiological Society and Advances in Physiology Education. 2010.

Fellow of the American College of Sports Medicine. Awarded April 23, 2008

UNK Senior Appreciation Program honoree, the University of Nebraska at Kearney

Iowa State University Research Excellence Award, Iowa State University, 2002

The Zaffarano Prize for Graduate Student Research, Iowa State University, 2002

Helen Hilton Lebaron Excellence in Research Award, Dept. of Health and Human Performance, Iowa State University, 2002

Best Paper Award, 2nd Annual Education Research Exchange. Iowa State University Education Research Exchange, 2001

Helen Hilton Lebaron Excellence in Research Award, Dept. of Health and Human Performance, Iowa State University, 2000

Professional Experience

Professor: University of Nebraska Kearney, Dept. of Kinesiology and Sport Sciences (2012-)

Associate Professor: University of Nebraska Kearney, HPERLS Dept. (2007-2012)

Assistant Professor: University of Nebraska Kearney, HPERLS Dept. (2004- 2007) Full Graduate Faculty status awarded on hire, 2004

Assistant Professor: Georgia Southern University, Jiann-Ping Hsu School of Public Health. (2002-2004) Full Graduate Faculty status awarded Nov. 26, 2002

Laboratory Director: Human Performance Laboratory, Georgia Southern University, Jiann-Ping Hsu School of Public Health. (2002-2004)

Research Assistant: Exercise Biochemistry and Physiology Laboratory, Iowa State University, Department of Health and Human Performance. (1997-2002)

Graduate Teaching Assistant: Iowa State University, Department of Health and Human Performance. (1997-2002)

Temporary Instructor: Iowa State University, Department of Health and Human Performance. (1999-2002)

Temporary Adjunct Faculty: Des Moines Area Community College. (2000)

Undergraduate Teaching Intern: Department of Biology, Utah State University. (1995-1996)

Refereed Publications

1. Schneider KM and Brown GA (as Faculty Mentor). What's at Stake: Is it a Vampire or a Virus? International Journal of Undergraduate Research and Creative Activities. 11, Article 4. 2019.
2. Christner C and Brown GA (as Faculty Mentor). Explaining the Vampire Legend through Disease. UNK Undergraduate Research Journal. 23(1), 2019. *this is an on campus publication
3. Schneekloth B and Brown GA. Comparison of Physical Activity during Zumba with a Human or Video Game Instructor. 11(4):1019-1030. International Journal of Exercise Science, 2018.
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8. Shaw BS, Shaw I, & Brown GA. Resistance Exercise is Medicine. Int J Ther Rehab. 22: 233-237, 2015.

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16. Jarvi MB, Brown GA, Shaw BS & Shaw I. Measurements of Heart Rate and Accelerometry to Determine the Physical Activity Level in Boys Playing Paintball. International Journal of Exercise Science: 6: 199-207, 2013

17. Brown GA, Krueger RD, Cook CM, Heelan KA, Shaw BS & Shaw I. A prediction equation for the estimation of cardiorespiratory fitness using an elliptical motion trainer. West Indian Medical Journal. 61: 114-117, 2013.

18. Shaw BS, Shaw I, & Brown GA. Body composition variation following diaphragmatic breathing. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). 18: 787-794, 2012.

19. Shaw I, Shaw BS, & Brown GA. Concurrent Training and Pulmonary Function in Smokers. Int J Sports Med. 32:776-80, 2011

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31. Shaw BS, Shaw I, & Brown GA. Resistance Training and Predicted Risk of Coronary Heart Disease in Sedentary Males. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). Supplement: 247-257. 2009

32. Stahlnecker IV AC, Brown GA, Shaw BS, & Shaw I. Acute Effects of a Weight Loss Supplement on Resting Metabolic Rate and Anaerobic Exercise Performance. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD). Supplement: 237-247. 2009

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37. Brown GA, Lynott F, & Heelan KA. A Service Learning Model for Teaching Fitness Assessment and Research Techniques to Undergraduate

Exercise Science Students. Adv Physiol Educ. 32: 212-218, 2008

38. Carstensen C, Brown GA, Shaw I, & Shaw BS. Freely-Paced Walking in Healthy Adults Does Not Meet Minimum Intensity Guidelines for Health Improvement. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD), 14: 178-187, 2008

39. Shaw BS, Shaw I, and Brown GA. Self-Reported Dietary Intake Following Endurance, Resistance And Concurrent Endurance And Resistance Training. J Sports Sci & Med 7: 255-259, 2008

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androstenedione ingestion in young women. Horm Metab Res. 1:62-66, 2004

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46. Brown GA, Martini ER, Roberts BS, Vukovich MD, & King DS. Acute hormonal responses to sublingual androstenediol intake in young men. J Appl Physiol. 92: 142-146, 2002.

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Refereed Presentations

1. Brown GA, Jackson B, Szekely B, Schramm T, Shaw BS, Shaw I. A Pre-Workout Supplement Does Not Improve 400 M Sprint Running or Bicycle Wingate Test Performance in Recreationally Trained Individuals. Med Sci Sport Exerc. 50(5), 2932. 65th Annual Meeting of the American College of Sports Medicine. Minneapolis, MN. June 2018.

2. Paulsen SM, Brown GA. Neither Coffee Nor A Stimulant Containing "Pre-workout" Drink Alter Cardiovascular Drift During Walking In Young Men. Med Sci Sport Exerc. 50(5), 2409. 65th Annual Meeting of the American College of Sports Medicine. Minneapolis, MN. June 2018.

3. Adkins M, Bice M, Bickford N, Brown GA. Farm to Fresh! A Multidisciplinary Approach to Teaching Health and Physical Activity. 2018 spring SHAPE

America central district conference. Sioux Falls, SD. January 2018.

4. Shaw I, Kinsey JE, Richards R, Shaw BS, and Brown GA. Effect Of Resistance Training During Nebulization In Adults With Cystic Fibrosis. International Journal of Arts & Sciences' (IJAS). International Conference for Physical, Life and Health Sciences which will be held at FHWien University of Applied Sciences of WKW, at Währinger Gürtel 97, Vienna, Austria, from 25-29 June 2017.

5. Bongers M, Abbey BM, Heelan K, Steele JE, Brown GA. Nutrition Education Improves Nutrition Knowledge, Not Dietary Habits In Female Collegiate Distance Runners. Med Sci Sport Exerc. 49(5), 389. 64th Annual Meeting of the American College of Sports Medicine. Denver, CO. May 2017.

6. Brown GA, Steele JE, Shaw I, Shaw BS. Using Elisa to Enhance the Biochemistry Laboratory Experience for Exercise Science Students. Med Sci Sport Exerc. 49(5), 1108. 64th Annual Meeting of the American College of Sports Medicine. Denver, CO. May 2017.

7. Brown GA, Shaw BS, and Shaw I. Effects of a 6 Week Conditioning Program on Jumping, Sprinting, and Agility Performance In Youth. Med Sci Sport Exerc. 48(5), 3730. 63rd Annual Meeting of the American College of Sports Medicine. Boston, MA. June 2016.

8. Shaw I, Shaw BS, Boshoff VE, Coetzee S, and Brown GA. Kinanthropometric Responses To Callisthenic Strength Training In Children. Med Sci Sport Exerc. 48(5), 3221. 63rd Annual Meeting

of the American College of Sports Medicine. Boston, MA. June 2016.

9. Shaw BS, Shaw I, Gouveia M, McIntyre S, and Brown GA. Kinanthropometric Responses To Moderate-intensity Resistance Training In Postmenopausal Women. Med Sci Sport Exerc. 48(5), 2127. 63rd Annual Meeting of the American College of Sports Medicine. Boston, MA. June 2016.

10. Bice MR, Cary JD, Brown GA, Adkins M, and Ball JW. The use of mobile applications to enhance introductory anatomy & physiology student performance on topic specific in-class tests. National Association for Kinesiology in Higher Education National Conference. January 8, 2016.

11. Shaw I, Shaw BS, Lawrence KE, Brown GA, and Shariat A. Concurrent Resistance and Aerobic Exercise Training Improves Hemodynamics in Normotensive Overweight and Obese Individuals. Med Sci Sport Exerc. 47(5), 559. 62nd Annual Meeting of the American College of Sports Medicine. San Diego, CA. May 2015.

12. Shaw BS, Shaw I, McCrorie C, Turner S., Schnetler A, and Brown GA. Concurrent Resistance and Aerobic Training in the Prevention of Overweight and Obesity in Young Adults. Med Sci Sport Exerc. 47(5), 223. 62nd Annual Meeting of the American College of Sports Medicine. San Diego, CA. May 2015.

13. Schneekloth B, Shaw I, Shaw BS, and Brown GA. Physical Activity Levels Using Kinect™ Zumba Fitness versus Zumba Fitness with a Human Instructor. Med Sci Sport Exerc. 46(5), 326. 61st

Annual Meeting of the American College of Sports Medicine. Orlando, FL. June 2014.

14. Shaw I, Lawrence KE, Shaw BS, and Brown GA. Callisthenic Exercise-related Changes in Body Composition in Overweight and Obese Adults. Med Sci Sport Exerc. 46(5), 394. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.

15. Shaw BS, Shaw I, Fourie M, Gildenhuys M, and Brown GA. Variances In The Body Composition Of Elderly Woman Following Progressive Mat Pilates. Med Sci Sport Exerc. 46(5), 558. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.

16. Brown GA, Shaw I, Shaw BS, and Bice M. Online Quizzes Enhance Introductory Anatomy & Physiology Performance on Subsequent Tests, But Not Examinations. Med Sci Sport Exerc. 46(5), 1655. 61st Annual Meeting of the American College of Sports Medicine. Orlando, FL June 2014.

17. Kahle, A. and Brown, G.A. Electromyography in the Gastrocnemius and Tibialis Anterior, and Oxygen Consumption, Ventilation, and Heart Rate During Minimalist versus Traditionally Shod Running. 27th National Conference on Undergraduate Research (NCUR). La Crosse, Wisconsin USA. April 11-13, 2013

18. Shaw, I., Shaw, B.S., and Brown, G.A. Resistive Breathing Effects on Pulmonary Function, Aerobic Capacity and Medication Usage in Adult Asthmatics Med Sci Sports Exerc 45 (5). S1602 2013. 60th Annual Meeting of the American

College of Sports Medicine, Indianapolis, IN USA, May 26-30 3013

19. Shaw, B.S. Gildenhuys, G.A., Fourie, M. Shaw I, and Brown, G.A. Function Changes In The Aged Following Pilates Exercise Training. Med Sci Sports Exerc 45 (5). S1566 60th Annual Meeting of the American College of Sports Medicine, Indianapolis, IN USA, May 26-30 2013

20. Brown, G.A., Abbey, B.M., Ray, M.W., Shaw B.S., & Shaw, I. Changes in Plasma Free Testosterone and Cortisol Concentrations During Plyometric Depth Jumps. Med Sci Sports Exerc 44 (5). S598, 2012. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

21. Shaw, I., Fourie, M., Gildenhuys, G.M., Shaw B.S., & Brown, G.A. Group Pilates Program and Muscular Strength and Endurance Among Elderly Woman. Med Sci Sports Exerc 44 (5). S1426. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

22. Shaw B.S., Shaw, I., & Brown, G.A. Concurrent Inspiratory-Expiratory and Aerobic Training Effects On Respiratory Muscle Strength In Asthmatics. Med Sci Sports Exerc 44 (5). S2163. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

23. Scheer, K., Siebrandt, S., Brown, G.A, Shaw B.S., & Shaw, I. Heart Rate, Oxygen Consumption, and Ventilation due to Different Physically Active Video Game Systems. Med Sci Sports Exerc 44 (5).

S1763. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

24. Jarvi M.B., Shaw B.S., Shaw, I., & Brown, G.A. (2012) Paintball Is A Blast, But Is It Exercise? Heart Rate and Accelerometry In Boys Playing Paintball. Med Sci Sports Exerc 44 (5). S3503. 59th Annual Meeting of the American College of Sports Medicine. May 29 - June 2, 2012; San Francisco, California

25. Shaw, I., Shaw, B.S., and Brown G.A. Effort-dependent Pulmonary Variable Improvements Following A Novel Breathing Retraining Technique In Asthmatics. Med Sci Sports Exerc 43 (5). S617, 2011. 58th Annual Meeting of the American College of Sports Medicine. May 31-June 4, 2011 Denver, Colorado

26. Brown G.A. Shaw, B.S., and Shaw, I. Exercise and a Low Carbohydrate Diet Reduce Body Fat but Not PYY and Leptin Concentrations. Med Sci Sports Exerc 43 (5). S4627, 2011. 58th Annual Meeting of the American College of Sports Medicine. May 31-June 4, 2011 Denver, Colorado

27. Shaw, B.S., Shaw, I, and Brown G.A. Pulmonary Function Changes In Response To Combined Aerobic And Resistance Training In Sedentary Male Smokers. Med Sci Sports Exerc 43 (5). S492, 2011. 58th Annual Meeting of the American College of Sports Medicine. May 31-June 4, 2011 Denver, Colorado

28. Heiserman, K., Brown G.A., Shaw, I., and Shaw, B.S. Seated Weighted Abdominal Exercise Activates the Hip Flexors, But Not Abdominals,

More Than Unweighted Crunches. A Med Sci Sports Exerc 43 (5). S277, 2011 58th Annual Meeting of the American College of Sports Medicine. May 31-June 4, 2011 Denver, Colorado

29. Brown, G.A., Nienhueser, J., Shaw, I., and Shaw, B.S. Energy Drinks Alter Metabolism at Rest but not During Submaximal Exercise in College Age Males. Med Sci Sports Exerc. 42 (5): S1930. 57th Annual Meeting American College of Sports Medicine, June 1-5, 2010. Baltimore, MD

30. Shaw, I, Shaw, B.S., and Brown G.A. Abdominal and Chest Wall Compliance in Asthmatics: Effects of Different Training Modes. Med Sci Sports Exerc. 42 (5): S1588. 57th Annual Meeting American College of Sports Medicine, June 1-5, 2010. Baltimore, MD.

31. Shaw, B.S., Shaw, I, and Brown G.A. Exercise Effects on Lipoprotein Lipids in the Prevention of Cardiovascular Disease in Sedentary Males Smokers. Med Sci Sports Exerc. 42 (5): S1586. 57th Annual Meeting American College of Sports Medicine, June 1-5, 2010. Baltimore, MD.

32. Brown, G.A. Collaborative Research at a Primarily Undergraduate University. Med Sci Sports Exerc. 42 (5): S424. 57th Annual Meeting American College of Sports Medicine, June 1-5, 2010. Baltimore, MD.

33. Nienhueser, J., Brown, G.A., Effects of Energy Drinks on Resting and Submaximal Metabolism in College Age Males. NCUR 24 (24th National Conference on Undergraduate Research). Missoula, MT. April 15-17, 2010

34. Brown, G.A., N. Dickmeyer, A. Glidden, C. Smith, M. Beckman, B. Malicky, B.S. Shaw and I. Shaw. Relationship of Regional Adipose Tissue Distribution to Fasting Plasma PYY Concentrations in College Aged Females. 56th Annual Meeting American College of Sports Medicine, May 27-30, 2009. Seattle, WA. Med Sci Sports Exerc. 41 (5): S1333

35. Shaw, B.S., I. Shaw, and G.A. Brown. Contrasting Effects Of Exercise On Total And Intraabdominal Visceral Fat. 56th Annual Meeting American College of Sports Medicine, May 27-30, 2009. Seattle, WA. Med Sci Sports Exerc. 41 (5): S1718

36. Shaw, I., B.S. Shaw, and G.A. Brown. Role of Endurance and Inspiratory Resistive Diaphragmatic Breathing Training In Improving Asthmatic Symptomology. 56th Annual Meeting American College of Sports Medicine, May 27-30, 2009. Seattle, WA. Med Sci Sports Exerc. 41 (5): S2713

37. McWha, J., S. Horst, G.A. Brown, B.S. Shaw, and I. Shaw. Energy Cost of Physically Active Video Gaming Against a Human or Computer Opponent. 56th Annual Meeting American College of Sports Medicine, May 27-30, 2009. Seattle, WA. Med Sci Sports Exerc. 41 (5): S3069

38. Horst, S., J. McWha, G.A. Brown, B.S. Shaw, and I. Shaw. Salivary Cortisol and Blood Lactate Responses to Physically Active Video Gaming in Young Adults. 56th Annual Meeting American College of Sports Medicine, May 27-30, 2009. Seattle, WA. Med Sci Sports Exerc. 41 (5): S3070

39. Glidden A., M. Beckman, B. Malciky, C. Smith, and G.A. Brown. Peptide YY Levels in Young Women: Correlations with Dietary Macronutrient Intake and Blood Glucose Levels. 55th Annual Meeting American College of Sports Medicine, May 28-31, 2008. Indianapolis, IN. Med Sci Sports Exerc. 40 (5): S741

40. Smith C., Glidden A. M. Beckman, B. Malciky, and G.A. Brown. Peptide YY Levels in Young Women: Correlations with Aerobic Fitness & Resting Metabolic Rate. 55th Annual Meeting American College of Sports Medicine, May 28-31, 2008. Indianapolis, IN. Med Sci Sports Exerc. 40 (5): S742

41. Brown, G.A. M. Holoubeck, B. Nylander, N. Watanabe, P. Janulewicz, M. Costello, K.A. Heelan, and B. Abbey. Energy Costs of Physically Active Video Gaming in Children: Wii Boxing, Wii tennis, and Dance Dance Revolution. 55th Annual Meeting American College of Sports Medicine, May 28-31, 2008. Indianapolis, IN. Med Sci Sports Exerc. 40 (5): S2243

42. McFarland, S.P. and G.A. Brown. One Session of Brisk Walking Does Not Alter Blood Glucose Homeostasis In Overweight Young Men. 53rd annual meeting of the American College of Sports Medicine, Denver, CO. Med Sci Sports Exerc 38: S205, 2006

43. Stahlnecker IV, A.C. and G.A. Brown Acute Effects of a Weight Loss Supplement on Resting Metabolic Rate and Anaerobic Exercise Performance. 53rd annual meeting of the American

College of Sports Medicine, Denver, CO. Med Sci Sports Exerc 38: S403, 2006

44. Brown, G.A. and A. Swendener. Effects of Exercise and a Low Carbohydrate Diet on Serum PYY Concentrations 53rd annual meeting of the American College of Sports Medicine, Denver, CO.. Med Sci Sports Exerc 38: s461, 2006

45. Swendener, A.M. and G.A. Brown. Effects of Exercise Combined with a Low Carbohydrate Diet on Health. 53rd annual meeting of the American College of Sports Medicine, Denver, CO. Med Sci Sports Exerc 38: s460, 2006

46. Swendener, A.M. and G.A. Brown. Effects Of Exercise Combined With A Low Carbohydrate Diet On Health. NCUR® 20, 2006

47. Stahlnecker IV, A.C. and G.A. Brown. Acute Effects Of A Weight Loss Supplement On Resting Metabolic Rate And Anaerobic Exercise. NCUR® 20, 2006

48. Eck, L. M. and G.A. Brown. Preliminary Analysis of Physical Fitness Levels in Kinesiology Students. Southern Regional Undergraduate Honors Conference. March 31, 2005.

49. Brown, G.A., J.N. Drouin, and D. MacKenzie. Resistance Exercise Does Not Change The Hormonal Response To Sublingual Androstenediol. 52nd Annual Meeting of the American College of Sports Medicine, June 1-4, 2005, Nashville, TN. Med Sci Sports Exerc 37(5): S40, 2005

50. Brown, G.A., M.P Rebok, M.L. Scott, M.K. Colaluca, and J Harris III. Economy of Jogging Stroller Use During Running. 51st Annual Meeting

of the American College of Sports Medicine, June 2-5, 2004, Indianapolis, IN. Med Sci Sports Exerc 36(5): S1714, 2004

51. M.P. Rebok, M.L. Scott, J. Harris III, M.K. Colaluca, and G.A. Brown. Economy of Jogging Stroller use During Running. Georgia Southern University Legislative Wild Game Supper, 2004.

52. M.P. Rebok, M.L. Scott, J. Harris III, M.K. Colaluca, and G.A. Brown. Energy cost of jogging stroller use during running. Annual Meeting of the Southeastern Chapter of the American College of Sports Medicine, 2004.

53. Brown, G.A., Effect of 8 weeks androstenedione supplementation and weight training on glucose tolerance and isokinetic strength. Annual Meeting of the Southeastern Chapter of the American College of Sports Medicine, 2004.

54. Brown, G.A., Vukovich, M.D., Kohut, M.L., Franke, W.D., Jackson, D.A., King, D.S., and Bowers, L.D. Urinary excretion of steroid metabolites following chronic androstenedione ingestion. 50th Annual Meeting of the American College of Sports Medicine, May 27-31 2003, San Francisco, CA. Med Sci Sports Exerc 35(5): S1835

55. Brown, G.A., E.R. Martini, B.S. Roberts, M.D. Vukovich, and D.S. King. Effects of Sublingual androstenediol-cyclodextrin on serum sex hormones in young men. 48th Annual Meeting American College of Sports Medicine, May 30 – June 2, 2001. Baltimore, MD. Med Sci Sports Exerc. 33(5): S1650

56. Kohut, M.L., J.R. Thompson, J. Campbell, G.A. Brown, and D.S. King. Ingestion of a dietary supplement containing androstenedione and dehydroepiandrosterone (DHEA) has a minimal effect on immune response. International Society of Exercise and Immunology, 3rd Annual Convention May 29-30, 2001. Baltimore, MD. Med. Sci. Sports Exerc. 33(5): SISEI12

57. Brown, G.A., E.R. Martini, B.S. Roberts, and D.S. King. Effects of Sublingual androstenediol-cyclodextrin on serum sex hormones in young men. Iowa State University Educational Research Exchange, March 24, 2001. Ames, IA.

58. Martini, E.R., G.A. Brown, M.D. Vukovich, M.L. Kohut, W.D. Franke, D.A. Jackson, and D.S. King. Effects of androstenedione-herbal supplementation on serum sex hormone concentrations in 30-59 year old men. Iowa State University Educational Research Exchange, March 24, 2001. Ames, IA.

59. King, D.S., G.A. Brown, M.D. Vukovich, M.L. Kohut, W.D. Franke, and D.A. Jackson. Effects of Chronic Oral Androstenedione Intake in 30-58 year Old Men. 11th International Conference on the Biochemistry of Exercise. June 4-7, 2000. Little Rock, Arkansas

60. Brown, G.A., M.L. Kohut, W.D. Franke, D. Jackson, M.D. Vukovich, and D.S. King. Serum Hormonal and Lipid Responses to Androgenic supplementation in 30 –59 year old men. 47TH Annual Meeting American College of Sports Medicine, May 31-June 3, 2000. Indianapolis, IN. Med Sci Sports Exerc. 32(5): S486

61. Brown, G.A., T.A. Reifenrath, N.L. Uhl, R.L. Sharp, and D.S. King. Oral anabolicandrogenic supplements during resistance training: Effects on glucose tolerance, insulin action, and blood lipids. 1999 Annual Meeting American College of Sports Medicine, Seattle, WA. Med Sci Sports Exerc. 31(5): S1293

62. Reifenrath, T.A., R.L. Sharp, G.A. Brown, N.L. Uhl, and D.S. King. Oral anabolicandrogenic supplements during resistance training: Effects on body composition and muscle strength. 1999 Annual Meeting American College of Sports Medicine, Seattle, WA. Med Sci Sports Exerc. 31(5): S1292

63. King, D.S., R.L. Sharp, G.A. Brown, T.A. Reifenrath, and N.L. Uhl. Oral anabolicandrogenic supplements during resistance training: Effects on serum testosterone and estrogen concentrations. 1999 Annual Meeting American College of Sports Medicine, Seattle, WA. Med Sci Sports Exerc. 31(5): S1291

64. Parsons, K.A., R.L. Sharp, G.A. Brown, T.A. Reifenrath, N.L. Uhl, and D.S. King. Acute effects of oral anabolic-androgenic supplements on blood androgen and estrogen levels in man. 1999 Annual Meeting American College of Sports Medicine, Seattle, WA. Med Sci Sports Exerc. 31(5): S1290

Book Chapters

Brown, G.A. Chapters on Androstenedione and DHEA. In: Nutritional Supplements in Sport, Exercise and Health an A-Z Guide. edited by Linda M. Castell, Samantha J. Stear, Louise M. Burke. Routledge 2015.

Brown, G.A. Evaluating a Nutritional Supplement with SOAP Notes to Develop Critical Thinking Skills. In: Teaching Critical Thinking and Clinical Reasoning in the Health Sciences, edited by Facione NC and Facione PA. Millbrae, CA: California Academic Press 2008

Non Refereed Publications

Brown, G.A. and King, D.S. Sport Dietary Supplement Update on DHEA supplementation. Human Kinetics Publishers, Inc. October, 2000.

Brown, G.A. Getting in Shape for Paintball in the Winter. Paintball Sports International, January, 1999

Invited Presentations

Brown G.A. Collaborative experiences with researchers in South Africa. Africa Summit 2019 (March 28, 2019). Presented by the University of Nebraska and the University of Nebraska Medical Center.

Peer Reviewer for the Following Journals

Advances in Physiology Education. http://www.the-aps.org/publications/advan/

African Journal For Physical, Health Education, Recreation and Dance (AJPHERD). ISSN: 1117-4315 http://www.ajol.info/journal_index.php?jid=153

Anatomical Sciences Education. http://www.asejournal.com

Asian Journal of Sports Medicine. http://asjsm.tums.ac.ir/index.php/asjsm

CardioVascular Journal of Africa. http://www.cvjsa.co.za/

Complementary Therapies in Medicine. http://ees.elsevier.com/ctim/

European Journal of Sport Science. http://www.tandf.co.uk/journals/titles/17461391.asp

Games for Health Journal. http://www.liebertpub.com/overview/games-for-health-journal/588/

Global Journal of Health and Physical Education Pedagogy. http://js.sagamorepub.com/gjhpep

Interactive Learning Environments. https://www.tandfonline.com/toc/nile20/current

International Journal of Exercise Science. http://digitalcommons.wku.edu/ijes/

Journal of Sports Sciences. http://www.tandf.co.uk/journals/titles/02640414.html

Journal of Strength and Conditioning Research. http://journals.lww.com/nscajscr/pages/default.aspx

Lung. http://www.springer.com/medicine/internal/journal/408

Pediatrics. http://pediatrics.aappublications.org/

Scandinavian Journal of Medicine and Science in Sports. http://www.blackwellpublishing.com/journal.asp?ref=0905-7188

South African Journal of Diabetes and Vascular Disease http://www.diabetesjournal.co.za/

The American Journal of Physiology - Endocrinology and Metabolism. http://ajpendo.physiology.org/

The American Journal of Physiology - Heart and Circulatory Physiology. http://ajpheart.physiology.org/

The American Journal of Physiology - Regulatory, Integrative and Comparative Physiology. http://ajpregu.physiology.org/

The International Journal of Sport Nutrition & Exercise Metabolism. http://www.humankinetics.com/IJSNEM/journalAbout.cfm

The Journal of Sports Science and Medicine (JSSM) http://www.jssm.org/

The International Journal of Nutrition and Metabolism ww.academicjournals.org/IJNAM

The Open Sports Sciences Journal. http://benthamscience.com/open/tossj/index.htm

The Journal of Applied Physiology. http://jap.physiology.org/

African Health Sciences. http://www.ajol.info/index.php/ahs

Menopause. http://journals.lww.com/menopausejournal/pages/default.aspx

Membership in Professional Organizations

American College of Sports Medicine

American Physiological Society

National Strength and Conditioning Association

Graduate Student Advisement/Mentoring

Kourtney Woracek. MAEd Thesis Committee. in progress

Marissa Bongers. MAEd Thesis Committee Director. Dietary Habits and Nutrition Knowledge in Female Collegiate Distance Runners. Degree Awarded Spring 2016.

Justin Thiel. MAEd Advisor. Degree Awarded Spring 2016.

