Labiaplasty – Mind the Gap

How the female genital cosmetic surgery industry has exposed gaps in medical anatomy education

Jennifer Anne Hayes MBBS

ORCID identifier: **0000-0003-4281-9607**

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Department of General Practice

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Abstract

Background: In the PhD research described herein, I used the female genital cosmetic surgery (FGCS) industry to illustrate a contemporary challenge to traditional representations of female genital anatomy. The most popular of the FGCS procedures, labiaplasty, involves trimming the labia minora so that they sit level with or are completely obscured by the labia majora. The labiaplasty market is booming. The anatomical criterion behind the justification for labiaplasty is problematic, because *normal* labia, which show a range of size, shape and asymmetry, are being confused with *idealised* labia, as promulgated on social media and cosmetic surgery websites. Cosmetic surgery websites use the term *hypertrophy* for protruding labia to imply a pathological condition requiring surgery, even though the labia have an important role in sexual response. Critically, anatomists have been absent from public and medical discourse about the FGCS industry, despite playing a pivotal role in the education of the next generation of doctors. It has been claimed that all medical and non-medical curricula lack genital anatomy education. My research explored whether the teaching of anatomy has, can or should play a role in informing frontline practitioners about the normal variation in structure and functions of female genitalia.

Methods: I employed a qualitative methodological approach to explore how female genital anatomy is represented in the scientific literature, anatomical textbooks and anatomy education, and whether that content has changed over time.

Results: My literature review identified an evidence base for *normal* in 12 population-based studies that recorded labial dimensions and showed wide variation in labial width and length. Protruding labia and asymmetry were common. An analysis of 78 historic and contemporary anatomy texts mapped representations of female genital anatomy

over time, and confirmed that the spectrum of normal appearance for the vulva was not acknowledged in English-language anatomy textbooks. A series of semi-structured interviews with Australian anatomists identified barriers and facilitators for teaching vulval anatomy. Barriers included lack of connection to contemporary clinical practice, technical difficulty and time involved in updating presentations, the crowded curriculum, and personal reticence about teaching genital anatomy. Facilitators included lived experience of vulval morphological variation and social media. Themes around inclusivity also emerged during the interviews, with reluctance to experiment with inclusive terminology identified as another barrier to teaching female genital anatomy.

Conclusion: My study provided the first evidence for diverse vulval morphology, and incorporated the first published qualitative investigation of the teaching of female genital anatomy. It established that vulval anatomy in textbooks and teaching does not acknowledge morphological diversity and function, knowledge required by general practitioners when advising patients requesting labiaplasty, and for which published evidence now exists. The anatomists interviewed acknowledged the importance of teaching about anatomical variation and using inclusive language in a contemporary society that is embracing non-binary views of gender. Results from this study will inform future development of anatomy curricula and resources, and inclusivity guidelines, and enable the discipline of anatomy to enter and influence contemporary discourses about genital and gender diversity.

Declaration of Authorship

I, Jennifer Anne Hayes, declare that this thesis and the work presented in it is my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a PhD at this University.
2. Where I have consulted the published work of others, this is always attributed.
3. Where I have quoted from the work of others, the source is always given.
4. Where the thesis is based on work done by myself jointly with others, I have made clear the contribution by others and by myself.
5. This thesis is less than 100,000 words in length, exclusive of tables, figures, references, and appendices.

Signed: [removed for security purposes]

Date: 01/06/2023

Preface

All of the work presented herein is my own original research, conducted under the supervision of Professor Meredith Temple-Smith. My and Professor Temple-Smith's contributions to published and submitted papers are shown below.

Published Articles

Hayes JA, Temple-Smith MJ. What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy. *Aust N Z J Obstet Gynaecol* 2021; 61:331–338. (Chapter 6)

Author	Conception	Design	Data collection	Analysis	Writing
Hayes	80%	80%	100%	90%	80%
Temple-Smith	20%	20%	0	10%	20%

Hayes JA, Temple-Smith MJ. New context, new content – rethinking genital anatomy in textbooks. *Anat Sci Educ* 2022; 15:943–956. (Chapter 7)

Author	Conception	Design	Data collection	Analysis	Writing
Hayes	90%	90%	100%	90%	95%
Temple-Smith	10%	10%	0%	10%	5%

Hayes JA, Temple-Smith MJ. Teaching vulval anatomy in the twenty-first century: The Australian experience. *Anat Sci Educ* 2023. https://doi.org/10.1002/ase.2264 (Chapter 8)

Author	Conception	Design	Data collection	Analysis	Writing
Hayes	90%	80%	100%	80%	95%
Temple-Smith	10%	20%	0%	20%	5%

Manuscripts Submitted for Publication

Hayes JA, Temple-Smith MJ. Anatomical variation in anatomy curricula: The Australian experience. Submitted to *Anat Sci Ed* on 30 Apr 2023 (Chapter 9)

Author	Conception	Design	Data collection	Analysis	Writing
Hayes	90%	80%	100%	80%	95%
Temple-Smith	10%	20%	0%	20%	5%

Conference Presentations During Candidature

Anatomy Textbooks – Mind the Gap. Oral presentation, *The Scottish Society of the History of Medicine Special Symposium on Teaching Anatomy from Classical to Modern Times*. Mar 12,26, 2021

Anatomy Textbooks – Mind the Gap. Oral presentation, *Experimental Biology*. Apr 27–30, 2021

Labiaplasty – Mind the Gap. Invited presentation, *Australian Society for Psychosocial Obstetrics and Gynaecology Webinar*. June 16, 2021

New context, new content – rethinking genital anatomy in textbooks. Member-focused extended presentation, *Australian and New Zealand Association of Clinical Anatomists Conference* (virtual), Dec 1–3, 2021

New context, new content – rethinking genital anatomy in textbooks. Invited presentation, *Federative International Program for Anatomy Education Symposium* (virtual), Dec 15, 2021

Where to next for anatomical variation? Oral presentation, *Australian and New Zealand Association of Clinical Anatomists Conference*, Dec 7–9, 2022

Translation of Research Findings

Components of this thesis have been translated into practical or potentially practical outcomes, as follows.

Delivery of four special research lectures (2018–22) to undergraduate anatomy students at the University of Melbourne (resulting in many requests for Honours projects).

Delivery of three genital diversity workshops within the MD Discovery Program, University of Melbourne.

Ongoing email communication and meetings with the editors of *Gray's Anatomy* and *Clinically Oriented Anatomy* about including the normal range of vulval morphology in their textbooks.

Development of a photographic teaching and textbook resource to illustrate normal vulval morphological variation (Appendix A).

Invited membership of the International Committee of Equity and Diversity in Anatomy, which reports to the International Federation of Associations of Anatomists. The Committee was set up to advise anatomists and inform them of how equality and diversity affects their academic activities, which makes it a perfect voice for my research.

Editorial Assistance

Dr Campbell Aitken provided professional editing services in accordance with the Institute of Professional Editors' *Guidelines for editing research theses*. Dr Aitken is not knowledgeable in the academic discipline of the thesis.

Financial Support

This research was supported by an Australian Government Research Training Program Scholarship.

Acknowledgments

First and foremost, this work benefited enormously from the incredible guidance and patience of my supervisors Professor Meredith Temple-Smith and Professor Lena Sanci. You encouraged me to believe in my research. Your input has been invaluable, and I have learned so much from you. Thank you both.

The work of contemporary artist Jamie McCartney, filmmaker Elliott Watson and academic historian Dr Yves Rees inspired my research, probably without realising it! The tendency of my discipline colleagues to simplify the human body to one version, easier to teach and easier for the students to learn, was always my frustration without context until Jamie, Elliott and Yves demonstrated to me the social impact of such simplification. And so, my PhD topic was born.

I was fortunate to interview some incredible anatomists as part of my research, and without them this thesis would have been a lesser product. I thank them all for their time and for sharing their experiences. I am also grateful to Dr Campbell Aitken, who provided professional editing services in accordance with the Institute of Professional Editors' *Guidelines for editing research theses*.

Finally, my family were and remain a constant source of support, and I am so grateful for their encouragement. Nigel and Edward – I don't know how I would have got through without you. Thank you for believing in me. Love always.

COVID-19 Impact Statement

As part of its response to the COVID-19 pandemic, the Australian state of Victoria experienced six lockdowns between March 2020 and October 2021 that collectively totalled 262 days (one of the longest total COVID-19 lockdown durations in the world). Victorian government regulations limited all social contact, and the University of Melbourne closed its campuses. These restrictions hampered face-to-face research and data collection substantially.

COVID-19 interrupted my original PhD project structure and plans for data collection and analysis, which required adjustment to allow for remote and online research. All supervision was conducted virtually, and I was removed not only from all collegiate support, but the support of my family and friends, because I live alone.

Victoria's lockdown measures included the closure of libraries, which limited access to historic and contemporary texts held locally, whilst Australian borders were closed between March 2020 and February 2022, completely excluding access to international holdings. Few of the historic texts I needed were digitised. Notes and images from my preliminary pre-COVID-19 investigations of textbook holdings became the data for analysis. This required laborious communications with librarians here and overseas and slow and painstaking image manipulation.

COVID-19 related closure of university campuses and state borders also made recruitment of interview participants at conferences and face-to-face interviews impossible. Virtual recruiting and interviewing academics, who were themselves busy creating new online resources, was a slow process.

This statement does not imply that the research and thesis were completed to a lower standard than originally intended.

Signed: [removed for security purposes]

Table of Contents

List of Figures

Note: figures shown in published or submitted manuscripts that form part of this thesis are not listed here.

List of Tables

Note: tables shown in published or submitted manuscripts that form part of this thesis are not listed here.

Abbreviations

AACA	American Association of Clinical Anatomists
AMC	Australian Medical Council
AMSA	Australian Medical Students' Association
FGCS	female genital cosmetic surgery
FGM	female genital mutilation
FGSIS	Female Genital Self-Image Scale
FSFI	Female Sexual Function Index
FTM	female to male
GP	general practitioner
LME	labia minora elongation
MeSH	medical subject headings
MTF	male to female
OR	odds ratio
PPE	peer physical examination
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SD	standard deviation
UK	United Kingdom
US/USA	United States
WHO	World Health Organization
2D	two dimensional
3D	three dimensional

Prologue

Throughout my 30-year career as a clinically trained teaching anatomist, I was frustrated by what I observed to be two popular mindsets. The first was the perception that the body of knowledge pertaining to the discipline of anatomy is immutable – an old-fashioned discipline in which everything that needs to be known is known, so that educational content and practices don't ever need to change. The second mindset was the tendency of some anatomy educators to teach only one version of the human body, easier for anatomists to teach and easier for students to learn. These frustrations lacked a specific context until the contemporary practices of the FGCS industry demonstrated to me the social impact of failing to communicate that morphological variation is normal.

The most popular of the FGCS procedures is labiaplasty, which involves trimming the labia minora so that they sit level with, or are completely obscured by, the labia majora. Current social perception is that this pre-pubescent vulval appearance constitutes *normal*. Resection of a structure, which is normally diverse in appearance and contributes to sexual pleasure, to comply with a narrow social *ideal*, can only serve the surgeons who are creating an expanding subpopulation of women who want to change the appearance of their genital anatomy, by "ever-narrowing definitions of normal which help turn the complaints of the healthy into the conditions of the sick" (Moynihan, 2003, p. 47).

What does it take, I wondered, to convince a woman that the appearance of her vulva is normal? I realised there was a pervasive lack of information and plenty of misinformation about normal vulval anatomy. To obtain preliminary data about these problems, I co-supervised a student project, a small qualitative study of 21 Australian university students, which found that many of the participants were not only unsure

about what constituted normal genital anatomy, but even to which parts the word "vulva" referred (Howarth et al., 2016).

In 2019, I met with British sculptor Jamie McCartney, who made 400 plaster casts of vulvas of volunteers of all ages to create an artwork he titled *The Great Wall of Vagina* (McCartney, 2011). But why was it called *The Great Wall of Vagina*, I wondered, when it clearly depicts vulvae? Said Jamie, "I chose a word in common usage instead" (see https://www.thegreatwallofvulva.com/vagina-vs-vulva/).[1] The same observation and motivation were reiterated by Florence Schechter, curator, when naming The Vagina Museum in London (Florence Schechter, personal communication, 13 August 2019).

It seems that lack of information about the normal vulva is not just an issue for the general public. A survey of 433 Australian GPs found that more than half had been consulted by patients seeking FGCS, and that 75% thought they had inadequate relevant knowledge (Simonis et al., 2016), because, it was claimed, "genital anatomy education is lacking from all medical and non-medical curricula" (Simonis, 2019, p. 130). This critique of anatomy teaching, which focused on absent critical content and lack of contemporary clinical relevancy, took me back to the mindsets described at the beginning of this section. I had to find out if this claim was true!

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[1] On 3 Nov 3 2022, *The Great Wall of Vagina* was renamed *The Great Wall of Vulva*. According to Jamie McCartney, "It was time. The common parlance is changing and using 'vulva' reflects this. Up until this year I felt the usage of vulva was still rather minimal in the general population. Indeed, it still is but there is a trend towards change and reflecting that makes it easier for educators to use the work" (Jamie McCartney, personal communication, 22 Jan 2023).

Chapter 1: Introduction

In anatomy, *normal* embraces a range of morphologies, including those that are most common; others, called *variations*, appear less frequently but are not considered abnormal (Willan & Humpherson, 1999). Many centuries, and dissections by famous anatomists such as Vesalius, Da Vinci and Gray, were necessary to define *normal*, in anatomical terms, as a range by "aggregating observed variations" (Cryle & Stephens, 2017, p. 92).

In this research project, I aimed to test my personal theory that the discipline of anatomy and its practitioners were failing their contemporary student cohorts by not evolving with new knowledge and sociocultural change, which should inform clinical practice. Embedded in this failure to evolve was an apologist mentality for the complexity of the human body, which resulted in "simplification and universalization" (Moore & Clarke, 1995, p. 255) to the one version only, easier for anatomists to teach and easier for students to learn.

The FGCS industry provided the perfect context to test this theory, because it is based on the premise of the existence of a single idealised version of normal. There are obvious falsehoods to be challenged, and anatomists could make an important contribution to this process. Instead, the discipline of anatomy has been openly criticised as missing in action from its role in education and preparation of the next generation of GPs who will be advising patients contemplating labiaplasty (Simonis, 2019).

At stake here is the knowledge base about normal vulval morphology and function. Is there an evidence base for *normal*? If so, how is and has the *normal* vulva been represented in anatomy textbooks and teaching? Is it being taught to contemporary student cohorts, and can or should the discipline of anatomy fill the gap in the discourse about *normal* versus *ideal*?

This thesis is structured as follows.

Chapter 2 covers the anatomy of the vulva from a discipline viewpoint, and then looks at how that same vulval anatomy has been socially constructed in the scientific and sociopolitical literature throughout history. This is an important lens because it has been theorised that the contemporary link between protruding (visible) labia minora and the need for surgical "repair", which the FGCS industry exploits, is informed by early anthropological and medical science discourses that associated labial protrusion with race and deviant femininity (Nurka & Jones, 2013).

Chapter 3 covers historic and contemporary practices of female genital modification including FGCS and female genital mutilation (FGM). It explores how and why cosmetic surgery procedures on the vulva have become normalised and legitimised despite critiques of cultural hypocrisy and dubious legal standing when considered alongside laws banning FGM.

Chapter 4 presents my investigation of whether the discipline of anatomy, through its teaching and resources, has engaged with the debate about *normal* versus *ideal* with regard to vulval anatomy. The contemporary student cohort contains not only future health professionals but those who might be considering labiaplasty. A search of the existing literature was undertaken to determine whether and how female genital anatomy education is included in medical curricula.

The literature search findings outlined in chapter 4 were used to generate research questions and to inform the detailed methodological approach presented in Chapter 5.

Key findings from investigations of individual research questions are presented in Chapters 6–9, each in the form of a preamble and then a paper. Three of the included papers have been published (Hayes & Temple-Smith, 2021; Hayes & Temple-Smith, 2022; Hayes & Temple-Smith, 2023), and one is currently under review.

Key findings are discussed in Chapter 10 with consideration of the broad context introduced in the first three chapters of the thesis.

My research coincided with a period of significant change for the discipline of anatomy. Volume 305, issue 4 of *The Anatomical Record*, published in early 2022, set the agenda for the discipline to "move forward to create a more diverse, equitable, and inclusive future for students, teachers, colleagues, and everyone else we touch through our work as anatomists" (Organ & Comer, 2022, p. 766). Consequently, Chapter 10 includes a discussion of my research findings in the context of sex, gender, binarism and inclusivity – an evolving component of my work.

Chapter 2: Female Genital Anatomy

> *The dictionary definition of male genital structures describes their function and action. The corresponding definition for female genital structures refers to their location only.* (My summary of Braun & Kitzinger's [2001] findings)

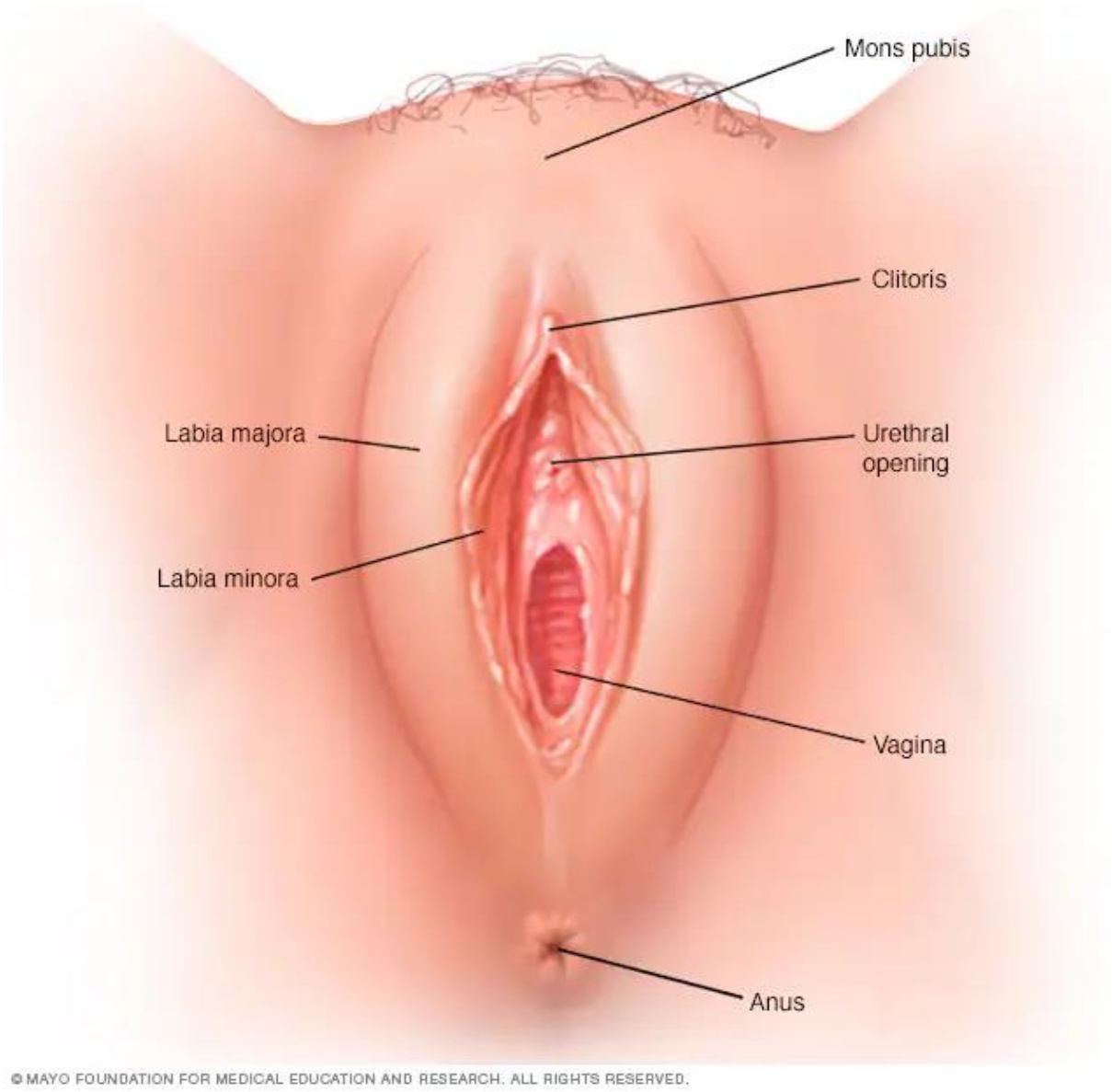
This chapter details the anatomy and development of the vulva from an anatomy discipline viewpoint, and then looks at how that same vulval anatomy has been socially constructed in the scientific and sociopolitical literature throughout history. It is especially focused on the labia minora and clitoris, because these are the structures most subjected to cultural and cosmetic manipulation.

2.1 Anatomical Viewpoint

The vulva is poorly described and understood (Crouch, 2019). It comprises the female genital organs contained within the region bounded by the mons pubis at the base of the abdominal wall, the anus, and the inner thigh on either side. The contained structures are the labia majora (outer lips), labia minora (inner lips), the vestibule, and the clitoris (Figure 2.1).