Mitchell Sasek. MAEd Advisor. Degree Awarded Summer 2015

Chad Keller. MAEd Advisor. Degree Awarded Summer 2014

Faron Klingehoffer. MAEd Advisor. Degree Awarded Summer 2014

Joe Scharfenkamp. MAEd Internship Advisor. Degree Awarded Summer 2014

Andrew Hudson. MAEd Thesis Committee. Thesis Title. valuation of Weight Loss in Parents Participating in a Pediatric Obesity Treatment Intervention Degree Awarded Fall 2012

Megan Adkins. Doctoral Dissertation Committee. An Examination of Changes in Sedentary Time with the Integration of Technology for Children Participating in a Morning Fitness Program. Degree Awarded Summer 2011

Christopher Campbell. MAEd Advisor. Degree Awarded Spring 2011

Logan Brodine. MAEd Advisor. Degree Awarded Spring 2010

Megan Costello. MAEd Thesis Committee. Changes in the Prevalence of at risk of overweight or overweight in children. Degree Awarded Spring 2009

Pamela Janulewciz, MAEd Thesis Committee. Effects of Exercise Balls as Chair Replacements in a Fourth Grade Classroom. Degree Awarded Spring 2008

Melissa Shelden. MAEd Advisor.

Michael Bell. MAEd Advisor.

Karen DeDonder. MAEd Thesis Committee. Confidence Levels of Certified Athletic Trainers Regarding Female Athlete Triad Syndrome. Degree Awarded Spring 2008

Benjamin Nylander. MAEd Comprehensive Project Director. Degree Awarded Summer 2007

Eme Ferro. MAEd advisor. Degree Awarded Summer 2007

Julie McAlpin. MAEd Thesis Committee. Children Escorted to School; effect on Parental Physical Activity Degree awarded fall 2006

Michael Ray. MAEd Comprehensive Project Director. Degree Awarded Summer 2006

Seth McFarland. MAEd Thesis Committee Director. The Effects of Exercise Duration on Glucose Tolerance and Insulin Sensitivity in Mildly Overweight Men. Degree Awarded Summer 2005

Drew McKenzie. MS Academic Advisor. Degree Awarded Spring 2005

Matthew Luckie. MS Academic Advisor. Degree Awarded Spring 2005

Todd Lane. MS Academic Advisor

Leilani Lowery. MS Internship committee, Degree Awarded Spring 2003

Johnna Ware. MS Internship committee, Degree Awarded Spring 2003

David Bass. MS Internship committee, Degree Awarded Spring 2003

Crystal Smith. MS Internship committee, Degree Awarded Summer 2003

Undergraduate Student Research Mentoring

Cassidy Johnson. Project to be determined. Undergraduate Research Fellowship (Fall 2019 -)

Taylor Wilson. A comparison of High Intensity Interval Exercise on a bicycle ergometer to a treadmill on Resting Metabolic Rate the next day. Undergraduate Research Fellowship (Fall 2018 -)

Dakota Waddell. The effect of yoga versus mindful meditation on stress in physically active and non-physically active female college-aged students Undergraduate Research Fellowship (Fall 2018 -)

Dakota Waddell. A case study of the effects of the osteostrong program on bone mineral density and lean body mass in a paraplegic male. Undergraduate Research Fellowship (Fall 2017 – Spring 2018)

Andrew Fields. The effects of retraining running cadence on oxygen consumption in experienced runners. Undergraduate Research Fellowship. (Fall 2017 – Spring 2019)

Logan Engel. The effects of Tart Cherry Juice on Delayed Onset Muscle Soreness following Eccentric Exercise. Undergraduate Research Fellowship. Fall 2017 -

Stephanie Paulsen. Comparing the effects of coffee to a pre-workout drink on cardiovascular drift. Summer Student Research Program. University of Nebraska Kearney. Summer 2017.

Stephanie Paulsen. Comparing the effects of coffee to a pre-workout drink on resting and exercise metabolic rate. Undergraduate Research Fellowship. Spring 2017 - .

Rachael Ernest. Comparing the effects of coffee to a pre-workout drink on resting and exercise metabolic rate. Undergraduate Research Fellowship. Fall 2016 - Spring 2017.

Aleesha Olena. Evaluating the role of body composition on abdominal muscle definition. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2016 - Spring 2017.

Marco Escalera. Evaluating the role of body composition on abdominal muscle definition. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2015 - Spring 2017.

Trevor Schramm. Effects of “pre-workout’ drinks on 400 m sprint performance and salivary cortisol concentrations. Undergraduate Research Fellowship. University of Nebraska Kearney. Spring 2016.

Taylor Turek. Evaluating the role of body composition on abdominal muscle definition. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2015 - Spring 2016.

Brian Szekely. Effects of “pre-workout” drinks on Wingate test performance and blood lactate concentrations. Undergraduate Research Fellowship.

University of Nebraska Kearney. Fall 2014 - Spring 2016.

Brianna Jackson. Effects of "pre-workout' drinks on 400 m sprint performance and salivary cortisol concentrations. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2014 – Fall 2015.

Ashley Pearson. Changes in resting metabolic rate over a semester in undergraduate students. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2013 - Spring 2015.

Tricia Young. Changes in resting metabolic rate over a semester in undergraduate students. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2013 - Spring 2014.

Gavin Schneider. Effects of "pre-workout" drinks on resistance training performance. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2013 - Spring 2014.

Bridgette Schneekloth. Physical Activity while engaging in a Zumba dance class or Microsoft Kinect Zumba. Summer Student Research Program. University of Nebraska Kearney. Summer 2013.

Bridgette Schneekloth. Physical Activity while engaging in Microsoft Kinect Track & Field running vs. free running on an indoor track. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2012 - Spring 2014.

Adam Kahle. Evaluating changes in running mechanics with "barefoot" footwear. Summer Student Research Program. University of Nebraska Kearney. Summer 2012

Michelle Jarvi. Quantifying paintball as a form of physical activity in Boys. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2011 - Spring 2012.

Benjamin Lentz, Krista Scheer, & Sarah Siebrandt. Wii, Kinect, and Move for Physical Activity: Analysis of Energy Expenditure, Heart Rate, and Ventilation. Undergraduate Research Fellowship. University of Nebraska Kearney. Fall 2010 - Spring 2012.

Katlyn Heiserman. Comparison of EMG activity in the rectus abdominis and rectus femoris during supine un-weighted abdominal crunch exercise and a seated abdominal crunch exercise weight machine. Summer Student Research Program. University of Nebraska Kearney. Summer 2010

Janae Nienhueser. Effects of Energy drink on resting and submaximal exercise metabolism in college age men. Summer Student Research Program. University of Nebraska Kearney. Summer 2009

Jessica McWha. Metabolic changes while playing active video gaming against a human and computer opponent. Summer Student Research Program and Undergraduate Research Fellowship. University of Nebraska Kearney. Summer 2008 – Spring 2009

Sarah Horst. Changes in blood lactate and salivary cortisol concentrations while "exergaming" against a human or computer opponent. Summer Student Research Program. University of Nebraska Kearney. Summer 2008

Craig Carstensen. Differences in the Physiological Response to Treadmill versus Freely Paced Walking.

Summer Student Research Program. University of Nebraska Kearney. Summer 2006

Alvah Stahlnecker Acute effects of a weight loss supplement on resting metabolic rate and anaerobic exercise performance. Summer Student Research Program. University of Nebraska Kearney. Summer 2005

Allison Swendener. Effects of exercise combined with a low carbohydrate diet on health. Summer Student Research Program. University of Nebraska Kearney. Summer 2005

Kamilah Whipple. A measurement of the physical activity and fitness of undergraduate Georgia Southern University students. Ronald E. McNair Post-Baccalaureate Achievement Program. Georgia Southern University. Summer 2004.

Lindsey Eck. Preliminary Analysis of Physical Fitness Levels in Kinesiology Students. Independent undergraduate research project. Georgia Southern University. Summer 2004.

Description of Graduate Courses Taught

PE 870: Advanced Exercise Physiology Course presumes a student has had a basic course in exercise physiology. The content of cardiorespiratory fitness, body composition, muscular strength/flexibility, body fluids and metabolism is presented beyond the introductory level. (University of Nebraska at Kearney)

PE 866P: Nutrition for Health and Sport. (Dual listed/taught with PE 469) Metabolism and metabolic regulation, the influence of dietary practices on health and human performance, and mechanisms and

consequences of weight loss and gain.. (University of Nebraska Kearney)

PE 861P: Physiology of Exercise. (Dual listed/taught with PE 461) Physiological processes of body as pertain to physical activity. How trained and untrained individuals differ, and importance of training. (University of Nebraska at Kearney)

TE 800: Education Research. This introductory web-based course in educational research focuses on evaluating and interpreting educational research and applying its findings to educational practice. (University of Nebraska at Kearney)

KINS 7230: Exercise Physiology. Focuses on the study of the effects of exercise on the physiological functions of the human organism with emphasis on theoretical orientations. (Georgia Southern University)

KINS 7231: Laboratory Techniques in Exercise Physiology. Acquaints the student with the use of typical laboratory equipment used in exercise physiology. (Georgia Southern University)

KINS 7238: Human Performance and Nutrition. Examines the interaction between nutrition and physical activity, including exercise and athletic performance. (Georgia Southern University)

KINS 7431: Applied Sport Physiology. Focuses on the study of exercise physiology principles applied to developing training and conditioning programs for enhancing health related fitness and performance (Georgia Southern University)

KINS 7899: Directed Independent Study. Provides the student with an opportunity to

investigate an area of interest under the direction of faculty mentor (Georgia Southern University)

EXSP 551: Advanced Exercise Physiology 2. Analysis of factors affecting work capacity and performance. Human energy metabolism concepts and measurement. (Iowa State University)

Description of Undergraduate Courses Taught

PE 498: Special Topics. (University of Nebraska at Kearney)

PE 475: Research Methods in Exercise Science. This course is designed to introduce advanced undergraduate students to the processes of research in the field of Exercise Science including the processes of finding, reading and understanding Exercise Science research; data collection; data analysis; and data interpretation. (University of Nebraska at Kearney)

PE 469: Sports Nutrition. Metabolism and metabolic regulation, the influence of dietary practices on human performance. (University of Nebraska at Kearney)

PE 461: Physiology of Exercise. Physiological processes of body as pertain to physical activity. How trained and untrained individuals differ, and importance of training. (University of Nebraska at Kearney)

PE 388: General Studies Capstone - The Living Dead in Fact & Fiction. The Living Dead, such as Zombies and Vampires, are pervasive in fictional literature, television, and movies. During this course, novels, television episodes, and movies will be used to identify disease symptoms displayed by the living

dead, and these symptoms will then be evaluated regarding what type of medical condition might cause the symptoms.

PE 310: Introduction to Exercise Physiology. Provides a foundation of scientific basis for understanding the body's anatomical structures and physiologic responses to acute exercise, as well as its adaptations to chronic exercise. (University of Nebraska at Kearney)

PE 107. This course is designed to introduce students to the field of Exercise Science as an area of academic study and as a professional career. Students majoring in Exercise Science should take this course in their first year. (University of Nebraska at Kearney)

KINS 4231: Fitness Evaluation and Exercise Prescription. Provides the student with an in-depth study of fitness appraisal and exercise prescription and the development, interpretation, implementation and management of fitness programs (with laboratory). (Georgia Southern University)

KINS 3133: Physiological Aspects of Exercise. Provides an in-depth perspective of physiological and biochemical responses of the human body when subjected to exercise (with laboratory). (Georgia Southern University)

GSU 1210: University Orientation 1. Designed to help first year students understand the purpose of a college education, learn about college requirements, explore values and interests, learn to make decisions and realistic choices, explore career objectives and programs of study, and establish supportive relationships with faculty and staff. Required of all

new students during their first semester. (Georgia Southern University)

EX SP 462: Medical Aspect of Exercise. The role of exercise in preventive medicine. Impact of exercise on various diseases, and the effect of various medical conditions on the ability to participate in vigorous exercise and competitive sports. Principles of exercise testing and prescription for individuals with these conditions. Environmental and nutritional aspects of exercise. (Iowa State University)

EX SP 458: Principles of Exercise Testing and Prescription. Physiological principles of physical fitness; design and administration of fitness programs; testing, evaluation, and prescription; cardiac risk factor modification. (Iowa State University)

EX SP 455 (Renumbered as EX SP 358 for Fall 2001). Physiology of Exercise. Physiological basis of human performance; effects of physical activity on body functions (with laboratory). (Iowa State University)

EX SP 355: Biomechanics (Laboratory). Mechanical basis of human performance; application of mechanical principles to exercise, sport and other physical activities. (Iowa State University)

EX SP 258: Physical Fitness and Conditioning. Development of personal fitness using a variety of conditioning and exercise techniques such as aerobics, weight training, and aquatic fitness. Introduction to acute and chronic responses to exercise, and the role of exercise in health promotion and weight management. (Iowa State University)

EX SP 236: Fundamentals of Archery, Badminton, Bowling (Archery Segment). (Iowa State University)

EX SP 119: Archery 1. (Iowa State University)

EX SP 220: Physical Fitness and Conditioning. Development of personal fitness using a variety of conditioning and exercise techniques such as aerobics, weight training, and aquatic fitness. Introduction to acute and chronic responses to exercise, and the role of exercise in health promotion and weight management. (Des Moines Area Community College)

PE 157: Introduction to Athletic training. Introduction to methods of prevention and immediate care of athletic injuries. Basic information concerning health supervision of athletes, and some basic wrapping and strapping techniques for common injuries. (Des Moines Area Community College)

PE 144: Introduction to Physical Education. History and development of physical education as an academic discipline. Principles and current practices of teaching physical education. (Des Moines Area Community College)

PHYSL 130: Human Physiology. Principles of the regulation and maintenance of human physiology. (Utah State University; Volunteer Undergraduate TA)

PHYSL 103 Human Anatomy. Introduction to the structure and location of bones, muscles, and organs in the human body. (Utah State University; Volunteer Undergraduate TA)

Service

Service to the Profession

Associate Editor, Asian Journal of Sports Medicine (2019-).

Director, North American Chapter, International Physical Activity Projects (IPAP) (2009-)

Fellow, American College of Sports Medicine (2008-_)

National Research Foundation (South Africa) peer evaluator for grant applicants

National Research Foundation (South Africa) evaluator of applications for funding in Thuthuka Programme

External Evaluator for Master's Theses and Doctoral Dissertations, University of Johannesburg, Johannesburg South Africa.

Grant proposal reviewer for NASPE/ING Run for Something Better School Awards Program.

Session Chair. Special Event. Undergraduate Research Experiences in Exercise Science. ACSM Annual Meeting, 2010

Session Chair. 2nd Annual Education Research Exchange. Iowa State University Education Research Exchange, 2001

Current Service at the University of Nebraska at Kearney

University Wide

Faculty Senate Parliamentarian (April 2019 – April 2022)

Faculty Senate Oversight Committee Chair (April 2019 – April 2022)

Faculty Senate Executive Committee (April 2019 – April 2022)

Faculty Senate, At Large representative (Fall 2018-)

University Student Conduct Appeals Board (Fall 2019 - May 2020)

General Studies Council (fall 2013-)

University Safety Committee (Fall 2018 -)

University Student Travel Policy Committee (Fall 2019-)

University Retention Council (Fall 2019 -)

External Evaluator, Promotion Committee, Department of Social Work & Criminal Justice (Fall

2019-)

College of Education Dean Search Committee Member (Fall 2019 -)

College of Education

College of Education Promotion and Tenure Committee, Chair (Fall 2012 – present) Member (fall 2008 – spring 2012)

Department of Kinesiology and Sport Sciences

Kinesiology Lecturer Search Committee Member (Fall 2019 -)

Nebraska Kids Fitness and Nutrition Day, volunteer educator and student coordinator. (fall 2005-present)

Academic Advisor for Undergraduate exercise Science Students (Fall 2005 - present)

Previous Service at the University of Nebraska at Kearney

Recreation Faculty Search Committee Member (Spring 2019)

University Student Conduct Board (Fall 2016- May 2017, Fall 2018 – May 2019)

Faculty Senate Athletic Committee (Fall 2018-May 2019)

External Evaluator, Promotion & Tenure, Department of Social Work & Criminal Justice (Fall 2018)

External Evaluator, Faculty Annual Performance Reviews, Department of Social Work & Criminal Justice (Spring 2018)

University Graduate Council. (Fall 2014 – spring 2017)

University Graduate Council Standing Committee I: Policy & Planning Committee (fall 2014–spring 2017)

Faculty Senate (April 2012- April 2016)

Faculty Senate Executive Council, (April 2014 – April 2016)

Faculty Senate representative to the Oversight Committee (September 2014 – April 2016)

Faculty Senate representative to the Grievance Committee (September 2014 – April 2016)

Faculty Senate representative to the Professional Conduct committee (September 2013 – April 2016)

Youth Agility Speed & Quickness program director (2011-2015)

Faculty Senate ad-hoc committee on best practices in peer evaluation (2013-2014)

Director of General Studies search committee, committee member (2013-2014)

Director of the Office of Sponsored Programs search committee member (2012-2013; 2013-2014)

College peer mentor for implementing Critical Thinking in the classroom (2013-2014)

Chair, Ad-hoc committee for the evaluation of a new Student Evaluation of Instruction survey (2012-2014 academic years)

Ad-hoc committee to enhance communication effectiveness within department faculty and staff (2013-2014)

Exercise Science faculty search (2012-2013)

Undergraduate Research and Creative Activity program review team (2011-2012)

Institutional Review Board for the protection of Human Research Subjects. (Service period 2006 - 2011)

Undergraduate Research Committee (Service fall 2008 – spring 2011)

University Graduate Council. (Service period 2006 - 2010)

Homecoming Hustle (HPERLS Fun Run) Race Director and Coordinator (Service period beginning Fall 2007 – fall 2009)

Ad-hoc Committee on Enhancing Enrollment and Course Offerings in PE 110 Dept. of HPERLS (Service period beginning fall 2006)

Graduate Council Standing Committee 1: Policy and Planning Committee. (Service period beginning fall 2006; Chair in 2007 – 2008 and 2009-2010)

General Studies Roundtable 2 (spring 2006-spring 2007)

Academic Affairs Committee on Teaching Continuity (Service period beginning fall 2006)

Health Science Program Assistant Director Search Committee, University of Nebraska at Kearney. (Service period summer 2006)

Graduate Program Chair, HPERLS Department, University of Nebraska at Kearney (Service period beginning summer 2006 - 2010)

Graduate Dean Search Committee. University of Nebraska at Kearney (Service period 2005 – 2006 academic year)

Assistant HPERLS Department Graduate Coordinator. (Service period 2005 – 2006 academic year)

University of Nebraska at Kearney Centennial Run committee. (Service period fall 2005)

Senior College of Central Nebraska, Fit after 50 course coordinator. (Service period 2005 – 2006 academic year)

Health Science Program Assistant Advisor Search Committee. (Service period summer 2005)

HPERLS Furniture Committee (Service period spring 2005)

Academic Advisor for Undergraduate exercise Science Students (Service period Beginning Fall 2005 academic year; ongoing)

Other Prior University Service

Institutional Review Board, Georgia Southern University (2003- 2004)

GSU Exercise Science undergraduate student advisor (2002 – 2004)

GSU Jiann-Ping Hsu School of Public Health extramural funding task force (2003-2004)

GSU Jiann-Ping Hsu School of Public Health Curriculum Committee (2003-2004)

GSU Jiann-Ping Hsu School of Public Health Assistant Graduate program director (2003-2004)

GSU Jiann-Ping Hsu School of Public Health Laboratory Director's Committee (2002-2004)

GSU Jiann-Ping Hsu School of Public Health Exercise Science Graduate program coordinator (2003-2004)

GSU Recreation and Athletic Center advisor to the personal training program (2003-2004)

Institutional Biosafety Committee, Georgia Southern University (2003-2004)

Kinesiology Cluster Area, Georgia Southern University, Jiann-Ping Hsu School of Public Health (2002-2004)

Biostatistics Faculty Search Committee. Georgia Southern University, Jiann-Ping Hsu School of Public Health (2002-2003, 2003-2004)

Computer Advisory Committee, Iowa State University, University-Wide, College of Education, and Dept. of Health and Human Performance (2000-2002)

Computer Fee Allocation Committee, Iowa State University (2000-2001)

Dept. of Health and Human Performance Graduate Student Association (Founding Officer and 1st President; 2001-2002)

Sport Management Faculty Search Committee, Iowa State University Dept. of Health and Human Performance (2001-2002)

Previous Community Involvement

Race Director, Central Nebraska Susan G. Komen Race for the Cure (2011, 2012, 2013 events)

Webelos Den Leader, Boy Scouts of America Pack 132, Kearney, NE. Chartered to the Church of Jesus Christ of Latter Day Saints

Scoutmaster, Boy Scouts of America Troop 132, Kearney, NE. Chartered to the Church of Jesus Christ of Latter Day Saints

Tiger Den Coach, Boy Scouts of America Pack 135, Kearney, NE. Chartered to Faith United Methodist Church.

Personal Fitness Merit Badge Counselor. Boy Scouts of America, Overland Trails Council Covered wagon District.

Certifications

American College of Sports Medicine: ACSM Certified Exercise Physiologist (05/21/1998 - 12/31/2021)

USA Track and Field: Level One Coach

American Red Cross: Community First Aid and CPR

Funding

Research Funding

Brown GA, Bice MR, Abbey BM. Shaw I, Shaw BS. Effects of aerobic exercise, resistance exercise, and combined aerobic & resistance exercise on food choices and endocrine signals of satiety in middle aged adults. Submitted 6/26/2017 to National Institutes of Health [PA16-200] - Academic Research Enhancement Award (Parent R15) (Application #1R15DK117436-01). Total Amount Requested: $367,708. (Resubmission of revised proposal; Pending Review.)

Brown GA, Bice MR, Abbey BM. Shaw I, Shaw BS. Effects of aerobic exercise, resistance exercise, and combined aerobic & resistance exercise on food choices and endocrine signals of satiety in middle aged adults. Submitted 6/26/2017 to National Institutes of Health [PA16-200] - Academic Research Enhancement Award (Parent R15) (Application #1R15DK117436-01). Total Amount Requested: $351,708. Pending Review.

Brown GA, Bice MR, Adkins MM, Hollman A, Bickford S, Bickford N, Ranglack D. HEAT it up (Health, Exercise, Aquaponics, Technology) summer camps to grow future health professionals in Rural Nebraska. Submitted 5/25/2017 to National Institutes of Health [PAR17- 183] - NICHD Research Education Programs (R25) (Application # 1R25 HD094673-01) Total Amount Requested: $777,006. Pending Review.

Brown GA, Bice MR, Adkins MM, Hollman A, Bickford S, Bickford N, Ranglack D. Teaching Health, Exercise, Technology, & Aquaponics (THETA) Day Camps to Grow Future Health Professionals. University of Nebraska Rural Futures Institutes (RFI) $20,000 – Funded (July 1, 2017 – June 30, 2019)

Brown GA, Bice MR, Adkins MM, Hollman A, Bickford S, Bickford N, Ranglack D. Teaching Health, Exercise, Technology, & Aquaponics (THETA) Day Camps to Grow Future Health Professionals. University of Nebraska Rural Futures Institutes (RFI) and McCook Economic Development Council $11,400 – Funded (May 1, 2017 – August 30, 2017)

Brown GA, Abbey BM, Bice MR. "Is milk an effective rehydration beverage during repeated days of dehydrating exercise?" to the Dairy Research Institute® (DRI) $125,560 – Not funded.

Brown GA & Steele J. "Biochemistry Laboratory Experiences for Exercise Science Students" to the Kelly Fund, University of Nebraska. $23,947. Funded. August 2014- June 2016

Brown GA. "Horizon After School Quickness Program" to Blue Cross & Blue Shield of Nebraska for a Community Wellness grant. $14,106. Not funded

Brown GA. "Effects of chocolate milk taken immediately post exercise on the adaptations to strength training in men" to the Dairy Research Institute® (DRI) $123,192 – not funded.

Brown GA., Heelan KA, Bartee RT, & Maughan S. "Active Video Games as an Alternative to Traditional Group Exercise Classes" to the Robert Wood Johnson

Health Games Research program. $297,201 – not funded

Brown GA., Nylander B, Heelan KA. Energy Expenditure for Active Video Game Systems: Dance Dance Revolution and Nintendo Wii. University of Nebraska at Kearney Research Services Council. $3,432. Funded

Brown G.A. Effects of green tea extract on fasting plasma insulin, glucose, leptin, and PYY concentrations in humans. University of Nebraska at Kearney Research Services Council. $3,822. Funded

Brown G.A. Dose response relationship between resistance exercise and changes in the hormonal regulation of blood glucose homeostasis. American Diabetes Association Junior faculty Award. $443,293. Not Funded.

Brown G.A., and K. Heelan. Health benefits of green tea extract in women. NIH NCCAM Exploratory/Developmental Grant for Clinical Studies (R21), PAR-03-153. $485,163. Not Funded.

Brown, G.A. Changes In Biomarkers Of Satiety, Aerobic Fitness, And Body Composition While On A Low Fat Or Low Carbohydrate Diet. University of Nebraska at Kearney Research Services Council. $3,750. Funded

Lynott, F., **Brown, G.A.**, and K. Heelan. Health and Fitness of HPERLS Students. University of Nebraska at Kearney Research Services Council. $4,000. Funded

Brown G.A., K. Heelan and D.S. King. Pharmacokinetics & Efficacy of Sublingual Androstenediol for Treating Andropause. NIH

NCCAM Exploratory/Developmental Grant for Clinical Studies (R21), PAR-03-153. $477,000. Not Funded.

Maughan S.L., D.P.Snider, and **G.A. Brown**, Physical Health and Social Factors Influencing Educational Success Among Hispanic Immigrant Children, University of Nebraska at Kearney Research Services Council. $4,214.60. Funded

McFarland S.P. and **G.A. Brown**, Effects of Exercise Duration on Glucose Tolerance In Mildly Overweight Men, University of Nebraska at Kearney Research Services Council. $750. Funded

Brown, G.A. Effects of Exercise Duration on Insulin Sensitivity In Mildly Overweight Men, University of Nebraska at Kearney Research Services Council. $2,000. Funded

McFarland S.P. and **G.A.Brown**, Effects of Exercise Duration on Glucose Tolerance In Mildly Overweight Men, Gatorade Sports Sciences Institute. $1,500. Not Funded

Brown, G.A. Effects of Exercise Duration on Glucose Tolerance and Insulin Sensitivity in Mildly Overweight Men. Life fitness Academy. $5,000. not funded

Brown, G.A. American College of Sports Medicine Foundation Grant. Endocrinology of weight lifting & androgen supplementation, $10,000. Not Funded.

Brown, G.A. and J.L. McMillan. Experimental and Applied Sciences. Effects of Green Tea Extract on Insulin Sensitivity and Adaptations to Exercise. $71,075. Not Funded.

Brown, G.A. American College of Sports Medicine Foundation Grant. Endocrinology of weight training & androgen supplementation, $10,000. Not Funded.

Brown, G.A. and J. Drouin. Georgia Southern University Faculty Research Grant. Effects of Resistance Training on the Hormonal response to Sublingual Androstenediol Intake. $5,000. Funded

King D.S. and **G.A. Brown**. World Anti Doping Agency. Effects of Testosterone Precursors on the Muscular and Hormonal Response to Resistance Training in Men. $464,634. Not Funded.

Brown, G.A. American College of Sports Medicine Foundation Grant. Effect of Raisin Ingestion on Substrate Use During Exercise. $5,000. Not Funded.

King D.S. and **G.A. Brown**. California Raisin Marketing Board. The Glycemic Index Of Raisins Fed To Normal People And Non-Insulin Dependent Diabetics. $110,869. Not Funded.

King D.S. and **G.A. Brown**. California Raisin Marketing Board. The Effects Of Raisin Ingestion On Substrate Utilization and Endurance Exercise Performance In Trained Cyclists. $84,258. Not Funded.

Brown, G.A., E.R. Martini, and B.S. Roberts. Effect of Androstenediol on Serum Sex Hormone Concentrations. Iowa State University Professional Advancement Grant. Graduate Student Senate and Iowa State University Dept. of Health and Human Performance. $700. Funded

Instructional Development Funding

Brown G.A. and K.A. Heelan. University of Nebraska at Kearney. Proposal for the purchase of upgraded resistance exercise equipment in the Human Performance Laboratory. $21,100. Funded.