The labia majora and minora are the concentric folds that surround the clitoris (an organ for sexual stimulation) and the vestibule which contains the openings of the urinary and reproductive tracts (urethra and vagina). The vagina, which is sometimes used as a misnomer for the vulva, is actually the muscular tube leading from the cervix of the uterus to open into the vestibule (Figure 1).

Figure 1. Basic anatomy of the vulva



Source: https://www.mayoclinic.org/vulva/img-20005974

The labia majora consist of hair-bearing skin that further extends over the mons pubis and sometimes onto the thighs. Each labium majora contains fibrofatty tissue to a varying degree, which may result in a full and tight or lax and baggy appearance. Between the labia majora and the labia minora is a deep groove, and the inner aspect of the labia majora forming that groove lacks hair (Figure 2).

The labia minora are cutaneous folds without hair or fat that lie internal to the labia majora. The upper or superior ends of the labia minora split to form the (dorsal) prepuce and (ventral) frenulum of the clitoris, while inferiorly the labia minora are united by a small transverse skin fold, the frenulum of the labia (Figure 2).

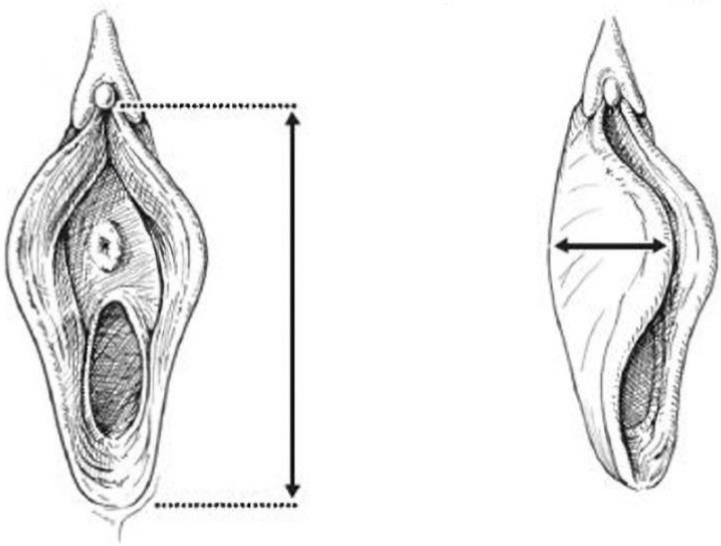
Figure 2. Detailed anatomy of the vulva

Source: Netter (2014, plate 354)

The dimensions of the labia minora are particularly relevant to my research. The length of the labia minora is measured between the frenulum of the clitoris and the frenulum of the labia minora (Figure 3A). The width (sometimes referred to as depth) of the labia minora is

measured from base to margin, at the point of maximal protrusion and without stretching (Figure 3B).

Figure 3. Dimensions of labia minora

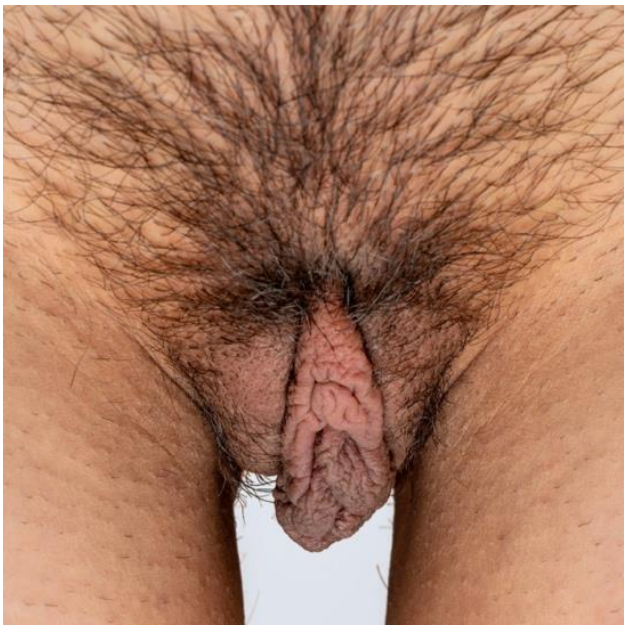


A) length of labia minora B) width of labia minora

Source: adapted by the author from Brodie et al. (2019)

Labia minora are rich in elastic fibres and small blood vessels that are arranged to form erectile tissue like that in the penis. The shape and appearance of the labia minora have many variations, and asymmetries are very common. Pigmentation is often present. In the standing position, labia minora may be tucked away and not visible from above or they may protrude beyond the labia majora (Figure 4), in which case the protruding parts have been described as resembling a scrotum (Pappis & Hadzihamberis, 1987).

Figure 4. Protruding labia minora in the standing position



Source: teaching resource developed by author, Appendix A

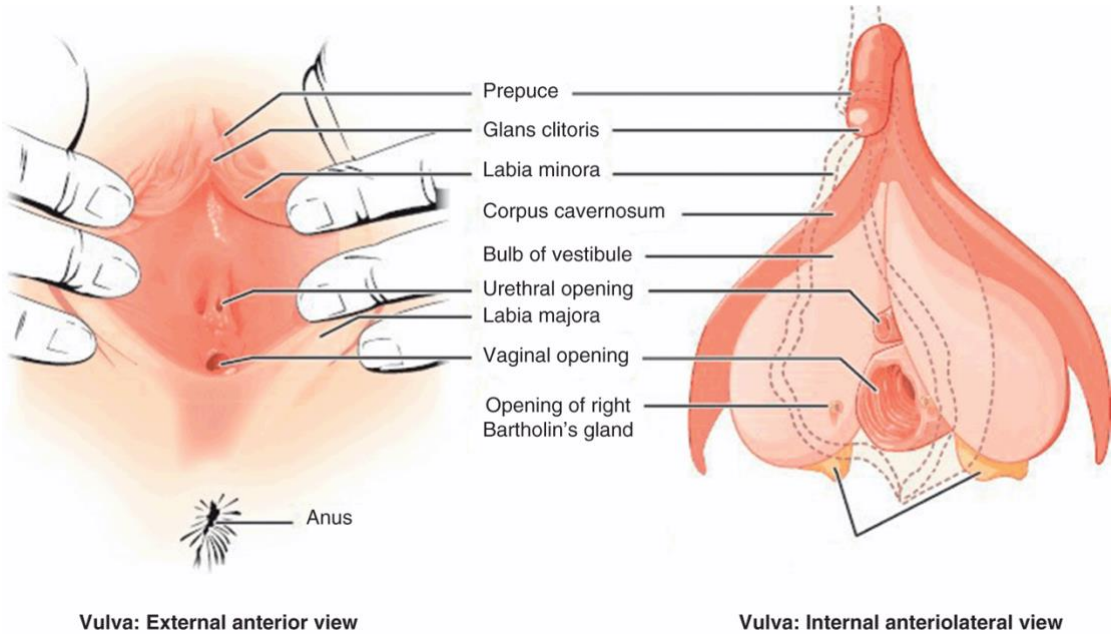
The labia minora take many years to develop fully and change significantly over a woman's lifetime (Sacher, 2019). The main functions of the labia minora are to protect the vaginal and urethral openings, direct the flow of urine, and contribute sensory and erectile tissue for sexual arousal and intercourse. In 2009, British cosmetic surgeon Erik Scholten wrote that subtotal or total amputation of the labia "are potentially dangerous procedures, where the function of the labia can be severely impaired leading to vaginal irritation and dryness" (Scholten, 2009, p. 291). It has been widely claimed that amputation should be limited to a retained width of at least 1 cm to avoid compromising these important functions (Choi & Kim, 2000; Dobbeleir et al., 2011; Hodgkinson & Hait, 1984; Maas & Hage, 2000), but it remains unclear whether this 1 cm limit has been validated in any way (Motakef et al., 2015).

The clitoris is the erectile structure partially enclosed by the divided superior ends of the labia minora. Described as "an iceberg, with only the tip being visible" (Crouch, 2019, p. 14), it consists of paired roots (the *crura*, singular is *crus*) which continue as paired erectile masses

(*corpora cavernosa*, singular is *corpus cavernosum*) that unite to form a cylindrical body, all of which are deeply placed and comprised of erectile tissue. The head (or glans), the midline tip of the body, is non-erectile, and is the only externally visible feature of the clitoris. It may be partially exposed in its resting state or completely "hooded" by a loose fold of skin, the prepuce (Figure 5).

Adjacent to the crura are the bulbs of the clitoris (also known as vestibular bulbs because they are situated in the vestibule), which are aggregations of erectile tissue on either side of the urethral and vaginal orifices (Figure 5). The distal vagina, urethra and clitoris have been described as an integrated entity, termed the clitoral complex, and identified as the location of female sexual activity, analogous to the penis (O'Connell et al., 2008).

Figure 5. Anatomy of the clitoris



Source: Crouch (2019)

The clitoris becomes engorged with blood during sexual arousal. The venous valves close, facilitating and maintaining erection, contributing to sexual arousal and the achievement of orgasm.

The erectile tissue of the labia minora also becomes engorged during sexual arousal, and some studies have explored whether there is a direct relationship between labial size and degree of sexual arousal. In a United States (US) study of 62 sexually active women aged between 18 and 60 years, researchers asked participants to use a validated Self-Assessment of Genital Anatomy and Sexual Function (L-SAGASF-F) tool, which included anatomical graphs, to assess their labial size and rate sexual pleasure and orgasm intensity. They found that those who rated their labia minora as large (11%) reported greater sexual satisfaction, more frequent sexual intercourse, and more intense orgasms than women with small labia (3%) (Schober et al., 2015). This correlation was not corroborated in two subsequent studies of 208 and 32 participants respectively (Kaya et al., 2020; Krissi et al., 2016), in which components of the vulva, including labia, were objectively measured by one (Krissi et al., 2016) or two (Kaya et al., 2020) gynaecologists in a clinical setting. A validated sexual function questionnaire (the PISQ-12), which included questions about sexual desire, orgasm frequency, arousal frequency and sexual satisfaction (Krissi et al., 2016), or the validated and widely used Female Sexual Function Index (FSFI) and Female Genital Self-Image Scale (FGSIS) (Kaya et al., 2020) were used to assess sexual function. In these studies, there was no demonstrated statistical relationship between labial size and sexual function. Body image and genital perception have also been shown to reduce sexual desire, arousability and sexual satisfaction (Amos & McCabe, 2016; La Rocque & Cioe, 2011; Satinsky et al., 2012) so, based on the current literature, it is not possible to equate sexual satisfaction solely with structural dimensions.

Arterial supply to the labia minora is abundant via the internal pudendal artery “and its local interruption will seldom result in ischemia in women without circulatory risks factors such as tobacco abuse, diabetes mellitus, or other vascular disorders” (Lange et al., 2023, p. 6). The sensory innervation is, however, potentially impacted in labiaplasty procedures. It is provided

by posterior labial branches of the perineal branch of the pudendal nerve and is especially dense along the free rim of the labia minora (Figure 6). Innervation is unidirectional, and transection of fibres may result in loss of sensation, reducing sexual function (Alter, 2008; Yang & Hengshu, 2020).

Figure 6. Nerve supply of the vulva

Source: adapted from Netter (2014, plate 391)

2.2 Historic Representation

> *"Three things are insatiable", runs a Muslim aphorism, "the desert, the grave, and a woman's vulva."* (Hickman, 2013, p. 130)

The vulva was a recurring motif in the discourses of early anthropological and medical sciences that gave labial protrusion a notorious association with race and deviant femininity (Nurka & Jones, 2013). The contemporary feelings of genital shame and abnormality that motivate women to seek FGCS are postulated to be rooted in the history of medico-scientific descriptions of the vulva (Nurka, 2019).

Vesalius (1514–64), considered to be the founder of modern human anatomy, was the first to assign a name (*nymphae*) to the labia minora. He observed their capacity to become "a marker of difference *between women*" (Nurka, 2019, p. 64), and wrote:

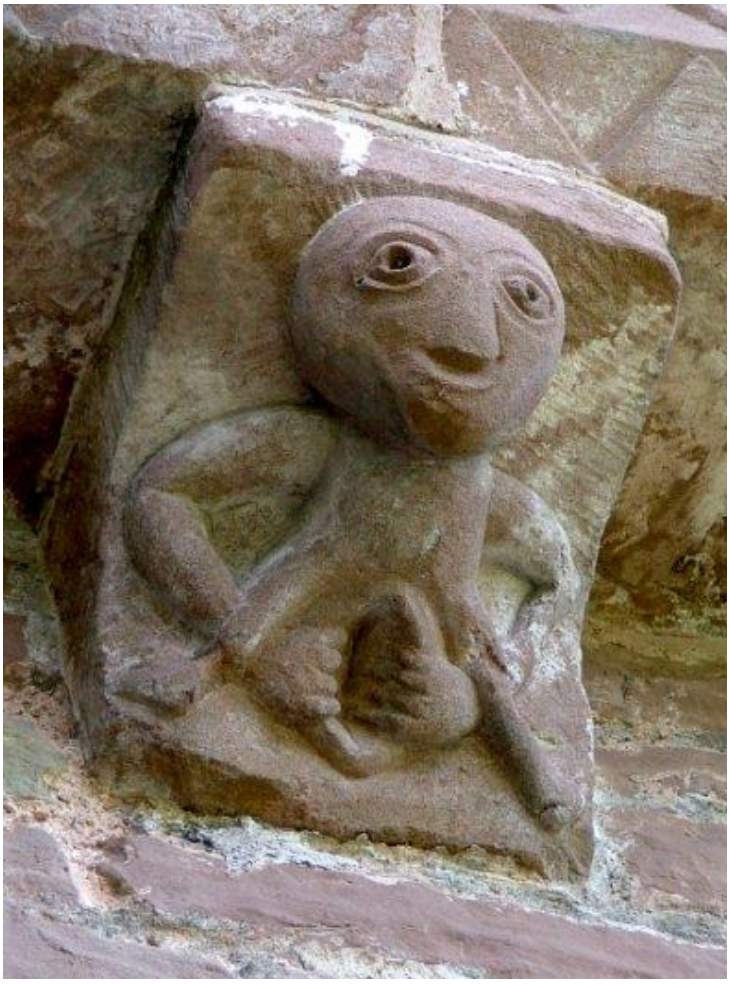
> in some women (they) grow so large as to be ugly and embarrassing and in many cultures this is regarded as a sign of gross immorality, though the truth is rather that, being continually chafed by garments they simulate lust and arouse the desire for venery. (Vesalius et al., 2007, p. 184)

Thomas Bartholin, a 17th-century physician and anatomist, likewise observed that nymphae "do hang down very long, yea in Whores that trade with these parts" (Bartholin, 1668, p. 77); whilst Francois Mauriceau asserted that they were "pendent in those who often copulate" (Mauriceau & Chamberlen, 1736, p. 34). By the 19th century, it was said to be common knowledge amongst medical men that "prostitutes had abnormally enlarged genitals" (Nurka, 2019, p. 65).

Whilst medical science was focused on the pathological, art focused on the grotesque. Figurative carvings of naked women on cathedrals and castles throughout Europe displayed exaggerated, gaping vulvae. Known as Sheela-na-gigs and thought to date to between the 12th

and 14th centuries, the recurring figure was typically caught mid-squat, legs apart and using hands to open the vulva for display (Figure 7). One of many theories was that Sheela-na-gig carvings depicted the sin of lust and acted as a warning to medieval Christians to keep their thoughts pure (Rees, 2015).

Figure 7. A Sheela-na-gig, Church of St Mary and St David, Kilpeck, UK, c. 1140



Source: https://en.wikipedia.org/wiki/Sheela_na_gig#/media/File:SheelaWiki.jpg

In early Hindu erotology, genital proportions were juxtaposed with capacity for love and lust. Women were classified as *lotus woman,* the perfection of womanhood, her vulva smooth and tiny resembling the lotus bud; *art woman,* the perfection of courtesans, her vulva a trifle plumper, with thin downy hair; *shell woman,* the common variety and ideal wife for labour and breeding with larger vulva covered with thick hair, or *elephant woman,* the most

undesirable with rabid sexual capacity and thick protruding labia and clitoris (Edwardes, 1969).

These associations of sexual voracity and enlarged labia eventually merged with a similar perception of the black female when 18th and 19th-century anthropologists became interested in the shape and size of the labia of African women, especially the indigenous Khoi women from the Cape of Good Hope, known as Hottentots (or sometimes Bushwomen). Their elongated labia were dubbed the *Hottentot apron*. Whilst many groups of African blacks were known to Europeans, the Hottentots came to represent the essence of the black female and the primary signifier of black sexuality in the 19th century (Gilman, 1985).

The key Hottentot figure was Saartjie Baartman (often referred to as Sarah Baartman), a Khoi woman whom British surgeon Alexander Dunlop convinced to travel to England in 1810 and exhibit herself both to circus audiences and medical men (Figure 8).

Baartmann was exhibited not only to show her genitals but another anomaly that captivated the European audience: the steatopygia, or protruding buttocks (Gilman, 1985). Both anatomical features were used to draw the damaging conclusion that European and African women were inherently different, and to further a linkage previously drawn in natural history, between the African and the ape (Wiegman, 1995). Comparisons of Hottentot women to ape bodies were rife at the time, positioning "the Khoi as the bestial intermediary between the animal and the human" (Nurka, 2019, p. 98). Historian Edward Long (1774), in his highly influential *History of Jamaica*, wrote "ludicrous as the opinion may ſeem, I do not think that an oran-outang hufband would be any diſhonour to an Hottentot female" (p. 364).

Figure 8. Saartjie Baartman

Source: https://aaregistry.org/story/saartjie-baartman-born/

After Hottentot women came to embody that absolute difference between black and white, the scientific literature turned to examine genital morphology in other races. In the illustrated work *Woman: An Historical, Gynaecological and Anthropological Compendium* by German anthropologists Heinrich Ploss, Max Bartels and Paul Bartels, descriptions, including illustrations, of vulval morphological variation were restricted specifically to non-white races (Dingwall, 1935). Multiple explicit nude photographs contained within the publication showed white women standing modestly in classical poses against scenic backgrounds, whilst *other* women appeared as natives, with protuberant labia clearly visible. The viewer was actively invited to draw comparison. Japanese genitalia, especially, were observed to be "not aesthetically pleasing to European eyes, either in form or colour" with "the slightest possible development of the outer labia and a strong protuberance of the inner" (Dingwall, 1935,

p. 322). In Japan though, this “winged butterfly” appearance was considered both attractive and feminine (McDougall, 2021).

Figure 9. European brunette

Source: Dingwall (1935, p. 176)

Figure 10. Japanese woman with elongated nymphae

Source: Dingwall (1935, p. 329)

By the beginning of the twentieth century, the gaze had shifted away from the anthropological towards the behavioural. Robert Latou Dickinson, an eminent American obstetrician and marital/sex therapist, provided detailed measurements and meticulous illustrations of “hypertrophied” labia minora in a paper titled *Hypertrophies of the Labia Minora and Their Significance* (Dickinson, 1902). In this paper, Dickinson presented his observations of 427 cases of various labial hypertrophies and concluded that hypertrophy of the labia minora was not a feature of race but, rather, acquired through masturbation. Dickinson was convinced that vulval morphology revealed the masturbatory habits of his female patients, at a time when the practice of masturbation was considered a social evil that purity movements in England, USA and Canada were committed to eliminating (Green, 2005).

Both racial and sexual deviancy were ultimately discredited as scientific explanations for labial hypertrophy. The growing trend in the 20th century, particularly in the USA, was to describe normal sexual behaviour, which resulted in the normalising of masturbation (Davis, 1929; Kinsey et al., 1953). Following a study in which five gynaecologists (three male, two female) performed tactile stimulation on the vulvae of 879 females, by gently stroking with a glass, metal or cotton tipped probe, Kinsey assigned a role to the labia minora in sexual arousal:

> Both the outer and the inner surfaces of the labia minora appear to be supplied with more nerves than most other skin-covered parts of the body, and are highly sensitive to tactile stimulation … As sources of erotic arousal, the labia minora seem to be fully important as the clitoris. (Kinsey et al., 1953, pp. 577–578)

Kinsey's findings gave impetus to the second wave feminist movement of the 1960s and 1970s, which started initially in the USA, and had a major impact on women's knowledge of their bodies. Small groups of women in the Women's Liberation Movement were encouraged to use a mirror and look at their own genitals. A core group of women began sharing genital self-examination with a larger audience via *Women and their bodies,* 193 pages of stapled newsprint initially published in 1970 and distributed in the USA by hand at workshops and amongst friends (Jacobs, 2005). The founding group subsequently formally incorporated as the Boston Women's Health Book Collective in order to negotiate a publishing contract with Simon & Schuster. They changed the publication's title to *Our Bodies, Ourselves: A Book by and for Women* (Boston Women's Health Book Collective, 1973) which went on to sell millions of copies.

How did we "progress" from these 1970s consciousness-raising groups to the thriving FGCS industry of today? It has been postulated that counternarratives that encouraged women to be more comfortable with their bodies through increased awareness of genital appearance also

allowed comparison with others and manipulation by the media, societal expectations, and the medical profession. As I show in Chapter 3, “women have not become liberated about their genital appearance, but anxious” (McDougall, 2021, p. 56).

Chapter 3: Female Genital Modification

> *At the present time, the field of female genital cosmetic surgery is like the old Wild, Wild West: wide open and unregulated*. (Goodman, 2009, p. 156)

This chapter covers historic and contemporary practices of female genital modification as further examples of interaction between the prevailing sociocultural framework and female genital anatomy. Although aesthetic surgery of the female genital structures may appear to be a new trend, social historians have provided evidence demonstrating that socially motivated female genital modification has been around for hundreds of years (Parekh, 2000).

3.1 Historic Practices

Evidence from Egyptian mummies suggests that female circumcision was practised in ancient Egypt 5,000 years ago, most likely based on the ancient Egyptian belief that all women and men possess bisexual souls. They believed that the male soul resided in the clitoris and the female soul resided in the penis, so healthy sexual development required circumcision of both the clitoris and the penis to allow girls to become women and boys to become men (Omar, 2022). In ancient Rome, the labia minora of female slaves were pierced with metal rings to prevent procreation, and in medieval England, high-status women were forced to wear chastity belts to stop them from being sexually active during their husband's long absences (Whitehorn et al., 2002). In Tsarist Russia, and 19th-century England, France and the USA, clitoridectomy was performed to variously cure hysteria, insanity, epilepsy and masturbation (Brown, 1866; Dally, 1991; Dobbeleir et al., 2011; Kandela, 1999; Parekh, 2000).

In Western societies, protruding labia might be considered unattractive but in east and southern African countries, the traditional ritual of labia minora elongation (LME) is practised in the belief that it will enhance sexual pleasure. The labia minora can be extended

to as much as 1.5 inches (approximately 3.8 cm) in length (Gulia, 2017) using a variety of techniques including manual massage, weights and clamps, and the application of herbal balms to facilitate the pulling process (Chubak, 2020; Pérez et al., 2014). Justifications for LME include maximisation of sexual pleasure (including that of the sexual partner), improved hygiene for the vaginal opening, and the entrapment of menstrual flow without pads or tampons (Chubak, 2020). Traditionally, older female relatives implement the practice, which represents a rite of passage into adult womanhood, and girls who refuse to participate risk stigmatisation and rejection by their community (Chubak, 2020; Pérez et al., 2014). Conversely, those who have experienced LME and then move to countries where their genital appearance does not conform with societal norms have been coerced to undergo corrective surgery (Bagnol & Mariano, 2008; Gallo et al., 2010).

3.2 Female Genital Cosmetic Surgery

Genital beauty is culturally defined. Protruding labia minora are considered unattractive by some people in Western societies, and a diverse range of contemporary procedures that alter the structure and appearance of female genitals in the absence of pathology are subsumed under the title of FGCS. These procedures are on the increase, with the number of surgeons offering them increasing steadily over time (see section 3.3). Following liposuction, breast augmentation and rhinoplasty, labiaplasty was reported to be the fourth most common cosmetic surgery procedure in the USA in 2013 (Wilkie & Bartz, 2018) and in the 2000s, FGCS was identified as being as popular as breast augmentation had been 30 years earlier (Braun, 2005; Gurley, 2003; Zielinski, 2009).

Female genital cosmetic surgery procedures include reduction of the labia minora (labiaplasty), reduction of the clitoral hood (labiaplasty and clitoral hood reduction are often performed together because the structures are contiguous), augmentation of the labia majora

(effectively reducing the relative size of the labia minora), vaginal tightening, and G-spot amplification. The procedures are variably performed by gynaecologists, plastic or cosmetic surgeons, or urologists (RACGP, 2015). FGCS is the umbrella term for cosmetic procedures performed on healthy vulvae, and does not include medically indicated surgery on the vulva performed for the management of congenital disorders, inflammatory conditions, malignancy or following childbirth trauma or mutilation (Lowe & Black, 2021).

3.3 The History of FGCS – Emerging Trend to Mainstream Practice

The first description of cosmetic labiaplasty in the plastic surgery literature was a three-case report by Hodgkinson and Hait (1984) who stated by way of surgical indication that "labia minora that protrude past the labia majora are aesthetically and functionally unsatisfactory to some women" (p. 414). In each case, they noted that the patient had been refused labial reduction surgery by her gynaecologist.

Of the FGCS procedures, labiaplasty has recorded the largest rise in worldwide popularity since the early 2000s. In 2019, 12,903 labiaplasties were performed in the USA, a 29.7% increase from 2015 (The Aesthetic Society's Cosmetic Surgery National Data Bank, 2020). Globally, the International Society of Aesthetic Plastic Surgery (2019) reported a 73.3% increase in labiaplasties between 2015 and 2019. This exponential growth, initially in higher-income countries, is now reflected in middle- and low-income countries; for example, the number of labiaplasty surgeries over the past five years in India has reportedly risen dramatically (Desai & Dixit, 2018).

Quoted figures likely underestimate the total number of labiaplasties performed. Plastic/cosmetic surgery numbers do not capture labiaplasties performed by gynaecologists and urologists. In Australia, accurate data is difficult to obtain because most surgeries are performed in the private sector (and cost $3500–$9000, depending on the clinic; Nurka,

2019). An Australian Department of Health review of vulval surgery in 2014 changed the criteria for national health insurance (Medicare) funding of vulval procedures to exclude government reimbursement for surgery for cosmetic reasons alone (Australian Government Department of Human Services, 2014). The Medicare Benefits Scheme item number 35534 (vulvoplasty or labiaplasty) can currently only be claimed "in a patient aged 18 years or more for a structural abnormality that is causing significant functional impairment, if the patient's labium extends more than 8cm below the vaginal introitus while the patient is in a standing resting position" (Commonwealth of Australia, no date). A clinical history detailing the structural abnormality and the need for surgery must be included in the patient notes.

3.4 Suspect Norms and Medical Framing

The prodigious rise in the number of FGCS procedures being performed suggests that the standard of normal or desirable anatomy has shifted in the last 50 years. The aesthetic ideal is now a "clean slit, a minimalist ideal for women's genitals where the labia are symmetrical and do not protrude" (McDougall, 2013, p. 776). This is nicknamed the "Barbie look" because the iconic fashion toy Barbie has no genital structures (Alinsod, 2006; Iglesia et al., 2013; Schick et al., 2011).

Before-and-after photographs of genitals found on websites promoting surgery (e.g., see https://www.vervecosmeticclinic.com.au/gallery/labiaplasty/), which carry the weight of professional respectability, confirm the aesthetic ideal of a "clean slit" just like female genitals commonly on display in digital and print soft pornography. Several studies have confirmed the intersection of media imagery with women's views of normal vulvae (Howarth et al., 2016; Moran & Lee, 2014, 2018; Sharp et al., 2016; Truong et al., 2017).

Explanations for the increasing demand for labiaplasty are numerous. Broader population exposure to pornography (McDougall, 2021), the popular trend for pubic hair removal

(Boddy, 2020; Braun & Tiefer, 2009; Schick et al., 2011; Sharp et al., 2016) and increased social acceptability of cosmetic procedures (Bonell et al., 2021; Braun & Tiefer, 2009) have all been suggested as contributory factors. It has also been speculated that male partner attitudes influence female decision-making. A survey of 2,403 US men showed that 63% showed a preference for partially or completely groomed female genitals and 51% of participants believed that the appearance of a woman's labia influenced their sexual desire. However, 60% of participants denied that labial appearance affected sexual pleasure, and 75% said that they would not encourage their female partner to modify her genital appearance (Mazloomdoost et al., 2015).

Soft-core pornography is instrumental in promulgating the "clean slit" ideal. In Australia, magazines such as *Playboy* and *Penthouse* are subject to the Guidelines for the Classification of Publications, which state; "realistic depictions of sexualised nudity should not be high in impact. Realistic depictions may contain discreet genital detail but there should be no genital emphasis" (Attorney-General's Department, 2005). As a result, genitals in soft-core pornography are often digitally altered, effectively rendering a digital labiaplasty (Drysdale, 2010), and the full range of genital anatomy is only seen in hardcore pornography, "an industry that many would argue demeans women" (McDougall, 2021, p. 61).

It has been postulated that the popularity of pubic hair removal is related to the portrayal of hairless genitals in pornography (Ramsey et al., 2009). Shaving, waxing, electrolysis and laser removal of pubic hair allow unobstructed views of the vulva for both women and their intimate partners which, in turn, may contribute to the perception of aesthetically unpleasing genitalia and increased desire for surgical alteration (Crouch et al., 2011; Plowman, 2010). A US study of more than 2,400 women aged 18–68 years, conducted over a decade ago, found that 79% had partially or totally removed their pubic hair in the past month or were already hair-free (Herbenick et al., 2010). Similarly, an Australian study of 235 undergraduate

students reported that 60% had removed some of their pubic hair, with 48% having removed most or all of it; reasons given included sexual attractiveness and self-enhancement (Tiggemann & Hodgson, 2008).

It is also possible that pubic hair depilation and cosmetic surgery are independent practices with no causal relationship. Using an online questionnaire distributed to 351 adult heterosexual Australian women aged 18–69 years, Sharp et al. (2015) found a positive correlation between the extent of pubic hair removal and consideration of labiaplasty, but concluded that "rather than directly influencing individual genital appearance dissatisfaction and consideration of surgery, the removal of pubic hair could be considered to be a societal setting condition that enables such dissatisfaction with labial appearance" (p. 9).

The business practices associated with FGCS have raised concerns about lack of professionalism and conflict of interest in direct-to-patient marketing on the internet (Chibnall et al., 2020). Cosmetic surgeons use the term *hypertrophy* to describe visible labia minora, and multiple classifications for hypertrophy of the labia minora have been proposed (Cunha, 2011; Felicio, 1992; González-Isaza, 2016; Motakef, 2015), some of which are based on labial width (Figure 3) and some on the extent of tissue protruding beyond the labia majora, so there is no consensus possible on the use of these classifications (De Freitas, 2018). In each case, protruding labia are positioned within the realm of the medical and the pathological.

Histologically, hypertrophy describes enlargement of a structure due to an increase in the size of its component cells. No evidence exists to support an increase in the size of labia minora cells in women with protruding labia minora (AUGS-IUGA, 2022) which suggests that protruding labia are just a variant of normal anatomy.

Marketing by surgeons and popular medical reality TV shows like *Embarrassing Bodies* (e.g., Series 4, Episode 21 – Eglin et al., 2007) have all contributed to the popular perception that labial hypertrophy is a common and curable "disorder". Nurka and Jones (2013) suggested that this linkage between labial hypertrophy and sickness, deviance and sexual shame owes its provenance to the discourses of early anthropological and medical sciences, which gave labial hypertrophy its notorious link with race and deviant femininity, and that the increasing demand for labiaplasty is only new in that it resurrects those historically entrenched narratives (Nurka, 2019).

3.5 Techniques of FGCS and Measuring Outcome

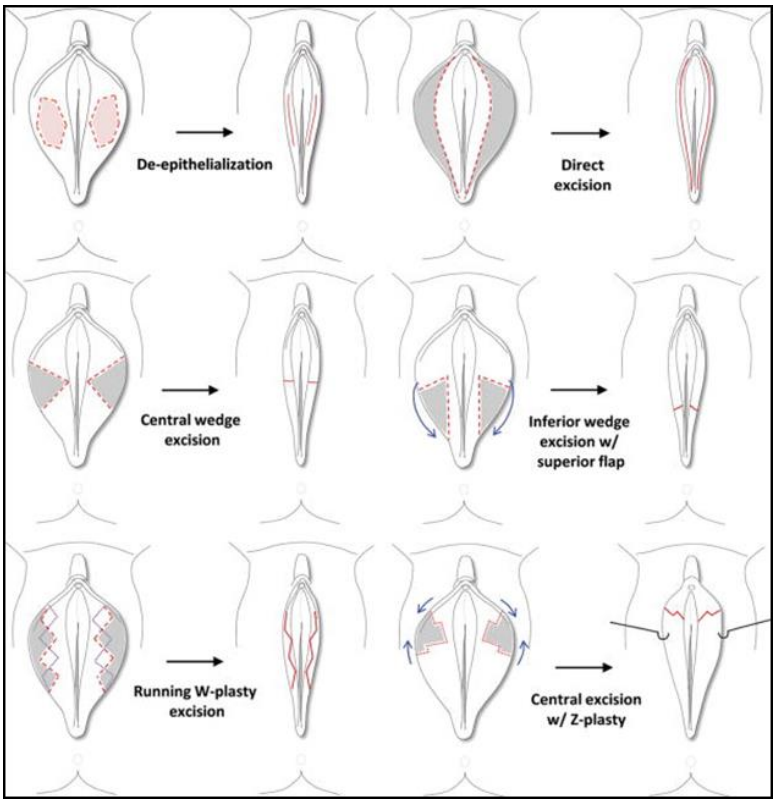
Despite the popularity of labiaplasty, current surgical practice is exceedingly diverse (Figure 11). Edge resection, wedge excision and central de-epithelialisation techniques have been variably described, then modernised and even combined as the three principal techniques for labial reduction (Lange et al., 2023). This diversity of surgical approaches means that no gold standard exists.

Direct excision (also described as edge resection or labial trimming) is where the edge of the protruding labia minora is cut off (Figure 11). This procedure is adaptable to any labial size and shape and runs the smallest risk of wound rupture. But because it removes the natural colour and contour of the free edge of the labium minora, it has more recently been modified to a running W-resection to ensure a more natural-appearing labial edge post-operatively (Lange et al., 2023).

Wedge excision is a more complex procedure usually carried out by plastic surgeons. It involves the removal of a triangular section of the labia whilst preserving the natural contour. The original central wedge excision technique has since been modified to an inferior wedge excision and superior flap technique which creates a less conspicuous scar (Figure 11).

Because full thickness wedge excision creates the greatest risk of wound rupture, a de-epithelialisation technique, which involves partial skinning of the surfaces of the labia rather than full thickness resection (Figure 11), has been advocated more recently, although this technique may result in a line of abrupt change in colour and texture (Lange et al., 2023).

Figure 11. Vaginal labiaplasty: Current practices and a simplified classification system for labial protrusion



Source: Motakef et al. (2015)

No single technique offers the optimal solution in all patients, and various algorithms have been published for choice of labiaplasty technique based on technical and anatomical considerations, as well as individual patient preference (Ellsworth et al., 2010; Lange et al., 2023; Smarrito, 2017; Yang & Hengshu, 2020). Because most of these procedures are carried out in the private sector, there is no obligation on the service providers to audit procedures and publish complication rates. Robust data are sparse, but labiaplasty can cause scarring,

disfigurement, diminished sensation or hypersensitivity, dyspareunia, infection or wound separation, affecting 4–18% of patients (Cain et al., 2013). A 2015 literature review found a 6.8% risk of short-term complications and a 90% global satisfaction rate (Oranges et al., 2015). A cross-sectional satisfaction survey of 17 adolescents who had undergone labiaplasty at the CHU Sainte-Justine Mother and Child University Hospital Centre in Montréal, Canada, reported a 20.5% complication rate with 14% wound rupture, 9.3% significant bleeding and one case of wound infection (Jodoin & Dubuc, 2021). As Michala (2019) noted, there is a particular risk to performing surgery during adolescence, with little yet known about how it will affect childbirth in later years, especially in relation to the likelihood of perineal tears.

Finally, a recent development in the field of FGCS is the marketing of revision surgery for "botched" labiaplasty, which does suggest that there is a degree of disatsifaction after the initial surgery. A content analysis of 12 websites specifically promoting revision labiaplasty reported that they used the same emotive and non-specific terms as those used to promote labiaplasty, so in effect, online advertising is capitalising on unchanged motivations (Learner et al., 2020).

3.6 Legal, Ethical and Feminist Challenges to FGCS

Proponents of FGCS state that if proper perioperative counselling is provided, patients should be free to commission it (Lista et al., 2015).

> It is the obligation of the surgeon to inform the patient fully regarding treatment options and the potential risks and benefits of these options. Once the physician is satisfied that the patient fully comprehends the options, the patient's autonomous decision ordinarily should be respected and supported. (Goodman, 2009, p. 155)

However, the scarcity of data available on long-term outcomes significantly limits the ability to provide proper patient counselling. Professional medical organisations are united in their

concerns about FGCS, the absence of consensus on acceptable clinical indications, and its potentially adverse outcomes (ACOG, 2016; RANZCOG, 2016; RCOG, 2013).

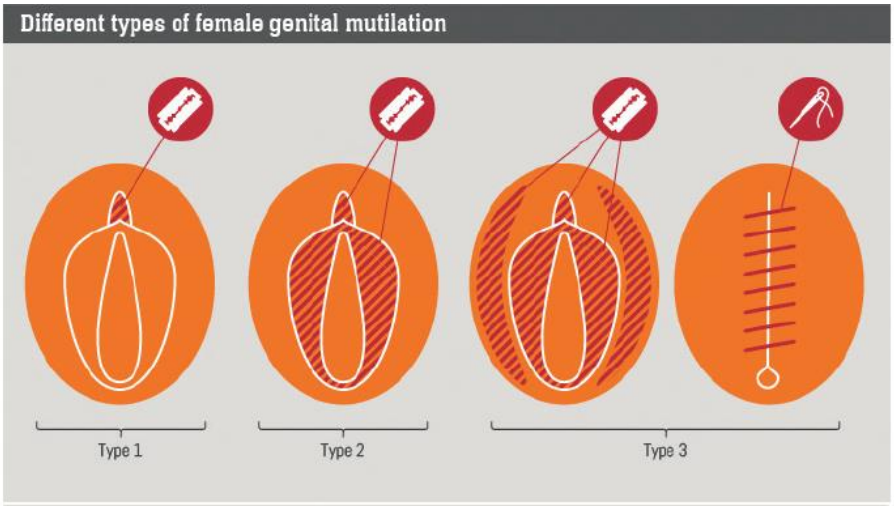
Opponents of FGCS argue that the wide range of *normal* for female genitalia makes surgery unnecessary. The marketing claims suggesting that FGCS procedures enhance sexual pleasure and treat both aesthetic and functional problems result in patients pursuing the surgery for all the wrong reasons (Braun, 2010). A proportion of patients seeking FGCS have body dysmorphic disorder, a psychopathology characterised by excessive preoccupation with an imagined physical defect (American Psychiatric Association, 2013); the underlying behavioural health issues should be treated instead (Spriggs & Gillam, 2016). Those responsible for (re)defining normal female genital anatomy are also profiting directly from the shift in those definitions, which is an inherent conflict of interest (Braun, 2010).

In several countries today, the diverse range of lawful surgical procedures subsumed under the title of FGCS overlap with ritual female genital cutting practices that constitute female genital mutilation (FGM). More than 200 million women and girls alive today have undergone FGM, mostly when aged 5–14 years and mostly in countries in Africa, the Middle East, and Southeast Asia (World Health Organization [WHO], 2023). Both FGCS and FGM result in a reduction in labial and clitoral tissue. In FGM, this is performed to diminish sexual function, which is the exact opposite of the sexual function enhancement and improved partner satisfaction promised on FGCS websites.

The WHO (2023) classifies FGM procedures into four types (Figure 12). Labiaplasty is comparable to FGM classification type 2a: “partial or total removal of the labia minora”. If we acknowledge the anatomical assumption that labiaplasty is indeed comparable to WHO classification type 2a, then its hugely problematic to condone a surgical procedure that is prohibited by law and based purely on patient request. “Given the WHO definition one ought

to conclude that FGM is the fastest-growing branch of aesthetic surgery for white middle-class women in North America and Europe" (Shweder, 2013, p. 357).

Figure 12. Types of female genital mutilation



World Health Organization Classification of Female Genital Mutilation	
Type I: Partial or total removal of the clitoris and / or the prepuce (clitoridectomy)	**Type Ia:** Removal of the clitoral hood or prepuce only
	Type Ib: Removal of the clitoris with the prepuce
Type II: Partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora (excision)	**Type IIa:** Removal of the labia minora only
	Type IIb: Partial or total removal of the clitoris and the labia minora
	Type IIc: Partial or total removal of the clitoris, the labia minora and the labia majora
Type III: Narrowing of the vaginal orifice with creation of a covering seal by cutting and apposition the labia minora and / or the labia majora, with or without excision of the clitoris (infibulation)	**Type IIIa:** Removal and apposition of the labia minora
	Type IIIb: Removal and apposition of the labia majora
Type IV: Unclassified	All other harmful procedures to the female genitalia for non-medical purposes, for example, pricking, piercing, incising, scraping and cauterisation

Source: https://www.thepmfajournal.com/features/features/post/clitoral-reconstructive-surgery-after-female-genital-cutting

3.7 Summary

Regardless of time and place, a woman's genital anatomy has been linked to her social and cultural value. Throughout history, the labia have variously been racialised by anthropologists, symbolised on medieval churches and castles, mythologised in Eastern

cultures as correlates of sexual appetite, minimised in Playboy centrefolds, and eulogised by counternarratives in feminist art and culture. In today's Western societies, protruding labia are pathologised by cosmetic surgeons.

Critically, the discipline of anatomy has been absent from this discourse, despite playing a pivotal role in the education of the next generation of doctors. Indeed, anatomy has been openly criticised as missing in action when preparing the next generation of GPs who will be advising patients contemplating labiaplasty (Simonis, 2019).

The next chapter describes my examination of how the knowledge base of anatomy on vulval morphology has evolved over time and is represented in the current day; whether it is included in anatomy curricula; and whether anatomy is, can and should contribute to the prevailing multidisciplinary discourse about *normal* and *ideal* with respect to female genital anatomy.