Brown G.A. and K.A. Heelan. University of Nebraska at Kearney. Proposal for the purchase of a new metabolic cart for the Human Performance Laboratory. $24,560. Funded

Brown, G.A. Georgia Southern University, Center for Excellence in Teaching Instructional Development Grant. Proposal for purchase of heart rate monitors, manual sphygmomanometers, and automated sphygmomanometers. $2,820. Funded.

Brown, G.A. Georgia Southern University, Center for Excellence in Teaching Innovative Teaching Strategies Retreat. Provides $2,000 in instructional technology funds to the participant. Funded.

Brown, G.A. Georgia Southern University, Center for Excellence in Teaching Travel Grant. $750. Funded.

Brown, G.A. Georgia Southern University student technology fee proposal. Proposal for purchase of Molecular Devices SpectraMax 250 plate reader. $17,000. Funded

Brown, G.A. Georgia Southern University student technology fee proposal. Proposal for purchase of Lode Excalibur Sport Bicycle Ergometer and Physiodyne Max 2 Metabolic Cart. $29,577. Funded

Brown, G.A. Georgia Southern University student technology fee proposal. Proposal for purchase of Packard Cobra 2 Automated Gamma Counter. $14,000. Not funded

References

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UNITED STATES DISTRICT COURT
DISTRICT OF IDAHO

LINDSAY HECOX, and JANE DOE with her next friends JEAN DOE and JOHN DOE,

Plaintiffs,

v.

BRADLEY LITTLE, in his official capacity as Governor of the State of Idaho; SHERRI YBARRA, in her official capacity as the Superintendent of Public Instruction of the State of Idaho and as a member of the Idaho State Board of Education; THE INDIVIDUAL MEMBERS OF THE STATE BOARD OF EDUCATION, in their official capacities; BOISE STATE UNIVERSITY; MARLENE TROMP, in her official capacity as President of Boise State University; INDEPENDENT SCHOOL DISTRICT OF BOISE CITY #1; COBY

Case No. 1:20-cv-00184-DCN

DECLARATION OF CHELSEA MITCHELL IN OPPOSITION TO PRELIMINARY INJUNCTION

DENNIS, in his official capacity as superintendent of the Independent School District of Boise City #1; THE INDIVIDUAL MEMBERS OF THE BOARD OF TRUSTEES OF THE INDEPENDENT SCHOOL DISTRICT OF BOISE CITY #1, in their official capacities; THE INDIVIDUAL MEMBERS OF THE IDAHO CODE COMMISSION, in their official capacities,

Defendants.

DECLARATION OF CHELSEA MITCHELL

I, Chelsea Mitchell, declare as follows:

1. I am a seventeen-year-old graduate of Canton High School in Canton, Connecticut.

2. I am an elite female athlete and competed in Connecticut Interscholastic Athletic Conference (CIAC) track and field events throughout all four years of high school.

3. A CIAC policy allows biological males who identify as girls to compete in the girls' category and on girls' athletic teams.

4. From the Spring 2017 outdoor track season through the Winter 2020 indoor track season[1]—six track seasons—I competed against biological males in my track and field athletic events due to the CIAC policy.

5. I understand that some individuals in this case state that they are not aware of any biological girls being harmed by the presence of transgender athletes competing in their league.

6. I personally have been harmed by competing against male athletes in my league. In total, I have lost four state championship titles, two All New England awards, medals, points, and publicity due to the CIAC policy that permits males to compete in girls' athletic events in Connecticut.

2016-2017 Freshman Year

7. I first competed against a male in girls' track and field as a fourteen-year-old freshman at the Spring 2017 outdoor CIAC State Open Championship.

8. On the way to this meet, I was instructed by my coach to respond "no comment" if asked about the issue of males competing in the female category.

9. In the 100m final at the 2017 outdoor State Open, I placed 7th overall. The top six receive a medal and qualify to advance to the New England Regional Championship: one of those top six spots was taken by male athlete Andraya Yearwood:

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[1] The Spring 2020 outdoor season was cancelled due to the global COVID-19 pandemic.

Table 1: 2017 CIAC State Open Women's Outdoor Track 100m Results (June 5, 2017)[2]

Place	Grade	Sex	Name	Time	High School
1*	12	F	Caroline O'Neil	12.14s	Daniel Hand
2*	12	F	Kathryn Kelly	12.36s	Lauralton Hall
3*	9	M	Andraya Yearwood	12.41s	Cromwell
4*	11	F	Tia Marie Brown	12.44s	Windsor
5*	12	F	Kiara Smith	12.59s	Jonathan Law
6*	11	F	Kate Hall	12.62s	Stonington
7	9	F	Chelsea Mitchell	12.69s	Canton
8	12	F	Tiandra Robinson	FS	Weaver

* Qualified for the New England Championship.

2017-2018 Sophomore Year

10. During my sophomore year, I learned that Andraya Yearwood's school was reclassified to the Class S division for indoor track events (the school remained a Class M for outdoor track events)—which was the same class as my school.

11. This news was upsetting for me because I would now be racing against a male competitor at both the Class S championship and the State Open championship.

12. At the February 10, 2018, indoor Class S Championship in the 300m, I was knocked out of advancing to the State Open by just one spot—a spot was taken by Andraya.

13. On April 27, 2018, at the first invitational race of the Spring 2018 outdoor season, I was seeded in the 100m in a lane beside not just one, but two male athletes: Terry Miller and Andraya Yearwood.

14. I distinctly remember seeing Terry look over to Andraya and say: "You and me, one and two." At

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[2] AthleticNet, https://www.athletic.net/TrackAndField/meet/306453/results/f/1/100m, last visited June 2, 2020.

fifteen years old, I felt extremely intimidated to run against bigger, faster, and stronger male competitors.

15. But Terry was right. I should have won that 100m race; but instead, Terry and Andraya took first and second place, while I placed third.

16. Similarly, at the Spring 2018 outdoor State Open Championship, Terry won the women's 100m event by a wide margin, while Andraya finished second.

17. But for CIAC's policy, I would have won second place statewide:

Table 2: 2018 CIAC State Open Championship Women's Outdoor Track 100m Results (June 4, 2018)[3]

Place	Grade	Sex	Name	Time	High School
1*	10	M	Terry Miller	11.72s	Bulkeley
2*	10	M	Andraya Yearwood	12.29s	Cromwell
3*	11	F	Bridget Lalonde	12.36s	RHAM
4*	10	F	Chelsea Mitchell	12.39s	Canton
5*	11	F	Maya Mocarski	12.47s	Fairfield Ludlowe
6*	10	F	Selina Soule	12.67s	Glastonbury
7	12	F	Tia Marie Brown	12.71s	Windsor
8	11	F	Ayesha Nelson	12.80s	Hillhouse

* Qualified for the New England Championship.

18. Bridget Lalonde beat me by just three-hundredths of a second, but I was so relieved that she did. Emotionally, it was less of a loss to be denied runner-up status than to be denied a first place State Open Championship—a feat almost unheard of for a high school sophomore.

19. At the 2018 outdoor New England Regional Championship, I placed seventh in the 100m. Only

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[3] AthleticNet, https://www.athletic.net/TrackAndField/meet/334210/results/f/1/100m, last visited June 2, 2020.

the top six medal and receive the All New England award—one of those top six spots was taken by Terry.

20. Had I earned the title of All New England, I would have made Canton High School history as the first Canton female athlete to win this prestigious award.

2018-2019 Junior Year

21. In the fall of my junior year, I learned that male athlete Terry Miller transferred to Bloomfield, another Class S school.

22. I was devastated, fearing that with two males competing in my division, my chances of ever winning a state championship in sprints were now over.

23. I trained harder than ever, spending countless hours to shave mere fractions of seconds off of my times. I never missed a practice, squeezed in extra workouts where I could, and saw my race times consistently drop.

24. But it was not enough. And my fears of losing championship after championship were realized in the Winter and Spring 2019 seasons.

25. At the February 7, 2019, indoor Class S State Championship, Terry finished first in the 55m. I placed second. But for the CIAC's policy, I would have been named the Class S State Champion in the 55m.

26. The February 16, 2019, indoor State Open Championship saw similar results and a similar impact. Terry and Andraya finished first and second respectively in both the preliminary and final Women's 55m races, each time defeating the fastest girl by a wide margin. I placed third in the final.

27. But for CIAC's policy, I would have won the 2019 State Open Championship in the 55m dash:

Table 3: 2019 CIAC State Open Championship Women's Indoor Track 55m Preliminary Results (February 16, 2019)[4]

Place	Grade	Sex	Name	Time	High School
1*	11	M	Terry Miller	7.00s	Bloomfield
2*	11	M	Andraya Yearwood	7.07s	Cromwell
3*	12	F	Cori Richardson	7.24s	Windsor
4*	11	F	Chelsea Mitchell	7.27s	Canton
5*	12	F	Kate Shaffer	7.27s	Conard
6*	12	F	Ayesha Nelson	7.29s	Hillhouse
7*	12	F	Maya Mocarski	7.34s	Fairfield Ludlowe
8	11	F	Selina Soule	7.37s	Glastonbury
9	10	F	Kisha Francois	7.41s	East Haven

* Qualified for the women's 55m final.

Table 4: 2019 CIAC State Open Championship Women's Indoor Track 55m Final Results (February 16, 2019)[5]

Place	Grade	Sex	Name	Time	High School
1*	11	M	Terry Miller	6.95s	Bloomfield
2*	11	M	Andraya Yearwood	7.01s	Cromwell
3*	11	F	Chelsea Mitchell	7.23s	Canton
4*	12	F	Kate Shaffer	7.24s	Conard
5*	12	F	Ayesha Nelson	7.26s	Hillhouse
6*	12	F	Maya Mocarski	7.33s	Fairfield Ludlowe
7	12	F	Cori Richardson	7.39s	Windsor

* Qualified for the New England Championship.

28. Instead, I was not named State Open Champion in the 55m, I received a bronze medal instead of a gold medal, and I did not make Canton High School history as the first ever Canton female athlete to be named a State Open Champion.

29. However, after the 55m race, I returned to the finals of the long jump, which had no males competing. While listening to them announce Terry

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[4] AthleticNet, https://www.athletic.net/TrackAndField/meet/352707/results/f/1/55m, last visited June 2, 2020.

[5] *Id.*

as the winner and new meet record holder in the 55m, I won the long jump event to solidify my place in the Canton record books as the first Canton indoor track athlete—male or female—to be named a State Open Champion.

30. State Champions are recognized as All-State Athletes, an award listed on college applications, scholarship applications, and college recruiting profiles. State Champions are invited to the All-State Banquet, and get their name celebrated on a banner in their high school gym. I did not receive any of these awards for the 55m. But I was able to receive these awards for my long jump championship.

31. After the State Open Championship, I was repeatedly referred to in the press as the "third-place competitor, who is not transgender." I was the fastest biological girl in the 55m race at the State Open Championship, but the press did not mention my name—I felt invisible.

32. At the March 2, 2019, indoor New England Regional Championship, Terry took first and Andraya took third place in the 55m dash. I missed medaling and being named All New England Champion by just two spots—two spots that were taken by male competitors.

33. Following Terry Miller's sweep of the CIAC's Indoor Class S, State Open, and New England titles in the 55m dash and 300m, Terry was named "All-Courant girls indoor track and field athlete of the year" by the Hartford Courant newspaper. This felt like an injustice to my fellow female athletes.

34. In the Spring 2019 outdoor season, I competed against both Terry and Andraya in the Class S

Championship. At this event, I ran the fastest biological female times in the 100m and 200m across all state class meets.

35. But because of the CIAC's policy, being the fastest biological girl just was not good enough to experience the thrill of victory. Instead, at the 2019 Class S Championship, Terry placed first in the 100m and 200m, while I placed second in both events. I won the long jump and received a state title. But because of the CIAC's policy, I took home only one state title instead of three.

36. The trend continued at the 2019 outdoor State Open Championship as Terry easily won the women's 200m race. But for CIAC's policy, Cori Richardson would have won the state championship, Alanna Smith would have finished runner-up, and Olivia D'Haiti would have advanced to the New England Championship:

Table 5: 2019 CIAC State Open Championship Women's Outdoor Track 200m Final Results (June 3, 2019)[6]

Place	Grade	Sex	Name	Time	High School
1*	11	M	Terry Miller	24.33s	Bloomfield
2*	12	F	Cori Richardson	24.75s	Windsor
3*	9	F	Alanna Smith	25.01s	Danbury
4*	11	F	Chelsea Mitchell	25.24s	Canton
5*	12	F	Nichele Smith	25.38s	East Hartford
6*	12	F	Bridget Lalonde	25.55s	RHAM
7	12	F	Olivia D'Haiti	25.63s	Kolbe-Cathedral

* Qualified for the New England Championship.

37. But I did receive one opportunity to compete on a more level playing field. At the Spring 2019 State

[6] AthleticNet, https://www.athletic.net/TrackAndField/MeetResults.aspx?Meet=364088&show=all, last visited June 2, 2020

Open Championship in the 100m, Terry, the top-seed in the race, false-started and was disqualified. This opened the door for me: I was able to relax, focus on my race, and win. I set a personal record of 11.67 seconds, made Canton High School history as the first sprinter to be a state open champion in any sprint event, medaled, received significant media publicity, and advanced to the New England Regional Championships.

38. I went on to win the New England Regional Championships in the 100m dash and was named All New-England. Here, too, I made Canton High School history as the first female to win a New England Championship.

39. Thereafter, I was awarded Track Athlete of the Year by the Connecticut High School Coaches Association, and the Hartford Courant named me 2019 All-Courant Girls Outdoor Track and Field Athlete of the Year and the Bo Kolinsky Female Athlete of the Year (across all sports).

40. My new personal record, State Open Champion and All New-England awards put me in a much better recruiting position for college scholarships—all because a false start that prevented a male from competing against me in the women's division leveled the playing field.

2019-2020 Senior Year

41. A similar scenario played out in the Winter 2020 season. At the indoor Class S Championship 55m race, Andraya Yearwood—the top seed in the race and the individual ranked number one in the state for the women's 55m dash—false-started and was disqualified. That false start opened the door for

me to not only win the CIAC Class S Championship in the 55m dash, but also to advance to the 2020 Connecticut State Open Championship in the 55m event and win.

42. To my disappointment, the 2020 Spring outdoor season was cancelled in light of the global COVID-19 pandemic.

43. I just completed my senior year of high school and the final track season of my high school athletic career.

44. It feels defeating to know that records at my high school, CIAC, AthleticNet, MySportsResults, CT.Milesplit.com, and others do not reflect the four state titles and two All New England awards I should have earned. It is upsetting to know that the meet records of many great female athletes before me have also been wiped from the books.

45. Competing against males makes me feel anxious and stressed. And stress has a direct, negative impact on my athletic performance.

46. I try to stay positive, to take support from family and friends, but it is hard when I know that I must compete against those who have a biological advantage because they were born male.

47. I hope that future female athletes will not have to endure the anxiety, stress, and performance losses that I have while competing under a policy that allows males to compete in the female category.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 2 day of June, 2020

Chelsea Mitchell

Chelsea Mitchell

EXPERT AFFIDAVIT OF DR. STEPHEN B. LEVINE, M.D.

June 4, 2020

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I. CREDENTIALS & SUMMARY

1. I am Clinical Professor of Psychiatry at Case Western Reserve University School of Medicine, and maintain an active private clinical practice. I received my MD from Case Western Reserve University in 1967, and completed a psychiatric residency at the University Hospitals of Cleveland in 1973. I became an Assistant Professor of Psychiatry at Case Western in 1973, and became a Full Professor in 1985.

2. Since July 1973, my specialties have included psychological problems and conditions relating to individuals' sexuality and sexual relations, therapies for sexual problems, and the relationship between love, intimate relationships, and wider mental health. In 2005, I received the Masters and Johnson Lifetime

Achievement Award from the Society of Sex Therapy and Research. I am a Distinguished Life Fellow of the American Psychiatric Association.

3. I have served as a book and manuscript reviewer for numerous professional publications. I have been the Senior Editor of the first (2003), second (2010), and third (2016) editions of the *Handbook of Clinical Sexuality for Mental Health Professionals*. In addition to five previously solo-authored books for professionals, I have recently published *Psychotherapeutic Approaches to Sexual Problems* (2020). The book has a chapter titled "The Gender Revolution."

4. I first encountered a patient suffering what we would now call gender dysphoria in July 1973. In 1974, I founded the Case Western Reserve University Gender Identity Clinic, and have served as Co-Director of that clinic since that time. Across the years, our Clinic treated hundreds of patients who were experiencing a transgender identity. An occasional child was seen during this era. I was the primary psychiatric care-giver for several dozen of our patients and supervisor of the work of other therapists. I was an early member of the Harry Benjamin International Gender Dysphoria Association (later known as WPATH) and served as the Chairman of the committee that developed the 5th version of its Standards of Care. In 1993 the Gender Identity Clinic was renamed, moved to a new location, and became independent of Case Western Reserve University. I continue to serve as Co-Director.

5. In 2006, Judge Mark Wolf of the Eastern District of Massachusetts asked me to serve as an

independent, court-appointed expert in a litigation involving the treatment of a transgender inmate within the Massachusetts prison system. I have been retained by the Massachusetts Department of Corrections as a consultant on the treatment of transgender inmates since 2007.

6. In 2019, I was qualified as an expert and testified concerning the diagnosis, understanding, developmental paths and outcomes, and therapeutic treatment of transgenderism and gender dysphoria, particularly as it relates to children, in the matter of *In the Interest of J.A.D.Y. and J.U.D.Y.*, Case No. DF-15-09887-S, 255th Judicial District, Dallas County, TX (the "*Younger* litigation").

7. A fuller review of my professional experience, publications, and awards is provided in my curriculum vitae, a copy of which is attached hereto as Exhibit A.

8. I have reviewed the "Expert Declaration of Deanna Adkins, MD, in Support of Plaintiffs' Motion for Preliminary Injunction," dated April 27, 2020 ("Adkins"). In that declaration Dr. Adkins makes a variety of statements about gender dysphoria, therapies for gender dysphoria, and outcomes of therapies, which I believe to be inaccurate, or unsupported by scientific evidence. Dr. Adkins is a pediatric endocrinologist. I note with some concern that Dr. Adkins makes a number of sweeping and purportedly scientific assertions but cites almost no peer-reviewed articles or studies that support her opinions, and I note also that Dr. Adkins herself has published only one peer-reviewed article relating to

treatment of individuals suffering from gender dysphoria.

9. Based on her declaration, Dr. Adkins' practice is focused on children and adolescents; her CV and declaration do not suggest substantial experience in working with adults or older young adults who are living in a transgender identity, or who suffer from gender dysphoria. (This diagnosis requires distress). The wider lifecycle view that derives from experience with these adults (and familiarity with the literature concerning them) provides an important cautionary perspective. The psychiatrist or psychologist treating a trans child or adolescent, of course seeks to make the young patient happy, but the overriding consideration is the creation of a happy, highly functional, mentally healthy person for the next 50 to 70 years of life. I refer to treatment that keeps this goal in view as the "life course" perspective.

10. It is my opinion that a number of Dr. Adkins' assertions are inaccurate or unsupported, for reasons that I explain in this Declaration. I will provide citations to published, peer-reviewed articles that inform my judgments.

11. A summary of the key points that I explain in this statement is as follows:

a. Sex as defined by biology and reproductive function cannot be changed. While hormonal and surgical procedures may enable some individuals to "pass" as the opposite gender during some or all of their lives, such procedures carry with them physical, psychological, and social risks, and no procedures can enable an individual

to perform the reproductive role of the opposite sex. (Section II.A.)

b. The diagnosis of "gender dysphoria" encompasses a diverse array of conditions, with widely differing pathways and characteristics depending on age of onset, biological sex, mental health, intelligence, motivations for gender transition, socioeconomic status, country of origin, etc. Data from one population (e.g., adults) cannot be assumed to be applicable to others (e.g., children). (Section II.B.) Generalizations about the treatment children in one country (e.g., Holland) do not necessarily apply to another (e.g., United States).

c. Among psychiatrists and psychotherapists who practice in the area, there are currently widely varying views concerning both the causes of and appropriate therapeutic response to gender dysphoria in children. Existing studies do not provide a basis for a scientific conclusion as to which therapeutic response results in the best long-term outcomes for affected individuals. (Sections II.E, II.F.)

d. A majority of children (in several studies, a large majority) who are diagnosed with gender dysphoria "desist"—that is, their gender dysphoria does not persist—by puberty or adulthood. It is not currently known how to distinguish children who will persist from those who will not. (Section III.)

e. Some recent studies suggest that active affirmation of transgender identity in young children will substantially reduce the number of children "desisting" from transgender identity.

This raises concern that this will increase the number of individuals who suffer the multiple long-term physical, mental, and social limitations that are strongly associated with living life as a transgender person. (Section III.)

f. Thus, social transition is itself an important intervention with profound implications for the long-term mental and physical health of the child. When a mental health professional evaluates a child or adolescent and then recommends social transition, presumably that professional is available to help with interpersonal, familial, and psychological problems that may already exist and will likely arise after transition. However, many adolescents are medically transitioned without a thorough, long-lasting mental health assessment and psychological ongoing care, leaving themselves and their families on their own to deal with ongoing and subsequent problems. (Section III.)

g. The knowledge-base concerning the cause and treatment of gender dysphoria available today has low scientific quality. (Section IV.)

h. There are no studies that show that affirmation of transgender identity in young children reduces suicide or suicidal ideation, or improves long-term outcomes as compared to other therapeutic approaches. Meanwhile, multiple studies show that adult individuals living transgender lives suffer much higher rates of suicidal ideation, completed suicide, and negative physical and mental health conditions than does the general population before and after transition, hormones, and surgery. (Section IV.)

i. In light of what is known and not known about the impact of affirmation on the incidence of suicide, suicidal ideation, and other indicators of mental and physical health, it is scientifically baseless, and therefore unethical, to assert that a child or adolescent who express an interest in a transgender identity will kill him- or herself unless adults and peers affirm that child in a transgender identity. (Section IV.)

j. Putting a child or adolescent on a pathway towards life as a transgender person puts that individual at risk of a wide range of long-term or even life-long harms, including: sterilization (first chemical, then surgical) and associated regret and sense of loss; inability to experience orgasm (for trans women); physical health risks associated with exposure to elevated levels of cross-sex hormones; surgical complications and life-long after-care; alienation of family relationships; inability to form lasting romantic relationships and attract a desirable mate; elevated mental health risks of depression, anxiety, and substance abuse. (Section V.)

II. BACKGROUND ON THE FIELD

A. The biological baseline of sex

12. Dr. Adkins refers to the sex of an individual as "given at birth" or "designated at birth." (Adkins 4, 5.) This phrasing is misleading. The sex of a human individual at its core structures the individual's biological reproductive capabilities—to produce ova and bear children as a mother, or to produce semen and beget children as a father. As physicians know, sex determination occurs at the instant of conception,

depending on whether a sperm's X or Y chromosome fertilizes the egg. Medical technology can now be used to determine a fetus's sex before birth almost as easily as after birth. It is thus not correct to assert that doctors "designate" or "assign" the sex of a child at birth. Instead, they simply recognize the existing fact of that child's sex; barring rare disorders of sexual development, anyone can identify the sex of an infant by genital inspection. What the general public may not understand, however, is that every nucleated cell of an individual's body is chromosomally identifiably male or female—XY or XX.

13. The self-perceived gender of a child, in contrast, arises in part from how others label the infant: "I love you, son (daughter)." This designation occurs thousands of times in the first two years of life when a child begins to show awareness of the two possibilities. As acceptance of the designated gender corresponding to the child's sex is the outcome in >99% of children everywhere, anomalous gender identity formation begs for understanding. Is it biologically shaped? Is it biologically determined? Is it the product of how the child was privately regarded and treated? Does it stem from trauma-based rejection of maleness or femaleness, and if so, flowing from what trauma? Does it derive from a tense, chaotic interpersonal parental relationship without physical or sexual abuse? Is it a symptom of another, as of yet unrevealed, emotional disturbance or neuropsychiatric condition (autism)? The answers to these relevant questions are not scientifically known.

14. Under the influence of hormones secreted by the testes or ovaries, numerous additional sex-specific differences between male and female bodies

continuously develop postnatally, culminating in the dramatic maturation of the primary and secondary sex characteristics with puberty. These include differences in hormone levels, height, weight, bone mass, shape and development, musculature, body fat levels and distribution, and hair patterns, as well as physiological differences such as menstruation. These are genetically programmed biological consequences of sex, which also serve to influence the consolidation of gender identity during and after puberty.

15. Despite the increasing ability of hormones and various surgical procedures to reconfigure some male bodies to visually pass as female, or vice versa, the biology of the person remains as defined by his (XY) or her (XX) chromosomes, including cellular, anatomic, and physiologic characteristics and the particular disease vulnerabilities associated with that chromosomally-defined sex. For instance, the XX (genetically female) individual who takes testosterone to stimulate certain male secondary sex characteristics will nevertheless remain unable to produce sperm and father children. It is certainly true, as Dr. Adkins writes, that "[h]ormone therapy and social transition significantly change a person's physical appearance." (Adkins 9.) But in critical respects this change can only be "skin deep." Contrary to assertions and hopes that medicine and society can fulfill the aspiration of the trans individual to become "a complete man" or "a complete woman," this is not biologically attainable.[1] It is possible for some

[1] S. Levine (2018), *Informed Consent for Transgendered Patients*, J. OF SEX & MARITAL THERAPY, at 6, DOI: 10.1080/0092623X.2018.1518885 ("*Informed Consent*"); S. Levine (2016), *Reflections on the Legal Battles Over Prisoners*

adolescents and adults to pass unnoticed as the opposite gender that they aspire to be—but with limitations, costs, and risks, as I detail later. These risks include a continuing sense of inauthencity as a member of the opposite "sex."

B. Definition and diagnosis of gender dysphoria

16. Specialists have used a variety of terms over time, with somewhat shifting definitions, to identify and speak about a distressing incongruence between an individual's sex as determined by their chromosomes and their thousands of genes, and the gender with which they eventually subjectively identify or to which they aspire. Today's American Psychiatric Association *Diagnostic and Statistical Manual of Mental Disorders* ("DSM-5") employs the term Gender Dysphoria and defines it with separate sets of criteria for adolescents and adults on the one hand, and children on the other.

17. There are at least five distinct pathways to gender dysphoria: early childhood onset; onset near or after puberty with no prior cross gender patterns; onset after defining oneself as gay for several or more years and participating in a homosexual life style; adult onset after years of heterosexual transvestism; and onset in later adulthood with few or no prior indications of cross-gender tendencies or identity. The early childhood onset pathway and the more recently observed onset around puberty pathway are relevant to this matter.

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with Gender Dysphoria, J. AM. ACAD. PSYCHIATRY LAW 44, 236 at 238 ("*Reflections*").

18. Gender dysphoria has very different characteristics depending on age and sex at onset. Young children who are living a transgender identity commonly suffer materially fewer symptoms of concurrent mental distress than do older patients.[2] The developmental and mental health patterns for each of these groups are sufficiently different that data developed in connection with one of these populations cannot be assumed to be applicable to another.

19. The criteria used in DSM-5 to identify Gender Dysphoria include a number of signs of discomfort with one's natal sex and vary somewhat depending on the age of the patient, but in all cases require "clinically significant distress or impairment in . . . important areas of functioning" such as social, school, or occupational settings.

20. When these criteria in children (or adolescents, or adults) are not met, two other diagnoses may be given. These are: Other Specified Gender Dysphoria and Unspecified Gender Dysphoria. Specialists sometimes refer to children who do not meet criteria as being "subthreshold."

21. Children who conclude that they are transgender are often unaware of a vast array of adaptive possibilities for how to live life as a man or a woman—possibilities that become increasingly

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[2] K. Zucker (2018), *The Myth of Persistence: Response to "A Critical Commentary on Follow-Up Studies & 'Desistance' Theories about Transgender & Gender Non-Conforming Children" by Temple Newhook et al.*, INT'L J. OF TRANSGENDERISM at 10, DOI: 10.1080/15532739.2018.1468293 ("*Myth of Persistence*").

apparent over time to both males and females. A boy or a girl who claims or expresses interest in pursuing a transgender identity often does so based on stereotypical notions of femaleness and maleness that reflect constrictive notions of what men and women can be.[3] A young child's—or even an adolescent's—understanding of this topic is quite limited. Nor can they grasp what it may mean for their future to be sterile. These children and adolescents consider themselves to be relatively unique; they do not realize that discomfort with the body and perceived social role is neither rare nor new to civilization. What is new is that such discomfort is thought to indicate that they must be a trans person.