Chapter 4: The Gap in the Peer-Reviewed Literature

> *Clear and unambiguous messages regarding the normality and variance of vulval anatomy are needed from the medical literature*. (Creighton & Liao, 2019, p. 20)
>
> *Descriptions of genital anatomy are sparse in the medical literature*. (Simonis et al., 2016, p. 7)
>
> *Genital anatomy education is lacking from all medical and non-medical curricula*. (Simonis, 2019, p. 130)

It seems that neither women who consider having labiaplasty, nor the GPs they consult for referral to a specialist who performs labiaplasty, are confident about their knowledge of female genital anatomy. A small qualitative study of 21 Australian university students found that young women had little knowledge of normal genital anatomy and might be reassured and dissuaded from undergoing unnecessary surgery by a confident and knowledgeable GP (Howarth et al., 2016). A survey of 433 Australian GPs found that more than half had been consulted by women and girls seeking FGCS and that 75% thought they had inadequate relevant knowledge (Simonis et al., 2016). This lack of knowledge extends beyond Australia. An audit of 48 referral letters in a National Health Service gynaecology clinic in the United Kingdom (UK) showed that only 77% of the referrers reported examining the patient, a third of the referrers described the labia as normal but still requested surgery for the patient, and 25% of referrals contained pejorative language such as “leathery” or “pendulous” (Deans et al., 2011, p. 99). In each case the GP, if inexperienced in dealing with such intimate concerns, might have been relying on the specialist to reassure the patient that she was normal (Liao & Creighton, 2007).

Acquisition of the anatomical knowledge GPs need to assess and advise patients asking about genital normality or requesting labiaplasty should begin in undergraduate teaching and rely

on anatomy textbooks. However, it has been claimed that descriptions of female genital anatomy are sparse in anatomy textbooks (Andrikopoulou et al., 2013, Simonis et al., 2016), and that detailed morphological study of the vulva, including normal variation, is not included in medical training (Deans et al., 2011; Simonis et al., 2016). If this is true, then we are graduating doctors whose knowledge and attitudes relating to female genital anatomy are likely to have developed from personal experiences and popular culture but not from their anatomy education.

In order to assess the evidence that supports the claim that female genital anatomy education is lacking in medical curricula, I undertook a review of the peer-reviewed literature. The methods used to perform my review, and its results, are described below.

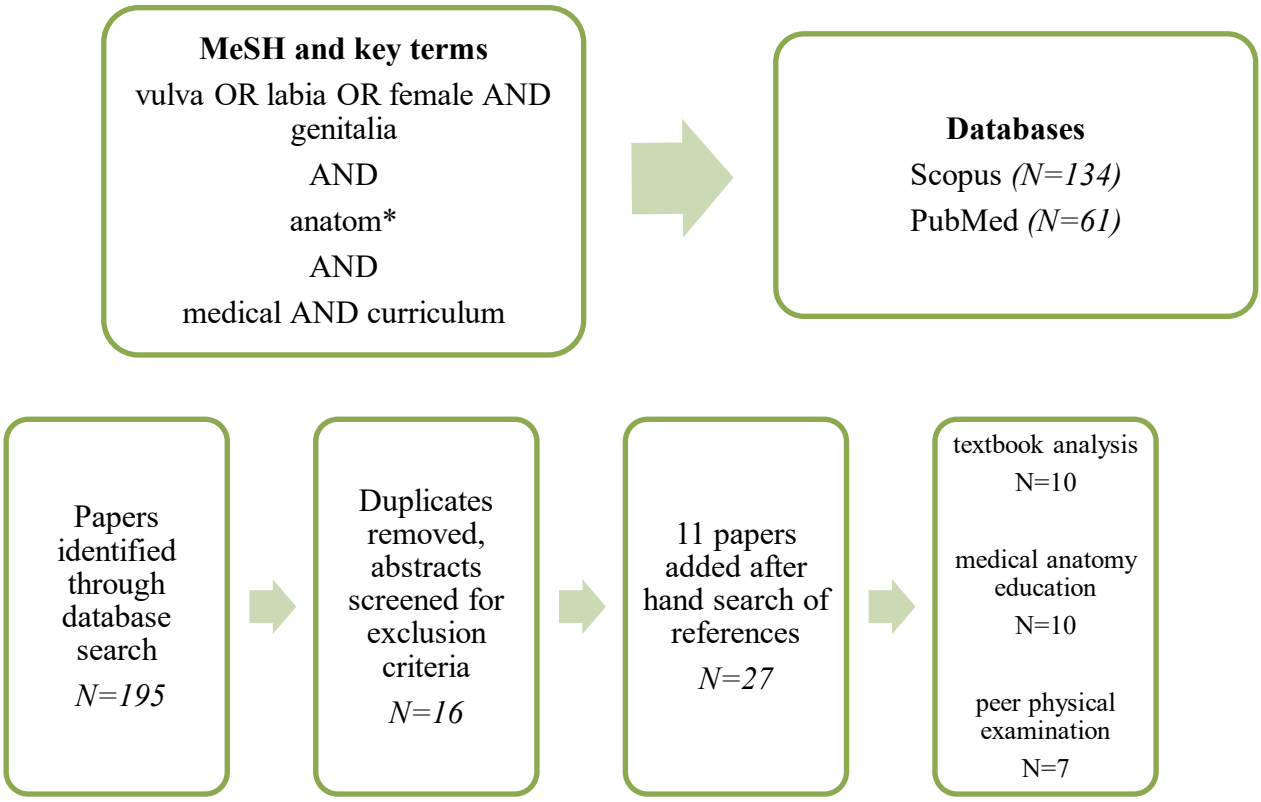
4.1 Methods

A search of existing literature, with no date limit, was conducted on 26 August 2020 (Figure 13). Medical Subject Headings (MeSH) and the key terms (vulva OR labia OR female AND genitalia) AND (anatom*) AND (medical AND curriculum) were used to search Scopus and PubMed. One hundred and ninety-five papers were found, but excluded subsequently if they were:

- duplicated in databases (n=4);
- in a language other than English (n=9);
- not relating to anatomy, human anatomy, or female genital anatomy (n=128); or
- relating to paediatric, transgender, or FGM populations (n=38).

To the remaining 16 papers were added 11 identified from hand-searching reference lists, resulting in a total of 27 papers. Of these 27 papers, 10 related to medical anatomy education, seven focused on peer physical examination (PPE) within medical curricula, and 10 analysed female genital anatomy in anatomical textbooks.

Figure 13. Flowchart of article selection



4.2 Results

The 27 papers identified in the search originated from 11 countries or territories (USA, Australia, UK, Netherlands, Greece, France, Switzerland, Italy, New Zealand, Japan, Hong Kong) and were published in 22 journals reflecting many disciplines in addition to anatomy and medical education.[2] No combination of search terms and databases located all the papers

[2] *Psychology of Women Quarterly*, *Social Science and Medicine*, *JAMA*, *Feminist Studies*, *Body and Society*, *Medical Humanities*, *Journal of Obstetrics and Gynaecology*, *Journal of Anatomy*, *Medical Science Educator*, *Journal of Reproductive Medicine*, *Journal of Women's Health and Gender-Based Medicine*, *BMJ Open*, *European Journal of Anatomy*, *Journal of Sexual Medicine*, *Academic Medicine*, *Teaching and Learning in Medicine*, *Medical Education*, *Advances in Health Science Education*, *Medical Teacher*, *BMC Medical Education*, *Anatomical Sciences Education*, *Clinical Anatomy*.

in one search. Fewer than half of the journals were using keywords at the time of publication, and there was wide variation in the keywords used, which hampered identification of papers. In all, 44 key words (Table 1) were employed, with only three terms used in three or more of the 27 papers: medical education (6) curriculum (3), anatomy (3).

Following analysis, the papers were grouped according to three themes, each associated with locating female genital anatomy in a specific component of medical education: female genital anatomy in medical curricula, female genital anatomy in textbooks, and female genital anatomy in PPE. The papers grouped under each theme are described in the following sections.

4.2.1 Female Genital Anatomy in Medical Curricula

None of the five papers identified in the original search specifically addressed the claim that "genital anatomy education is lacking from all medical and non-medical curricula" (Simonis, 2019, p. 130). Two papers indirectly addressed the absence. One (Simonis et al., 2016) reported the results of a survey of 443 Australian GPs' knowledge, attitudes and practice regarding FGCS, and highlighted the shortfall in GP confidence about normal female genital anatomy, concluding that "as depictions of genital anatomy are sparse in the medical literature, it is not surprising that only 75% of GPs were confident in evaluating normality of female genital anatomy" (Simonis et al., 2016, p. 7). Another (Nicolette, 2000) was written from the perspective of a resident reflecting on her own medical education experience. It described women's health in general as missing from medical education, and used textbook representations, the predominance of male case examples in the literature and clinical data, and the fragmented approach to women's health in the medical curriculum by way of illustration.

Table 1. Keywords and number of times used

Keyword	Uses	Keyword	Uses
medical education	6	gender stereotypes	1
curriculum	3	general medicine	1
anatomy	3	general surgery	1
anatomy education	2	gross anatomy education	1
medical curriculum	2	humans	1
medical students	2	labia	1
anatomical knowledge	1	multicentre study	1
anatomy curriculum	1	neuroanatomy education	1
anatomy teaching	1	osteopathic student	1
anxiety/aetiology	1	peer group	1
attitudes	1	peer physical examination	2
attitude change	1	physical examination/psychology	1
Australia	1	regional anatomy	1
basic sciences	1	sex differences	1
clinical competence/standards	1	students, medical/psychology	1
core syllabus	1	syllabus	1
cosmetic genitoplasty	1	textbooks	1
cross sectional survey	1	textbooks as topic	1
Delphi panels	1	undergraduate education	1
embodiment	1	United States	1
gender	1	visual analysis	1
gender bias	1	vulva	1

Several papers examined the issue from a curriculum perspective. An early paper (Lloyd & Steinberger, 1980) reported a survey of 97 American medical schools about the reproductive biology and human sexuality components of their courses and reported that female urogenital

anatomy, histology and embryology and anatomy of the pelvis, perineum and external genitalia were the most frequently covered content, although the content was "highly individualistic" (p. 17). Quality of instruction depended on the availability of qualified faculty to teach in these areas. The most recent of the papers (Abdulcadir et al., 2020) described construction of three-dimensional (3D) models and two-dimensional (2D) figures of female and male sexual anatomy for use in anatomy and sex education by educators and health professionals, with some preliminary feedback from potential users. Only one paper (Riederer et al., 2018) identified in the original search looked specifically at gross anatomy tuition in healthcare curricula by providing five examples/case scenarios that demonstrated how a close relationship between anatomists and clinicians can reinforce core anatomical knowledge. None of the example scenarios related to genital anatomy.

A manual search of the reference lists of the five papers grouped under the theme *genital anatomy education in a medical curriculum* identified an additional five papers which, whilst not specifically addressing genital anatomy education in a medical curriculum, covered the definition of, importance of, and development and revision of content for core anatomy syllabuses in medical education.

Bergman et al. (2014) cited the absence of a core anatomy syllabus as one of eight factors considered to have a negative influence on the anatomy knowledge of medical students (the others being nonmedically qualified teachers; decreased use of dissection; absence of teaching in contexts such as clinical skills, radiology, or pathology; integrated medical curricula; multiple-choice assessment; decreased time allocated to teaching anatomy; and lack of vertical integration of anatomy teaching).

The International Federation of Associations of Anatomists and the European Federation for Experimental Morphology published a review of core anatomy syllabuses designed for inclusion in medical curricula. They employed the term *curriculum* to describe the whole of a

course of study, including structure, aims, outcomes, learning and teaching methods, and assessment, and defined as *syllabus* the list of topics that needs to be taught within a curriculum (Moxham et al., 2014, p. 303). The published core syllabuses reviewed in the paper varied between the highly detailed document produced by the American Association of Clinical Anatomists (AACA) which "ensures a solid anatomical basis for current and future medical practice" (Leonard, 1996, p. 72), to the syllabus produced by the Anatomical Society, which was formulated as a set of learning outcomes that defined the minimum anatomical knowledge required of a new medical graduate (McHanwell et al., 2007).

Both syllabuses included female genital anatomy. The structure of the more detailed AACA syllabus involved an initial broad statement of required knowledge for each region followed by a specific list of structures. Female external genitalia was a separate heading in the document, and followed by the list: "mons pubis, labia majora, pudendal cleft, labia minora, vestibule of the vagina (external urethral and vaginal orifices, orifices of the ducts of the greater vestibular glands), clitoris (body, glans, prepuce, frenulum)" (Leonard, 1996, p. 82). The Anatomical Society syllabus also referenced female genital anatomy, but without a separate heading, both in the general discussion of pelvic anatomy: "medical graduates should be familiar with the anatomy of the external and internal genitalia in males (scrotum, testis, vas deferens, seminal vesicles, prostate, penis) and females (ovaries, uterine tubes, uterus, cervix, vagina, labia, clitoris)" (McHanwell et al., 2007, p. 8), and then again in a more detailed list of structures as: "describe the structure of the penis, scrotum and its contents, the clitoris and vulva" (p. 14).

The Anatomical Society syllabus was criticised on the grounds that the learning outcomes were generated by a limited number of anatomists, thus the core syllabus was revised in 2016 using a modified Delphi technique, a form of consensus survey using large teams of clinicians and anatomists, to analyse syllabus content (Smith et al., 2016). The revised core

syllabus had 156 learning outcomes, designed for use by “curriculum planners, teachers and students alike in addressing the perennial question: What do I need to know?” (Smith et al., 2016, p. 15). In terms of female genital anatomy, learning outcome 125 was the only remaining reference to the vulva, simply stating “Describe the anatomy and neurovascular supply of the penis, scrotum, the clitoris, vulva and vagina” (Smith et al., 2016, p. 21).

Table 2 outlines the 10 papers relating to medical curricula.

Table 2. Brief descriptions of the 10 papers relating to medical curricula

Author, year, location	Title, journal	Methodology	Findings
Lloyd & Steinberger **1980** **USA**	Survey and analysis of educational efforts in reproductive biology and human sexuality in American medical schools *Journal of Reproductive Medicine*	Survey of 97 American medical schools about content in reproductive biology and human sexuality courses	• The content of reproductive biology and human sexuality courses varies considerably • In reproductive biology, female urogenital anatomy, histology and embryology and anatomy of the pelvis, perineum and external genitalia are the most frequently covered content and four times more time is devoted to females than males • The quality of instruction depends on the availability of qualified faculty to teach in these areas
Leonard **1996** **USA**	A clinical anatomy curriculum for the medical student of the 21st century *Clinical Anatomy*	Developed by the Educational Affairs Committee, American Association of Clinical Anatomists to define a gross anatomy curriculum leading to the MD or DO degree	• Comprehensive lists of anatomical concepts and regional anatomy structures • Includes a listing of female genital anatomy structures under the heading "urogenital triangle" (see text above)
Nicolette. **2000** **USA**	Searching for women's health: a resident's perspective *Journal of Women's Health and Gender-Based Medicine*	Guest editorial about women's health component in medical course written from female student's perspective	• Women's health is missing from medical education • Examples given are textbook representations, predominance of male case examples in the literature and clinical data, fragmented approach to women's health

McHanwell et al. (The Education Committee of the Anatomical Society of Great Britain and Ireland) **2007** **USA**	A core syllabus in anatomy for medical students-Adding common sense to need to know *European Journal of Anatomy*	Description of a core syllabus drafted by Education Committee and posted on Anatomical Society website for members' comment. The minimum level of knowledge expected of a recently qualified medical graduate in the UK and Ireland	• Broad statement of required knowledge for each region followed by specific lists of structures • Includes female genital anatomy in the general discussion of pelvic anatomy (see text above) • Refers to the vulva once in the more detailed list of structures (see text above)
Bergman et al. **2014** **Netherlands**	Influences on anatomical knowledge: the complete arguments *Clinical Anatomy*	Review of influences on anatomical knowledge extracted from 32 papers published after 1990	• Eight factors identified: nonmedically qualified teachers, absence of core anatomy curriculum, decreased use of dissection, absence of teaching in contexts such as clinical skills, pathology, or radiology, integrated medical curricula, multiple-choice assessment, decreased time allocated to teaching anatomy and lack of vertical integration of anatomy teaching
Moxham et al. **2014** **UK, France, USA**	An approach toward the development of core syllabuses for the anatomical sciences *Anatomical Sciences Education*	Descriptive article to outline past changes in design and content of anatomy syllabuses, define terms, and report preliminary stages in development of neuroanatomy syllabus	• 97% had been asked about genital normality • 54% had seen patients requesting FGCS • 35% had seen females younger than 18 requesting FGCS • 75% rated their knowledge of FGCS as inadequate • GPs often suspected an associated range of mental health issues

Simonis et al. **2016** **Australia**	Female genital cosmetic surgery: a cross-sectional survey exploring knowledge, attitude, and practice of general practitioners *BMJ Open*	A national online survey of 443 Australian GPs' knowledge, attitude, and practice in managing patients asking about FGCS	• 97% had been asked about genital normality • 54% had seen patients requesting FGCS • 35% had seen females younger than 18 requesting FGCS • 75% rated their knowledge of FGCS as inadequate • GPs often suspected an associated range of mental health issues
Smith et al. **2016**	The Anatomical Society core regional syllabus for undergraduate medicine *Journal of Anatomy*	A Delphi method (wider consensus survey) revised the Anatomical Society's core syllabus 2007 down from 182 learning outcomes to 156	• Includes 'Describe the anatomy and neurovascular supply of the penis, scrotum, the clitoris, vulva and vagina"
Riederer et al. **2018** **Switzerland, Italy, UK**	Clinically orientated anatomy: five exemplars to portray the concept *European Journal of Anatomy*	5 case scenarios are presented illustrating interaction between professional anatomists and clinicians	• A close relationship between anatomists and surgeons can reinforce core anatomical knowledge by promoting an understanding of its clinical importance
Abdulcadir et al. **2020** **Switzerland**	In vivo imaging-based 3-dimensional pelvic prototype models to improve education regarding sexual anatomy and physiology *The Journal of Sexual Medicine*	Construction of 3D models and 2D figures of female and male sexual anatomy with files for 3D printing using in vivo imaging data and preliminary feedback from potential users	• More detail than existing models, especially regarding clitoral anatomy • Some key structures missing including labia

4.2.2 Female Genital Anatomy in Textbooks

Six of the papers identified in the search (Giacomini et al., 1986; Lawrence & Bendixon, 1992; Mendelsohn et al., 1994; Morgan et al., 2014; Murciano-Goroff, 2015; Petersen, 1998) analysed anatomy texts and demonstrated that women were under-represented. They also reported that references to females were primarily focused on their reproductive attributes (Mendelsohn et al., 1994; Morgan et al., 2014; Murciano-Goroff, 2015). Parker et al. (2017) analysed 17 contemporary anatomy textbooks used in Australian medical schools for visual gender bias only, and found that the odds ratio (OR) of representation of males to females was 2.22 (standard deviation [SD]=0.94). In another study, Howarth et al. (2010) compared 253 visual images from online pornography, feminist publications (online and print) and anatomy textbooks, and found that labia minora were significantly less protuberant in anatomy textbooks and online pornography than in the feminist publications. Two papers (Petersen, 1998; Moore and Clarke, 1995) concluded that genital anatomy descriptions in anatomy texts had remained static through time, although this related more specifically to anatomy of the clitoris and these papers were published more than 20 years ago. Only one study (Andrikopoulou et al., 2013) looked at both female genital descriptions and illustrations in textbooks. In this study, the textbooks were selected on the basis that they were held at the libraries of University College, Imperial College, King's College, and Bart's College London Schools of Medicine. The study reported that: "No anatomy textbook provided measurements for the labia minora or the major ... None of the textbooks included more than one picture or suggested in text and illustration appearance variability" (Andrikopoulou et al., 2013, p. 648–649).

Table 3 outlines the papers relating to female genital anatomy in anatomical texts.