C. Impact of gender dysphoria on minority and vulnerable groups

22. In considering the appropriate response to gender dysphoria, it is important to know that certain groups of children and adolescents have an increased prevalence and incidence of trans identities. These include: children of color,[4] children with mental

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[3] S. Levine (2017), *Ethical Concerns About Emerging Treatment Paradigms for Gender Dysphoria*, J. OF SEX & MARITAL THERAPY at 7, DOI: 10.1080/0092623X.2017.1309482 ("*Ethical Concerns*").

[4] G. Rider et al. (2018), *Health and Care Utilization of Transgender/Gender Non-Conforming Youth: A Population Based Study*, PEDIATRICS at 4, DOI: 10.1542/peds.2017-1683. (In a large sample, non-white youth made up 41% of the set who claimed a transgender or gender-nonconforming identity, but only 29% of the set who had a gender identity consistent with their sex.)

developmental disabilities,[5] including children on the autistic spectrum (at a rate more than 7x the general population),[6] children residing in foster care homes, adopted children (at a rate more than 3x the general population),[7] children with a prior history of psychiatric illness,[8] and more recently adolescent girls (in a large recent study, at a rate more than 2x that of boys). (G. Rider at 4.)

23. The social transitioning, hormonal, and surgical paths often recommended and facilitated by gender clinics may lead to life-long sterilization by the

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[5] D. Shumer & A. Tishelman (2015), *The Role of Assent in the Treatment of Transgender Adolescents*, INT. J. TRANSGENDERISM at 1, DOI: 10.1080/15532739.2015.1075929.

[6] D. Shumer et al. (2016), *Evaluation of Asperger Syndrome in Youth Presenting to a Gender Dysphoria Clinic*, LGBT HEALTH, 3(5) 387 at 387.

[7] D. Shumer et al. (2017), *Overrepresentation of Adopted Adolescents at a Hospital-Based Gender Dysphoria Clinic*, TRANSGENDER HEALTH Vol. 2(1) 76 at 77.

[8] L. Edwards-Leeper et al. (2017), *Psychological Profile of the First Sample of Transgender Youth Presenting for Medical Intervention in a U.S. Pediatric Gender Center*, PSYCHOLOGY OF SEXUAL ORIENTATION AND GENDER DIVERSITY, 4(3) 374 at 375 ("*Psychological Profile*"); R. Kaltiala-Heino et al. (2015), *Two Years of Gender Identity Service for Minors: Overrepresentation of Natal Girls with Severe Problems in Adolescent Development*, CHILD & ADOLESCENT PSYCHIATRY & MENTAL HEALTH 9(9) 1 at 5. (In 2015 Finland gender identity service statistics, 75% of adolescents assessed "had been or were currently undergoing child and adolescent psychiatric treatment for reasons other than gender dysphoria."); L. Littman (2018), *Parent Reports of Adolescents & Young Adults Perceived to Show Signs of a Rapid Onset of Gender Dysphoria*, PLoS ONE 13(8): e0202330 at 13 (Parental survey concerning adolescents exhibiting Rapid Onset Gender Dysphoria reported that 62.5% of gender dysphoric adolescents had "a psychiatric disorder or neurodevelopmental disability preceding the onset of gender dysphoria."

time the patient reaches young adulthood. They may add a future source of despair in an already vulnerable person. Caution, and time to reflect as one matures, are prudent.

D. Three competing conceptual models of gender dysphoria and transgender identity

24. Discussions about appropriate responses by mental health professionals ("MHPs") to actual or sub-threshold gender dysphoria are complicated by the fact that various speakers and advocates (or a single speaker at different times) view transgenderism through at least three very different paradigms, often without being aware of, or at least without acknowledging, the distinctions.

25. Gender dysphoria is **conceptualized and described by some professionals and laypersons as though it were a serious, physical medical illness that causes suffering**, comparable, for example, to prostate cancer, a disease that is curable before it spreads. Within this paradigm, whatever is causing distress associated with gender dysphoria—whether secondary sex characteristics such as facial hair, nose and jaw shape, presence or absence of breasts, or the primary anatomical sex organs of testes, ovaries, penis, or vagina—should be removed to alleviate the illness. The promise of these interventions is the cure of the gender dysphoria.

26. Dr. Adkins appears to endorse this perspective, asserting that gender dysphoria is a "medical condition." (Adkins 5.) It should be noted, however, that gender dysphoria is a psychiatric, not a medical, diagnosis. Since its inception in DSM-III in

1983, it has always been specified in the psychiatric DSM manuals and is not specified in medical diagnostic manuals. Notably, gender dysphoria is the only psychiatric condition to be treated by surgery, even though no endocrine or surgical intervention package corrects any identified biological abnormality. (Levine, *Reflections*, at 240.)

27. Gender dysphoria is alternatively **conceptualized in developmental terms**, as an adaptation to a psychological problem that was first manifested as a failure to establish a comfortable conventional sense of self in early childhood. This paradigm starts from the premise that all human lives are influenced by past processes and events. Trans lives are not exceptions to this axiom. (Levine, *Reflections*, at 238.) MHPs who think of gender dysphoria through this paradigm may work both to identify and address causes of the basic problem of the deeply uncomfortable self, and also to ameliorate suffering when the underlying problem cannot be solved. They work with the patient and (ideally) family to inquire what forces may have led to the trans person repudiating the gender associated with his sex. The developmental paradigm is mindful of temperamental, parental bonding, psychological, sexual, and physical trauma influences, and the fact that young children work out their psychological issues through fantasy and play.

28. In addition, the developmental paradigm recognizes that, with the important exception of genetic sex, essentially all aspects of an individual's identity evolve—often markedly—across the individual's lifetime. This includes gender. Some advocates assert that a transgender identity is

biologically caused, fixed from early life, and eternally present in an unchanging manner. Taking this line, Dr. Adkins asserts that gender identity is "fixed." (Adkins 5.) This assertion, however, is not supported by science.[9] Although numerous studies have been undertaken to attempt to demonstrate a distinctive physical brain structure associated with transgender identity, as of yet there is no evidence that these patients have any defining abnormality in brain structure that precedes the onset of gender dysphoria. The belief that gender dysphoria is the consequence of brain structure is challenged by the sudden increase in incidence of child and adolescent gender dysphoria over the last twenty years in North America and Europe. Meanwhile, multiple studies have documented rapid shifts in gender ratios of patients presenting for care with gender-related issues, pointing to cultural influences,[10] while a recent study documented "clustering" of new presentations in specific schools and among specific friend groups, pointing to social influences (Littman). Both of these findings strongly suggest cultural factors. From the beginning of epidemiological research into this arena, there have always been some countries, Poland and Australia, for example, where the sex ratios were reversed as compared to North

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[9] Even the advocacy organization The Human Rights Campaign asserts that a person can have "a fluid or unfixed gender identity." https://www.hrc.org/resources/glossary-of-terms.

[10] Levine, *Ethical Concerns*, at 8 (*citing* M. Aitken, T. D. Steensma, et al. (2015), *Evidence for an Altered Sex Ratio in Clinic-Referred Adolescents with Gender Dysphoria*, J. OF SEXUAL MEDICINE 12(3) 756 at 756-63).

America and Europe, again demonstrating a powerful effect of cultural influences.

29. Further, as I detail later below, many studies and clinical observations confirm that gender identity can and does change or evolve over time for many individuals. And recent studies and anecdotal reports provide strong if preliminary evidence that therapeutic choices can have a powerful effect on whether and how gender identity does change, or gender dysphoria desists.

30. In recent years, for adolescent patients, intense involvement with online transgender communities or "friends" is the rule rather than the exception, and the MHP will also be alert to this as a potentially significant influence on the identity development of the patient.

31. The third paradigm through which gender dysphoria is alternatively conceptualized is from **a sexual minority rights perspective**. Under this paradigm, any response other than medical and societal affirmation and implementation of a patient's claim to "be" the opposite gender is a violation of the individual's civil right to self-expression. Any effort to ask "why" questions about the patient's condition, or to address underlying causes, is viewed as a violation of autonomy and civil rights. In the last few years, this paradigm has been successful in influencing public policy and the education of pediatricians, endocrinologists, and many mental health professionals. Obviously, however, this is not a medical or psychiatric perspective.

E. Four competing models of therapy

32. Because of the complexity of the human psyche and the difficulty of running controlled experiments in this area, substantial disagreements among professionals about the causes of psychological disorders, and about the appropriate therapeutic responses, are not unusual. When we add to this the very different paradigms for understanding transgender phenomena discussed above, it is not surprising that such disagreements also exist with regard to appropriate therapies for patients experiencing gender-related distress. I summarize below the leading approaches, and offer certain observations and opinions concerning them.

(1) The "watchful waiting" therapy model

33. I review below the uniform finding of follow-up studies that the large majority of children who present with gender dysphoria will desist from desiring a transgender identity by adulthood if left untreated. (See infra ¶ 60.)

34. When a pre-adolescent child presents with gender dysphoria, a "watchful waiting" approach seeks to allow for the fluid nature of gender identity in children to naturally evolve—that is, take its course from forces within and surrounding the child. Watchful waiting has two versions:

a. Treating any other psychological co-morbidities—that is, other mental illnesses as defined by DSM-5—that the child may exhibit (separation anxiety, bedwetting, attention deficit disorder, obsessive-compulsive disorder) without a focus on gender (model #1); and

b. No treatment at all for anything but a regular follow-up appointment. This might be labeled a "hands off" approach (model #2).

(2) The psychotherapy model: Alleviate distress by identifying and addressing causes (model #3)

35. One of the foundational principles of psychotherapy has long been to work with a patient to identify the causes of observed psychological distress and then to address those causes as a means of alleviating the distress. The National Institute of Mental Health has promulgated the idea that 75% of adult psychopathology has its origins in childhood experience.

36. Many experienced practitioners in the field of gender dysphoria, including myself, have believed that it makes sense to employ these long-standing tools of psychotherapy for patients suffering gender dysphoria, asking the question as to what factors in the patient's life are the determinants of the patient's repudiation of his or her natal sex. (Levine, *Ethical Concerns*, at 8.) I and others have reported success in alleviating distress in this way for at least some patients, whether or not the patient's sense of discomfort or incongruence with his or her natal sex entirely disappeared. Relieving accompanying psychological co-morbidities leaves the patient freer to consider the pros and cons of transition as he or she matures.

37. Among other things, the psychotherapist who is applying traditional methods of psychotherapy may help—for example—the male patient appreciate the wide range of masculine emotional and behavioral

patterns as he grows older. He may discuss with his patient, for example, that one does not have to become a "woman" in order to be kind, compassionate, caring, noncompetitive, and devoted to others' feelings and needs.[11] Many biologically male trans individuals, from childhood to older ages, speak of their perceptions of femaleness as enabling them to discuss their feelings openly, whereas they perceive boys and men to be constrained from emotional expression within the family and larger culture. Men, of course, can be emotionally expressive, just as they can wear pink. Converse examples can be given for girls and women. These types of ideas regularly arise during psychotherapies.

38. As I note above, many gender-nonconforming children and adolescents in recent years derive from minority and vulnerable groups who have reasons to feel isolated and have an uncomfortable sense of self. A trans identity may be a hopeful attempt to redefine the self in a manner that increases their comfort and decreases their anxiety. The clinician who uses traditional methods of psychotherapy may not focus on their gender identity, but instead work to help them to address the actual sources of their discomfort. Success in this effort may remove or reduce the desire for a redefined identity. This often involves a focus on disruptions in their attachment to parents in vulnerable children, for instance, those in the foster care system.

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[11] S. Levine (2017), *Transitioning Back to Maleness*, ARCH. OF SEXUAL BEHAVIOR at 7, DOI: 10.1007/s10508-017-1136-9) ("*Transitioning*").

39. Because "watchful waiting" can include treatment of accompanying psychological co-morbidities, and the psychotherapist who hopes to relieve gender dysphoria may focus on potentially causal sources of psychological distress rather than on the gender dysphoria itself, there is no sharp line between "watchful waiting" and the psychotherapy model in the case of prepubescent children.

40. To my knowledge, there is no evidence beyond anecdotal reports that psychotherapy can enable a return to male identification for genetically male boys, adolescents, and men, or return to female identification for genetically female girls, adolescents, and women. On the other hand, anecdotal evidence of such outcomes does exist; I and other clinicians have witnessed reinvestment in the patient's biological sex in some individual patients who are undergoing psychotherapy. The Internet contains many such reports, and I have published a paper on a patient who sought my therapeutic assistance to reclaim his male gender identity after 30 years living as a woman and is in fact living as a man today. (Levine, *Transitioning*, at 1.) I have seen children desist even before puberty in response to thoughtful parental interactions and a few meetings of the child with a therapist.

(3) The affirmation therapy model (model #4)

41. While it is widely agreed that the therapist should not directly challenge a claimed transgender identity in a child, some advocates and practitioners go much further, and promote and recommend that any expression of transgender identity should be

immediately accepted as decisive, and thoroughly affirmed by means of consistent use of clothing, toys, pronouns, etc., associated with transgender identity. As I understand it, this is asserted as a reason why male students who assert a female gender identity must be permitted to compete in girls' or women's athletic events. These advocates treat any question about the causes of the child's transgender identification as inappropriate, and assume that observed psychological co-morbidities in the children or their families are unrelated or will get better with transition, and need not be addressed by the MHP who is providing supportive guidance concerning the child's gender identity.

42. Some advocates, indeed, assert that unquestioning affirmation of any claim of transgender identity in children is essential, and that the child will otherwise face a high risk of suicide or severe psychological damage. Dr. Adkins appears to follow this line, asserting that "My clinical experience . . . has been that [patients] suffer and experience worse health outcomes" when they are not permitted to enter all spaces and participate in all activities in a manner "consistent with gender identity." (Adkins 11.) I address claims about suicide and health outcomes in Sections IV and V below.

43. Dr. Adkins asserts that fully supported social transition is the "only treatment for prepubertal children." (Adkins 7.) As my discussion above indicates, this is not correct. On the contrary, one respected academic in the field has recently written that "almost all clinics and professional associations in the world" do not use "gender affirmation" for

prepubescent children and instead "delay any transitions after the onset of puberty."[12]

44. It is notable that even the Standards of Care published by WPATH, an organization which in general leans strongly towards affirmation in the case of adults, do not specify affirmation of transgender identity as the indicated therapeutic response for young children. Instead, the WPATH Standards of Care recognize that social transition in early childhood "is a controversial issue, and divergent views are held by health professionals"; state that "[t]he current evidence base is insufficient to predict the long-term outcomes of completing a gender role transition during early childhood"; and acknowledge that "previously described relatively low persistence rates of childhood gender dysphoria" are "relevant" to the wisdom of social transition in childhood. (WPATH SOC p. 17.)

45. Dr. Adkins cites a statement published by the American Academy of Pediatrics (Rafferty 2019) as asserting that "gender transition" "is safe, effective, and medically necessary treatment for the health and wellbeing of children and adolescents suffering from gender dysphoria." (Adkins 7.) Dr. Adkins neglects to mention that a detailed and peer-reviewed review of that AAP statement by prominent researcher James Cantor concluded that "In its policy statement, AAP told neither the truth nor the whole truth, committing sins both of commission and of omission, asserting

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[12] J. Cantor (2019), *Transgender and Gender Diverse Children and Adolescents: Fact-Checking of AAP Policy*, J. OF SEX & MARITAL THERAPY at 1, DOI: 10.1080.0092623X.2019.1698481.

claims easily falsified by anyone caring to do any fact-checking at all," and described Rafferty 2019 as "a systematic exclusion and misrepresentation of entire literatures." Based on my professional expertise and my review of the literature, I agree with Dr. Cantor's evaluation of Rafferty 2019.

46. In fact, the DSM-5 added—for both children and adolescents—a requirement that a sense of incongruence between biological and felt gender must last at least six months as a precondition for a diagnosis of gender dysphoria, precisely because of the risk of "transitory" symptoms and "hasty" diagnosis that might lead to "inappropriate" treatments.[13]

47. I do not know what proportion of practitioners are using which model. However, in my opinion, in the case of young children, prompt and thorough affirmation of a transgender identity disregards the principles of child development and family dynamics and is not supported by science. Rather, the MHP must focus attention on the child's underlying internal and familial issues. Ongoing relationships between the MHP and the parents, and the MHP and the child, are vital to help the parents, child, other family members, and the MHP to understand over time the issues that need to be dealt with over time by each of them.

48. Likewise, since the child's sense of gender develops in interaction with his parents and their own

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[13] K. Zucker (2015), *The DSM-5 Diagnostic Criteria for Gender Dysphoria*, in C. Trombetta et al. (eds.), MANAGEMENT OF GENDER DYSPHORIA: A MULTIDISCIPLINARY APPROACH, DOI 10.1007/978-88-470-5696-1_4 (Springer-Verlag Italia 2015).

gender roles and relationships, the responsible MHP will almost certainly need to delve into family and marital dynamics.

F. Patients Differ Widely and Must Be Considered Individually.

49. In my opinion, it is not possible to make a single, categorical statement about the proper treatment of children or adolescents presenting with gender dysphoria or other gender-related issues. There is no single pathway of development and outcomes governing transgender identity, nor one that predominates over the large majority of cases. Instead, as individuals grow up and age, depending on their differing psychological, social, familial, and life experiences, their outcomes differ widely.

50. As to causes in children and adolescents, details about the onset of gender dysphoria may be found in an understanding of family relationship dynamics. In particular, the relationship between the parents and each of the parents and the child, and each of the siblings and the child, should be well known by the MHP. Further, a disturbingly large proportion of children and adolescents who seek professional care in connection with gender issues have a wider history of psychiatric co-morbidities. (*See supra* n. 9.) A 2017 study from the Boston Children's Hospital Gender Management Service program reported that: "Consistent with the data reported from other sites, this investigation documented that 43.3% of patients presenting for services had significant psychiatric history, with 37.1% having been prescribed psychotropic medications, 20.6% with a history of self-injurious

behavior, 9.3% with a prior psychiatric hospitalization, and 9.3% with a history of suicide attempts." (L. Edwards-Leeper, *Psychological Profile*, at 375.) It seems likely that an even higher proportion will have had prior undiagnosed psychiatric conditions.

51. In the case of adolescents, as I have noted above, there is evidence that peer social influences through "friend groups" (Littman) or through the internet can increase the incidence of gender dysphoria or claims of transgender identity, so the responsible MHP will want to probe these potential influences to better understand what is truly deeply tied to the psychology of this particular individual, and what may instead be "tried on" by the youth as part of the adolescent process of self-exploration and self-definition.

G. Understanding the WPATH and its "Standards of Care"

52. Dr. Adkins notes that she is a member of the World Professional Association for Transgender Health (WPATH), invokes Standards of Care that that organization publishes, and asserts that the WPATH Standards of Care are "widely accepted." (Adkins 3, 6.) Accordingly, I provide some context concerning that private organization and its Standards of Care.

53. I was a member of the Harry Benjamin International Gender Dysphoria Association from 1974 until 2001. From 1997 through 1998, I served as the Chairman of the eight-person International Standards of Care Committee that issued the fifth version of the Standards of Care. I resigned my

membership in 2002 due to my regretful conclusion that the organization and its recommendations had become dominated by politics and ideology, rather than by scientific process, as it was years earlier. In approximately 2007, the Henry Benjamin International Gender Dysphoria Association changed its name to the World Professional Association for Transgender Health.

54. WPATH is a voluntary membership organization. Since at least 2002, attendance at its biennial meetings has been open to trans individuals who are not licensed professionals. While this ensures taking patients' needs into consideration, it limits the ability for honest and scientific debate, and means that WPATH can no longer be considered a purely professional organization.

55. WPATH takes a decided view on issues as to which there is a wide range of opinion among professionals. WPATH explicitly views itself as not merely a scientific organization, but also as an advocacy organization. (Levine, *Reflections*, at 240.) WPATH is supportive to those who want sex reassignment surgery ("SRS"). Skepticism as to the benefits of SRS to patients, and strong alternate views, are not well tolerated in discussions within the organization or their educational outreach programs. Such views have been known to be shouted down and effectively silenced by the large numbers of nonprofessional adults who attend the organization's biennial meetings.

56. The Standards of Care ("SOC") is the product of an enormous effort to be balanced, but it is not a politically neutral document. WPATH aspires to be

both a scientific organization and an advocacy group for the transgendered. These aspirations sometimes conflict. The limitations of the Standards of Care, however, are not primarily political. They are caused by the lack of rigorous research in the field, which allows room for passionate convictions on how to care for the transgendered.

57. In recent years, WPATH has fully adopted some mix of the medical and civil rights paradigms. It has downgraded the role of counseling or psychotherapy as a requirement for these life-changing processes. WPATH no longer considers preoperative psychotherapy to be a requirement. It is important to WPATH that the person has gender dysphoria; the pathway to the development of this state is not. (Levine, *Reflections*, at 240.) The trans person is assumed to have thoughtfully considered his or her options before seeking hormones, for instance.

58. Most psychiatrists and psychologists who treat patients suffering sufficiently severe distress from gender dysphoria to seek inpatient psychiatric care are not members of WPATH. Many psychiatrists, psychologists, and pediatricians who treat some patients suffering gender dysphoria on an outpatient basis are not members of WPATH. WPATH represents a self-selected subset of the profession along with its many non-professional members; it does not capture the clinical experiences of others. WPATH claims to speak for the medical profession; however, it does not welcome skepticism and therefore, deviates from the philosophical core of medical science.

59. For example, in 2010 the WPATH Board of Directors issued a statement advocating that incongruence between sex and felt gender identity should cease to be identified in the DSM as a pathology.[14] This position was debated but not adopted by the (much larger) American Psychiatric Association, which maintained the definitions and diagnoses of gender dysphoria as a pathology in the DSM-5 manual issued in 2013.

60. In my experience most current members of WPATH have little ongoing experience with the mentally ill, and many trans care facilities are staffed by MHPs who are not deeply experienced with recognizing and treating frequently associated psychiatric co-morbidities. Because the 7th version of the WPATH SOC deleted the requirement for therapy, trans care facilities that consider these Standards sufficient are permitting patients to be counseled to transition by means of social presentation, hormones, and surgery by individuals with masters rather than medical degrees. As a result of the downgrading of the role of the psychiatric assessment of patients, new "gender affirming" clinics have arisen in many urban settings that quickly (sometimes within an hour's time) recommend transition. Concerned parents who came wanting to know what is going on in their children are overwhelmed, and feel disoriented, fearful for the health and safety of their children, and dependent on the professional. In has been nine years since the Standards of Care were last revised. Much has

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[14] WPATH *De-Psychopathologisation Statement* (May 26, 2010), available at wpath.org/policies (last accessed January 21, 2020).

changed in that interval. It is my understanding that the complex committee process that will generate an 8th version is underway.

III. GENDER IDENTITY, GENDER DYSPHORIA, AND THERAPIES FOR GENDER DYSPHORIA IN YOUNGER CHILDREN

61. A distinctive and critical characteristic of juvenile gender dysphoria is that multiple studies from separate groups and at different times have reported that in the large majority of patients, absent a substantial intervention such as social transition and/or hormone therapy, it does *not* persist through puberty. A recent article reviewed all existing follow-up studies that the author could identify of children diagnosed with gender dysphoria (11 studies), and reported that "every follow-up study of GD children, without exception, found the same thing: By puberty, the majority of GD children ceased to want to transition." (Cantor at 1.) Another author reviewed the existing studies and reported that in "prepubertal boys with gender discordance . . . the cross gender wishes usually fade over time and do not persist into adulthood, with only 2.2% to 11.9% continuing to experience gender discordance."[15] A third summarized the existing data as showing that "Symptoms of GID at prepubertal ages decrease or

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[15] S. Adelson & American Academy of Child & Adolescent Psychiatry (2012), *Practice Parameter on Gay, Lesbian, or Bisexual Sexual Orientation, Gender Nonconformity, and Gender Discordance in Children and Adolescents*, J. AM. ACAD. CHILD ADOLESCENT PSYCHIATRY 51(9) 957 at 963 ("*Practice Parameter*").

disappear in a considerable percentage of children (estimates range from 80-95%)."[16]

62. It is not yet known how to distinguish those children who will desist from that small minority whose trans identity will persist. (Levine, *Ethical Concerns*, at 9.)[17]

63. Desistance within a relatively short period may also be a common outcome for post-pubertal youths who exhibit recently described "rapid onset gender disorder." I observe an increasingly vocal online community of young women who have reclaimed a female identity after claiming a male gender identity at some point during their teen years. However, data on outcomes for this age group with and without therapeutic interventions is not yet available to my knowledge.

64. In contrast, there is now data that suggests that a therapy that encourages social transition before or during puberty—which would include participation on athletic teams designated for the opposite sex—dramatically changes outcomes. A prominent group of authors has written that "The gender identity affirmed during puberty appears to predict the gender identity that will persist into adulthood."[18] Similarly, a comparison of recent and

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[16] P. T. Cohen-Kettenis, H. A. Delemarre-van de Waal et al. (2008), *The Treatment of Adolescent Transsexuals: Changing Insights*, J. SEXUAL MEDICINE 5(8) 1892 at 1895.

[17] It is also apparent in the adolescent phenomenon of rapid onset of gender dysphoria following a gender normative childhood that childhood gender identity is not inherently stable in either direction.

[18] C. Guss et al. (2015), *Transgender and Gender Nonconforming Adolescent Care: Psychosocial and Medical*

older studies suggests that when an "affirming" methodology is used with children, a substantial proportion of children who would otherwise have desisted by adolescence—that is, achieved comfort identifying with their natal sex—instead persist in a transgender identity. (Zucker, *Myth of Persistence*, at 7.)[19]

65. Indeed, a review of multiple studies of children treated for gender dysphoria across the last three decades found that early social transition to living as the opposite sex severely reduces the likelihood that the child will revert to identifying with the child's natal sex, at least in the case of boys. That is, while, as I review above, studies conducted before the widespread use of social transition for young children reported desistance rates in the range of 80-98%, a more recent study reported that fewer than 20% of boys who engaged in a partial or complete social transition before puberty had desisted when surveyed at age 15 or older. (Zucker, *Myth of Persistence*, at 7; Steensma (2013).)[20] Some vocal

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Considerations, CURR. OPIN. PEDIATR. 26(4) 421 at 421 ("TGN Adolescent Care").

[19] One study found that social transition by the child was found to be strongly correlated with persistence for natal boys, but not for girls. (Zucker, *Myth of Persistence*, at 5 (citing T.D. Steensma, J.K. McGuire et al. (2013), *Factors Associated with Desistance & Persistence of Childhood Gender Dysphoria: A Qualitative Follow-up Study*, J. OF THE AM. ACAD. OF CHILD & ADOLESCENT PSYCHIATRY 52, 582.).)

[20] Only 2 (3.6%) of 56 of the male desisters observed by Steensma et al. had made a complete or partial transition prior to puberty, and of the twelve males who made a complete or partial transition prior to puberty, only two had desisted when surveyed at age 15 or older. Steensma (2013) at 584.

practitioners of prompt affirmation and social transition even claim that essentially *no* children who come to their clinics exhibiting gender dysphoria or cross-gender identification desist in that identification and return to a gender identity consistent with their biological sex.[21] This is a very large change as compared to the desistance rates documented apart from social transition. Some researchers who generally advocate prompt affirmation and social transition also acknowledge a causal connection between social transition and this change in outcomes.[22]

66. Accordingly, I agree with a noted researcher in the field who has written that social transition in children must be considered "a form of psychosocial treatment." (Zucker, *Debate*, at 1.)

67. Dr. Adkins speaks of the use of puberty blockers as though this major hormonal disruption of some of the most basic aspects of ordinary human development were a small thing, and entirely benign.