Table 3. Author, title, methodology and findings for each paper relating to female genital anatomy in anatomical texts identified in the literature search

Author (year)	Title (journal)	Methodology	Findings
Giacomini et al. **1986** **USA**	Gender bias in human anatomy textbook illustrations Psychology of Women Quarterly	Analysis of Illustrations in 8 anatomy texts (on reserve in 1 medical school) from chapters covering both non-gender specific and gender specific systems or regions using a list of indicators of gender	• In non-gender specific chapters, 86% gendered illustrations were male • In gender-specific chapters (reproductive system) representation was approximately equal: 52% male, 48% female
Lawrence & Bendixen **1992** **USA**	His and hers: male and female anatomy in anatomy texts for US medical students, 1890-1989 Social Science and Medicine	Analysis of Illustrations and text in 31 anatomy texts (used in US gross anatomy courses) from thorax, abdomen, pelvis, and perineum chapters	• In illustrations, vocabulary and syntax male anatomy was presented as norm or standard against which female structures were compared, perpetuating the historical convention in which male provides the basic model for the human body
Mendelsohn et al. **1994** **USA**	Sex and gender bias in anatomy and physical diagnosis text illustrations JAMA	Analysis of 3827 illustrations (2915 of which were non-reproductive) in 7 anatomy texts and 5 physical diagnosis texts to determine sex and gender distribution	• 11.1% of non-reproductive illustrations in anatomy texts and 8.8% in physical diagnosis texts were female compared to 43.1% and 23.7% male (the remainder were classified gender neutral) • Gender representation was nearly equal in reproductive images in anatomy texts (47.7% female, 47.5% male) • Greater representation of females 71.1% compared to males 25.9% in physical diagnosis texts

Author (year)	Title (journal)	Methodology	Findings
Moore & Clarke **1995** **USA**	Clitoral conventions and transgressions: Graphic representations in anatomy texts, c. 1900-1991 *Feminist Studies*	Descriptive analysis of anatomical representations of the clitoris in a selection of anatomy texts from each of the following time periods: 1850-1900, 1900-1950, 1950-1980, 1980-1995	• Considerable range of variation in construction of the clitoris among texts within time periods • "Short shrift" when compared to male anatomy • No change or "backlash of deletion" in response to feminist anatomies
Petersen **1998** **Australia**	Sexing the body: representations of sex differences in *Gray's Anatomy*, 1858 to the present *Body & Society*	Systematic analysis of visual and descriptive portrayals of sex organs, pelvis, skull and brain in 140 years of *Gray's Anatomy*	• Disproportionate emphasis on male anatomy including graphic representations which position male first or to the left; also evident in use of metaphors and vocabulary in textual descriptions
Howarth et al. **2010** **UK, Netherlands**	Visual depictions of female genitalia differ depending on source *Medical Humanities*	Comparative analysis of vulval depictions in anatomy textbooks, feminist publications and online pornography	• Labial protuberance was significantly less in images from online pornography and anatomy texts when compared to feminist publications
Andrikopoulou et al. **2012** **UK, Greece**	The normal vulva in medical textbooks *Journal of Obstetrics and Gynaecology*	Female genital description and measurements were analysed in 59 gynaecology and anatomy texts	• More information overall was found in gynaecology texts compared with anatomy texts • Descriptions of female genital structures were found in 57/59 texts • Illustrations and images were found in 51/59 texts of which 5 had a photograph and 46 included a line drawing • 14/30 anatomy texts provided one or more measurement of any genital structure

Author (year)	Title (journal)	Methodology	Findings
Morgan et al. **2014** **UK, France**	Sexism and anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes *Journal of Anatomy*	Analysis of 10 contemporary anatomy texts and survey by questionnaire of 2nd-year medical students from Cardiff (n=250) and Paris Descartes (n=142). Universities to ascertain gender neutrality of anatomy texts and teaching	• In terms of imagery and text, many of the textbooks lacked neutrality • Most students were unaware of any negative aspects of sexism in anatomy
Murciano-Goroff **2015** **USA**	Differences in the percentage of illustrations showing males versus females in general medicine and general surgery textbooks *Medical Science Educator*	Analysis of face, chest, and genital depictions in 3447 illustrations in 13 general medicine and 2 general surgery texts (listed as essential purchase) to assess male versus female representation	• 1153 illustrations were clearly identifiable as male (58.28%) or female (41.72%) • Of identifiable faces, 78.04% were male and 21.96% female • Of genital regions, 55.93% were male and 44.07% were female
Parker at al. **2017** **Australia**	A visual analysis of gender bias in contemporary anatomy textbooks *Social Science and Medicine*	Visual content analysis of 6044 images from 17 anatomy texts published 2008–2013 in which sex/gender could be identified	• Representation of gender in images predominantly male (OR= 2.22) except in sex-specific sections where females were more likely to be represented (OR=4.43) • There were 5 intersex representations across all texts

4.2.3 Female Genital Anatomy in Peer Physical Examinations

Peer physical examination is often employed as an adjunct to learning anatomy from dissection and prosection, allowing the medical student to bridge the gap between basic

anatomical knowledge and physical examination. Classmates are a readily available for learning normal living anatomy and to practise clinical skills. Six of the identified papers referred to the high level of acceptability for PPE of non-intimate regions only amongst medical students, especially students of the same gender (Chang & Power, 2000; Chen et al., 2011; Consorti et al., 2013; Power & Center, 2005; Rees et al., 2009; Wearn et al., 2008). Only one paper, the earliest, so arguably the least aligned with contemporary student attitudes, reported the possibility of using PPE for socially sensitive areas of the body such as breast and genitals (Metcalf et al., 1982).

Table 4 outlines the papers relating to PPE.

4.3 Discussion

This review explored the question of whether female genital anatomy is lacking, as has been claimed (Deans et al., 2011; Simonis et al., 2016), from all medical curricula.

The claim that "descriptions of genital anatomy are sparse in the medical literature" (Simonis et al., 2016, p. 7) was supported in terms of female genital anatomy by the literature review. Females were under-represented in the texts and mostly shown in terms of their reproductive attributes, where male images cannot possibly substitute.

The claim that "genital anatomy education is lacking from all medical and non-medical curricula" (Simonis M, 2019, p.1 30) was not wholly supported by the literature review. There were no papers at all directly addressing the inclusion of female genital anatomy teaching in medical anatomy education, but the core anatomy syllabuses identified in the hand search of references did include the vulva and its component structures in the long lists of anatomical knowledge required by medical graduates.

Table 4. Author, title, methodology and findings for each paper relating to PPE identified in literature search

Author (year)	Title (journal)	Methodology	Findings
Metcalf et al. 1982 USA	Peer group models in examination instruction as an integral part of medical gross anatomy *Academic Medicine*	Evaluation of Living Anatomy laboratory sessions, in which student pairs (3 groupings: mixed, all male, all female) examined sensitive and non-sensitive regions on each other, to determine feasibility (via assessment) and effects on students (via attitudinal questionnaire)	• All groupings of pairs performed equally well on assessment tasks and rated strongly positive on attitudinal response • Mixed groups scored higher in professionalism (96%), were less bothered by sensitive area examination (94%) and showed more patient empathy as rated by their partners (96%) compared to segregated groups (84%, 80%, 90%) • It is possible and instructionally advantageous to use medical students as peer group models in classes examining socially sensitive areas
Chang & Power 2000 USA	Are medical students comfortable with practicing physical examination on each other? *Academic Medicine*	Survey of 124 end-first-year medical students assessing comfort with, attitudes towards and perceived value of PPEs	• 98% agreed that PPEs are appropriate, valuable and a comfortable experience • Examples given are textbook representations, predominance of male case examples in the literature and clinical data, fragmented approach to women's health
Power & Center 2005 USA	Examining the medical student body: Peer physical exams and genital, rectal, or breast exams *Teaching and Learning in Medicine*	Survey of 162 year 4 medical students (50% male,50% female) assessing attitudes towards assess practising PPE with classmates, including genital, rectal, or female breast (GRB) components.	• 95% believed that PPE (excluding GRB) was valuable • 6% were uncomfortable with PPE and this was strongly associated with having had a negative experience • There is no role for peer genital, rectal, or female breast exams in the curriculum

Wearn et al. 2008 Australia, NZ, UK	Understanding student concerns about peer physical examination using an activity theory framework. *Medical Education*	Survey of 617 year 1 medical students (6 schools across 5 countries) assessing views and concerns about learning using PPE	• Only complexities around student relationships and their anxieties about PPE compared with patient examination are discussed with focus on concerns and ambiguities around relationships, community, and rules
Rees et al. 2009 Australia, NZ, Japan	Medical students' attitudes towards peer physical examination: findings from an international cross-sectional and longitudinal study. *Advances in Health Science Education*	Cross-sectional and longitudinal design examining attitudes towards PPE of 618 year 1 medical students (6 schools across 5 countries) including changes in their attitudes over first year.	• High level of acceptance of PPE of non-intimate body regions at all schools • Decline in willingness to examine upper body, breast, groin region, genitals and hips of same- and opposite- gender peers over first year • Gender is the key predictor of attitude changes towards PPE • Students least comfortable with PPE tended to be female, non-white, religious, and studying at Auckland
Chen et al. 2011 Hong Kong	Does medical student willingness to practice peer physical examination translate into action? *Medical Teacher*	Survey of100 year 1 medical students assessing attitude towards PPE before and after clinical skills program (CSP)	• High level of willingness to conduct PPE did not transform into action in CSP, even for non-intimate regions • Female students were more likely to exhibit attitude–behaviour inconsistency
Consorti et al. 2013 Italy	Evaluation of the acceptability of peer physical examination (PPE) in medical and osteopathic students: a cross sectional survey *BMC Medical Education*	Cross-sectional survey to compare acceptability of PPE in 129 third-year medical and 112 first-year osteopathic students	• Osteopathic students showed a higher acceptance of PPE than did medical students (not explained by any demographic or sociocultural variables)

Peer physical examination is an alternative means of teaching female genital anatomy in medical education, but six of the seven papers identified in the search (Chang & Power, 2000; Chen et al., 2011; Consorti et al., 2013; Power & Center, 2005; Rees et al., 2009; Wearn et al., 2008) were reluctant to admit that theer was a place – or adamant that there was no place – for sensitive area examination to be included in PPE. The one exception (Metcalf et al., 1982) was published in 1982, so was post-dated by the other surveys.

The discipline of anatomy and anatomy teaching resources are evidence-based. Anatomy textbooks could only be reasonably expected to include, for example, genital dimension data if it existed in the peer-reviewed literature. There have been calls for such data to be published; "clear and unambiguous messages regarding the normality and variance of vulval anatomy are needed from the medical literature" (Creighton & Liao, 2019, p. 20).

There is some evidence that anatomy texts in the past have changed their content in response to contemporary social and scientific challenges. Petersen (1998) and Moore and Clarke (1995) suggested that there was a precedent for change, certainly in terms of anatomy of the clitoris and *Gray's Anatomy*. In the 20th century, newly constructed feminist anatomies were said to have provoked "a backlash of deletion" (Moore & Clarke, 1995, p. 290) of clitoral detail in the texts.

It possibly takes more than being on a list in a core anatomy syllabus developed by a European anatomical society to ensure that an anatomical region or structure is included in medical anatomy education worldwide. In Australia, the Australian Medical Council (2022) develops the standards for medical education (see https://www.amc.org.au/accreditation-and-recognition/). In the accreditation and cyclical review process, the AMC assesses educational institutions and their medical courses against these standards, which do not specify content requirement for individual subjects including anatomy. They focus on "the achievement of objectives, maintenance of educational standards, public safety requirements, and expected

outputs and outcomes" rather than on detailed specification of curriculum content or educational method.

A survey of 19 Australian and New Zealand medical schools identified considerable variability between institutions in the time allocated to anatomy in medical curricula, the anatomy content covered, instructional methodology and assessment methods (Craig et al., 2010). Such variability raise questions about the depth of understanding of anatomy of graduates from the medical schools surveyed. Indeed, both the Australian and New Zealand Association of Clinical Anatomists and the Australian Medical Students' Association (AMSA) had actively called for the development of national standards in anatomical education (AMSA, 2018; Chapuis et al., 2010; Farey et al., 2014).

4.4 Strengths and Weaknesses

This literature review was the first analysis of female genital anatomy teaching in medical curricula. The lack of consistency in publication fields and keywords has already been discussed as a limitation. A further potential weakness of this study is its limitation to English-language publications, given that medical education research is published in many languages other than English.

4.5 Conclusion

My literature search identified no published information that specifically addressed the inclusion or exclusion of vulval morphology in medical anatomy curricula. In addition, I found no recent analysis of contemporary anatomy texts with respect to inclusion of or change in female genital anatomy descriptions and illustrations in the era of increasingly popular FGCS.

Chapter 5: Research Questions and Methodology

> *When there is little knowledge about the phenomenon of interest, qualitative approaches are suggested to explore and understand the phenomenon*. (Tavakol & Sandars, 2014, p. 838)

The aim of this research project was to test my personal theory that the discipline of anatomy and its practitioners were failing their contemporary student cohorts by not embracing new knowledge and sociocultural change to inform clinical practice. Part of this failure to evolve, I argue, rested with an apologist mentality for the complexity of the human body, which resulted in teaching a simplified and universalised version of the body (Moore & Clarke, 1995), easier for anatomists to teach and for students to learn.

The FGCS industry provided the perfect context to test this theory, because it is based on the premise of one idealised version of normality. There are obvious falsehoods to be challenged, and anatomists could make an important contribution to this process. Instead, the discipline of anatomy has been openly criticised as missing in action from its role in education and preparation of the next generation of GPs who will be advising patients contemplating labiaplasty (Simonis, 2019).

At stake here is the knowledge base about normal vulval morphology and function. Is there an evidence base for *normal*? If so, how is and has the *normal* vulva been represented in anatomy textbooks and teaching? Is it being taught to contemporary student cohorts, and can or should the discipline fill the gap in the discourse about *normal* versus *ideal*? Consideration of these broad questions, and the fact that labiaplasty is the most popular of the female genital cosmetic surgeries, meant that labia became the specific focus of this PhD project. I sought answers to the following three specific research questions:

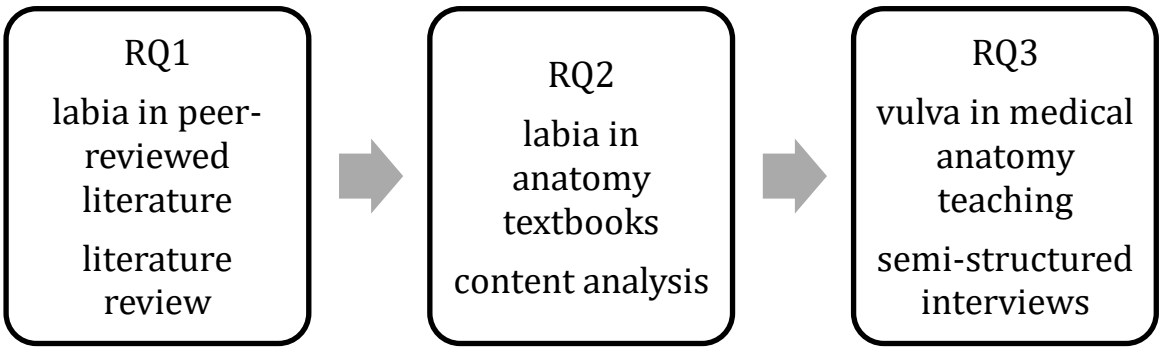
1 – What evidence base is there for *normal* in terms of labial anatomy?

2 – What information about normal labial anatomy is included in anatomy textbooks and how has that changed through history?

3 – Is vulval anatomy included in medical anatomy teaching?

This chapter presents the multimethod qualitative research design used in gathering and analysing data for my PhD project, as summarised in Figure 14.

Figure 14. Research questions and methodological design



A qualitative methodological approach was chosen as the most appropriate way to explore female genital anatomy in the contexts of the scientific literature, anatomical textbooks, and medical education. Qualitative methods are useful for describing "uncertain and 'immature' concepts; sensitive and socially dependent concepts; and complex human intentions and motivations" (Maudsley, 2011, p. e95). A qualitative descriptive approach enables the researcher to address important issues in which the focus is not on increasing theoretic and conceptual understanding, but rather contributing to change and quality improvement in practice setting (Chafe, 2017). Because qualitative research methods produce much richer datasets than qualitative methods, they allowed for a smaller number of carefully chosen sources and respondents, a significant advantage during COVID-19 restrictions.

Detailed information about the instruments used to collect data, the sampling process, and the methods of analysis for each research question is presented below.

5.1 What Evidence Base is There for *Normal* in Terms of Labial Anatomy?

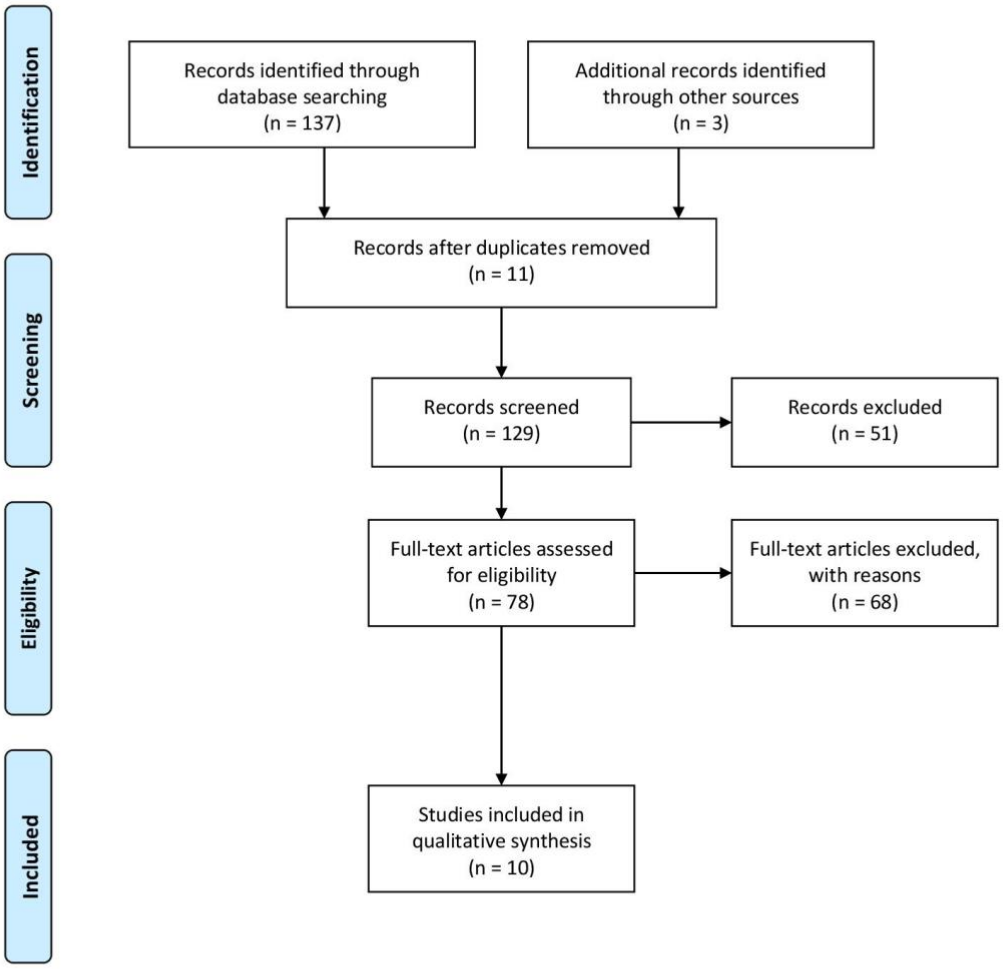
The first research question aimed to determine what is known in the published literature about the anatomical basis of *normal* for the labia. Despite claims to the contrary (Creighton & Liao, 2019; Simonis et al., 2016), an initial scan of the literature revealed some previously published datasets.

A scoping review of the existing literature was used to identify all empirical evidence available about *normal* in terms of labial anatomy. The general purpose of a scoping review is to identify and map all of the available evidence in a given field rather than to critically appraise the literature and answer a precise question, which is more the domain of a systematic review (Munn et al., 2018). Although conducted for different purposes, scoping review methodology still requires a rigorous approach to collection of articles to maximise certainty that all relevant data have been identified. Following identification, the research findings can then be synthesised in a systematic, transparent and reproducible way.

The processes used in designing and conducting the literature review for Research Question 1 are outlined below, and were influenced by published standards and guidelines for scoping reviews (Colquhoun et al., 2014; Peters et al., 2015).

A search of existing literature to identify all empirical evidence available about *normal* in terms of labial anatomy, with no date limit, was conducted on 13 June 2020. MeSH and the key terms (labiaplasty OR labioplasty) AND (anatom*) AND (normal* OR variation) were used to search Scopus, PubMed and PsychInfo databases utilising a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) search strategy (Figure 15).

Figure 15. PRISMA flow diagram for literature review, research question 1



The search terms used – (labiaplasty OR labioplasty) AND (anatom*) AND (normal* OR variation) –related directly to the research question, and the three databases, Scopus, PubMed and PsychInfo, were chosen to reflect the broad interdisciplinary interest in the field. Strict inclusion and exclusion criteria were applied (see below), then reference lists were searched until no further papers that met the criteria were located.

A total of 137 papers was identified; papers were then excluded if they:

- were duplicated in databases (n=11);
- in a language other than English (n=6);
- referred to labial structures other than vulval (n=17);
- related to development, pathology, or genital function without structure (n=21); or
- reported non-surgical therapies or surgery related to gender reassignment or genital cutting (n=7).

Of the remaining 75 papers, only seven defined normal labial dimensions by measurement. To these were added three more papers identified from searching reference lists manually.

Each of the identified studies was abstracted, and I explored the possibility of performing a meta-analysis (a statistical method of integrating studies by combining results, if they have similar methodological approaches, to prepare a common metric to calculate an overall effect; Haidich, 2010). Data abstracted was in the form of descriptive information, such as author, country of origin, year of publication, as well as information about sampling, including inclusion and exclusion criteria, methodology and findings. Although the datasets in the 10 studies analysed demonstrated a wide variability of female genital anatomy, they could not be combined to establish an international normal range because of significant variation in inclusion and exclusion criteria and methodology that precluded direct comparison.

The scoping review was published in *The Australian & New Zealand Journal of Obstetrics & Gynaecology* in 2021, and is reproduced in Chapter 6 of this thesis.

5.2 What Information About Normal Labial Anatomy is Included in Anatomy Textbooks and how has it Changed Throughout History?

Once I had established an evidence base for the existence of vulval diversity, the next step was to investigate whether this data was included in anatomical textbooks. This was a two-step process involving past and contemporary anatomy texts, as follows.

1. Descriptive and visual portrayals of the vulva in historic anatomy textbooks, especially those published in series spanning multiple editions, were analysed to determine whether anthropological, sexual, feminist and surgical publications in the past had influenced the content of anatomy textbooks of the time. In other words, did textbook content reflect contemporaneous sociopolitical context? *Gray's Anatomy*[3] provided the best opportunity to map the changing representation of genital anatomy over multiple periods of substantial change in medical knowledge and social values. Multiple editions of three other historical texts (*Cunningham's Textbook of Anatomy*,[4] *Quain's Elements of Anatomy*,[5] and *Buchanan's Manual of Anatomy*[6]) were selected for analysis on the basis that they too were published in several editions over the 19th and 20th centuries.
2. Textual descriptions and images of the vulva and component structures were analysed and compared across multiple editions of *Clinically Oriented Anatomy*,[7] *Gray's*

[3] 42 editions, 1858–2021; for full references, see my paper in Chapter 7.

[4] 12 editions, 1902–1981; see Chapter 7.

[5] 11 editions (1828–1914); see Chapter 7.

[6] 8 editions (1906–1950); see Chapter 7.

[7] 7 editions (1980–2014); see Chapter 7.

Anatomy for Students,[8] and *Last's Anatomy*,[9] the most prescribed or recommended contemporary textbooks for anatomy subjects in the 22 Australian medical schools.[10] Descriptions were specifically searched for reference to morphological variability and function, the information most useful to a GP in frontline consultations with patients asking about genital normality and FGCS procedures.

The published studies discussed in chapter 3, whose authors had analysed *gender* (Giacomini et al., 1986; Lawrence & Bendixon, 1992; Mendelsohn et al., 1994; Morgan et al., 2014; Murciano-Goroff, 2015; Parker et al., 2017; Petersen, 1998) and *genital* (Howarth et al., 2010) representations in anatomy textbooks, employed varied processes for sampling and analysis (Table 5). Most of these studies were cross-sectional, assessing material available at a single time point. Texts were mostly chosen on the basis that they were listed on a particular syllabus or present in a particular library holding at the time of data collection. I was interested in performing a longitudinal analysis, looking for change over multiple editions of iconic texts that might mirror the changing historic narrative of female genitals outlined in Chapter 2.

I had abstracted preliminary data from several historic editions of *Gray's Anatomy*, *Cunningham's Textbook of Anatomy*, *Quain's Elements of Anatomy*, and *Buchanan's Manual of Anatomy* whilst in the UK, with the aim of refining data collection and analysis strategies for a later trip, when the COVID pandemic emerged. In March 2020, the Australian Government closed international borders and the Victorian government introduced

[8] 4 editions (2005–2020); see Chapter 7.

[9] 12 editions (1954–2011); see Chapter 7.

[10] Determined from current online course information and from interviews conducted with Australian anatomists; see Chapter 8.

regulations limiting social contact. Lockdown measures included the closure of libraries, which limited my access to historic and contemporary texts locally and completely excluded access to international holdings. Very few of the historic texts were digitised. Notes and images from my pre-COVID investigations of textbook holdings became the data for analysis. This required laborious communications with librarians here and overseas and slow and painstaking image manipulation. It also meant that no further texts were added to my original list.

For contemporary texts, I employed a similar sampling strategy to Parker et al. (2017), and selected the most prescribed or recommended anatomy textbooks for anatomy subjects in Australian medical schools , as identified from current online course information. This selection was confirmed in interviews I subsequently conducted with Australian anatomists between June 2021 and February 2022 (see Chapter 8).

Table 5. Selection and analysis methods of textbooks evaluated in earlier papers

Author/year	Selection strategy for texts	Method/s of analysis
Giacomini et al., 1986	All books catalogued under "anatomy" on permanent reserve in a major west coast medical school (n=8)	Analysed gender of illustrations only, using specific visual cues
Lawrence and Bendixon, 1992	Interviews with anatomy instructors at major medical schools in the US provided an initial list of titles to which authors added titles contained within the University of Iowa's Hardin Library for the Health Sciences (n=31)	Analysed gender representation in illustrations using tally sheets, and numeric calculation of ratio between male-specific and female-specific text
Mendelsohn et al., 1994	Texts chosen were those on required and supplemental reading lists in 5 Philadelphia medical schools (n=12)	Analysed gender of illustrations only, using specific visual cues
Petersen, 1998	Multiple editions of *Gray's Anatomy* only	Focus on textual description and illustrations of sex organs, pelvis, skull and brain
Howarth et al., 2010	All general anatomy texts in the University College London Science Library on 28 May 2008 (n=220)	Measurement of screen images or book illustrations
Andrikopoulou et al., 2013	All medical and gynaecological textbooks held at the libraries of University College London Hospital, Imperial College London, Barts and the London School of Medicine and Dentistry, and Kings College London School of Medicine (n=59)	Assessed inclusion of genital dimensions and number and type of illustrations
Morgan et al., 2014	Texts described as "the most common textbooks used at present to teach gross anatomy through the medium of English and to instruct on surface anatomy" (n=10) plus one French textbook	Looked at all images and counted the proportion that depicted female anatomy. Also evaluated language used in sections on breast and perineum for evidence of sexism
Murciano-Goroff, 2015	All textbooks listed as essential purchase titles in either general surgery (n=2) or general medicine (n=13) categories of *Doody's Core Titles* 2013	Frequency count of male and female depiction

Parker et al., 2017	Contemporary anatomy textbooks used in Australian medical schools as identified from online course information during 2013–14 academic year (n=17)	Analysed relative frequency of male v female, areas in which they were differently represented and whether gendered representations were stereotyped

Data was extracted as follows:

- the preface of each text was analysed to determine the target audience;
- the index was searched for the terms “normal and anatomical variation”, “vulva” (and individual component structures), “orgasm”, “erection” and “ejaculation”;
- textual descriptions and images of the vulva and component structures were analysed and compared across each textbook series for references to variability and function and change between editions; and
- textual descriptions of breast anatomy were compared because the breasts are morphologically variable structures which are also under (re)construction in contemporary society.

Results of analyses were reported according to three outcomes:

- the content of textual descriptions and illustrations of the vulva;
- whether the concept of “normal variation” was included in the text and, if so, how; and
- the audience and educational aim of the text.

This review was published in *Anatomical Sciences Education* in 2022 and is reproduced in Chapter 7 of this thesis.

5.3 Is Vulval Anatomy Included in Medical Anatomy Teaching?

No scientific literature about barriers to and facilitators of teaching female genital anatomy could be located. There was a demonstrated evidence base for morphological diversity (as shown in the article reproduced in Chapter 6), but that information was not represented in contemporary anatomy texts (as shown as shown in the article reproduced in Chapter 7). Medical graduates were therefore reliant on learning female genital anatomy in anatomy lectures and labs, or elsewhere in the medical curriculum, or they graduated ill-equipped for frontline consultations with women and girls asking about genital normality and labiaplasty. This part of the study collected data directly from those involved in the practice of teaching anatomy.

I decided semi-structured interviews were the most effective method to collect qualitative, open-ended data about teaching female genital anatomy; to explore participant feelings, thoughts, and beliefs; and to probe into personal and potentially sensitive issues (DeJonckheere & Vaughn, 2019). During the interviews, I established a conversational dialogue (Morse & Field, 1995) with my anatomist colleagues, which allowed me to explore their experiences and motives in detail (Rubin & Rubin, 2012).

Study protocols were approved by the Human Research Ethics Committee of The University of Melbourne (ID:14564) on 29 September 2020. Reproductions of ethics approval letters are shown in Appendix B.

Participants were recruited via the Australian and New Zealand Association of Clinical Anatomists newsletter (Appendix C) and conference 2021 and snowball sampling. No financial reimbursement was offered for participation in the study. Anyone who had current or previous experience teaching anatomy at an Australian tertiary institution was included; there were no other inclusion or exclusion criteria. Demographic data related to sex and

educational background were noted; data such as age and years of teaching experience were deemed a risk to identification in what is a relatively small pool of teaching anatomists in Australia.

The semi-structured interviews were conducted via Zoom. Prior to the interview commencing, participants were required to read a plain language statement (Appendix D) to ensure that they were fully informed about what their involvement in the study would entail, to sign the consent form (Appendix E) and to provide permission for the interview to be audio-recorded. Participants' views were sought on the content of anatomy lectures and laboratory classes, including the need for updating that content, the place of anatomical variation in anatomy teaching, and factors that might influence the teaching of vulval anatomy,using the interview schedule shown in Appendix F.

Interviewing was conducted iteratively, and data analysis commenced after the fifth interview. The initial data were analysed deductively with coding mapped to specific research questions (Braun & Clarke, 2006), but new concepts and themes around inclusivity soon emerged, and questions about how best to address diversity and inclusivity in anatomy teaching were added to subsequent interviews. Data collection continued until the point of data saturation, at which no new data were being identified.

Interviews were transcribed verbatim, deidentified and then analysed, initially by breaking down the transcripts into units using a coding system. The coded units were then clustered based on their shared concepts to develop themes (a theme is "an abstract entity that brings meaning and identity to a current experience and its variant manifestations"; DeSantis & Ugarriza, 2000, p. 362). I originally commenced the process of analysis using one of the commercially available computer-assisted qualitative data analysis software programs. After coding several interviews, I decided that I preferred to code and categorise the data manually,

finding that the nuanced and personal nature of the conversations didn't lend itself well to the reductive nature of software entry.

In qualitative research, the interpretation of codes and themes rely on the subjective interpretations of the researcher. Prior to commencement of data collection, I discussed my preconceptions about the study population with my supervisor, and the need to ensure these assumptions did not harm data collection and analysis.

This review was published in *Anatomical Sciences Education* in 2023 and is reproduced in Chapter 8 of this thesis.

Chapter 6: The Evidence Base for *Normal* in Terms of Labial Anatomy

Although the first description of labiaplasty in the literature was published in 1984 (Hodgkinson & Hait,1984), it was not until 2005 that the first study of genital dimensions in healthy women was published (Lloyd et al., 2005). My search of the literature conducted in June 2020 identified 10 existing papers reporting measurements of normal genitalia in pre-pubertal and adolescent girls, and/or in pre- and post-menopausal women, from eight different countries and varied ethnicities, published between 2005 and 2020. The subsequent literature review was an important first step in providing quantitative information about normal labial diversity to guide medical education, patient education and surgical treatment.

The review was published in *The Australian & New Zealand Journal of Obstetrics & Gynaecology* in 2021 (Hayes & Temple-Smith, 2021) and is presented in its final published form below. According to citation data provided by Wiley, it was one of the top cited articles published in this journal between 1 Jan 2021 and 15 Dec 2022 (see Appendix G).

Variation in recruitment, inclusion and exclusion criteria, and measurement techniques did not allow for combined analysis of the 10 datasets, but I noted a clear and significant variation in labial length (range 5–100 mm) and width (range 1–60 mm) across the study populations. Overall, labia minora were wider in pre-menopausal women than post-menopausal women, protruding labia minora were more common than not, and asymmetry between right and left labia was common.

No combination of search terms and databases located all these papers in one search. The 10 studies located in the search were published in nine journals and offered a total of 33 keywords, with the words *female*, *anatomy* and *measurements* listed in three studies, and the words *labiaplasty*, *genitalia* and *vulva* listed in two studies. The remaining 27 key words

were used in one article each. The apparent diffusion of labial measurement reports through the literature might explain the perception that this data didn't exist, as this statement from Creighton and Liao (2019) suggests: "clear and unambiguous messages regarding the normality and variance of vulval anatomy are needed from the medical literature" (p. 20). The wide variation in keywords also reflects the breadth of academic interest in FGCS, which has captured the attention of professionals from many specialties (gynaecologists, sexual therapists and psychologists) in addition to cosmetic surgeons.

Prior to thesis submission, the search process was repeated (23rd February 2023), and two additional recently published papers that defined normal labial dimensions in 400 Indian women aged 18–79 years (Agrawal et al., 2021), and 208 premenopausal Turkish women (Kaya et al., 2020), were identified. Once again, there were variations in inclusion and exclusion criteria and methodologies that precluded direct comparison between the measurements in these and the earlier studies, but the additional papers replicated the range of variation already observed in English (Lloyd et al., 2005), Thai (Chinkangsadan et al., 2020), Austrian (Widschwendter et al., 2019), US (Brodie et al., 2018; Chalmers et al., 2014), Swiss (Kreklau et al., 2018), Danish (Lykkebo et al., 2017), Israeli (Krissi et al., 2015) and Turkish (Akbiyik & Kutlu, 2010; Basaran et al., 2008) samples of adolescent girls and pre- and post-menopausal women. To enable comparison with the data in my published paper (below), summary data from the two recently published papers are shown in Table 6.

Table 6. Summary data from the additional two studies of genital dimensions in healthy women

Author (year)	Aim	Participants (country)	Patient selection	Method	Measurements
Kaya et al. (2020)	To provide baseline data for anatomy of female genital structures and to investigate correlation between those measurements and sexual function and genital perception	208 premenopausal women aged 18–52 years (Turkey)	Attending gynaecological outpatient clinic Excluded postmenopausal, pregnant, oral contraception, IUD, prolapse, malignancy, PCOS and previous surgery	• Lithotomy position • Not anaesthetised • Steel caliper • Measuring done by 2 gynaecologists • Female sexual function index (FSFI) to evaluate sexual function • Female genital self-image scale (FGSIS) to measure female genital perception	• Labia minora width: right 2.12±0.86cm; left 2.20±0.96cm • No significant relationship found between genital measurements and sexual function • Positive correlation between FSFI and FGSIS

Agrawal et al. (2021)	To measure the anatomical dimensions of the vulva in adult Indian women and analyse correlation with age, BMI, parity and mode of delivery	400 women aged 18–79 years (India)	Attending gynaecological outpatient clinic Excluded chronic vulvar disease, "vulvar problems", prior surgery of the vulva, stage 2 pelvic organ prolapse, hormone therapy and pregnancy	• Lithotomy position • Not anaesthetised • Disposable surgical ruler • First author did all measuring	• Labia minora width: 2.6±0.74cm (range 0.7-4.9 cm) • Labia minora length: 7.6±1.04cm (range 5-10.7 cm) • Statistically significant positive correlation of age, BMI and obstetric history seen with labia minora width

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SYSTEMATIC REVIEW

What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy

Jennifer A. Hayes[1,2] **and Meredith J. Temple-Smith**[1]

[1]Department of General Practice, University of Melbourne, Melbourne, Victoria, Australia

[2]Department of Anatomy and Neuroscience, University of Melbourne, Melbourne, Victoria, Australia

Correspondence: A/Prof. Jennifer A. Hayes, Department of General Practice, University of Melbourne, 780 Elizabeth St, Carlton, Melbourne, Vic. 3010, Australia. Email: j.hayes@unimelb.edu.au

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Background: Despite increasing numbers of labiaplasties being performed, there is little quantitative information on normal labial diversity to guide medical education, patient education and surgical treatment.

Aim: This scoping review will determine what is known in the published literature about the anatomical basis of normal for labia and female genital cosmetic surgery (FCGS).

Materials and methods: The scoping review identified ten population-based studies that recorded labial dimensions by searching three electronic databases utilising a Preferred Reporting Items for Systematic Reviews and Meta-Analyses search strategy. Strict inclusion and exclusion criteria were applied and then reference lists were scrutinised until no further articles that met the criteria were located.

Results: These studies showed significant variation in labial length (range 5–100 mm) and width (range 1–60 mm). Labia minora were wider in pre-menopausal women than in post-menopausal women, protruding labia minora were more common than not, and asymmetry between right and left labia was common. Variation in recruitment, inclusion and exclusion criteria, and measurement did not allow for summation of the data sets.

Conclusion: This information could usefully be added to medical textbooks and teaching to ensure that medical graduates are sufficiently informed about normal variation in female genital anatomy to assess and advise women seeking FGCS.

KEYWORDS

anatomy, female, genitalia, plastic, reference values, review, surgery

INTRODUCTION

Female genital cosmetic surgery (FGCS) is an umbrella term encompassing a diverse range of surgical procedures that change the structure and appearance of female genitals in the absence of pathology. These surgeries are performed on women and girls with a normal range of genital variation including post-childbearing and age-related changes.[1] Professional medical organisations[1,2,3] are united in their concerns about FGCS and the lack of an evidence base for the long-term outcomes of these surgeries, including the oft-promised additional benefit of sexual function enhancement and partner satisfaction. This is, of course, the opposite of female genital mutilation, which is performed to diminish sexual function. In neither case is there a robust dataset to validate the claim.[4]

The business practices surrounding FGCS have raised concerns about conflict of interest and lack of professionalism in direct-to-patient marketing on the internet.[5] Together with censored vulvar images in print and online pornography, these have contributed to the skewing of social perception of what constitutes *normal* toward a 'slit like genital hiatus with the labia minora and labia majora coming together in the midline'.[6] Skewing the perception of normal coincides with the increasing trend among women for Brazilian waxing and other forms of pubic hair

depilation. This provides unobstructed views of variable normal genitalia, creating an ever-increasing subpopulation of women wanting to change their genital anatomy in the belief that it will enhance their attractiveness, sexual desire and sexual function.[7] As Moynihan noted, it is 'the ever-narrowing definitions of normal which help turn the complaints of the healthy into the conditions of the sick'.[8]

The most popular of the female genital cosmetic surgeries is labiaplasty, which involves cutting back the labia minora so that they sit flush with, or are entirely hidden by, the labia majora.[9] The labia minora are cutaneous folds without hair or fat that lie internal to the labia majora and form the boundaries of the vestibule of the vagina. The anterior ends of the labia minora split to form the (dorsal) prepuce and (ventral) frenulum of the clitoris, while posteriorly they are united by a small transverse skin fold, the frenulum of the labia. Labia minora are rich in elastic fibres and small blood vessels that are arranged to form erectile tissue similar to that in the penis. Arterial supply is abundant via the internal pudendal artery. Venous return is into the vaginal venous plexus and internal pudendal vein. Innervation is via the internal pudendal nerve (S2–4) posteriorly and the ilio-inguinal (T12, L1) and genito-femoral (L1–2) nerves anteriorly. The labia minora can be short or long, smooth or wrinkled, light or dark, and one side may be longer or wider, which is similar to the asymmetry of many body parts. The labia minora take many years to develop fully and change significantly over a woman's lifetime.[10] The main functions of the labia minora are to protect the vaginal and urethral openings, direct the flow of urine, and contribute sensory and erectile tissue for sexual arousal and intercourse, functions that require the labia minora to be 1 cm or more in size.[11]

Descriptions of female genital anatomy are sparse in medical textbooks,[12] and detailed morphological study of the vulva, including normal variation, is not included in medical training.[13] The resulting knowledge gap in medical graduates may underlie the lack of confidence reported in a survey of 433 Australian general practitioners which found that more than half had been consulted by women and girls seeking FGCS and that 75% thought they had inadequate relevant knowledge.[14] A small qualitative study of 21 Australian university students found that young women had little knowledge of normal genital anatomy and might be reassured and dissuaded from undergoing unnecessary surgery by a confident and knowledgeable general practitioner.[15] However, an audit of 48 referral letters in a National Health Service gynaecology clinic in the United Kingdom showed that only 77% of the referrers reported examining the patient, a third of the referrers described the labia as normal but still requested surgery for the patient and 25% of referrals contained pejorative language such as 'leathery' or 'pendulous'.[13] In each case, the general practitioner, if inexperienced in dealing with such intimate concerns, might have been relying on the specialist to persuade the patient that she was normal, but the lack of immediate reassurance combined with specialist referral could be interpreted by the patient as proof of the need for surgery.[16]

In summary, there appears to be a pervasive lack of general knowledge about the normal anatomy and function of female genitalia that may contribute to the notion that any variation from an idealised appearance is abnormal and requires surgical repair to achieve perfection and enhance function. To explore this in more detail, this study aimed to determine what is known in the published literature about the anatomical basis of normal for labia and FGCS.

METHODS

A search of existing literature with no date limit was conducted on 13 June 2020. Medical Subject Headings (MeSH) and the key terms (labiaplasty OR labioplasty) AND (anatom*) AND (normal* OR variation) were used to search Scopus, PubMed and PsychInfo databases. A total of 137 papers were identified, after which papers were excluded if they were (Fig. 1):

- duplicated in databases (n = 11)
- non-English language (n = 6)
- referring to labial structures other than vulva (n = 17)
- relating to development, pathology or genital function without structure (n = 21)
- reporting non-surgical therapies or surgery related to gender re-assignation or genital cutting (n = 7).

Of the remaining 75 papers, only seven defined normal labial dimensions by measurement. To these were added three more papers identified from hand-searching reference lists.

RESULTS

In contrast to public discourse, there had, until fairly recently, been only limited discussion in the medical literature about what constitutes *normal* anatomy for female genitalia. Much of the attention had instead been devoted to the underlying social and psychological reasons for women contemplating and undergoing labiaplasty, and to the surgical planning and technique (most of the papers dealing with female genital anatomy are cosmetic surgery orientated and start with the notion of *abnormal*).[17] Although the first description of labiaplasty in the literature was in 1984,[18] it was not until 2005 that the first study regarding genital dimensions in healthy women was published. A search of the literature identified ten papers (see Table 1) measuring normal genitalia in pre-pubertal and adolescent girls, and pre- and post-menopausal women from eight different countries and varied ethnicities, all published from 2005 to 2020.