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[21] *See*, *e.g.*, B. Ehrensaft (2015), *Listening and Learning from Gender-Nonconforming Children*, THE PSYCHOANALYTIC STUDY OF THE CHILD 68(1) 28 at 34: "In my own clinical practice . . . of those children who are carefully assessed as transgender and who are allowed to transition to their affirmed gender, we have no documentation of a child who has 'desisted' and asked to return to his or her assigned gender."

[22] *See* Guss, *TGN Adolescent Care*, at 2. "The gender identity affirmed during puberty appears to predict the gender identity that will persist into adulthood." "Youth with persistent TNG [transgender, nonbinary, or gender-nonconforming] identity into adulthood . . . are more likely to have experienced social transition, such as using a different name . . . which is stereotypically associated with another gender at some point during childhood."

(Adkins 8.) It should be understood that puberty blockers are usually administered to early-stage adolescents as part of a path that includes social transition. I address later medical, social, and mental health risks associated with the use of puberty blockers. Here, I note that the data reviewed above strongly suggests that the administration of puberty blockers, too, must be considered to be a component of a "psychosocial treatment" with complex implications, and an experimental treatment at that.

68. So far as I am aware, no study yet reveals whether the life-course mental and physical health outcomes for this relatively new class of "persisters" are more similar to those of the general non-transgender population, or to the notably worse outcomes exhibited by the transgender population generally.

69. However, I agree with Zucker who has written, "…we cannot rule out the possibility that early successful treatment of childhood GID [Gender Identity Disorder] will diminish the role of a continuation of GID into adulthood. If so, successful treatment would also reduce the need for the long and difficult process of sex reassignment which includes hormonal and surgical procedures with substantial medical risks and complications."[23] By the same token, a therapeutic methodology for children that *increases* the likelihood that the child will continue to identify as the opposite gender into adulthood will

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[23] Zucker, *Myth of Persistence*, at 8 (citing H. Meyer-Bahlburg (2002), *Gender Identity Disorder in Young Boys: A Parent- & Peer-Based Treatment Protocol*, CLINICAL CHILD PSYCHOLOGY & PSYCHIATRY 7, 360 at 362.).

increase the need for the long and potentially problematic processes of hormonal and genital and cosmetic surgical procedures.

70. Not surprisingly, given these facts, encouraging social transition in children remains controversial. Supporters of such transition acknowledge that "Controversies among providers in the mental health and medical fields are abundant. . . . These include differing assumptions regarding . . . the age at which children . . . should be encouraged or permitted to socially transition . . . . These are complex and providers in the field continue to be at odds in their efforts to work in the best interests of the youth they serve."[24]

71. In sum, therapy for young children that encourages transition (including use of names, clothing and restrooms, and participating on athletic teams, associated with the opposite sex) cannot be considered to be neutral, but instead is an experimental procedure that has a high likelihood of changing the life path of the child, with highly unpredictable effects on mental and physical health, suicidality, and life expectancy. Claims that a civil right is at stake do not change the fact that what is proposed is a social and medical experiment. (Levine, *Reflections*, at 241.) Ethically, then, it should be undertaken only subject to standards, protocols, and reviews appropriate to such experimentation.

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[24] A. Tishelman et al. (2015), S*erving Transgender Youth: Challenges, Dilemmas and Clinical Examples*, PROF. PSYCHOL. RES. PR. at 11, DOI: 10.1037/a0037490 ("*Serving TG Youth*").

IV. THE AVAILABLE DATA DOES NOT SUPPORT THE CONTENTION THAT "AFFIRMATION" OF TRANSGENDER IDENTITY REDUCES SUICIDE OR RESULTS IN BETTER PHYSICAL OR MENTAL HEALTH OUTCOMES GENERALLY.

72. I am aware that organizations including The Academy of Pediatrics and Parents, Families and Friends of Lesbians and Gays (PFLAG) have published statements that suggest that all children who express a desire for a transgender identity should be promptly supported in that claimed identity. This position appears to rest on the belief—which is widely promulgated by certain advocacy organizations—that science has already established that prompt "affirmance" is best for all patients, including all children, who present indicia of transgender identity. As I discuss later below, this belief is scientifically incorrect, and ignores both what is known and what is unknown.

73. The knowledge-base concerning the causes and treatment of gender dysphoria has low scientific quality.

74. In evaluating claims of scientific or medical knowledge, it is important to understand that it is axiomatic in science that no knowledge is absolute, and to recognize the widely-accepted hierarchy of reliability when it comes to "knowledge" about medical or psychiatric phenomena and treatments. Unfortunately, in this field opinion is too often confused with knowledge, rather than clearly locating what exactly is scientifically known. In order of

increasing confidence, such "knowledge" may be based upon data comprising:

a. Expert opinion—it is perhaps surprising to educated laypersons that expert opinion standing alone is the lowest form of knowledge, the least likely to be proven correct in the future, and therefore does not garner as much respect from professionals as what follows;

b. A single case or series of cases (what could be called anecdotal evidence) (Levine, *Reflections*, at 239.);

c. A series of cases with a control group;

d. A cohort study;

e. A randomized double-blind clinical trial;

f. A review of multiple trials;

g. A meta-analysis of multiple trials that maximizes the number of patients treated despite their methodological differences to detect trends from larger data sets.

75. Prominent voices in the field have emphasized the severe lack of scientific knowledge in this field. The American Academy of Child and Adolescent Psychiatry has recognized that "Different clinical approaches have been advocated for childhood gender discordance. . . . There have been no randomized controlled trials of any treatment. . . . [T]he proposed benefits of treatment to eliminate gender discordance … must be carefully weighed against … possible deleterious effects." (Adelson et al., *Practice Parameter*, at 968–69.) Similarly, the American Psychological Association has stated,

"because no approach to working with [transgender and gender nonconforming] children has been adequately, empirically validated, consensus does not exist regarding best practice with pre-pubertal children."[25]

76. Critically, "there are no randomized control trials with regard to treatment of children with gender dysphoria." (Zucker, *Myth of Persistence*, at 8.) On numerous critical questions relating to cause, developmental path if untreated, and the effect of alternative treatments, the knowledge-base remains primarily at the level of the practitioner's exposure to individual cases, or multiple individual cases. As a result, claims to certainty are not justifiable. (Levine, *Reflections*, at 239.)

77. Extending beyond treatment of children, a review of 28 studies of outcomes from hormonal therapy in connection with sex reassignment reported that these studies provided only "very low quality evidence" for a variety of reasons.[26] Large gaps exist in the medical community's knowledge regarding the long-term effects of SRS and other gender identity

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[25] American Psychological Association, *Guidelines for Psychological Practice with Transgender & Gender Nonconforming People* (2015), AM. PSYCHOLOGIST 70(9) 832 at 842.

[26] H. Murad et al., *Hormonal therapy and sex reassignment: a systematic review and meta-analysis of quality of life and psychosocial outcomes*. CLINICAL ENDOCRINOLOGY 2010; 72(2): 214-231. *See also* R. D'Angelo, *Psychiatry's ethical involvement in gender-affirming care*, AUSTRALASIAN PSYCHIATRY 2018, Vol 26(5) 460-463, noting the large number of non-responders in follow-up outcome studies, and observing that "it is generally not known whether they are alive or dead," and that "it is . . . pure speculation to assume that none committed suicide."

disorder treatments in relation to their positive or negative correlation to suicidal ideation, attempts, and completion. What is known, however, is not encouraging.

78. With respect to suicide, individuals with gender dysphoria are well known to commit suicide or otherwise suffer increased mortality before and after not only social transition, but also before and after SRS. (Levine, *Reflections*, at 242.) For example, in the United States, the death rates of trans veterans are comparable to those with schizophrenia and bipolar diagnoses—20 years earlier than expected. These crude death rates include significantly elevated suicide rates. (Levine, *Ethical Concerns*, at 10.) Similarly, researchers in Sweden and Denmark have reported on almost all individuals who underwent sex-reassignment surgery over a 30-year period.[27] The Swedish follow-up study found a suicide rate in the post-SRS population 19.1 times greater than that of the controls; both studies demonstrated elevated mortality rates from medical and psychiatric conditions. (Levine, *Ethical Concerns*, at 10.)

79. Advocates of immediate and unquestioning affirmation of social transition in children who indicate a desire for a transgender identity sometimes assert that any other course will result in a high risk of suicide in the affected children and young people. Dr. Adkins asserts that "Attempted suicide rates in

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[27] C. Dhejne et al. (2011), *Long-Term Follow-Up of Transsexual Persons Undergoing Sex Reassignment Surgery: Cohort Study in Sweden*, PLOS ONE 6(2) e16885 ("*Long Term*"); R. K. Simonsen et al. (2016), *Long-Term Follow-Up of Individuals Undergoing Sex Reassignment Surgery: Psychiatric Morbidity & Mortality*, NORDIC J. OF PSYCHIATRY 70(4).

the transgender community are over 40%," and that "[t]he only treatment to avoid this serious harm is to . . . affirm gender identity." (Adkins 6.) Contrary to these assertions, no studies show that affirmation of children (or anyone else) reduces suicide, prevents suicidal ideation, or improves long-term outcomes, as compared to either a "watchful waiting" or a psychotherapeutic model of response, as I have described above.[28] In considering "suicide," mental health professionals distinguish between suicidal thoughts (ideation), suicide gestures, suicide attempts with a lethal potential, and completed suicide. Dr. Atkins may be referring to numerous studies that have found suicidal ideation to have been present at some time in life in ~40-50%. This figure is approximately twice that in gay and lesbian communities. In the heteronormative communities it is approximately 4%. Mental health professionals distinguish clearly between gestures and potentially lethal attempts, which often result in hospitalization.

80. I will also note that any discussion of suicide when considering younger children involves very long-range and very uncertain prediction. Suicide in pre-pubescent children is rare and the existing studies of gender identity issues in pre-pubescent children do not report significant incidents of suicide. The estimated suicide rate of trans adolescents is the

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[28] A recent article, J. Turban et al. (2020), *Puberty Suppression for Transgender Youth and Risk of Suicidal Ideation*, PEDIATRICS 145(2), DOI: 10.1542/peds.2019-1725, has been described in press reports as demonstrating that administration of puberty suppressing hormones to transgender adolescents reduces suicide or suicidal ideation. The paper itself does not make that claim, nor permit that conclusion.

same as teenagers who are in treatment for serious mental illness. What trans teenagers do demonstrate is more suicidal ideation and attempts (however serious) than other teenagers.[29] Their completed suicide rates are not known.

81. In sum, claims that affirmation will reduce the risk of suicide for children are not based on science. Such claims overlook the lack of even short-term supporting data as well as the lack of studies of long-term outcomes resulting from the affirmation or lack of affirmation of transgender identity in children. They also overlook the other tools that the profession does have for addressing depression and suicidal thoughts in a patient once that risk is identified. (Levine, *Reflections*, at 242.)

82. A number of data sets have also indicated significant concerns about wider indicators of physical and mental health, including ongoing functional limitations;[30] substance abuse, depression, and psychiatric hospitalizations;[31] and increased cardiovascular disease, cancer, asthma, and COPD.[32]

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[29] A. Perez-Brumer, J. K. Day et al. (2017), *Prevalence & Correlates of Suicidal Ideation Among Transgender Youth in Cal.: Findings from a Representative, Population-Based Sample of High Sch. Students*, J. AM. ACAD. CHILD ADOLESCENT PSYCHIATRY 56(9), 739 at 739.

[30] G. Zeluf, C. Dhejne et al. (2016), *Health, Disability and Quality of Life Among Trans People in Sweden—A Web-Based Survey*, BMC PUBLIC HEALTH 16(903), DOI: 10.1186/s12889-016-3560-5.

[31] C. Dhejne, R. Van Vlerken et al. (2016), *Mental Health & Gender Dysphoria: A Review of the Literature*, INT'L REV. OF PSYCHIATRY 28(1) 44.

[32] C. Dragon, P. Guerino, et al. (2017), *Transgender Medicare Beneficiaries & Chronic Conditions: Exploring Fee-for-*

Worldwide estimates of HIV infection among transgendered individuals are up to 17-fold higher than the cisgender population. (Levine, *Informed Consent*, at 6.)

83. Meanwhile, no studies show that affirmation of pre-pubescent children or adolescents leads to more positive outcomes (mental, physical, social, or romantic) by, e.g., age 25 or older than does "watchful waiting" or ordinary therapy. Because affirmation and social transition for children and adolescents, and the use of puberty blockers for transgender children, are a recent phenomenon, it could hardly be otherwise.

84. Given what is known and what is not known about the incidence and causes of suicide attempts and suicide in children and adolescents who suffer from gender dysphoria, and what is known about the incidence of suicide attempts and suicide in individuals who have transitioned to live in a transgender identity, it is in my view unethical for a mental health professional to tell a young patient, or the parents of a young patient, that social transition, puberty blockers, or use of cross-sex hormones will reduce the likelihood that the young person will commit suicide.

85. Instead, transition of any sort must be justified, if at all, as a life-enhancing measure, not a lifesaving measure. (Levine, *Reflections*, at 242.) In my opinion, this is an important fact that patients, parents, and even many MHPs fail to understand.

Service Claims Data, LGBT HEALTH 4(6) 404, DOI: 10.1089/lgbt.2016.0208.

V. KNOWN, LIKELY, OR POSSIBLE DOWNSIDE RISKS ATTENDANT ON MOVING QUICKLY TO "AFFIRM" TRANSGENDER IDENTITY IN CHILDREN.

86. As I have detailed above, enabling and affirming social transition in a prepubescent child appears to be highly likely to increase the odds that the child will in time pursue pubertal suppression and persist in a transgender identity into adulthood. This means that the MHP, patient, and in the case of minors, parents must consider long-term as well as short-term implications of life as a transgender individual when deciding whether to permit or encourage a child to socially transition.

87. Dr. Adkins asserts without citation to peer-reviewed literature that social transition and hormone therapy are "safe, effective and essential" for young people. (Adkins 6, 10.) A great deal of data point in the opposite direction. The multiple studies from different nations that have documented the increased vulnerability of the adult transgender population to substance abuse, mood and anxiety disorders, suicidal ideation, and other health problems warn us that assisting the child or adolescent down the road to becoming a transgender adult is a very serious decision, and stand as a reminder that a casual assumption that transition will improve the young person's life is not justified based on numerous scientific snapshots of cohorts of trans adults and teenagers.

88. The possibility that steps along this pathway, while lessening the pain of gender dysphoria, could lead to additional sources of crippling emotional and

psychological pain, are too often not considered by advocates of social transition and not considered at all by the trans child. (Levine, *Reflections*, at 243.)

89. I detail below several classes of predictable, likely, or possible harms to the patient associated with transitioning to live as a transgender individual.

A. Physical risks associated with transition

90. Sterilization. Dr. Adkins rightly notes that many patients who begin down the path defined by puberty blockers and social transition end up feeling the need to undergo "surgical treatment" "to alleviate gender dysphoria." (Adkins 10.) As I have noted above, there is not good scientific evidence that SRS results in better long-term mental health outcomes. What is certain, however, is that SRS that removes testes, ovaries, or the uterus is inevitably sterilizing. While by no means all transgender adults elect SRS, many patients do ultimately feel compelled to take this serious step in their effort to live fully as the opposite sex. More immediately, practitioners recognize that the administration of cross-sex hormones, which is often viewed as a less "radical" measure, and is now increasingly done to minors, creates at least a risk of irreversible sterility.[33] As a result, even when treating a child, the MHP, patient, and parents must consider loss of reproductive capacity—sterilization—to be one of the major risks of starting down the road. The risk that supporting

[33] *See* C. Guss et al., *TGN Adolescent Care* at 4 ("a side effect [of cross-sex hormones] may be infertility") and 5 ("cross-sex hormones . . . may have irreversible effects"); Tishelman et al., *Serving TG Youth* at 8 (Cross-sex hormones are "irreversible interventions" with "significant ramifications for fertility").

social transition may put the child on a pathway that leads to intentional or unintentional permanent sterilization is particularly concerning given the disproportionate representation of minority and other vulnerable groups among children reporting a transgender or gender-nonconforming identity. (*See supra* ¶ 21.)

91. Loss of sexual response. Puberty blockers prevent maturation of the sexual organs and response. Some, and perhaps many, transgender individuals who transitioned as children and thus did not go through puberty consistent with their sex face significantly diminished sexual response as they enter adulthood and are unable ever to experience orgasm. Dr. Adkins acknowledges that those "who undergo hormone treatment before the end of puberty may experience some permanent changes that a person who transitions later in life would not" (Adkins 10), and this may be one of the irreversible effects to which she refers. She may also be referring to the social, psychological, and interpersonal impact of not being in puberty for 4-5 years while one's peers are challenged by the normative processes of maturing bodies and minds. To my knowledge, data quantifying these impacts has not been published. In the case of males, the cross-sex administration of estrogen limits penile genital function. Much has been written about the negative psychological and relational consequences of anorgasmia among non-transgender individuals that is ultimately applicable to the transgendered. (Levine, *Informed Consent*, at 6.)

92. Other effects of hormone administration. While it is commonly said that the effects of puberty blockers are reversible after cessation (Dr. Adkins

describes the effect of puberty blockers as just a "pause" (Adkins 8)), in fact controlled studies have not been done of how completely this is true. A more prudent assessment is that medicine does not know what the long-term health effects on bone, brain, and other organs are of a "pause" between ages 11-16, and psychology likewise does not know the long-term effects on coping skills, interpersonal comfort, and intimate relationships of this "pause" while one's peers are undergoing their maturational gains in these vital arenas of future mental health. However, it is well known that many effects of cross-sex hormones cannot be reversed should the patient later regret his transition. After puberty, the individual who wishes to live as the opposite sex will in most cases have to take cross-sex hormones for most of life.

93. The long-term health risks of this major alteration of hormonal levels have not yet been quantified in terms of exact risk.[34] However, a recent study found greatly elevated levels of strokes and other acute cardiovascular events among male-to-female transgender individuals taking estrogen. Those authors concluded, "it is critical to keep in mind that the risk for these cardiovascular events in this population must be weighed against the benefits of hormone treatment."[35] Another group of authors similarly noted that administration of cross-sex hormones creates "an additional risk of

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[34] *See* Tishelman et al., *Serving TG Youth* at 6-7 (Long-term effect of cross-sex hormones "is an area where we currently have little research to guide us.").

[35] D. Getahun et al. (2018), *Cross-Sex Hormones and Acute Cardiovascular Events in Transgender Persons: A Cohort Study*, ANNALS OF INTERNAL MEDICINE at 8, DOI:10.7326/M17-2785.

thromboembolic events"—which is to say blood clots (Guss et al., *TGN Adolescent Care* at 5), which are associated with strokes, heart attacks, and lung and liver failure. Clinicians must distinguish the apparent short-term safety of hormones from likely or possible long-term consequences, and help the patient or parents understand these implications as well. The young patient may feel, "I don't care if I die young, just as long I get to live as a woman." The mature adult may take a different view.

94. Health risks inherent in complex surgery. Complications of surgery exist for each procedure,[36] and complications in surgery affecting the reproductive organs and urinary tract can have significant anatomical and functional complications for the patient's quality of life.

95. Disease and mortality generally. The MHP, the patient, and in the case of a child, the parent must also be aware of the wide sweep of strongly negative health outcomes among transgender individuals, as I have detailed above.

B. Social risks associated with transition

96. Family and friendship relationships. Gender transition routinely leads to isolation from at least a significant portion of one's family in adulthood. In the case of a juvenile transition, this will be less dramatic while the child is young, but commonly increases over time as siblings who marry and have children of their own do not wish the transgender individual to be in

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[36] Levine, *Informed Consent*, at 5 (citing T. van de Grift, G. Pigot et al. (2017), *A Longitudinal Study of Motivations Before & Psychosexual Outcomes After Genital Gender-Confirming Surgery in Transmen*, J. SEXUAL MEDICINE 14(12) 1621.).

contact with those children. By adulthood, the friendships of transgender individuals tend to be confined to other transgender individuals (often "virtual" friends known only online) and the generally limited set of others who are comfortable interacting with transgender individuals. (Levine, *Ethical Concerns*, at 5.)

97. Long term psychological and social impact of sterility. The life-long negative emotional impact of infertility on both men and women has been well studied. While this impact has not been studied specifically within the transgender population, the opportunity to be a parent is likely a human, emotional need, and so should be considered an important risk factor when considering gender transition for any patient. However, it is particularly difficult for parents of a young child to seriously contemplate that child's potential as a future parent and grandparent. This makes it all the more critical that the MHP spend substantial and repeated time with parents to help them see the implications of what they are considering.

98. Sexual-romantic risks associated with transition. After adolescence, transgender individuals find the pool of individuals willing to develop a romantic and intimate relationship with them to be greatly diminished. When a trans person who passes well reveals his or her natal sex, many potential cisgender mates lose interest. When a trans person does not pass well, he discovers that the pool of those interested consists largely of individuals looking for exotic sexual experiences rather than genuinely loving relationships. (Levine, *Ethical Concerns*, at 5, 13.) Nor is the problem all on the other side;

transgender individuals commonly become strongly narcissistic, unable to give the level of attention to the needs of another that is necessary to sustain a loving relationship.[37]

99. Social risks associated with delayed puberty. The social and psychological impacts of remaining puerile for, e.g., three-to- five years while one's peers are undergoing pubertal transformations, and of undergoing puberty at a substantially older age, have not been systematically studied, although clinical mental health professionals often hear of distress and social awkwardness in those who naturally have a delayed onset of puberty. In my opinion, individuals in whom puberty is delayed multiple years are likely to suffer at least subtle negative psychosocial and self-confidence effects as they stand on the sidelines while their peers are developing the social relationships (and attendant painful social learning experiences) that come with adolescence. (Levine, *Informed Consent*, at 9.)

C. Mental health costs or risks

100. One would expect the negative physical and social impacts reviewed above to adversely affect the mental health of individuals who have transitioned. In addition, adult transitioned individuals find that living as the other (or, in a manner that is consistent with the stereotypes of the other as the individual perceives them) is a continual challenge and stressor, and many find that they continue to struggle with a sense of inauthenticity in

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[37] S. Levine, *Barriers to Loving: A Clinician's Perspective*, at 40 (Routledge, New York 2013).

their transgender identity. (Levine, *Informed Consent*, at 9.)

101. In addition, individuals often pin excessive hope in transition, believing that transition will solve what are in fact ordinary social stresses associated with maturation, or mental health co-morbidities. Thus, transition can result in deflection from mastering personal challenges at the appropriate time or addressing conditions that require treatment.

102. Whatever the reason, transgender individuals including transgender youth certainly experience greatly increased rates of mental health problems. I have detailed this above with respect to adults living under a transgender identity. Indeed, Swedish researchers in a long-term study (up to 30 years since SRS, with a median time since SRS of > 10 years) concluded that individuals who have SRS should have postoperative lifelong psychiatric care. (Dhejne, *Long Term*, at 6-7.) With respect to youths a cohort study found that transgender youth had an elevated risk of depression (50.6% vs. 20.6%) and anxiety (26.7% vs. 10.0%); a higher risk of suicidal ideation (31.1% vs. 11.1%), suicide attempts (17.2% vs. 6.1%), and self-harm without lethal intent (16.7% vs. 4.4%) relative to the matched controls; and a significantly greater proportion of transgender youth accessed inpatient mental health care (22.8% vs. 11.1%) and outpatient mental health care (45.6% vs. 16.1%) services.[38]

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[38] S. Reisner et al. (2015), *Mental Health of Transgender Youth in Care at an Adolescent Urban Community Health Center: A Matched Retrospective Cohort Study*, J. OF

103. Dr. Adkins asserts that when the "transition, affirmation, and hormones" therapy that she advocates is followed, "gender dysphoria is easily managed." (Adkins 6.) I am not aware of any long-term studies that justify this assertion, and as I have explained above, the responsible MHP cannot focus narrowly on the short-term happiness of the patient, but must instead consider the happiness and health of the patient from a "life course" perspective. The many studies that I have cited here warn us that as we look ahead to the patient's life as a young adult and adult, the prognosis for the physical health, mental health, and social well-being of the child or adolescent who transitions to live in a transgender identity is not good. Gender dysphoria is not "easily managed" except when it naturally desists. A recent study in the American Journal of Psychiatry reported the high mental health utilization patterns of adults for ten years after surgery for approximately 35% of patients.[39] This is not "easy" management.

D. Regret following transition is not an infrequent phenomenon.

104. The large numbers of children and young adults who have desisted as documented in both group and case studies each represent "regret" over the initial choice in some sense.

ADOLESCENT HEALTH 56(3) at 6, DOI:10.1016/j.jadohealth. 2014.10.264; see also supra ¶ 21.

[39] Branstrom & Pachankis, (2019), *Reduction in Mental Health Treatment Utilization Among Transgender Individuals After Gender-Affirming Surgeries*, AM. J. OF PSYCHIATRY. 4:Appiajp201919010080. Doi: 10.1176/Appi.Ajp.2019.19010080.

105. The phenomenon of desistance or regret experienced *later* than adolescence or young adulthood, or among older transgender individuals, has to my knowledge not been quantified or well-studied. However, it is a real phenomenon. I myself have worked with multiple individuals who have abandoned trans female identity after living in that identity for years, and who would describe their experiences as "regret."

106. I have seen several Massachusetts inmates and trans individuals in the community abandon their [trans] female identity after several years. (Levine, *Reflections*, at 239.) In the gender clinic which I founded in 1974 and to this day, in a different location, continue to co-direct, we have seen many instances of individuals who claimed a transgender identity for a time, but ultimately changed their minds and reclaimed the gender identity congruent with their sex.

107. More dramatically, a surgical group prominently active in the SRS field has published a report on a series of seven male-to-female patients requesting surgery to transform their surgically constructed female genitalia back to their original male form.[40]

108. I noted above an increasingly visible online community of young women who have desisted after claiming a male gender identity at some point during their teen years. (*See supra* ¶ 62.) Given the rapid increase in the number of girls presenting to

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[40] Djordjevic et al. (2016), *Reversal Surgery in Regretful Male-to-Female Transsexuals After Sex Reassignment Surgery*, J. Sex Med. 13(6) 1000, DOI: 10.1016/j.jsxm.2016.02.173.

gender clinics within the last few years, the phenomena of regret and desistance by young women deserves careful attention and study by MHPs.

109. Thus, one cannot assert with any degree of certainty that once a transgendered person, always a transgendered person, whether referring to a child, adolescent, or adult, male or female.

I, Dr. Stephen B. Levine, swear that the statements in this affidavit are true and accurate to the best of my knowledge, and represent my professional opinions. Because of restrictions and health concerns relating to COVID-19, I am not readily able to subscribe this affidavit in the presence of a notary, but I am willing to do so if desired when it becomes practical to do so.

Dated: June 4, 2020.

Stephen B. Levine
Stephen B. Levine

Exhibit A to Affidavit of Dr. Stephen Levine

Stephen B. Levine, M.D. Curriculum Vita

Brief Introduction

Dr. Levine is Clinical Professor of Psychiatry at Case Western Reserve University School of Medicine. He is the solo author of four books, Sex Is Not Simple in 1989 (translated to German in 1992 and reissued in English in 1997 as Solving Common Sexual Problems); Sexual Life: A clinician's guide in 1992; Sexuality in Midlife in 1998 and Demystifying Love: Plain talk for the mental health professional in 2006; Barriers to Loving: A clinician's perspective in October 2013. He is the Senior Editor of the first (2003), second (2010) and third (2016) editions of the Handbook of Clinical Sexuality for Mental Health Professionals. Psychotherapeutic Approaches to Sexual Problems: An Essential Guide For Mental Health Professionals will be published in the fall 2019. He has been teaching, providing clinical care, and writing since 1973 and has generated original research, invited papers, commentaries, chapters, and book reviews. He has served as a journal manuscript and book prospectus reviewer for many years. He was co-director of the Center for Marital and Sexual Health/ Levine, Risen & Associates, Inc. in Beachwood, Ohio from 1992-2017. He and two colleagues received a lifetime achievement Masters and Johnson's Award from the Society for Sex Therapy and Research in March 2005.