In the first observational cross-sectional study, which was published in 2005, Lloyd et al. recruited 50 pre-menopausal women from gynaecology operating lists at a central London teaching hospital.[19] All were having routine procedures such as hysteroscopy

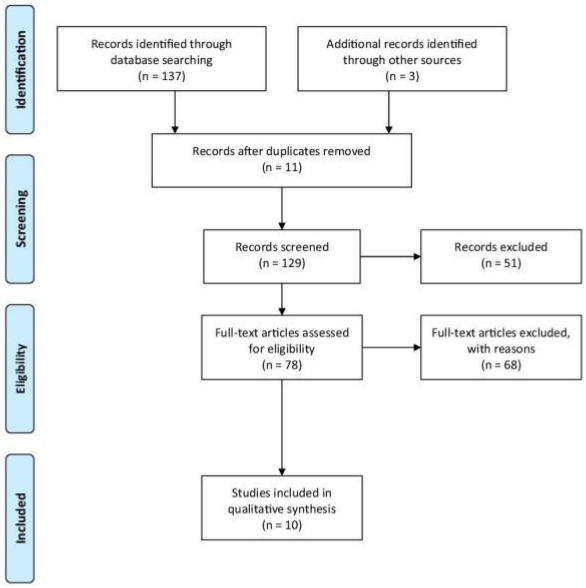

FIGURE 1 Literature search process and results in Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2009 flow diagram.

or diagnostic laparoscopy and had not expressed concern about their vulval appearance. The researchers measured a variety of parameters, including labial length, labial width and rugosity (ridging or wrinkling) of labial skin. They found a wide range for each measurement (up to 5 cm for labial width) and found no statistically significant association with age, parity, ethnicity, hormone use or sexual history.

Lloyd et al.'s[19] study is widely regarded as the seminal reference and seven papers have replicated this range of variation in Thai,[20] Austrian,[21] American,[22] Swiss,[23] Danish,[24] Israeli,[25] and Turkish[26] samples of adolescent girls and pre- and post-menopausal women. Kreklau et al. published the largest of these studies, measuring the vulval dimensions of a group of 657 pre- and post-menopausal women covering seven decades of ages.[23]

Very little is known about the development of female external genitalia during puberty.[7] The classification system of physical development in children and adolescents, Tanner stages 1–5, comes from a large epidemiological study by Marshall and Tanner[27] which recorded pubic hair and testicular development in boys, and pubic hair and breast development in girls, so no studies exist for female genitalia. Two of the ten papers identified in this review sought to establish genital standards in girls through external genital measurements in pre-pubertal samples. Akbiyik et al. examined 205 girls aged one month to ten years old and developed equations to estimate the expected external genital dimensions according to age, weight and height.[28] Chalmers et al. examined and measured the genitalia of 56 Tanner stage 1 girls in several age groups and generated regression models to show significant linear growth with age.[29]

The findings of the papers in this review are striking and highlight the variety in normal vulval appearance. All studies found a wide disparity in labial length (range 5–100 mm) and labial width (range 1–60 mm). Kreklau et al. created seven subgroups within their sample, one for each decade between 25 and 84 years, and found at least a five-fold variation in labia minora width within any of the groups.[23] Labia minora were wider in pre-menopausal women compared with post-menopausal women.[26] It was more common to have protruding labia minora than not,[20,21,24] and asymmetry between right and left labia was common.[22,24] Although these data demonstrate the wide variability of female genital anatomy, they bring us no closer to an established international normal range because there are significant variations in inclusion and exclusion criteria and methodologies that preclude direct comparison between the measurements in each study.

All of the studies recruited patients attending public gynaecology clinics, either for annual examination or for unrelated surgery. Within the cohorts there were different approaches to racial and ethnic diversity. In Lloyd et al.'s original sample of 50, 'the majority of women were white (n = 37) with five Asian women, six black women, one Latin American woman and one woman

TABLE 1 Aim, selection criteria, methodology and results for each study

Author (year)	Aim	Participants (country)	Patient selection
Chinkangsadan et al. (2020)[20]	Normative data and difference between pre- and post-menopausal groups	155 pre- and post-menopausal women aged 20–70 years (Thailand)	Attending outpatient clinic for annual pelvic exam and satisfied with external genitalia (Genital Appearance Satisfaction Questionnaire) Excluded previous genital surgery or episiotomy
Widschwendter et al. (2020)[21]	To correlate objective measurements of labia minora with perception or complaints	200 pre-menopausal women aged 18–50 years; median 33.5 years (Austria)	Attending outpatient clinic for check-up or other gynaecological issue Excluded previous genital surgery or vulval disease
Brodie et al. (2019)[22]	Sample of normal female adolescents with focus on size and morphology of labia minora	44 adolescents aged 10–19 years; mean 14.4 years (United States)	Presenting for routine surgical procedures Excluded pre-pubertal (Tanner stage 1, 2), genital abnormality or previous genital surgery
Kreklau et al. (2018)[23]	Cross-sectional study of normal vulva in white women aged 15–84 years (conscious avoidance of ethnic diversity)	657 pre- and post-menopausal women aged 15–84 years; mean 47.27 years (Switzerland)	Attending outpatient clinic Excluded previous genital surgery, vulval pathology, pregnancy or hormone therapy other than oral contraceptive pill
Lykkebo et al. (2017)[24]	To correlate size and perception of labia minora in normal women	244 pre-menopausal women aged 18–50 years (Denmark)	Attending outpatient clinic Excluded previous genital surgery or vulval skin disease
Krissi et al. (2016)[25]	Correlate anatomical dimensions of adult female genitalia with sexual function (orgasm frequency)	32 pre-menopausal women aged 20–51 years; mean 33.38 years (Israel)	Undergoing surgery unrelated to vulvar morphology Excluded previous genital surgery, oral contraceptive pill or post-menopausal
Chalmers et al. (2014)[29]	Baseline genital standards in prepubescent females for genital reconstruction in congenital abnormalities	56 pre-pubertal girls divided into age groups: <2, 2–5, 5–11 and > 11 years (United States)	Undergoing unrelated surgery Excluded previous genital surgery, genital anomalies or developmental delay
Akbiyik et al. (2010)[28]	Baseline genital standards in pre-adolescent females for feminising genitoplasty	205 pre-pubertal girls divided into age groups: 1–12, 13–24, 25–60 and 61–120 months (Turkey)	Undergoing unrelated surgery Excluded previous genital surgery, genital anomalies or developmental delay
Basaran (2008)[26]	Compare genital measurements between pre- and post-menopausal women	50 pre-menopausal women aged 22–39 years; mean 30.2 years 50 post-menopausal women aged 47–60 years; mean 55.1 years (Turkey)	Attending outpatient gynaecology and menopause clinics Excluded history of pelvic surgery or congenital anomaly, episiotomy or hormone replacement therapy
Lloyd (2005)[19]	Observational cross-sectional study of genital dimensions in normal women	50 pre-menopausal women aged 18–50 years; mean 35.6 years (United Kingdom)	Undergoing gynaecological surgery not involving genitalia Excluded previous genital surgery or female genital mutilation

Method	Measurements
• Lithotomy position • Not anaesthetised • Minimal traction • Digital calipers • First author did all measuring	• Labia minora median width: right 9.69 mm (range 6.61–27.30 mm), left 10.46 mm (range 6.75–32.91 mm) • Labia minora median length: right 30.91 mm (range 8.85–85.73 mm), left 30.93 mm (range 7.71–87.33 mm) • Protrusion of labia minora median 0 mm (range 0–15.81 mm) • 38.1% had protruding labia minora
• Dorsosacral position • Not anaesthetised • No traction applied • Tape measure • Measurers not identified • Participants also completed questionnaire about subjective perception of labial size and complaints	• Labia minora median width 19.0 mm (interquartile range 12.6–27.5 mm) • Labia minora median length 35.5 mm (interquartile range 27.8–48.9 mm) • Median difference in length between sides 4 mm • 56.5% had visible labia minora
• Frog-leg position or stirrups • Anaesthetised • Stretched and unstretched measurements taken • Flexible paper ruler • Four measurers	• Labia minora median width 10 mm (range 3–70 mm) • Labia minora median length 31 mm (range 10–90 mm) • Right and left labial width (unstretched) different in 55%
• Lithotomy position • Not anaesthetised • No traction applied • Paper measuring tape • 12 measurers	• Labia minora mean width: right 13.4 mm (range 2–61 mm), left 14.15 mm (range 1–42 mm) • Labia minora mean length: right 42.1 mm (range 6–100 mm), left 42.97 mm (range 5–100 mm) • Asymmetry not statistically significant
• Lithotomy position • Not anaesthetised • No traction applied, • Tape measure • Four measurers	• Mean width: right 15.9 mm (range 1–45 mm), left 15.5 mm (range 1–40 mm) • Median length 35.5 mm • 54% had visible labia minora • 87.5% perceived their vulva as normal, including 2/3 women with labia > 26.5 mm
• Lithotomy position • Anaesthetised • No traction applied • Paper tape • One measurer	• Mean width: right 14.9 mm (range 10–30 mm), left 14.5 mm (range 10–40 mm) • Mean length: right 34.7 mm (10–60 mm), left 38.2 mm (range 20–60 mm)
• Supine position • Anaesthetised • Gentle traction • Metric ruler • Resident or surgeon measuring	• Labia minora size showed a linear correlation with advance of age, height and body weight
• Supine with hips flexed • Anaesthetised • Digital caliper • Measurers not identified	• Labia minora size showed a linear correlation with advance of age, height and body weight • Asymmetry in 25%
• Lithotomy • Not anaesthetised • Tape measure • Measurers not identified	Pre-menopausal • Mean width: right 17.7 mm (range 9–29 mm), left 18.1 mm (range 12–33 mm) • Mean length: right 55.6 mm (range 33–75 mm), left 55.8 mm (range 35–75 mm) Post-menopausal • Mean width: right 15.5 mm (range 7–29 mm), left 15.3 mm (range 6–26 mm) • Mean length: right 34.7mm (range 10–60 mm), left 38.2 mm (range 20–60 mm) • The labia minora were wider in pre-menopausal women than post-menopausal women (mean ± standard deviation: 17.9 ± 4.1 mm vs 15.4 ± 4.7 mm)
• Lithotomy • Anaesthetised • Tape measure • Two registrars measured	• Mean length 60.6 mm (range 20–100 mm) • Mean width 21.8 mm (range 7–50 mm

who was mixed race'.[19] Brodie et al. also measured a racially and ethnically diverse cohort where 'most were non-Hispanic ethnicity (*n* = 32/44) and were Caucasian race (*n* = 38/44)'.[22] Three of the reviewed studies[20,23,24] consciously avoided racial and ethnic diversity to create a normative dataset specific to that cohort: 'we chose to include white women only, to create a homogeneous group of just one ethnicity'.[23] In the other five studies,[21,25,26,28,29] cohort composition was not recorded.

In terms of defining a sample of women with *normal* labia to measure, only one study[20] used the validated Genital Appearance Satisfaction scale to include only women who were rated *most satisfied*. The Genital Appearance Satisfaction scale was originally developed to measure the attitudes toward genital appearance of *normal* women in general society, but it has subsequently been validated for labiaplasty patient samples as well.[30] The remaining studies simply presumed participants were satisfied with their vulvae because they were not actively seeking FGCS; 'none of the women in our study had expressed any personal difficulty or sought cosmetic surgical alternation'.[19]

Two of the studies excluded women using hormone replacement therapy,[23,26] one study excluded women using oral contraceptives and medicated intrauterine devices[25] and one study excluded pregnant women.[23] Two of the studies that did not apply these exclusion criteria instead analysed the potential effects of use of systemic hormone therapy on genital dimension and found that women taking oestrogen-containing medications did not show any variation compared with the rest of the pre-menopausal women.[19,22] Another study[26] compared pre- and post-menopausal women and found that the mean width of labia minora was significantly higher in the pre-menopausal group (mean ± standard deviation: 17.9 ± 4.1 mm vs 15.4 ± 4.7 mm), which is consistent with reduction in collagen levels and skin thickness associated with ageing and oestrogen withdrawal.[31]

In the original 2005 paper, Lloyd et al.[19] used a disposable paper tape for all measurements other than vaginal length, for which a vaginal swab was used. There is no reference to traction being applied (or not) before measurement. All measurements were taken by one of two gynaecology registrars to minimise inter-observer variability and both registrars were present during examinations. There is significant variation in measurement technique between Lloyd et al. and the subsequent studies. Four of the ten studies specified that no traction was applied when measuring the flexible tissue (labia folded to the side without stretching),[21,23,24,25] two studies specified minimal traction,[20,29] one study measured with and without stretching (on a pre-pubertal sample)[22] and three studies made no reference to applying traction.[19,26,28] It is reasonable to assume that traction was only applied under general anaesthetic. Measuring tools were measuring tape or ruler (eight studies) and digital calipers (two studies). Two distinct ways of measuring labia minora width were used: from lateral edge to vaginal introitus (internal surface) or from lateral edge to interlabial sulcus (external surface). The number of measurers varied between one and 12, although three studies did not specify, and there was wide variation in measures taken to reduce observer variability from stringent to none described.

All of the patients were measured supine, mostly lithotomy or frog-leg position. Those attending outpatient clinics were not anaesthetised for measurement, unlike those undergoing unrelated surgery. This potentially makes a difference to the recorded measurements because of the vascularity of the labia minora. It is reasonable to assume that general anaesthetic agents would produce vasodilation and engorgement of the vascular structures while the anxiety provoked by measuring an unanaesthetised patient in a clinical setting might induce sympathetic-mediated vasoconstriction.

DISCUSSION

The international FGCS market is booming due to the promotion of a specific notion of *normal*, the flat Barbie doll vulva with no protuberances beyond the labia majora.[32] This appearance is not consistent with the wide range of labial morphology and measurements in the studies analysed. Despite variation in recruitment, inclusion and exclusion criteria, and measurement, these studies showed significant variation in labial length and labial width. Labia minora were wider in pre-menopausal women compared with post-menopausal women,[26] it was more common to have protruding labia minora than not[20,21,24] and asymmetry between right and left labia was common.[22,24]

These findings coincide with a proliferation of resources on female genital diversity that reflect the depth of societal concerns[33,34,35,36] but are not represented in anatomy texts.[12] A study comparing 253 visual images from online pornography, feminist publications (online and print) and anatomy textbooks found that labia minora were significantly less protuberant in anatomy textbooks and online pornography compared with the feminist publications.[37] The anatomy textbooks used in medical education should include images of non-protruding and visible, and symmetrical and asymmetrical, labia minora so that non-specialist medical professionals are fully conversant with normal genital diversity when consulted by women who are concerned about their genital appearance.

Cosmetic surgeons describe visible labia minora as *hypertrophy*, which means excessive growth.[9] Hypertrophy of the labia has been variably defined, without proper scientific methodology, as maximal labial width exceeding 5 cm,[38] 4 cm[39] or 3 cm,[40] and more recently cosmetic surgeon Stefan Gress suggested that 2 cm constituted a useful baseline definition of hypertrophy because it is at this point that 'the inner vaginal lips generally start to be visible outside the shelter of the labia majora'.[41] A variety of classification schemes for labial protrusion have been proposed to guide different treatment paradigms but, again, with no consensus regarding definition or use.[42]

The implication here is that *abnormal* is the key ethical criterion for labiaplasty[43] and that a cut-off or threshold exists for normal beyond which surgery is indicated. Only one study has proposed an evidence-based cut-off point for normal labia minora. The United Kingdom group who reported the first study on normal genitalia subsequently published a prospective study of 33 women seeking labiaplasty.[44] They found that the labial widths of all 33 women seeking surgery (right labia mean 26.9 mm (standard deviation 12.8 mm), left labia mean 24.8 mm (standard deviation 13.1 mm)) were within the defined normal limits of their previous study,[19] although three patients had significant labial asymmetry with a difference of 30 mm in width. Unilateral labiaplasty was offered to the three women with asymmetry but the other 30 women were refused surgery: 11 accepted a psychologist referral, 12 opted for a second opinion and one was referred for urgent mental health assessment. The authors concluded that 'there is an urgent need for data based on a large general population sample stratified according to age, ethnicity and parity'.[44] All of the studies analysed shared this common objective of establishing a normative numeric data resource for preoperative counselling, especially when labiaplasty is desired for aesthetic reasons (with the exception of the two studies with pre-pubertal subjects). 'These women need to have access to adequate education and knowledge of the diversity in the normal genital appearance. This could be conducted by presenting the normative data'.[24]

The focus on normative datasets and *normal* has been labelled a preoccupation of the literature[43] and a distraction[45] because it implies that women who seek surgery to alter the appearance of their vulvae have 'an underlying desire for normalcy'.[43] In a recent qualitative study, the authors interviewed 11 clinicians who had received requests for labiaplasty from adolescent girls and concluded that education and reassurance do not always work. The researchers identified two categories of patients: the *desisters* who were reassured with explanations about normality and subsequently lost their desire for labiaplasty, and the *persistors* who, despite education and reassurance, remained concerned and desirous of surgery. In doing so the authors identified a clear gap in the recommendations of professional position statements, with their emphasis on education and reassurance, because they do not address how to deal with *persistors*.[43]

Normative datasets are useful when planning reconstructive or transgender surgery but their role in patient education has been questioned by the identification of the *persistor* subgroup in adolescent labiaplasty referrals. Further research could usefully be directed toward whether and to what degree the *persistor* patient profile exists in pre- and post-menopausal cohorts of women seeking FGCS and what it might take to dissuade them from submitting to costly labiaplasty surgery. Many researchers have stressed the need for preoperative counselling and education to go beyond what is *normal* and include the use of validated tools that measure psychological, physical and sexual function.[46]

This review is the first analysis of normative datasets from an anatomical viewpoint. There was no combination of search terms and databases that located all of these papers in one search. The ten studies analysed were published in nine different journals and had a total of 33 key words, with the words *female, anatomy* and *measurements* listed in three studies each, and the words *labiaplasty, genitalia* and *vulva* listed in two studies each. The remaining 27 key words were used in one article each. This diffusion through the literature reflects the breadth of academic interest in FGCS, which has captured the attention of many other specialties (gynaecologists, sexual therapists and psychologists) in addition to cosmetic surgeons. A weakness of this study is the limitation to English language publications, given that the successful mainstreaming of FGCS in higher income countries is now reflected in middle and low income countries with the potential for publications in many languages other than English.

Data on vulval measurements have historically been sparse. This paper has reviewed ten published studies that show a wide range of normal variation in the anatomy of the labia minora. This information does not appear to be common knowledge among the general public, or even the medical profession, as evidenced by the fact that labia are described as *hypertrophic* when still within the normal range demonstrated.

Summation of the data sets did not allow for population-based and observer-based bias and methodological variation, and evidence was presented that the focus on defining *normality* may be overemphasised, but the general findings can still be helpful in counselling women seeking labiaplasty. This information could usefully be added to medical textbooks and teaching to ensure that medical graduates are sufficiently informed about normal variation in female genital anatomy to assess and advise women seeking FGCS.

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REFERENCES

1. Committee on Gynecologic Practice. Elective female genital cosmetic surgery: ACOG committee opinion, Number 795. *Obstet Gynecol* 2020; **135**: e36–e42.
2. Royal College of Obstetricians and Gynaecologists Ethics Committee. *Ethical Opinion Paper: Ethical Considerations in Relation to Female Genital Cosmetic Surgery (FGCS)* [Internet]. London: Royal College of Obstetricians and Gynaecologists, 2013. [Accessed 21 July 2020.] Available from URL: https://www.rcog.org.uk/globalassets/documents/guidelines/ethics-issues-and-resources/rcog-fgcs-ethical-opinion-paper.pdf
3. RANZCOG Women's Health Committee. Vaginal "rejuvenation" and cosmetic vaginal procedures. *Aust N Z J Obstet Gynaecol* 2019. https://doi.org/10.1111/ajo.12999.
4. Cain JM, Iglesia CB, Dickens B, Montgomery O. Body enhancement through female genital cosmetic surgery creates ethical and rights dilemmas. *Int J Gynaecol Obstet* 2013; **122**(2): 169–172.
5. Chibnall K, McDonald K, Kirkman M. Pathologising diversity: medical websites offering female genital cosmetic surgery in Australia. *Cult Health Sex* 2020; **22**: 64–80.