Personal Information

Date of birth 1/14/42

Medical license no. Ohio 35-03-0234-L

Board Certification 6/76 American Board of Neurology and Psychiatry

Education

1963 BA Washington and Jefferson College

1967 MD Case Western Reserve University School of Medicine

1967-68 internship in Internal Medicine University Hospitals of Cleveland

1968-70 Research associate, National Institute of Arthritis and Metabolic Diseases, Epidemiology Field Studies Unit, Phoenix, Arizona, United States Public Health Service

1970-73 Psychiatric Residency, University Hospitals of Cleveland

1974-77 Robert Wood Johnson Foundation Clinical Scholar

Appointments at Case Western Reserve University School of Medicine

1973 - Assistant Professor of Psychiatry

1979 - Associate Professor

1982 - Tenure

1985 - Full Professor

1993 - Clinical Professor

Honors

Summa Cum Laude, Washington & Jefferson

Teaching Excellence Award - 1990 and 2010 (residency program)

Visiting Professorships:

- Stanford University-Pfizer Professorship program (3 days) - 1995
- St. Elizabeth's Hospital, Washington, DC - 1998
- St. Elizabeth's Hospital, Washington, DC - 2002

Named to America's Top Doctors consecutively since 2001

Invitations to present various Grand Rounds at Departments of Psychiatry and Continuing Education Lectures and Workshops

Masters and Johnson Lifetime Achievement Award from the Society of Sex Therapy and Research, April 2005 along with Candace Risen and Stanley Althof

2006 SSTAR Book Award for The Handbook of Clinical Sexuality for Mental Health Professionals: Exceptional Merit

2018 - Albert Marquis Lifetime Achievement Award from Marquis Who's Who. (exceling in one's field for at least twenty years)

Professional Societies

1971 - American Psychiatric Association; fellow

2005 - American Psychiatric Association - **Distinguished Life Fellow**

1973 - Cleveland Psychiatric Society

1973 - Cleveland Medical Library Association

- 1985 - Life Fellow
- 2003 - Distinguished Life Fellow

1974 - Society for Sex Therapy and Research

- 1987-89 - President

1983 - International Academy of Sex Research

1983 - Harry Benjamin International Gender Dysphoria Association

- 1997-98 - Chairman, Standards of Care Committee

1994-99 - Society for Scientific Study of Sex

Community Boards

1999-2002 - Case Western Reserve University Medical Alumni Association

1996-2001 - Bellefaire Jewish Children's Bureau

1999-2001 - Physicians' Advisory Committee, The Gathering Place (cancer rehabilitation)

Editorial Boards

1978-80 Book Review Editor Journal Sex and Marital Therapy

Manuscript Reviewer for:

- Archives of Sexual Behavior
- Annals of Internal Medicine
- British Journal of Obstetrics and Gynecology
- JAMA
- Diabetes Care
- American Journal of Psychiatry
- Maturitas

- Psychosomatic Medicine
- Sexuality and Disability
- Journal of Nervous and Mental Diseases
- Journal of Neuropsychiatry and Clinical Neurosciences
- Neurology
- Journal Sex and Marital Therapy
- Journal Sex Education and Therapy
- Social Behavior and Personality: an international journal (New Zealand)
- International Journal of Psychoanalysis
- International Journal of Transgenderism
- Journal of Urology
- Journal of Sexual Medicine
- Current Psychiatry
- International Journal of Impotence Research
- Postgraduate medical journal
- Academic Psychiatry

Prospectus Reviewer for:

- Guilford
- Oxford University Press
- Brunner/Routledge
- Routledge

Administrative Responsibilities

Co-director, Center for Marital and Sexual Health/ Levine, Risen & Associates, Inc. until June 30, 2017

Principal Investigator of approximately 70 separate studies involving pharmacological interventions for sexual dysfunction since 1989.

Co-leader of case conferences at DELRLLC.com

Recent Expert Witness Appearances

US District Court, Judge Mark L.Wolf's witness in Michelle Kosilek vs. Massachusetts Dept of Corrections et al. case (transsexual issue) in Boston 2007

Deposition in the Battista vs. Massachusetts Dept of Corrections case (transsexual issue) in Cleveland October 2009

Witness for Massachusetts Dept. of Corrections in their defense of a lawsuit brought by prisoner Katheena Soneeya. March 22, 2011 Deposition in Boston and October 2018 in Cleveland

Witness for State of Florida vs. Reyne Keohane July 2017

Expert testimony by deposition and at trial in *In the Interests of the Younger Children*, Dallas, TX, 2019.

Consultancy

Massachusetts Department of Corrections - evaluation of 12 transsexual prisoners and the development of a Gender Identity Disorders Program for the state prison system. Monthly

consultation with the GID treatment team since February 2009 and the GID policy committee since February 2010

California Department of Corrections and Rehabilitation; 2012-2015; education, inmate evaluation, commentary on inmate circumstances, suggestions on future policies

Virginia Department of Corrections - evaluation of an inmate

New Jersey Department of Corrections - evaluation of an inmate

Idaho Department of Corrections - workshop 2016

Grant Support/Research Studies

TAP - studies of Apomorphine sublingual in treatment of erectile dysfunction

Pfizer - Sertraline for premature ejaculation

Pfizer - Viagra and depression; Viagra and female sexual dysfunction; Viagra as a treatment for SSRI-induced erectile dysfunction

NIH - Systemic lupus erythematosis and sexuality in women

Sihler Mental Health Foundation

- Program for Professionals
- Setting up of Center for Marital and Sexual Health
- Clomipramine and Premature ejaculation
- Follow-up study of clergy accused of sexual impropriety

- Establishment of services for women with breast cancer

Alza - controlled study of a novel SSRI for rapid ejaculation

Pfizer - Viagra and self-esteem

Pfizer - double-blind placebo control studies of a compound for premature ejaculation

Johnson & Johnson - controlled studies of Dapoxetine for rapid ejaculation

Proctor and Gamble - multiple studies to test testosterone patch for post menopausal sexual dysfunction for women on and off estrogen replacement

Lilly-Icos - study of Cialis for erectile dysfunction

VIVUS - study for premenopausal women with FSAD

Palatin Technologies - studies of bremelanotide in female sexual dysfunction—first intranasal then subcutaneous administration

Medtap - interview validation questionnaire studies

HRA - quantitative debriefing study for Female partners of men with premature ejaculation, Validation of a New Distress Measure for FSD,

Boehringer-Ingelheim - double blind and open label studies of a prosexual agent for hypoactive female sexual desire disorder

Biosante - studies of testosterone gel administration for post menopausal women with HSDD

J&J - a single-blind, multi-center, in home use study to evaluate sexual enhancement effects of a product in females.

UBC - Content validity study of an electronic FSEP-R and FSDS-DAO and usability of study PRO measures in premenopausal women with FSAD, HSDD or Mixed FSAD/HSDD

National registry trial for women with HSDD

Endoceutics - two studies of DHEA for vaginal atrophy and dryness in post menopausal women

Palatin - study of SQ Bremelanotide for HSDD and FSAD

Trimel - a double-blind, placebo controlled study for women with acquired female orgasmic disorder.

S1 Biopharma - a phase 1-B non-blinded study of safety, tolerability and efficacy of Lorexys in premenopausal women with HSDD

HRA - qualitative and cognitive interview study for men experiencing PE

Publications

A) Books

1) Pariser SR, Levine SB, McDowell M (eds.), *Clinical Sexuality*, Marcel Dekker, New York, 1985

2) Sex Is Not Simple, Ohio Psychological Publishing Company, 1988; Reissued in paperback as: Solving Common Sexual Problems: Toward a Problem Free Sexual Life, Jason Aronson, Livingston, NJ. 1997

3) Sexual Life: A Clinician's Guide. Plenum Publishing Corporation. New York, 1992

4) Sexuality in Midlife. Plenum Publishing Corporation. New York, 1998

5) Editor. Clinical Sexuality. Psychiatric Clinics of North America, March, 1995.

6) Editor, (Candace Risen and Stanley Althof, associate editors) Handbook of Clinical Sexuality for Mental Health Professionals. Routledge, New York, 2003

   (a) 2006 SSTAR Book Award: Exceptional Merit

7) Demystifying Love: Plain Talk For The Mental Health Professional. Routledge, New York, 2006

8) Senior editor, (Candace B. Risen and Stanley E. Althof, Associate editors), Handbook of Clinical Sexuality for Mental Health Professionals. 2nd edition Routledge, New York, 2010. See review by Pega Ren, JSex&Marital Therapy

9) Barriers to Loving: A Clinician's Perspective. Routledge, New York, 2014.

10) Senior editor Candace B. Risen and Stanley E. Althof, Associate editors), Handbook of Clinical Sexuality for Mental Health Professionals. 3rd edition Routledge, New York, 2016

B) Research and Invited Papers

(When his name is not listed in a citation, Dr. Levine is either the solo or the senior author)

1) Sampliner R. Parotid enlargement in Pima Indians. Annals of Internal Medicine 1970; 73:571-73 2) Confrontation and residency activism: A technique for assisting residency change: World Journal of Psychosynthesis 1974; 6: 23-26

3) Activism and confrontation: A technique to spur reform. Resident and Intern Consultant 173; 2

4) Medicine and Sexuality. Case Western Reserve Medical Alumni Bulletin 1974:37:9-11.

5) Some thoughts on the pathogenesis of premature ejaculation. J. Sex & Marital Therapy 1975; 1:326-334

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF IDAHO

LINDSAY HECOX, et al., *Plaintiffs*, v. BRADLEY LITTLE, et al., *Defendants*.	No. 1:20-cv-184-CWD **SUPPLEMENTAL DECLARATION OF DEANNA ADKINS, MD, IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION**

I, Deanna Adkins, MD, declare as follows:

1. I have personal knowledge of the matters stated in this declaration.

2. As set forth in greater detail in my previously submitted declaration dated April 24, 2020, my background and credentials include the following: I served as the Fellowship Program Director of Pediatric Endocrinology at Duke University School of Medicine for fourteen years and am currently the Director of the Duke Center for Child and Adolescent Gender Care; I have treated approximately 500 transgender and intersex young people in my career. My CV is attached to my previously submitted declaration.

3. I reviewed the declaration of Stephen Levine, MD, dated June 4, 2020. Here, I respond to the central points raised in Dr. Levine's declaration. I do not specifically address each study or article cited by Dr. Levine, but instead explain the overall problems with

some of the conclusions that he draws and provide data showing why such conclusions are in error. I reserve the right to supplement my opinions concerning Dr. Levine's opinions if necessary as the case proceeds.

"BIOLOGICAL SEX"

4. In his discussion of "the biological baseline of sex," Dr. Levine provides no citations—with the exception of one citation to his own work—and oversimplifies the biological components of sex.

5. As I explained in paragraphs 42 through 44 of my previous declaration, sex-related characteristics include external genitalia, internal reproductive organs, gender identity, chromosomes, and secondary sex characteristics. All of these characteristics have biological bases.

6. Dr. Levine claims that "The sex of a human individual at its core structures the individual's biological reproductive capabilities—to produce ova and bear children as a mother, or to produce semen and beget children as a father." (Levine Decl. ¶ 12.) But this is not how we define or think about sex as a matter of science of medicine. For example, many individuals are unable to produce ova or semen, but have other sex characteristics. I have been involved in designating sex for over one hundred infants and the medical standards look at multiple factors, among which reproductive capacity is just one, to determine sex assignments at birth.[1] If we designate sex

[1] Cools, M., Nordenström, A., Robeva, R. et al., Caring for individuals with a difference of sex development (DSD): a Consensus Statement. *Nat Rev Endocrinol* 14, 415–429 (2018).

incorrectly at birth, protocol is to update it once the person is old enough to articulate their gender identity and re-assign consistent with gender identity.

7. It also is not correct that in medicine we only look at whether an individual has 46-XX or 46-XY chromosomes to understand the biological components of sex. (Levine Decl. ¶12.) As the Endocrine Society guidelines explain, the terms "[b]iological sex, biological male or female . . . are imprecise and should be avoided."[2] Generally speaking, "[t]hese terms refer to physical aspects of maleness and femaleness [but] these may not be in line with each other (e.g., a person with XY chromosomes may have female-appearing genitalia)."[3]

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[2] Hembree, Wiley C., et al., Endocrine Treatment of Gender-Dysphoric/Gender-Incongruent Persons: An Endocrine Society Clinical Practice Guideline, *J Clin Endocrinol Metab*, Vol. 102, Issue 11, 1 November 2017, 3869–3903.; Berenbaum S., et al., Effects on gender identity of prenatal androgens and genital appearance: Evidence from girls with congenital adrenal hyperplasia. *J Clin Endocrinol Metab* 2003;88(3):1102-6; Dittmann R, et al., Congenital adrenal hyperplasia. I: Gender-related behavior and attitudes in female patients and sisters. *Psychoneuroendocrinology* 1990;15(5-6):401-20; Cohen-Kettenis P. Gender change in 46,XY persons with 5alpha-reductase-2 deficiency and 17beta-hydroxysteroid dehydrogenase-3 deficiency. *Arch Sex Behav* 2005;34(4):399-410; Reiner W, Gearhart J. Discordant sexual identity in some genetic males with cloacal exstrophy assigned to female sex at birth. *N Engl J Med* 2004;350(4):333-41.

[3] Wylie et al. (2017); Meyer-Bahlburg H. Gender identity outcome in female-raised 46,XY persons with penile agenesis, cloacal exstrophy of the bladder, or penile ablation. *Arch Sex Behav* 2005;34(4):423-38; Reiner W. Assignment of sex in

TREATMENT PROTOCOLS FOR TRANSGENDER YOUTH

8. I am currently a provider to approximately 350 transgender youth. Each patient is treated individually by a multi-disciplinary team.

9. Though Dr. Levine claims that the treatment protocols for transgender youth and adolescents recommended by the World Professional Association for Transgender Health ("WPATH"), the Endocrine Society, and the American Academy of Pediatrics ("AAP") are not in the best interests of such patients, that is contrary to an overwhelming body of contemporary research that says the opposite as well as to the teachings of clinical practice, including mine.

10. WPATH is the leading association of medical and mental health professionals in the treatment of transgender individuals. The AAP is an association representing more than 67,000 pediatricians. The Endocrine Society is an organization representing more than 18,000 endocrinologists. WPATH and the Endocrine Society have published widely accepted standards of care for treating gender dysphoria, which are based on considerable scientific and

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neonates with ambiguous genitalia. *Curr Opin Pediatri* 1999;11(4):363-5; Byne W, Sekaer C. *The question of psychosexual neutrality at birth*. In Legato M, ed. Principles of Gender Specific Medicine. San Diego: Academic Press, 2004:155-66. Coates S, Wolfe S. Assessment of gender and sex in children in Noshpitz J, ed. Handbook of Child and Adolescent Psychiatry: Clinical Assessment/Intervention. New York: John Wiley and Sons; 2004:242-52; Cohen-Bendahan C, van de Beek C, Berenbaum S. Prenatal sex hormone effects on child and adult sex-typed behavior: methods and findings. *Neurosci Biobehav Rev* 2005;29(2):353-84.

medical research, and which have been endorsed by the AAP.

11. Dr. Levine critiques WPATH because it is "a voluntary membership organization" and "attendance at its biennial meetings has been open to trans individuals who are not licensed professionals." (Levine ¶ 54.) This critique is misplaced, as an organization can be both an advocacy and a scientific organization, as is WPATH. This is not a new phenomenon in medicine. The American Diabetes Association, for example, is a professional association that both advocates for patients with diabetes and is a scientific organization. Rigorous papers are presented at the WPATH meetings and well-funded scientific research is reported on.

12. Dr. Levine's critique also ignores the November 2017 Endocrine Society Guidelines on the treatment of gender-incongruent persons. This more recent treatment protocol mirrors the WPATH Standards of Care and recommends pubertal suppression and gender-affirming hormone therapy for adolescents and young adults who meet the clinical standards.[4] The guidelines were developed through rigorous scientific processes in which "followed the approach recommended by the Grading of Recommendations, Assessment, Development, and Evaluation group, an international group with expertise in the development and implementation of evidence-based guidelines."[5] The guidelines affirm that patients with gender dysphoria often must be treated with "a safe and effective hormone regimen

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[4] Wylie et al. (2017).
[5] *Id.*

that will (1) suppress endogenous sex hormone secretion determined by the person's genetic/gonadal sex and (2) maintain sex hormone levels within the normal range for the person's affirmed gender."[6]

13. Dr. Levine critiques WPATH and its members claiming, "most current members of WPATH have little ongoing experience with the mentally ill." (Levine Decl. ¶ 60.) In my clinic, as is recommended by the Endocrine Guidelines, every patient is treated by a multi-disciplinary team that includes a social worker, psychological, psychiatrist, and an endocrinologist. The providers are all well-trained faculty and clinicians at Duke with years of experience diagnosing and treating mental health conditions.

14. Dr. Levine's only support for his critique of the AAP's position on affirming gender identity in youth is an article by James Cantor in the Journal of Sex & Marital Therapy. Cantor's article is his opinion and critique but relies on outdated evidence and misinformation about the benefits of gender affirming treatment for children and adolescents.[7] In any event, a lone critique of the medical standards that govern the profession is not a legitimate basis to attack well-researched, widely accepted medical protocols. By contrast, these protocols are being followed by

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[6] *Id.*

[7] Olson, K. R., Durwood, L., DeMeules, M., & McLaughlin, K. A. (2016). Mental health of transgender children who are supported in their identities. Pediatrics, 137(3). Durwood, L., McLaughlin, K. A., & Olson, K. R. (2017). Mental health and self-worth in socially transitioned transgender youth. Journal of the American Academy of Child & Adolescent Psychiatry, 56(2), 116-123.

thousands of medical providers to achieve life-saving ends for our patients.

15. Dr. Levine claims that "the use of puberty blockers for transgender children, [is] a recent phenomenon." (Levine Decl. ¶ 83.) However, puberty blockers began to be used in transgender patients in 2004, which is not considered recent in medicine. We also have over thirty years of data on the impact of puberty blockers on children who undergo precocious puberty[8] that we can apply to the transgender population. There is no evidence of short or long-term negative effects on patients who receive puberty blockers from the more than thirty years of data that we have. And for transgender youth (as compared to those treated for precocious puberty), the treatment is used for a much shorter period of time, in order to pause puberty before either initiating puberty with cross-sex hormones or resuming endogenous puberty. This medication is also used in adolescents and adults undergoing chemotherapy to preserve fertility and in patients with hormone sensitive cancers, like breast and prostate cancer.

16. Though Dr. Levine warns about delaying puberty, pubertal suppression in transgender youth does not delay puberty beyond the typical range. (Levine Decl. ¶ 92.) Pubertal development has a very wide variation among individuals. Puberty in individuals assigned male at birth typically begins anywhere from age nine to age fourteen, and

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[8] Children with precocious puberty develop signs of puberty before the typically expected time. In some this can happen as early as 12 months of age and puberty blockers are used to pause puberty until the appropriate time.

sometimes does not complete until a person's early twenties. For those individuals assigned female at birth, puberty typically ranges from age eight to age seventeen.[9] Protocols used for transgender youth would tend to put them in the latter third of typical puberty but nothing outside of the typical range.[10] As such there is no reason to assume, and no data to support, Dr. Levine's assumption that slightly delaying puberty will have negative short- or long-term consequences. This is particularly true given the life-saving results early treatment has for transgender youth.[11]

17. Dr. Levine incorrectly suggests that lifelong hormone treatment is, as a blanket matter, bad for one's health. (Levine Decl. ¶¶ 92–93.) There is nothing inherently harmful about undergoing hormone treatment to sustain one's health. Many transgender people have been on hormone therapy for decades, and we are not seeing proof of negative health outcomes as a result. Likewise, many non-transgender individuals must undergo hormone treatment for the majority of their lives, and it is well-managed. This includes patients with Turner syndrome, Klinefelter syndrome, premature ovarian failure, and cancer. Moreover, not all individuals who

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[9] Wyshak, Grace, PhD and Frisch, Rose E., Evidence for a Secular Trend in Age of Menarche, April 29, 1982, N Engl J Med 1982; 306:1033-1035.

[10] Wylie et al. (2017); Euling SY, Herman-Giddens ME, Lee PA, et al. Examination of U.S. puberty-timing data from 1940 to 1994 for secular trends: panel Findings. *Pediatrics*. 2008;1221: S172–S191.

[11] Turban JL, King D, Carswell JM, et al. Pubertal Suppression for Transgender Youth and Risk of Suicidal Ideation. *Pediatrics*. 2020;145(2):e20191725.

initiate gender-affirming hormone therapy continue such therapy for the entirety of their lives. Transgender women who have testicles surgically removed, for example, no longer take testosterone suppressors after the procedure. Some transgender individuals also may limit or change the dose of hormone therapy that is needed at different stages of life, not unlike cisgender women undergoing menopause and experiencing changing hormones.

18. It also is not true, as Dr. Levine suggests, that gender-affirming surgical treatment that involves the removal of internal reproductive organs is "inevitably sterilizing." (Levine ¶ 90.) Many people undergo fertility preservation before any treatment that would compromise fertility. Many more transgender people may be treated with gender affirming surgery that has no impact on fertility such as chest reconstruction, breast augmentation, and facial feminization, which are among the more common surgical treatments for transgender patients. Though Dr. Levine warns of risks of infertility related to gender-affirming hormone therapy, this too is speculative and not borne out by data. Many transgender individuals conceive children after undergoing hormone therapy.[12] More generally, many medical interventions that are necessary to preserve

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[12] Light AD, Obedin-Maliver J, Sevelius JM, Kerns JL. Transgender men who experienced pregnancy after female-to-male gender transitioning. *Obstet Gynecol.* 2014;124(6):1120-1127; Maxwell S, Noyes N, Keefe D, Berkeley AS, Goldman KN. Pregnancy Outcomes After Fertility Preservation in Transgender Men. *Obstet Gynecol.* 2017;129(6):1031-1034; Neblett MF 2nd, Hipp HS. Fertility Considerations in Transgender Persons. *Endocrinol Metab Clin North Am.* 2019;48(2):391-402.

a person's health and well-being can impact an individual's fertility, but we proceed with the treatment after informed consent.

19. Given the extreme dysphoria that many transgender individuals experience with respect to their genitals, it is not true, as Dr. Levine suggests, that data concerning loss of genital sensation and orgasm in non-transgender individuals can be applied to transgender individuals. (Levine Decl. ¶ 91.) Distress of genital change and sensation loss for someone who has a positive association with their genital characteristics does not translate to the experience of someone who might experience disgust and extreme distress at the sight of their genitals. It is simply not reasonable to compare cisgender experiences to transgender experience in the context of genital sensation.

20. Though Dr. Levine attacks the widely accepted treatment protocols for transgender patients, recent studies affirm just how critical such treatment is for the long-term health of pediatric patients with gender dysphoria. In a 2020 study published in *Pediatrics*, the official journal of the American Academy of Pediatrics, researchers concluded that "Treatment with pubertal suppression among those who wanted it was associated with lower odds of lifetime suicidal ideation when compared with those who wanted pubertal suppression but did not receive it. Suicidality is of particular concern for this population because the estimated lifetime prevalence of suicide attempts among transgender people is as

high as 40%."[13] More recent studies than those cited by Dr. Levine also show significantly improved outcomes for patients who undergo gender-affirming surgery when such surgery is medically indicated.[14]

21. Ultimately, it appears from Dr. Levine's declaration that his central point is that it is not healthy to be transgender and that government policies and medical practice should consider efforts to make people not transgender (i.e., encourage people to live in accordance with their assigned sex at birth rather than their gender identity). This approach to treating transgender people is known to be extremely harmful and is considered unethical by every major medical association.[15]

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[13] Turban JL, King D, Carswell JM, et al. Pubertal Suppression for Transgender Youth and Risk of Suicidal Ideation. *Pediatrics*. 2020;145(2):e20191725.

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I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on: 6/28/2020 *Deanna Adkins, MD*
Deanna Adkins, MD

EXHIBIT C

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF IDAHO

LINDSAY HECOX, et al., *Plaintiffs*, v. BRADLEY LITTLE, et al., *Defendants*.	No. 1:20-cv-184-CWD **SUPPLEMENTAL DECLARATION OF JOSHUA D. SAFER, MD, FACP, FACE, IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION**

I, Joshua D. Safer, MD, FACP, FACE, declare as follows:

1. I have personal knowledge of the matters stated in this declaration.

2. As set forth in greater detail in my previously submitted declaration dated April 24, 2020, my background and credentials include the following: I am a Staff Physician in the Endocrinology Division of the Department of Medicine at the Mount Sinai Hospital and Mount Sinai Beth Israel Medical Center in New York, NY. I serve as Executive Director of the Center for Transgender Medicine and Surgery at Mount Sinai. I have served as a Transgender Medicine Guidelines Drafting Group Member for the International Olympic Committee ("IOC") since 2017. I have also served since 2019 as a drafting group member of the transgender medical guidelines of World Athletics, formerly known as the International

Amateur Athletic Federation ("IAAF"). My CV is attached to my previously submitted declaration.

3. I reviewed the declaration of Gregory A. Brown, Ph.D. ("Brown Decl.") dated June 3, 2020, and am responding to certain statements therein. Here, I respond to the central points raised in Dr. Brown's declaration. I do not specifically address each study or article cited by Dr. Brown,but instead explain the overall problems with the conclusions that he draws and provide data showing why such conclusions are in error. I reserve the right to supplement my opinions concerning Dr. Brown's opinions if necessary as the case proceeds.

4. In his declaration, Dr. Brown makes three general arguments: "a. At the level of elite, college, high school, and recreational competition, men or boys have an advantage over comparably aged women or girls, in almost all athletic contests; b. Biological male physiology and anatomy is the basis for the performance advantage that men or boys have over women or girls, in almost all athletic contests; and c. Administration of androgen inhibitors and cross-sex hormones to men, or adolescent boys, after male puberty, and administration of testosterone to women or adolescent girls, after female puberty, does not eliminate the performance advantage of men or adolescent boys over women or adolescent girls in almost all athletic contests." (Brown Decl. ¶ 11.)

5. With respect to point (a), it is my opinion that on average, beginning during puberty, cisgender men and boys have better performance outcomes in most athletic competition as compared to cisgender women and girls. However, this is not a controversial

statement and is beside the point here, as it does not concern the alleged performance advantages of transgender athletes (as opposed to men versus women generally).

6. As to Dr. Brown's point (b), he states that "[b]iological male physiology and anatomy is the basis for the performance advantage." (Brown Decl. ¶ 11.)

7. This point is not supported by the studies that Dr. Brown cites. Rather, these studies explain that the advantage observed among cisgender boys and men is due to circulating testosterone levels that typically diverge significantly between cisgender males and females at puberty. Dr. Brown only speculates that any advantage is not due to testosterone alone but other physiological factors that he describes as "male physiology and anatomy." This claim is not supported by the studies that exist and that we both cite. For example, Dr. Brown cites Handelsman et al, which states that ". . . evidence makes it highly likely that the sex difference ***in circulating testosterone*** of adults explains most, if not all, of the sex differences in sporting performance." (Brown Decl. ¶ 81 (emphasis added).)

8. In paragraphs 63 and 64, Dr. Brown cites to additional studies that look at differences between adult cisgender men and adult cisgender women. These studies make no claims about inherent differences in athleticism that are independent of levels of circulating testosterone. (Brown Decl. ¶¶ 63–64.) The Gershoni et al. study compares genes from adult cisgender men and adult cisgender women. (Brown Decl. ¶ 63.) However, hormone levels might explain the differences observed. Notably, the largest

number of genes observed to be different are related to breast tissue, which is a type of tissue that can be changed with hormone therapy. The Haizlip et al. study (Brown Decl. ¶ 64) reviews 56 articles relating to sex-based differences in skeletal muscle. This study draws no conclusions about the impact of hormone suppression or circulating testosterone on the differences the authors observe, underscored by the authors' concluding observations that future "studies should be aimed at determining the role of hormonal interventions in males and females given their clinical relevance" and that "[t]his review summarizes key findings in skeletal muscle physiology in the hopes of bringing to the forefront areas of future research . . . ."[1]

9. In addition, none of the studies cited by Dr. Brown about comparative foot and toe size of cisgender men and cisgender women look at the impact of circulating testosterone on those differences. In fact, several of the articles (cited in Brown ¶ 72) simply look at intra-sex differences among male athletes with no data about any differences between cisgender men and cisgender women.

10. The proven impact of circulating testosterone on the body is the reason why the Olympics, World Athletics, and the National Collegiate Athletic Association ("NCAA") focus on testosterone suppression for transgender and intersex inclusion in women's sports. Though Dr. Brown calls these

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[1] K. M. Haizlip, et al., Sex-based differences in skeletal muscle kinetics and fiber-type composition, 30 *PHYSIOLOGY* (*BETHESDA*), 39 (2015).

standards into question, claiming that they still allow for levels of circulating testosterone above what is typical for cisgender women, he fails to note that (a) some cisgender women have testosterone levels of up to approximately 5 nmol/L;[2] and (b) these are the best practices that have been in place for years with absolutely no evidence of any dominance among transgender women at the elite level—in fact no trans woman has ever even qualified for the Olympics.

11. The majority of the studies that Dr. Brown cites and almost the entirety of his declaration have nothing to do with transgender women who have suppressed testosterone. For example, the data about the general differences between male and female athletes cited in paragraphs 12-112 and 114-125 includes no reference to or information about transgender athletes. That is also true of the first ***fourteen*** studies (those identified from letters (a) through (l) in paragraph 20) that Dr. Brown references. These studies have no bearing on transgender athletes who have suppressed testosterone—i.e., the impact of hormone therapy on physiological characteristics relative to undergoing endogenous puberty.

12. Though Dr. Brown states that "a number of studies indicate that males' athletic advantages over females begin before puberty, and may be apparent as early as six years of age," the cited studies are

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[2] Approximately 6% to 10% of women have a condition called polycystic ovary syndrome (PCOS), which can raise women's testosterone levels up to 4.8 nmol/L. *See* Handelsman DJ, et al. Circulating testosterone as the hormonal basis of sex differences in athletic performance. Endocrine Reviews 2018; 39:803-29 (pp. 806-807).

epidemiological studies from which cause cannot be assessed. (Brown Decl. 23.) The studies merely observe phenomena across a population sample but do not determine the cause for whatever is observed. Here, for example, the role played by cultural factors is not addressed in these studies. Thus, differences could be explained by, among other things, greater encouragement of athleticism in boys and greater opportunities to play sports. (Brown Decl. ¶ 23.)

13. Moreover, the more detailed studies that Dr. Brown cites state that before puberty there are not noticeable performance difference between boys and girls. For example, Dr. Brown cites Louis J. G. Gooren & Mathijs C. M. Bunck, Transsexuals & Competitive Sports, 151 European J. of Endocrinology 425 (2004) in paragraph 114 of his declaration stating: "[b]efore puberty, boys and girls do not differ in height, muscle and bone mass. Recent information shows convincingly that actual levels of circulating testosterone determine largely muscle mass and strength." (Brown Decl. ¶ 114.) Likewise, Dr. Brown references Tonnessen et al., which states that "[m]ale and female athletes perform almost equally in running and jumping events up to the age of 12." (Brown Decl. ¶ 49.) Similar conclusions can be found in almost every study he cites. There is simply no basis for the assertion that pre-pubertal children have physical sex-based performance differences.

14. With respect to point (c), Dr. Brown and I both agree that levels of circulating testosterone are the definitive factor impacting sex-based performance differences between cisgender males and females beginning in puberty.

15. I disagree with and the science does not support Dr. Brown's assertion that "[a]dministration of androgen inhibitors and cross-sex hormones to men, or adolescent boys, after male puberty . . . does not eliminate the performance advantage of men or adolescent boys over women or adolescent girls in almost all athletic contests." (Brown Decl. ¶ 11.)

16. Though Dr. Brown argues that testosterone suppression is not sufficient to reduce any performance disparities between transgender women and girls and cisgender women and girls, his assumptions are not borne out by data.

17. Dr. Brown states that "[i]t is obvious that some effects of male puberty that confer advantages for athletic performance—in particular bone size and configuration—cannot be reversed once they have occurred." (Brown Decl. ¶ 128.) This is misleading. First, decreased muscle will have some impact on corresponding bone. That means that bone grows when corresponding muscle grows and bone shrinks when corresponding muscle shrinks (Hart NH et al. J Musculoskelet Neuronal Interact 2017; 17:114-139.) Second, carrying larger bones without typical male range levels of circulating testosterone does not necessarily confer an athletic advantage. As I explained in my previous declaration, it could potentially slow a runner down or change an athlete's weight class.

18. The Knox study that Dr. Brown discusses in paragraphs 138 through 144 does not accurately assess the impact of sustained hormone therapy on transgender women. The study documented the effects of administering hormone therapy to cisgender

males for a period of 20 weeks. By contrast, transgender women who are on consistent treatment and eligible to participate on women's teams under prevailing NCAA or Olympic inclusion policies would be suppressing their levels for at least one full year.

19. The Wiik study that Dr. Brown cites does not study athletes at all. As the authors report, because the subjects were not athletes, findings might be attributable in part to the subjects improving over time as they got better at the items tested. For example, for knee flexion, the authors state " . . . measurements in the TW [transgender women] most likely arose from the learning effects from repeating the test . . ." All the Wiik study shows is that testosterone makes a difference with regard to muscle. More testosterone is associated with more strength and more muscle mass. Also, the Wiik study is only "provocative," meaning the findings are not conclusive but should be studied in the future. The authors themselves state, "[i]t is also important to recognize that we only assessed proxies for athletic performance, such as muscle mass and strength. Future studies are needed to examine a more comprehensive battery of performance outcomes in transgender athletes" and " . . . it is still uncertain how the findings would translate to transgender athletes . . . "

20. The Scharff study that Dr. Brown cites (his final cited study dealing with transgender individuals) also does not support the conclusion he draws. Transgender women had a decrease in grip strength and transgender men had an increase in grip strength while on their respective hormone regimens. (Brown Decl. ¶ 151.) Dr. Brown suggests that the

decrease in grip strength observed among transgender women still left them with more strength than would be expected for most cisgender women. However, the study was only intended to demonstrate the direction of change, not its absolute amount. The absolute degree of change in a larger population of transgender women along with the net impact on specific athletic activities remains conjecture, subject to future study.

21. My opinions about the impact of hormone therapy, including testosterone suppression and estrogen, on transgender people are not from the Harper study as the Defendants suggest. They are, by contrast, drawn from my more than 15 years of treating transgender patients with hormone therapy, my training as an endocrinologist, my review of the literature concerning the impact of circulating testosterone on athletic performance, and my experience as an expert in establishing policies for the inclusion of transgender athletes in the Olympics and World Athletics.

22. The Harper study, although modest with a sample of eight individuals, is the only study of transgender female athletes treated for a sustained period of time with (1) evaluation of athletic performance prior to gender affirming treatment relative to cisgender men followed by (2) evaluation of athletic performance after gender affirming treatment relative to cisgender women. This study, even with its limits, supports the conclusion that suppression of testosterone *does* diminish performance outcomes for women who are transgender.

23. Research with greater rigor must be done along the lines of the Harper study, but until that time there is no reason to conclude that the opposite of the Harper findings is true.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on: June 25, 2020

Joshua D. Safer

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF IDAHO

LINDSAY HECOX, et al., *Plaintiffs*, v. BRADLEY LITTLE, et al., *Defendants*.	No. 1:20-cv-184-CWD **EXPERT DECLARATION OF JACK L. TURBAN, MD, MHS, IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION**

I, Jack L. Turban, MD, MHS, have been retained by counsel for Plaintiffs Lindsay Hecox and Jane Doe, with her next friends, Jean Doe and John Doe, as an expert in connection with the above-captioned litigation.

1. The purpose of this declaration is to respond to certain opinions set forth by Dr. Stephen Levine in opposition to Plaintiffs' Motion for Preliminary Injunction. Here, I respond to the central points raised in Dr. Levine's declaration ("Levin Decl."). I do not specifically address each study or article cited by Dr. Levine, but instead explain the overall problems with the conclusions that he draws and provide data showing why such conclusions are in error. I reserve the right to supplement my opinions concerning Dr. Levine's opinions if necessary as the case proceeds.

2. I have actual knowledge of the matters stated in this declaration. In preparing this declaration, I

reviewed the materials listed in the attached Bibliography (Exhibit B), as well as the Expert Report of Dr. Stephen Levine. I may rely on those documents as additional support for my opinions. I have also relied on my years of research and other experience, as set out in my curriculum vitae (Exhibit A), and on the materials listed therein. The materials I have relied upon in preparing this declaration are the same types of materials that experts in my field of study regularly rely upon when forming opinions on the subject. I may wish to supplement these opinions or the bases for them as a result of new scientific research or publications or in response to statements and issues that may arise in my area of expertise.

BACKGROUND AND QUALIFICATIONS

3. I am currently a clinical fellow in psychiatry at Harvard Medical School, where I research the mental health of transgender youth. Beginning on July 1, 2020, I will be a Fellow in Child and Adolescent Psychiatry at Stanford University.

4. I received my undergraduate degree in neuroscience from Harvard College. I received both my MD and Masters of Health Science degree from Yale University School of Medicine. I am writing in my capacity as a mental health researcher.

5. My research focuses on the mental health of transgender youth. While at Yale, I was awarded the Ferris Prize for my thesis entitled "Evolving Treatment Paradigms for Transgender Youth." In 2017, I received the United States Preventative Health Services Award for Excellence in Public Health based on my work related to the mental health of transgender youth. I have lectured on the mental

health of transgender youth at Yale School of Medicine and Massachusetts General Hospital (a teaching hospital of Harvard Medical School).

6. I have served as a manuscript reviewer for numerous professional publications including *The Journal of The American Medical Association, The Journal of The American Academy of Child & Adolescent Psychiatry, Pediatrics, The Journal of Adolescent Health, and The American Journal of Public Health*. I have served as lead author for textbook chapters on the mental health of transgender youth, including for *Lewis's Child & Adolescent Psychiatry: A Comprehensive Textbook* and the textbook of The International Academy for Child & Adolescent Psychiatry and Allied Professionals. I am co-editor of the textbook, P*ediatric Gender Identity: Gender-affirming Care for Transgender and Gender Diverse Youth*.

7. I have published extensively on the topic of transgender youth, including five articles in peer-reviewed journals in the past two years alone.

8. I have never testified as an expert at trial or in deposition. I am being compensated at an hourly rate of $250 per hour for preparation of expert declarations and reports, and $400 per hour for time spent preparing for or giving deposition or trial testimony. My compensation does not depend on the outcome of this litigation, the opinions I express, or the testimony I provide.

SUMMARY OF OPINIONS

9. Dr. Levine is an adult psychiatrist who appears to have limited understanding of the research involving the mental health of children and

adolescents who are transgender. He applies outdated research about pre-pubertal children presenting to gender clinics to make broad arguments about the treatment of transgender patients of all ages. His sweeping claims about alleged harms of affirming treatment for transgender youth are contradicted by all recent data, which show precisely the opposite of what he argues: youth and young adults who are affirmed in their gender identity and who have access to social transition and appropriate medical treatment, including puberty blockers and gender affirming hormones, have favorable mental health outcomes.

10. In this declaration, I cite relevant literature to support my opinions that: (1) existing evidence supports transition for transgender youth; (2) the "desistence" literature that Dr. Levine cites does not apply once a young person reaches the earliest stages of puberty; (3) the "watchful waiting" approach that Dr. Levine describes is only relevant to pre-pubertal children and is not generally practiced in the United States; (4) "regret" is not common among youth who receive gender affirming treatment and all existing evidence regarding gender-affirming care for transgender youth has shown positive mental health outcomes; and (5) efforts to force transgender people to be cisgender are dangerous and unethical.

EXISTING EVIDENCE SUPPORTS SOCIAL TRANSITION FOR TRANSGENDER YOUTH

11. Though the premise of Dr. Levine's declaration is that social transition for transgender youth is harmful to youth who undergo it, existing evidence shows the opposite. For example, Dr. Levine

neglects to cite the recent work of Dr. Kristina Olson at The University of Washington, which found that transgender youth who socially transition have levels of depression no different from cisgender controls and only marginally elevated levels of anxiety (in the pre-clinical range).[1] As Olson's team explains in their 2017 manuscript (Durwood et al.), "our findings of normative levels of depression, slightly higher rates of anxiety [pre-clinical], and high self-worth in socially transitioned transgender children stand in marked contrast with previous work with gender non-conforming children who had not socially transitioned."[2] In other words, the research shows that youth who are treated consistent with their gender identity and allowed to socially transition have better mental health than cohorts of youth who were not allowed to socially transition. In contrast, if a transgender child's gender identity is not supported, and professionals attempt to make them cisgender, they have a higher likelihood of attempting suicide.[3] Among transgender people who were exposed to

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[1] Olson, K. R., Durwood, L., DeMeules, M., & McLaughlin, K. A. (2016). Mental health of transgender children who are supported in their identities. *Pediatrics*, 137(3). Durwood, L., McLaughlin, K. A., & Olson, K. R. (2017). Mental health and self-worth in socially transitioned transgender youth. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(2), 116-123.

[2] Durwood, L., McLaughlin, K. A., & Olson, K. R. (2017). Mental health and self-worth in socially transitioned transgender youth. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(2), 116-123.

[3] Turban, J. L., Beckwith, N., Reisner, S. L., & Keuroghlian, A. S. (2020). Association between recalled exposure to gender identity conversion efforts and psychological distress and suicide attempts among transgender adults. *JAMA Psychiatry*, *77*(1), 68-76.

efforts to make them cisgender during childhood, 90% had considered suicide.[4] The dangers of efforts to force transgender people to be cisgender are further described below.

12. Dr. Levine also implies that allowing a child to socially transition makes them identify more strongly as transgender and thus more likely to "persist" in their transgender identity. (Levine Decl. ¶ 64.) A study recently published by Dr. Olson's group, which Dr. Levine also failed to cite, has found this not to be true.[5] The study authors found that gender identification did not meaningfully differ before and after social transition.

13. In addition, no evidence establishes a "social contagion" theory of gender transition mentioned by Dr. Levine. He claims that "[i]n the case of adolescents . . . there is evidence that peer social influences through 'friend groups' (Littman) or through the internet can increase the incidence of gender dysphoria or claims of transgender identity." (Levine Decl. ¶ 51.) The Littman study he cites was an anonymous online survey of the parents of transgender youth, recruited from websites where this notion of "social contagion" leading to transgender identity is popular. The anonymous survey participants were asked what they thought was the etiology of their children's transgender identity. Some of these parents believed that their children became transgender as a result of watching

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[4] *Id.*

[5] Rae, J. R., Gülgöz, S., Durwood, L., DeMeules, M., Lowe, R., Lindquist, G., & Olson, K. R. (2019). Predicting early-childhood gender transitions. *Psychological Science, 30*(5), 669-681.

transgender-related content on websites like YouTube and having LGBTQ friends. The obvious alternative interpretation is that these youth sought out transgender-related media and LGBTQ friends because they wanted to find other people who understood their experiences and could offer support. If the study had surveyed the children in addition to their parents, they may have been able to establish if this were the case. Unfortunately, the Littman study is based on an anonymous survey of parents only. No conclusions can be drawn from the Littman study other than the fact that some anonymous people recruited from the Internet theorize that transgender identity is due to social contagion. This theorizing from people online does not establish a true phenomenon. No study to date has found a psychosocial determinant of gender identity. Preliminary biological studies have estimated that gender identity is as much as 70% heritable.[6]

14. In addition, there is no established medical phenomenon of "rapid onset gender dysphoria" as Dr. Levine claims. (Levine Decl. ¶ 63.) This term entered the literature through this same article from Dr. Lisa Littman. A correction was published on this article, which noted, "Rapid-onset gender dysphoria (ROGD) is not a formal mental health diagnosis at this time. This report did not collect data from the adolescents and young adults (AYAs) or clinicians and therefore

[6] Turban, J. L., & Ehrensaft, D. (2018). Research Review: Gender identity in youth: treatment paradigms and controversies. *Journal of Child Psychology and Psychiatry, 59*(12), 1228-1243.

does not validate the phenomenon."[7] The correction goes on to say "the term should not be used in any way to imply that it explains the experiences of all gender dysphoric youth . . . "

"DESISTENCE LITERATURE" DOES NOT APPLY ONCE YOUTH REACH THE EARLIEST STAGES OF PUBERTY

15. Dr. Levine references a body of literature commonly referred to as the "desistence literature." (Levine Decl. ¶ 61.) He incorrectly states that this literature found that "the large majority of children who present with gender dysphoria will desist from desiring a transgender identity." (Levine Decl. ¶ 33.) The studies cited by Dr. Levine did not use the current DSM-5 gender dysphoria diagnosis. Rather, most of these studies used the DSM-IV construct of "gender identity disorder." One could meet criteria for the DSM-IV diagnosis of gender identity disorder without identifying as transgender because the diagnostic criteria did not require identification with a gender other than the one assigned to the person at birth. This problem with the diagnosis was remedied with the new DSM-5 diagnosis of "gender dysphoria in children," which requires a child to have "a strong desire to be of the other gender or an insistence that one is the other gender (or some alternative gender different from one's assigned gender)." Furthermore, a large proportion of children in these studies did not even meet criteria for DSM-IV's "gender identity disorder" diagnosis. Because these children did not

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[7] Littman, L. (2019). Correction: Parent reports of adolescents and young adults perceived to show signs of a rapid onset of gender dysphoria. *PloS One*, 14(3), e0214157.

necessarily identify as transgender to begin with, it is not surprising that they did not identify as transgender at follow-up.

16. Perhaps more importantly, these studies all examined *pre-pubertal* children. There is broad consensus that once youth reach the earliest stages of puberty (i.e. Tanner 2) and identify as transgender, "desistence" is rare.[8] The notion of "desistence" therefore is not generally applied to transgender people once they reach Tanner 2 (the earliest stage of puberty). Even the researchers who published the dataset about desistance that Dr. Levine cites are clear that once a child reaches puberty, it is not medically appropriate to withhold affirming treatment. When discussing individuals in high school and college who have transitioned, this data is completely irrelevant.

THE "WATCHFUL WAITING" APPROACH REFERS TO THE TREATMENT OF PREPUBERTAL YOUTH ONLY

17. Dr. Levine references the "watchful waiting" approach to the treatment of transgender youth. (Levine Decl. ¶¶ 33–34.) This approach was developed by the VUMC Center for Expertise in Gender Dysphoria in Amsterdam and only applies to the treatment of prepubertal youth.

18. "Watchful waiting" refers to advising parents to wait until the earliest stages of puberty before

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[8] Turban JL, DeVries ALC, Zucker K. Gender Incongruence & Gender Dysphoria. In Martin A, Bloch MH, Volkmar FR (Editors): *Lewis's Child and Adolescent Psychiatry: A Comprehensive Textbook*, Fifth Edition. Philadelphia: Wolters Kluwer 2018.

facilitating a social transition for their child. The VUMC clinic does not advocate for "watchful waiting" once transgender adolescents reach the earliest stages of puberty (i.e. Tanner 2). At that developmental stage, they recommend affirmation of the adolescent's gender identity. In fact, the VUMC clinic was the first clinic in the world to utilize pubertal suppression and gender-affirming hormones for transgender youth and has published on the positive outcomes for youth who receive these medical interventions.[9]

19. Most practitioners in the U.S. do not follow the "watchful waiting" approach for prepubertal youth, as there is concern that forcing a child to wait until the beginning of puberty to facilitate social transition may promote stigma and damage relationships between the child and their parents and clinicians, which could subsequently lead to adverse mental health outcomes.[10] In any event, "watchful waiting" is not considered an ethical model of treatment for a young person once puberty has begun in the U.S. or elsewhere.

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[9] De Vries, A. L., McGuire, J. K., Steensma, T. D., Wagenaar, E. C., Doreleijers, T. A., & Cohen-Kettenis, P. T. (2014). Young adult psychological outcome after puberty suppression and gender reassignment. *Pediatrics*, 134(4), 696-704.

[10] Turban, J. L., & Ehrensaft, D. (2018). Research Review: Gender identity in youth: treatment paradigms and controversies. *Journal of Child Psychology and Psychiatry, 59*(12), 1228-1243.

ALL EXISTING EVIDENCE SHOWS THAT, AMONG TRANSGENDER YOUTH WHO RECEIVE GENDER-AFFIRMING MEDICAL INTERVENTIONS, MENTAL HEALTH OUTCOMES ARE FAVORABLE AND REGRET IS RARE

20. In the largest longitudinal study of transgender adolescents to date, 98.1% of those who started pubertal suppression continued on to receive gender-affirming medical care.[11] This same study found extremely low rates of surgical regret among transgender adults: 99.4% of transgender women and 99.7% of transgender men did not have identified surgical regret.

21. All existing data examining the mental health outcomes of transgender adolescents who received pubertal suppression indicate positive mental health outcomes. In a study of 55 transgender people from the Netherlands—the only study following young transgender people through receiving pubertal suppression, gender-affirming hormones, and gender-affirming surgeries—none regretted treatment.[12] Over the course of treatment, their mental health and global functioning scores improved. By the end of the treatment protocol, these properly treated

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[11] Wiepjes, C. M., Nota, N. M., de Blok, C. J., Klaver, M., de Vries, A. L., Wensing-Kruger, S. A., ... & Gooren, L. J. (2018). The Amsterdam cohort of gender dysphoria study (1972–2015): trends in prevalence, treatment, and regrets. *The Journal of Sexual Medicine, 15*(4), 582-590.

[12] De Vries, A. L., McGuire, J. K., Steensma, T. D., Wagenaar, E. C., Doreleijers, T. A., & Cohen-Kettenis, P. T. (2014). Young adult psychological outcome after puberty suppression and gender reassignment. *Pediatrics, 134*(4), 696-704.

transgender young adults had global functioning scores on par with the general population of the Netherlands. This is a remarkable finding, given the high rates of anxiety, depression, and suicidality generally seen among transgender people, most of whom are unable to access this type of care. A recent study from our group found that among transgender people who expressed a desire for pubertal suppression, those who accessed it had a 70% lower odds of considering suicide in their lifetime.[13] In another study by Costa et al., transgender youth who received pubertal suppression in addition to psychological support had better global functioning scores than those who received psychological support alone.[14] In other words, Dr. Levine's suggestion that "[w]hat is known [about the impact of treatment] . . . is not encouraging" is not accurate. (Levine Decl. ¶ 77.) The data that we do have is all encouraging regarding the mental health benefits of gender-affirming medical interventions for transgender youth.

22. Dr. Levine cites a study by Dhejne et al. that examined long-term follow-up of transgender individuals who received gender-affirming surgeries. He states that, "the Swedish follow-up study found a suicide rate in the post-SRS [Sex Reassignment

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[13] Turban, J. L., King, D., Carswell, J. M., & Keuroghlian, A. S. (2020). Pubertal suppression for transgender youth and risk of suicidal ideation. *Pediatrics, 145*(2).

[14] Costa, R., Dunsford, M., Skagerberg, E., Holt, V., Carmichael, P., & Colizzi, M. (2015). Psychological support, puberty suppression, and psychosocial functioning in adolescents with gender dysphoria. *The journal of sexual medicine, 12*(11), 2206-2214.

Surgery] population 19.1 times greater than that of controls . . . " (Levine Decl. ¶ 78.) Dr. Levine's extrapolation from this data set is flawed. First, the control group Dr. Levine references consists of cisgender people. This is not an appropriate control group. Transgender people face a range of stressors that affect their mental health, most prominently societal rejection based on being transgender. Though gender-affirming surgery improves mental health, it cannot eliminate societal discrimination for many people, and thus even after surgery, many transgender people still suffer elevated rates of mental health problems compared to cisgender people. This reality of mental health challenges even with gender-affirming care is not a valid argument against the provision of gender-affirming care. The very study Dr. Levine cites explains this point: "no inferences can be drawn as to the effectiveness of sex reassignment as a treatment for transsexualism [sic]. In other words, the results should not be interpreted such as sex reassignment per se increases morbidity and mortality. Things might have been even worse without sex reassignment. As an analogy, similar studies have found increased somatic morbidity, suicide rate, and overall mortality for patients treated for bipolar disorder and schizophrenia. This is important information, but it does not follow that mood stabilizing treatment or antipsychotic treatment is the culprit."[15] Second, the study was published in 2011, and it followed individuals who

[15] C. Dhejne et al. (2011), Long-Term Follow-Up of Transsexual Persons Undergoing Sex Reassignment Surgery: Cohort Study in Sweden, *PLoS ONE* 6(2) e16885, 7.

had surgery when the surgical techniques were not as advanced and discrimination in society was far worse.

23. A more recent study of Swedish population registry data once again found (unsurprisingly, given the stressors faced) evidence that transgender people suffer from mental health needs at higher rates than cisgender people; however, this study also found a reduction in mental health treatment needs among transgender people following gender-affirming surgery.[16] The authors of this more recent study conclude: "The longitudinal association found in the present study between gender-affirming surgery and reduced mental health treatment utilization, combined with the physical and mental health risks of surgery denial, supports policies that provide gender affirming surgeries to transgender individuals who seek such treatments."[17]

EFFORTS TO FORCE TRANSGENDER PEOPLE TO BE CISGENDER ARE DANGEROUS AND UNETHICAL

24. Dr. Levine advocates for psychotherapeutic attempts to change a young person's gender identity from transgender to cisgender. He offers a litany of speculative and unsupported harms of "being transgender" and concludes that "one cannot assert with any degree of certainty that once a transgendered person, always a transgendered person, whether referring to a child, adolescent, or

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[16] Bränström, R., & Pachankis, J. E. (2019). Reduction in mental health treatment utilization among transgender individuals after gender-affirming surgeries: a total population study. *American Journal of Psychiatry*.

[17] *Id.*

adult, male or female," suggesting that there should be a therapeutic goal of preventing someone from being transgender.[18] (Levine Decl. ¶ 109.) Often, this approach is colloquially referred to as "gender identity conversion therapy." Given that it is not considered an appropriate therapeutic modality, it is often referred to in the academic literature as "gender identity conversion efforts."

25. All relevant major medical organizations have issued clear statements that gender identity conversion efforts should not be practiced, including The American Medical Association,[19] The American Academy of Pediatrics,[20] and The American Academy of Child & Adolescent Psychiatry.[21]

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[18] As just one example of this, Dr. Levine cites only himself in non-peer reviewed articles in support of the idea that transgender individuals are "strongly narcissistic" and have difficulty forming romantic attachments. (Levine ¶ 98.) I am not familiar with any data that demonstrate increased rates of narcissism among transgender individuals. Likewise, Dr. Levine suggests that transgender individuals only form attachments to other transgender individuals, again without any data to support this supposition, which I have never seen borne out in any data. (Levine ¶ 96.)

[19] American Medical Association. Health care needs of lesbian, gay, bisexual and transgender populations. H-160.991. 2017. https://policysearch.ama-assn.org/policyfinder/detail/H-160.991%20?uri=%2FAMADoc%2FHOD.xml-0-805.xml. Accessed June 21, 2020.

[20] Rafferty, J., & Committee on Psychosocial Aspects of Child and Family Health. (2018). Ensuring comprehensive care and support for transgender and gender-diverse children and adolescents. *Pediatrics, 142*(4).

[21] The American Academy of Child & Adolescent Psychiatry. Conversion Therapy. 2018. https://www.aacap.org/AACAP/Policy_Statements/2018/Conversion_Therapy.aspx Accessed June 21, 2020.

26. In a recent paper from our team at Harvard Medical School, published in *JAMA Psychiatry*, we found that, after adjusting for a range of potentially confounding variables, exposure to gender identity conversion efforts was associated with greater odds of attempting suicide.[22] The increased odds of attempting suicide were even greater for transgender people who were exposed to gender identity conversion efforts during childhood.

27. Dr. Levine is correct in pointing out that our study in *JAMA Psychiatry* was cross-sectional. In the realm of scientific evidence, this level of evidence is less conclusive than a randomized controlled trial. However, given that gender identity conversion efforts have been labeled unethical by the major medical organizations cited above, it is not possible to conduct a randomized controlled trial of gender identity conversion efforts. No institutional review board would allow such a study to proceed. Because such a study design is not ethically permissible or feasible, we must rely on the evidence we currently have. All existing evidence suggests that trying to force a transgender person to be cisgender is harmful to those exposed to this intervention.[23] There is no evidence of any benefit from such interventions.

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[22] Turban, J. L., Beckwith, N., Reisner, S. L., & Keuroghlian, A. S. (2020). Association between recalled exposure to gender identity conversion efforts and psychological distress and suicide attempts among transgender adults. *JAMA Psychiatry, 77*(1), 68-76.

[23] Not all transgender people will desire medical or surgical interventions. However, for these individuals, it would still be unsafe and unethical to try to force them to live as their sex

28. Rejection of a young transgender person's gender identity is one of the strongest predictors for adverse mental health outcomes. Family rejection of a young transgender person's gender identity is associated with mental health problems for these youth.[24] Non-acceptance by peers is another major risk factor for mental health problems.[25] Inability to obtain gender congruent government identification has been shown to be associated with adverse mental health outcomes.[26] Given that all data point to the conclusion that non-acceptance of a person's gender identity leads to poor mental health outcomes, it is likely that rejection of a transgender person's gender identity by forcing them to play on a sports team that does not match their gender identity would damage their mental health. Doing so would also be, in essence, forcing them to express themselves as cisgender, and as described above, forcing a transgender person to be cisgender is associated with adverse mental health outcomes.

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assigned at birth. Doing so would be a clear violation of the policy statements set forth by these major professional organizations.

[24] Travers, R., Bauer, G., & Pyne, J. (2012). Impacts of strong parental support for trans youth: A report prepared for Children's Aid Society of Toronto and Delisle Youth Services. Trans Pulse.

[25] de Vries, A. L., Steensma, T. D., Cohen-Kettenis, P. T., VanderLaan, D. P., & Zucker, K. J. (2016). Poor peer relations predict parent-and self-reported behavioral and emotional problems of adolescents with gender dysphoria: a cross-national, cross-clinic comparative analysis. *European Child & Adolescent Psychiatry, 25*(6), 579-588.

[26] Scheim, A. I., Perez-Brumer, A. G., & Bauer, G. R. (2020). Gender-concordant identity documents and mental health among transgender adults in the USA: a cross-sectional study. *The Lancet Public Health*, 5(4), e196-e203.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on: June 26, 2020

Jack L. Turban
JACK L. TURBAN, MD, MHS

EXHIBIT A

Jack L. Turban MD MHS
401 Quarry Road
Stanford, California 94304
650-498-4960
jturban@stanford.edu

EDUCATION

Yale School of Medicine New Haven, CT
2012-2017

Doctor of Medicine & Master of Health Science with honors. Clinical rotations included inpatient pediatrics, inpatient child psychiatry, inpatient adolescent psychiatry, residential adolescent psychiatry, psychiatric consult liaison service, clinical neuromodulation, neurology clinics, and neurosurgery. Completed award-winning masters' thesis as a Howard Hughes Medical Institute (HHMI) medical research fellow on evolving treatment paradigms for transgender youth. Clerkship Grades: All Honors

Harvard University Cambridge, MA
2007-2011

B.A. Neurobiology magna cum laude. Coursework included clinical neuroscience, systems neurobiology,

visual neuroscience, positive psychology, neurobiology of behavior, CNS regenerative techniques, neuroanatomy, vertebrate surgery, and extensive coursework in dramatic theory and practice. International study included Spanish language (Alicante, Spain), stem cell biology (Shanghai, China), and studying how visual art may be used as a window into the mechanisms of neural processing (Trento, Italy). Honors thesis completed at The Massachusetts Eye & Ear Infirmary studying inner-ear development and regeneration. GPA: 3.8/4.0

WORK EXPERIENCE

Stanford Healthcare Palo Alto, CA 2020-2022
Fellow in Child & Adolescent Psychiatry. Fellow in child and adolescent psychiatry. Research focuses on pediatric gender identity and LGBTQ health.

Harvard Medical School Boston, MA 2017-2020
Clinical Fellow in Psychiatry. Resident physician in the MGH/McLean integrated adult, child, and adolescent psychiatry program. Research focuses on pediatric gender identity and LGBT mental health.

Clarion Healthcare Consulting, LLC Boston, MA 2011-2012
Associate Consultant. Worked as a strategy and management consultant for top ten pharmaceutical companies and emerging biotech. Areas of focus included neuroscience business development, life cycle management, and innovation in new product commercialization.

Harvard Summer School in Mind/Brain Sciences Trento, Italy 2011-2012

Resident Director. Directed a study abroad program for Harvard undergraduate and Italian graduate students, introducing them to the basic principles of neuroscience and cognitive psychology.

RESEARCH EXPERIENCE

The Fenway Institute Boston, MA 2017-Present
LGBT Mental Health Research. Currently using data from the National Transgender Discrimination Survey to determine the adult mental health correlates of recalled childhood experiences including exposure to conversion therapy and access to gender-affirming hormonal interventions.

McLean Institute for Technology in Psychiatry Belmont, MA 2017-Present
LGBT Mental Health Research. Conducting cross-sectional studies that examine the associations between geosocial "hook-up apps," internalizing psychopathology, and compulsive sexual behavior. Utilizing the TestMyBrain platform.

Yale Program for Research on Impulsivity & Impulse Control Disorders New Haven, CT 2016-Present
Clinical Research. Conducted a study on US military veterans who had recently returned from deployment, studying rates and comorbidities of those veterans who exhibit compulsive sexual behavior facilitated by social media. Currently studying psychiatric morbidities among veterans who send sexually explicit self-images over social media.

Yale Child Study Center New Haven, CT 2015-2017

Medical Education Research. Conducted a study to evaluate pediatric attending and medical student knowledge regarding transgender pediatric patient care. Additionally studied participants' personal ethical views regarding pubertal blockade and cross-sex hormone therapy for adolescent patients.

Eaton-Peabody Laboratory Cambridge, MA
2009-2011

Basic Research. Worked at the Massachusetts Eye and Ear Infirmary laboratory, studying stem cells of the inner ear and working toward cochlear hair cell regeneration.

Novartis Pharmaceuticals Shanghai, China
2009-2009

Intern. Worked as a biological research intern, studying the role of Math-1 in inner-ear development and regeneration.

LEADERSHIP

MGH Psychiatry Gender Lab Meetings
2019-Present

Founder. Established monthly lab meetings for those in the MGH psychiatry department to discuss ongoing research regarding transgender mental health.

Yale School of Medicine Cultural Competence Committee New Haven, CT 2012-2017

Chair. Worked with individual course directors to develop course material on cultural competence. Authored case studies on handling pediatric patient sexuality (Professional Responsibility Course), authored a pre-clinical lecture on LGBT healthcare (Ob/Gyn Module), and lectured on transgender pediatric patient care (Pediatrics Clinical Clerkship).

Dean's Advisory Committee on LGBTQ Affairs (Yale School of Medicine) New Haven, CT 2016-2017

Member. Served on the advisory committee to the Dean of Yale School of Medicine, advising on issues related to LGBTQ affairs.

Yale HIV Dermatology Roundtable New Haven, CT 2014-2017

Founder. Eighty percent of patients suffering from HIV face a dermatologic manifestation of their disease. Struck by these patients' experience of stigma, I organized a bi-monthly interdisciplinary roundtable to improve research, education, and clinical care in HIV dermatology. Interventions have included primary care provider training on the treatment of genital warts and improved referral systems for cutaneous malignancies.

Yale Gay & Lesbian Medical Association New Haven, CT 2013-2017

President. Led a group of medical students focused on supporting careers in medicine for LGBT individuals. Organized mixers with LGBT organizations from other graduate schools and with LGBT faculty. Coordinated trips to GLMA national conferences. Worked with the medical school administration to create an LGBT faculty advisor position.

VOLUNTEER WORK & ADVOCACY

American Academy of Child & Adolescent Psychiatry "Break the Cycle" 2017-2017

Event Coordinator. Worked with Dr. Andres Martin to coordinate a fundraising indoor cycling event for the AACAP Break The Cycle fundraising campaign to fight children's mental illness.

Yale Hunger & Homelessness Auction New Haven, CT 2012-2014
Logistics Co-Chair. Organized a group of ten students to coordinate entertainment, donations, and event logistics for the Yale annual charity auction. All proceeds for the auction go to support local charities.

Yale School of Medicine Admissions Committee New Haven, CT 2015-2017
Interviewer. Served as a full voting member of the admissions committee. Responsibilities include student interviewing, recruitment, and organizing LGBT-focused activities for admitted students.

Harvard College Admissions New Haven, CT 2012-Present
Interviewer. Interviewing students from the Boston area for admission to Harvard College.

SELECTED PUBLICATIONS

Turban, J. L., Passell E, Scheer L, Germine L. Use of Geosocial Networking Applications Is Associated With Compulsive Sexual Behavior Disorder in an Online Sample. *The Journal of Sexual Medicine*. [ePub ahead of print]

Turban, J. L., Keuroghlian, A. S., & Mayer, K. H. Sexual Health in the SARS-CoV-2 Era. *Annals of Internal Medicine*. [ePub ahead of print]

Suozzi, K., **Turban, J.**, & Girardi, M. (2020). Focus: Skin: Cutaneous Photoprotection: A Review of the Current Status and Evolving Strategies. *The Yale Journal of Biology and Medicine, 93*(1), 55.

Malta, M., LeGrand, S., **Turban, J.**, Poteat, T., & Whetten, K. (2020). Gender-congruent government

identification is crucial for gender affirmation. *The Lancet Public Health*. [ePub ahead of print]

Turban, J. L., King, D., Carswell, J. M., & Keuroghlian, A. S. (2020). Pubertal suppression for transgender youth and risk of suicidal ideation. *Pediatrics, 145*(2).

Turban, J. L., Shirk, S. D., Potenza, M. N., Hoff, R. A., & Kraus, S. W. (2020). Posting Sexually Explicit Images or Videos of Oneself Online Is Associated With Impulsivity and Hypersexuality but Not Measures of Psychopathology in a Sample of US Veterans. *The Journal of Sexual Medicine, 17*(1), 163-167.

Turban, J. L., Beckwith, N., Reisner, S. L., & Keuroghlian, A. S. (2020). Association between recalled exposure to gender identity conversion efforts and psychological distress and suicide attempts among transgender adults. *JAMA Psychiatry, 77*(1), 68-76.

Acosta, W., Qayyum, Z., **Turban, J. L.**, & van Schalkwyk, G. I. (2019). Identify, engage, understand: Supporting transgender youth in an inpatient psychiatric hospital. *Psychiatric Quarterly,* 90(3), 601-612.

Turban, J. L. (2019). Medical Training in the Closet. *The New England Journal of Medicine, 381*(14), 1305.

Turban, J. L., King, D., Reisner, S. L., & Keuroghlian, A. S. (2019). Psychological Attempts to Change a Person's Gender Identity from Transgender to Cisgender: Estimated Prevalence Across US States, 2015. *American Journal of Public Health*, 109(10), 1452-1454.

Turban, J. L., & Keuroghlian, A. S. (2018). Dynamic gender presentations: understanding transition and" de-transition" among transgender youth. *Journal of the American Academy of Child and Adolescent Psychiatry, 57*(7), 451-453.

Turban, J. L., Carswell, J., & Keuroghlian, A. S. (2018). Understanding pediatric patients who discontinue gender-affirming hormonal interventions. *JAMA Pediatrics, 172*(10), 903-904.

Turban, J. L. (2018). Potentially Reversible Social Deficits Among Transgender Youth. *Journal of Autism and Developmental Disorders*, 48(12), 4007-4009.

Turban, J. L., Shadianloo S. Transgender & Gender Non-conforming Youth. *IACAPAP e-Textbook of Child and Adolescent Mental Health*. Geneva. International Association of Child and Adolescent Psychiatry and Allied Professionals, 2018.

Turban, J. L., & van Schalkwyk, G. I. (2018). "Gender dysphoria" and autism spectrum disorder: Is the link real?. *Journal of the American Academy of Child & Adolescent Psychiatry, 57*(1), 8-9.

Turban, J. L., Winer, J., Boulware, S., VanDeusen, T., & Encandela, J. (2018). Knowledge and attitudes toward transgender health. *The clinical teacher, 15*(3), 203-207.

Turban, J. L., & Ehrensaft, D. (2018). Research review: gender identity in youth: treatment paradigms and controversies. *Journal of Child Psychology and Psychiatry, 59*(12), 1228-1243.

Turban, J. L., DeVries, A.L.C., Zucker, K. Gender Incongruence & Gender Dysphoria. In Martin A,

Bloch MH, Volkmar FR (Editors): Lewis's Child and Adolescent Psychiatry: A Comprehensive Textbook, Fifth Edition. Philadelphia: Wolters Kluwer 2018.

The American Academy of Child & Adolescent Psychiatry. Policy Statement on 'Reparative Therapy' for LGBT Youth, 2017.

Turban, J. L., Genel, M. (2017) Evolving Treatment Paradigms for Transgender Patients. *Connecticut Medicine*, 81(8), 483-486.

Turban, J., Ferraiolo, T., Martin, A., & Olezeski, C. (2017). Ten things transgender and gender nonconforming youth want their doctors to know. *Journal of the American Academy of Child & Adolescent Psychiatry, 56*(4), 275-277.

Turban, J. L. (2017). Transgender Youth: The Building Evidence Base for Early Social Transition. *Journal of the American Academy of Child and Adolescent Psychiatry, 56*(2), 101.

Turban, J. L., Potenza, M. N., Hoff, R. A., Martino, S., & Kraus, S. W. (2017). Psychiatric disorders, suicidal ideation, and sexually transmitted infections among post-deployment veterans who utilize digital social media for sexual partner seeking. *Addictive Behaviors, 66*, 96-100.

Turban, J. L., Martin A. (2017) Book Forum: Becoming Nicole. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(1): 91-92.

Turban, J. L.*, Lu, A. Y*., Damisah, E. C., Li, J., Alomari, A. K., Eid, T., ... & Chiang, V. L. (2017). Novel biomarker identification using metabolomic profiling to differentiate radiation necrosis and recurrent tumor following Gamma Knife

radiosurgery. *Journal of neurosurgery, 127*(2), 388-396.

Kempfle, J. S., **Turban, J. L.**, & Edge, A. S. (2016). Sox2 in the differentiation of cochlear progenitor cells. *Scientific Reports, 6*, 23293.

PRESENTATIONS & ABSTRACTS

Turban JL, McFarland C, Walters O, Rosenblatt S. An Overview of Best Outpatient Practice in the Care of Transgender Individual. Oral Presentation, Annual Meeting of the American Psychiatric Association, Philadelphia, 2020. [Accepted, but cancelled due to COVID19]

Turban JL, Lakshmin P, Gold J, Khandai C. #PsychiatryMatters: Combating Mental Health Misinformation Through Social Media and Popular Press. Oral Presentation, Annual Meeting of the American Psychiatric Association, Philadelphia, 2020. [Accepted, but cancelled due to COVID19]

Turban JL, The Pen and the Psychiatrist: Outreach and Education Through the Written Word. Oral Presentation, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Chicago, 2019.

Turban, JL, For Better and For Worse: Gender and Sexuality Online, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Chicago, 2019.

Turban, JL, Gender Diverse Young Adults: Narratives and Clinical Considerations, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Chicago, 2019.

Turban, JL, Transgender Youth: Controversies and Research Updates, Oral Presentation, Annual Meeting of the American Psychiatric Association, San Francisco, 2019.

Turban, JL, Beckwith N, Reisner S, Keuroghlian A. Exposure to Conversion Therapy for Gender Identity Is Associated with Poor Adult Mental Health Outcomes among Transgender People in the U.S. Poster Presentation, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Seattle, 2018.

Shirk SD, **Turban JL**, Potenza M, Hoff R, Kraus S. Sexting among military veterans: Prevalence and correlates with psychopathology, suicidal ideation, impulsivity, hypersexuality, and sexually transmitted infections. Oral Presentation, International Conference on Behavioral Addictions, Cologne, Germany, 2018.

Turban JL, Gender Identity and Autism Spectrum Disorder. Oral Presentation, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Washington D.C., 2017.

Turban JL, Tackling Gender Dysphoria in Youth with Autism Spectrum Disorder from the Bible Belt to New York City. Oral Presentation, Annual Meeting of the American Academy of Child & Adolescent psychiatry, Washington D.C., 2017.

Turban JL, Affirmative Protocols for Transgender Youth. Oral Presentation, Annual Meeting of the American Academy of Child & Adolescent Psychiatry, Washington D.C., 2017.

Turban JL, Evolving Management of Transgender Youth. Oral Presentation, Klingenstein Third Generation Foundation Conference, St Louis, 2017.

Turban, JL, Potenza M, Hoff R, Martino S, Kraus S. Clinical characteristics associated with digital hookups, psychopathology, and clinical hypersexuality among US military veterans. Oral Presentation, International Conference on Behavioral Addictions, Haifa, Israel, 2017.

Lewis J, Monaco P, **Turban JL**, Girardi M. UV-induced mutant p53 ketatinocyte clonal expansion dependence on IL-22 and RORγT. Poster, Society of Investigative Dermatology, Portland, 2017.

Turban JL, Winer J, Encandela J, Boulware S, VanDeusen T. Medical Student Knowledge of and Attitudes toward Transgender Pediatric Patient Care. Abstract, Gay & Lesbian Medical Association, St Louis, 2016.

Turban JL, Lu A, Damisah E, Eid T, Chiang V. Metabolomics to Differentiate Radiation Necrosis from Recurrent Tumor following Gamma Knife Stereotactic Radiosurgery for Brain Metastases. Oral Presentation, 14th Annual Leksell Gamma Knife Conference, New York City, 2014.

Turban JL, Lewis J, Girardi M. UVB-induced HMGB1 and extracellular ATP increase Langerhans cell production of IL-23 implicated in ILC3 activation. Poster, Society of Investigative Dermatology, Scottsdale, 2016.

Turban JL, Lewis J, Girardi M. Characterization of cytokine pathways associated with Langerhans cell facilitation of UVB-induced epidermal carcinogenesis.

Poster, American Society of Clinical Investigation, Chicago, 2016.

Lewis J, **Turban JL**, Girardi M, Michael Girardi. Langerhans cells and UV-radiation drive local IL22+ ILC3 in association with enhanced cutaneous carcinogenesis. Poster, Society of Investigative Dermatology, Scottsdale, 2016.

Sewanan L, Zheng D, Wang P, Guo X, Di Bartolo I, Marukian N, **Turban JL**, Rojas-Velazques D, Reisman A. Reflective Writing Workshops Led By Near Peers During Third-Year Clerkships: A Safe Space for Solidarity, Conversation, and Finding Meaning in Medicine. Poster & Workshop, Society of General Internal Medicine, New Haven and Hollywood, 2016.

EDUCATIONAL PRESENTATIONS

Gender-affirming Care for Transgender Elders. McLean Geriatric Psychiatry Seminar Series, 2019
Writing about Gender & Sexuality (Guest Lecture), Course: Sexual Outcasts & Uncommon Desires, Emerson College, 2019
Gender-affirming Care for Transgender and Gender Diverse Patients on Inpatient Psychiatric Units, MGH Inpatient Psychiatry Seminar Series, 2019
Transgender & Gender Non-conforming Youth, MGH/McLean Adult Residency program, 2018
Writing about Gender Identity for the Lay Audience (Guest Lecture), Course: Kids These Days, Emerson Journalism Program, 2017
International Approaches to the Treatment of Gender Incongruence, VU Medical Center, Amsterdam, 2017
Time to Talk About It: Physician Depression and Suicide, Yale Clerkship Didactics, 2017

Medical Management of Adolescent Gender Dysphoria. Yale Pediatrics Clerkship, 2015-2016
Medical Management of Children and Adolescents with Gender Dysphoria, Yale Pediatrics Residency Didactics, 2016
Reflective Writing Workshop Leader. Yale Surgery Clerkship, 2015-2016
Langerhans Cell Facilitation of Photocarcinogenesis. Yale Department of Dermatology Research Forum, 2016
Panel: Treating Transgender & Gender Non-conforming Patients in the Emergency Setting. Yale Emergency Medicine Clerkship, 2016
Panel: Challenges to the Learning Climate: Difficult Patients, Harassment, and Mistreatment. Yale Pre-Clinical Orientation, 2016
Panel: Personal Behavior and Professionalism, Introduction to the Profession, 2016

AWARDS & HONORS

American Academy of Child & Adolescent Psychiatry Pilot Research Award, $15,000 (2019-2020)
American Psychiatric Association Child & Adolescent Psychiatry Fellowship (2019-2021)
Ted Stern Scholarship and Travel Award (2019)
Ted Stern Scholarship and Travel Award (2018)
Medaris Grant (2018)
United States Preventative Health Services Award for Excellence in Public Health (2017)
NBC Pride 30 Innovator (2017)
Ferris Thesis Prize, Yale School of Medicine (2017)
Parker Prize, Yale School of Medicine (2017)
Howard Hughes Medical Institute Medical Research Fellowship (2015-2016)

American Academy of Child and Adolescent Psychiatry Life Members Mentorship Grant (2016)
Student Scholarship, Gender Conference East (2016)
Farr Award for Excellence in Research (2016)
Yale Office of International Medical Education Grant, Buenos Aires, Argentina (2016)
Yale Office of International Medical Education Grant, VU Medical Center, The Netherlands (2016)
Yale Summer Research Grant (2012)
AIG International Scholar, Harvard College (2007-2011)
Harvard International Study Grant, Alicante, Spain (2008)
David Rockefeller International Study Grant, Shanghai, China (2009)

PROFESSIONAL MEMBERSHIPS

American Medical Association, Member
American Psychiatric Association, Member
American Psychiatry Association, Council on Communications
American Academy of Child & Adolescent Psychiatry, Member
American Academy of Child & Adolescent Psychiatry, Media Committee
Journal of the American Medical Association, Peer Reviewer
Journal of the American Academy of Child & Adolescent Psychiatry, Peer Reviewer
Pediatrics, Peer Reviewer
Journal of Adolescent Health, Peer Reviewer
Academic Psychiatry, Peer Reviewer
Journal of Autism and Developmental Disorders, Peer Reviewer

Journal of Child Psychology and Psychiatry, Peer Reviewer
American Journal of Public Health, Peer Reviewer
Journal of Clinical Medicine, Peer Reviewer
Brain Sciences, Peer Reviewer
Journal of Homosexuality, Peer Reviewer
American Journal of Geriatric Psychiatry, Peer Reviewer

EXHIBIT B

BIBLIOGRAPHY

1. The American Academy of Child & Adolescent Psychiatry. Conversion Therapy. 2018. https://www.aacap.org/AACAP/Policy_Statements/2018/Conversion_Therapy.aspx.

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Appeal Nos. 20-35813, 20-35815

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

LINDSAY HECOX and JANE DOE, with her next friends Jean Doe and John Doe,
Plaintiffs-Appellees,

v.

BRADLEY LITTLE, *et al.*,

Defendants-Appellants,

and

MADISON KENYON and MARY MARSHALL,

Intervenors-Appellants.

On Appeal from the United States District Court
for the District of Idaho
District Court Case No. 1:20-cv-00184-DCN
Hon. David C. Nye

DECLARATION OF LINDSAY HECOX

I, Lindsay Hecox, depose and say as follows:

1. I have personal knowledge of the facts herein. I am a plaintiff in this case.

My Enrollment and Academic Progress at Boise State University (BSU)

2. I am enrolled at BSU.

3. I qualified for in-state tuition at BSU in January 2022.

4. I was enrolled in nine credits during the Spring 2022 semester. I completed three of those credits and received incompletes for the remaining six.

5. I was unable to complete Spring 2022 schoolwork because my father died during the middle of the Spring 2022 semester. My grief affected everything, including my ability to focus and stay motivated to complete my schoolwork. I needed to take care of myself and my emotions first and my schoolwork second.

6. My professors at BSU, who understood that I was grieving the loss of my father, allowed me to take incompletes in their courses. I have until May 2023 to complete that coursework and receive six credits. I am working to complete those credits now with the support of an academic coach.

7. I enrolled in 13 credits this Fall 2022 semester.

8. I may have to adjust my schedule this semester. I will likely have to withdraw from one of my three-credit courses.

9. I am continuing to grapple with all that I have to bear: the loss of my father, no family support in Idaho, recovering from completing three physical moves over the course of the last few months, and some financial stress because I have not earned much income this year. I do, however, have enough in my savings accounts to pay for my tuition and I do expect

to earn more income and receive more financial aid in the near future.

10. I also contracted COVID-19 at the beginning of the Fall 2022 semester. I had a fever, a sore throat, and cough, experienced shortness of breath and extreme fatigue, and was in a state of brain fog.

11. While my professors were understanding as I recovered from COVID-19, my illness and recovery put me behind in my coursework. I missed three days of school and schoolwork. All four of my classes met at least once during those three days; one of them met twice (the one I may have to withdraw from now). During that period of time, I fell behind in my schoolwork and am struggling to catch up now.

12. I have been working with an academic coach and the Dean of Students to devise a plan to continue making satisfactory progress toward my degree. I feel optimistic about completing my coursework and the required number of credits for NCAA eligibility before next fall's tryouts. I plan to be enrolled in the coming spring semester as well as next fall.

My Participation on the BSU Women's Cross Country Team Again

13. I did not try out for the BSU Women's Cross Country Team for Fall 2022, due to my recovery from COVID-19, as well as the emotional and focus challenges I have been facing since my father's death, having to move one more time late this summer, and needing to focus on my coursework, including completing the six credits from the Spring 2022 semester and taking on thirteen credits during this Fall 2022 semester. I also believed that even if I tried out and made the team this fall, I might have been

unable to join due to my having had to take incompletes in Spring 2022. I decided not to try out after I contracted COVID-19. Experiencing the symptoms of COVID-19 and dealing with all the other stressors I had going into the Fall 2022 semester, I felt that it would be unwise to try out for the team.

14. Even though I decided not to try out for the cross country team this fall, I still intend to try out for the cross country team as soon as I am able. Since failing to make the team in 2020, I have been training as if I am on the team. I now run more miles more consistently than I have previously and I run with people of my skill level or better. When I tried out for the BSU cross country team the first time, I had only been running on my own or with casual running groups. Since then, I have been training with the Boise Area Runners and with the Boise High School Cross Country/Track Team, which I also coach. I have been mimicking BSU women's cross country team training regimen, including the kind of mileage I think they are doing and the workouts and drills they are doing because I know I will need that base of high mileage and skills going into the tryouts and be on the team. I believe that this work I am currently doing will mean that I will not have such a steep jump up when I make the team.

15. My testosterone levels are well below the levels required to meet NCAA eligibility for cross country and track.

16. I intend to do what I need to do academically so I can be NCAA eligible as soon as possible.

17. I want to try out for the BSU Women's Cross Country Team at least one more time. I definitely

want to do so in Fall 2023 because it could be my very last opportunity. I want to show myself that I can be competitive in a sport I love. I love running and I will always love running. But I also found it late, in high school, and I am still in the process of seeing out my potential.

My Participation in BSU Women's Club Soccer

18. I joined the BSU Women's Club Soccer Team during the Spring 2022 semester.

19. I loved playing on the team. It is a healthy outlet for me.

20. I am playing for the BSU Women's Club Soccer Team right now. Practices started on August 29.

21. I intend to play for the BSU's Women's Club Soccer Team this semester, next semester, and through the remainder of my time at BSU.

22. Playing for the team allows me to connect with people, compete, and improve at a sport that I wasn't great at going into it. The others on the team played soccer in their high school years. I did not. I started behind and I enjoy the process of getting better at something, and seeing the small improvements. And I love the camaraderie of being on a team.

I certify under penalty of perjury pursuant to the laws of the United States that the foregoing is true and correct.

Executed this 21 day of September, 2022.

Lindsay Hecox

Lindsay Hecox

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on September 23, 2022, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system which sent a Notice of Electronic Filing to the following persons:

Bruce D. Skagg (bruce@skauglaw.com) Roger G. Brooks (rbrooks@ADFlegal.org) Kristin Waggoner (kwaggoner@ADFlegal.org) Raul R. Labrador (raul@skauglaw.com) Christiana Holcomb (cholcomb@ADFlegal.org)	Steven L. Olsen (steven.olsen@ag.idaho.gov) W. Scott Zanzig (scott.zanzig@ag.idaho.gov) Dayton P. Reed (dayton.reed@ag.idaho.gov) Matthew K. Wilde (mattwilde@boisestate.edu)
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/s/ Kathleen Hartnett
Kathleen Hartnett