6. Iglesia CB. Cosmetic gynecology and the elusive quest for the "perfect" vagina. *Obstet Gynecol* 2012; **119**(6): 1083–1084.
7. Michala L, Koliantzaki S, Antsaklis A. Protruding labia minora: abnormal or just uncool? *J Psychosom Obstet Gynaecol* 2011; **32**(3): 154–156.
8. Moynihan R. The making of a disease: female sexual dysfunction. *BMJ* 2003; **326**(7379): 45–47.
9. Nurka C. *Female Genital Cosmetic Surgery: Deviance, Desire and the Pursuit of Perfection*. Switzerland: Palgrave McMillan, 2019.
10. Sacher BC. The normal vulva and vagina. In: Bornstein J, ed. *Vulvar Disease*. Cham: Springer, 2019; 7–19.
11. Clerico C, Lari A, Mojallal A, Boucher F. Anatomy and aesthetics of the labia minora: the ideal vulva? *Aesthetic Plast Surg* 2017; **41**(3): 714–719.
12. Andrikopoulou M, Michala L, Creighton SM, Liao LM. The normal vulva in medical textbooks. *J Obstet Gynaecol.* 2013; **33**(7): 648–650.
13. Deans R, Liao LM, Crouch NS, Creighton SM. Why are women referred for female genital cosmetic surgery? [letter]. *Med J Aust* 2011; **195**(2): 99.
14. Simonis M, Manocha R, Ong JJ. Female genital cosmetic surgery: a cross-sectional survey exploring knowledge, attitude and practice of general practitioners. *BMJ Open* 2016; **6**(9): e013010.
15. Howarth C, Hayes J, Simonis M, Temple-Smith M. "Everything's neatly tucked away": young women's views on desirable vulval anatomy. *Cult Heal Sex* 2016; **18**(12): 1363–1378.
16. Liao LM, Creighton SM. Requests for cosmetic genitoplasty: how should healthcare providers respond? *BMJ* 2007; **334**(7603): 1090–1092.
17. Braun V. Selling the "perfect" vulva? In: Heyes CJ, Jones M, eds. *Cosmetic Surgery: A Feminist Primer*. Abingdon: Routledge, 2016; 133–154.
18. Hodgkinson DJ, Hait G. Aesthetic vaginal labioplasty. *Plast Reconstr Surg* 1984; **74**(3): 414–416.
19. Lloyd J, Crouch NS, Minto CL *et al*. Female genital appearance: "normality" unfolds. *BJOG* 2005; **112**(5): 643–646.
20. Chinkangsadan T, Ruanphoo P, Bunyavejchevin S. Variation of genital appearance in Thai women. *Thai J Obstet Gynaecol* 2020; **28**(2): 112–119.
21. Widschwendter A, Riedl D, Freidhager K *et al*. Perception of labial size and objective measurements – is there a correlation? A cross-sectional study in a cohort not seeking labiaplasty. *J Sex Med* 2020; **17**(3): 461–469.
22. Brodie K, Alaniz V, Buyers E *et al*. A study of adolescent female genitalia: what is normal? *J Pediatr Adolesc Gynecol* 2019; **32**(1): 27–31.
23. Kreklau A, Vâz I, Oehme F *et al*. Measurements of a "normal vulva" in women aged 15–84: a cross-sectional prospective single-centre study. *BJOG* 2018; **125**(13): 1656–1661.
24. Lykkebo AW, Drue HC, Lam JUH, Guldberg R. The size of labia minora and perception of genital appearance: a cross-sectional study. *J Low Genit Tract Dis* 2017; **21**(3): 198–203.
25. Krissi H, Ben-Shitrit G, Aviram A *et al*. Anatomical diversity of the female external genitalia and its association to sexual function. *Eur J Obstet Gynecol Reprod Biol* 2016; **196**: 44–47.
26. Basaran M, Kosif R, Bayar U, Civelek B. Characteristics of external genitalia in pre-and postmenopausal women. *Climacteric* 2008; **11**(5): 416–421.
27. Marshall WA, Tanner JM. Variations in pattern of pubertal changes in girls. *Arch Dis Child* 1969; **44**(235): 291–303.
28. Akbiyik F, Kutlu AO. External genital proportions in prepubertal girls: a morphometric reference for female genitoplasty. *J Urol* 2010; **184**(4): 1476–1481.
29. Chalmers DJ, O'Donnell CI, Casperson KJ *et al*. Normal anatomic relationships in prepubescent female external genitalia. *J Pediatr Urol* 2014; **10**(6): 1117–1121.
30. Sharp G, Maynard P, Hamori CA *et al*. Measuring quality of life in female genital cosmetic procedure patients: a systematic review of patient-reported outcome measures. *Aesthet Surg J* 2020; **40**: 311–318.
31. Brincat M, Kabalan S, Studd JW *et al*. A study of the decrease of skin collagen content, skin thickness, and bone mass in the postmenopausal woman. *Obstet Gynecol* 1987; **70**(6): 840–845.
32. Iglesia CB, Yurteri-Kaplan L, Alinsod R. Female genital cosmetic surgery: a review of techniques and outcomes. *Int Urogynecol J* 2013; **24**(12): 1997–2009.
33. Women's Health Victoria. *The Labia Library* [Internet]. Melbourne: Women's Health Victoria, 2011. [Accessed 21 July 2020.] Available from URL: www.labialibrary.org.au/
34. Women's Health Victoria. *The Vulva Gallery* [Internet]. Melbourne: Women's Health Victoria, 2017. [Accessed 21 Jul 2020.] Available from URL: www.thevulvagallery.com/
35. Karras N. *Petals*. San Diego: Crystal River Publishing, 2003.
36. McCartney J. *Great Wall of Vagina*. London: Fine Art Studios. [Accessed 21 July 2020.] Available from URL: www.greatwallofvagina.co.uk/home
37. Howarth H, Sommer V, Jordan FM. Visual depictions of female genitalia differ depending on source. *Med Humanit* 2010; **36**(2): 75–79.
38. Friedrich EG. *Vulvar Disease*, 2ndedn. Philadelphia: WB Saunders, 1983.
39. Rouzier R, Louis-Sylvestre C, Paniel BJ, Haddad B. Hypertrophy of labia minora: experience with 163 reductions. *Am J Obstet Gynecol* 2000; **182**(1 Pt 1): 35–40.
40. Munhoz AM, Filassi JR, Ricci MD *et al*. Aesthetic labia minora reduction with inferior wedge resection and superior pedicle flap reconstruction. *Plas Reconstr Surg* 2006; **118**(5): 1237–1247.
41. Gress S. *Aesthetic and Functional Labiaplasty*. Cham: Springer, 2017.
42. Motakef S, Rodriguez-Feliz J, Chung MT, *et al*. Vaginal labiaplasty: current practices and a simplified classification system for labial protrusion. *Plast Reconstr Surg* 2015; **135**(3): 774–788.
43. Spriggs M, Gillam L. "I don't see that as a medical problem": clinicians' attitudes and responses to requests for cosmetic genital surgery by adolescents. *J Bioeth Inq* 2018; **15**(4): 535–548.
44. Crouch NS, Deans R, Michala L *et al*. Clinical characteristics of well women seeking labial reduction surgery: a prospective study. *BJOG* 2011; **118**(12): 1507–1510.
45. Spriggs M, Gillam L. Cosmetic labiaplasty: defining "normality" is not the issue. *J Pediatr Adolesc Gynecol* 2017; **30**(3): 438.
46. Brotto LA, Bryce M, Todd N. Female genital cosmetic surgery: psychological aspects and approaches. In: Creighton SM, Liao L-M, eds. *Female Genital Cosmetic Surgery: Solution to What Problem?*. Cambridge: Cambridge University Press, 2019; 118–128.

Chapter 7: Information About Normal Labial Anatomy Included in Anatomy Textbooks and how it has Changed

Once I had established the evidence base for vulval diversity, my next step was to investigate the inclusion of this data in anatomical textbooks.

The analysis was undertaken in 78 textbooks, with publication dates ranging from 1858 to 2020. Analysis showed that an historical precedent for change in response to sociopolitical commentaries of the 19th and 20th centuries did exist, and that vulval diversity is poorly represented in contemporary anatomy textbooks despite the published evidence base. The paper describing this work was published as a descriptive review in *Anatomical Sciences Education* in 2022 (Hayes & Temple-Smith, 2022) and is presented in its final published form below. Note that the references cited in the paper are not reproduced in the references section of the thesis, although naturally they overlap substantially.

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DESCRIPTIVE ARTICLE

New context, new content—Rethinking genital anatomy in textbooks

Jennifer A. Hayes[1,2] | **Meredith J. Temple-Smith**[1]

[1]Department of General Practice, Melbourne Medical School, University of Melbourne, Parkville, Victoria, Australia

[2]Department of Anatomy and Neuroscience, School of Biomedical Sciences, University of Melbourne, Melbourne, Victoria, Australia

Correspondence
Dr. Jennifer A. Hayes, Department of General Practice, The University of Melbourne, Grattan Street, Parkville VIC 3010, Australia.
Email: j.hayes@unimelb.edu.au

Abstract

It has been widely claimed that reductions in allocated teaching time and the widespread implementation of short-cut teaching methodologies have led to a shortfall in anatomy knowledge among graduating doctors. This decline in knowledge is evident in the failure of anatomy content to prepare graduates for contemporary clinical practice. The implications for postgraduate surgical training are addressed in the numerous extracurricular anatomy courses available to surgical candidates. This paper focuses on genital diversity and its relevance to non-surgical graduates, thus highlighting another potential impact of this knowledge shortfall on frontline clinic consultations. As the gender revolution and female genital cosmetic surgery industry flourish, nothing in contemporary anatomy textbooks addresses issues of diversification of female genitalia nor gives medical graduates a realistic view of what is normal regarding female genital appearance.

KEYWORDS
anatomical variations, anatomy textbooks, female genitalia, gross anatomy education, normal apperance, vocational relevance, vulva

INTRODUCTION

Modern society is undergoing a gender revolution, as evidenced by the heightened visibility of nonbinary gender identities within media and politics (Allen et al., 2021). There have been calls for more inclusive gender-aware medical curricula that encourage students to sensitively explore the nuances of working with people who identify as LGBTQIA+ (lesbian, gay, bisexual, transgender, queer/questioning, intersex, asexual/aromantic/agender) and foster knowledge and attitudes appropriate to the evolving patient population (Morrison et al., 2017; Dubin et al., 2018; James & Sylvester, 2018).

Anatomy is said to be a prime example of a curricular component that has not evolved in response to this movement in societal norms (Finn et al., 2021). Traditionally taught in a binary context of male and female with a heteronormative presentation of genitalia and their function, the surface and transformed anatomy of postoperative transitioning individuals is not explicitly taught within curricula nor advocated for inclusion by regulators or accrediting bodies (Finn et al., 2021). Examples cited to illustrate the importance for practitioner awareness of transgender anatomy include "the need to differentiate between inflammation or infection in the clitoris and labia of a woman against the clitoromegaly and labial atrophy of a trans man who has undergone hormone therapy" (Finn et al., 2021, p. 30). An example of a consideration for a transgender woman is that a neovagina is a more posteriorly situated blind cuff, lacking a cervix and fornices, and better examined with an anoscope (Finn et al., 2021). Although this postsurgical detail may be considered beyond the remit of medical anatomy education (and surgery is not a prerequisite for transgenderism), there is a danger of creating a hidden curriculum of binarism and exclusion if alternative

anatomies are not acknowledged in inclusive, compassionate, and ethical curricula.

Even for "bodies with vaginas" (Davis, 2021, p. 1124), the anatomy is far from uniform. An emerging and increasing interest in normal female genital anatomy, driven by the rapidly expanding international market for female genital cosmetic surgeries, has highlighted the lack of accurate information on typical female genital dimensions (Crouch, 2018). The most popular of the female genital cosmetic surgeries is labiaplasty, which involves cutting back the labia minora so that they sit flush with, or are entirely hidden by, the labia majora (Iglesia, 2012). According to a report released by the International Society of Aesthetic Plastic Surgery, 164,667 labiaplasty operations were performed in 110 countries in 2019 (ISAPS, 2020) to achieve the single slit appearance promulgated as normal in media images (McDougall, 2013). However, these statistics are merely indicative because labiaplasty is also performed by gynecologists, and procedures performed in the private sector are not routinely recorded in all countries (McDougall, 2021).

"The slit-like genital hiatus with the labia minora and labia majora coming together in the midline" (Iglesia, 2012, p. 1083) is a socially constructed normal rather than an objective fact. The anatomical boundaries of normal labia have been investigated in an analysis of ten studies published from 2005 to 2020 (Hayes & Temple-Smith, 2021). The analysis showed significant variation in labial length (range 5–100 mm) and width (range 1–60 mm). Labia minora were wider in premenopausal women than in postmenopausal women, protruding labia minora were more common than not, and asymmetry between right and left labia was common (Hayes & Temple-Smith, 2021).

As the first point of contact in the healthcare system, general practitioners have an important role in answering questions about the range of genital appearances, function of genital structures, and risks associated with genital surgery. A recently published survey of 433 Australian general practitioners found that 97% had been asked by women of all ages about genital normality, 50% had been asked for a referral for labiaplasty surgery, and only 75% were confident in assessing genital appearance (Simonis et al., 2016). The general practitioners in this survey were all female with an interest in women's health; therefore, these findings cannot be generalized to the broader general practitioner population in which the level of knowledge and confidence would probably be lower. An audit of 48 referral letters in a National Health Service gynecology clinic in the United Kingdom showed that only 77% of the referrers reported examining the patient and 25% of referrals contained non-scientific pejorative language such as "leathery" or "pendulous" (Deans et al., 2011, p. 99).

Appreciation of the range of normality and variation in the human body is traditionally gained by medical students over several years. It begins in the dissection room, and it is reinforced on the hospital wards. However, contemporary medical students "may never see the inside of a dissecting room" (Standring, 2009, p. 53). Instead, they increasingly rely on plastic models, "where all organs are color coordinated and impeccably shaped" (Sugand et al., 2010, p. 87), and new electronic resources, many of which are based on the Visible Human Project (NLM, 2019) that originally looked at only one male and one postmenopausal female body. Contemporary medical students also spend fewer hours on the wards than students did in the past (Standring, 2009), which reduces their opportunistic anatomy experience, resulting in newly graduated doctors who rely more than ever on the concepts and clinical relevance of normal range and variations being presented to them.

Previous research showed that women were underrepresented in anatomy texts—with a narrow stereotypical representation of ethnicity, age, and body type—and were primarily identified by their reproductive attributes (Giacomini et al., 1986; Lawrence & Bendixon, 1992; Mendelsohn et al., 1994; Petersen, 1998; Morgan et al., 2014; Murciano-Goroff, 2015). Labia minora were significantly less protuberant in anatomy textbooks and online pornography when compared with feminist publications (Howarth et al., 2010). Only one study reviewed genital descriptions and illustrations in textbooks. Andrikopoulou et al. (2013) analyzed one edition of 30 anatomy textbooks and 29 gynecology textbooks and found that "No anatomy textbook provided measurements for the labia minora or the labia majora … None of the textbooks included more than one picture or suggested in text and illustration appearance variability" (Andrikopoulou et al., 2013, p. 648–649).

Despite human anatomy often being considered as immutable, descriptions of the labia and clitoris in the sociopolitical and scientific literature have varied considerably over the last 200 years. In the nineteenth century, anthropologists described labial protrusion as a feature peculiar to non-white races (Gilman, 1985) before the medical literature shifted the gaze away from race and toward a theory of sexual perversion, arguing that hypertrophy of the labia was the result of masturbation (Dickenson, 1902). In the mid-twentieth century, Kinsey shifted the focus away from abnormality to the role of the labia minora in sexual arousal (Kinsey et al., 1953). This provided impetus for the second wave feminist rebellion and the development of radical texts such as *A New View of a Woman's Body* (Federation of Feminist Women's Health Centers, 1981) which offered fully developed alternative feminist anatomies. More recently, Helen O'Connell, Australia's first female urologist, used magnetic resonance imaging technology to provide a comprehensive picture of the structure of the clitoris (O'Connell et al., 2005).

Descriptive and visual portrayals of the vulva in historic anatomy textbooks were analyzed in this study to determine whether these anthropological, sexual, feminist, and surgical publications had influenced the content of anatomy textbooks at the time. In exposing past and present representational practices, the aim was to create impetus for reimagining the spectrum of genital morphology as a continuous sequence in which all variations are depicted equally.

MATERIALS AND METHODS

The methodology provided a descriptive analysis of the vulva as portrayed in textbooks throughout the nineteenth and twentieth

centuries and contemporarily. For this reason, textbooks published in series spanning multiple editions were analyzed.

Firstly, the most commonly prescribed or recommended anatomy textbooks for anatomy subjects in Australian medical schools (AMC, 2020), as identified from current online course information and from transcripts of interviews conducted with Australian anatomists in 2021 (work in progress) were examined.

By way of historical comparison, *Gray's Anatomy* provided the best opportunity to map the changing representation of genital anatomy over multiple periods of substantial change in medical knowledge and social values. Multiple editions of three further historical texts were selected for analysis on the basis that they too were published in a number of series over the nineteenth and twentieth centuries.

Systematic examination of the texts was performed by the first author (J.A.H.). The preface of each was analyzed to determine the text's target audience; the index was searched for the terms "normal and anatomical variation," "vulva" (and individual component structures), "orgasm," "erection," and "ejaculation." Textual descriptions and images of the vulva and component structures were analyzed and compared across each textbook series for references to variability and function, and change between editions. Textual descriptions of breast anatomy were compared because the breasts are morphologically variable structures also under (re)construction in contemporary society.

Results of analyses were reported according to three contexts: (1) textual descriptions and illustrations of the vulva; (2) whether "normal variation" was included and, if so, how; and (3) remit of the text.

RESULTS

In total, 78 textbooks were analyzed. These comprised:

- four historical texts, consisting of 40 of the 42 editions of *Gray's Anatomy*, plus multiple editions of *Cunningham's Textbook of Anatomy*, *Quain's Elements of Anatomy*, and *Buchanan's Manual of Anatomy*
- four contemporary anatomy texts commonly prescribed in Australian medical schools: *Clinically Oriented Anatomy*, *Gray's Anatomy for Students*, *Gray's Anatomy*, and *Last's Anatomy*.

In Table 1, each text is summarized regarding its inclusion of the terms "vulva," "normal," and "anatomical variation" in its index, the details in textual and visual representation of the vulva, and the details of the remit of the text as given in the preface.

The analysis of *Gray's Anatomy* is presented first, followed by other historical texts and, last, contemporary texts.

Gray's Anatomy (42 editions, 1858–2021)

No anatomy textbook matches *Gray's Anatomy* in terms of longevity; it spans the period 1858 to the present day and comprises 42 editions (Gray & Carter, 1858, 1860; Holmes, 1864, 1866, 1869, 1872, 1875, 1877, 1880; Pick, 1883, 1887, 1890, 1893, 1897; Pick & Howden, 1901, 1905; Howden, 1909, 1913, 1916, 1918, 1920, 1923, 1926; Johnston, 1930, 1932, 1935; Johnston & Whillis, 1938, 1942, 1946, 1949, 1954; Johnston et al., 1958; Davies & Davies, 1962; Davies & Coupland, 1967; Warwick & Williams, 1973; Williams & Warwick, 1980; Williams, 1989, 1995; Standring, 2005, 2008, 2015, 2021). Of those 42 editions, 40 were available for analysis in this research (see Table 1).

Previous analyses of *Gray's Anatomy* have highlighted the consistency with which the male body has been posited as the standard in textual descriptions and illustrations across all editions (Laqueur, 1992; Petersen, 1998). In early editions, "male generative organs" were presented first, followed by "female organs of generation" with reference to the homologous male genital structure:

> The labia are analogous to the scrotum in the male … The clitoris is an erectile structure, analogous to the corpus cavernosum of the penis … They are analogous to Cowper's glands in the male and are called the *glands of Bartholine*. (Gray & Carter, 1858, p. 683)

In the single black-and-white image of the vulva in the first edition of *Gray's Anatomy* (Figure 1A), the clitoris was relatively prominent, with both the glans and body labeled (Gray & Carter, 1858, p. 1491). By the thirteenth edition (Figure 1B), the clitoris was proportionally smaller compared with other component vulval structures (Pick, 1893, p. 1047), and by the eighteenth edition (Figure 1C), only one label "clitoris" remained (Howden, 1913, p. 1170). The image remained unchanged in all subsequent twentieth-century editions until the fortieth edition (Figure 1D) in which a new multipart illustration was included comprising a color line drawing and three-color photographs of a vulva with all clitoral components labeled (Standring, 2005, p. 1355).

In early editions of *Gray's Anatomy*, the descriptive text accompanying the images focused on structure and the relationship of the labia minora to the labia majora and clitoris. There was no reference to morphological variation or function. Little changed until the thirty-eighth edition (Williams, 1995), in which a reference to labium tertium had been added: "Sometimes an extra labial fold (labium tertium) is found on one or both sides between the labia minora and majora" (p. 1876). In the thirty-ninth edition, reference to "age-related changes" was added at the end of the section on female genital organs (and included in the index): "After the menopause, pubic hair thins, and labial tissues atrophy slightly" (Standring, 2005, p. 1355).

The convention of homologous organs persisted in *Gray's Anatomy* until the fortieth edition when the clitoris was no longer represented as homologous to the penis but rather as "important in sexual responses" (Standring, 2008, p. 1280). Two further anatomical variations were added in subsequent editions: adhesions between the labia minora in prepubertal girls in the forty-first edition (Standring, 2015), and severe atrophy in postmenopausal females in the forty-second edition (Standring, 2021).

TABLE 1 Summary of textbook analysis

Textbook	Index	Image	Description	Remit from preface
Gray's Anatomy 42 editions 1858-2021 (40 editions analyzed) Davies and Davies (1962) Davies and Coupland (1967) Gray and Carter (1858, 1860) Holmes (1864, 1869, 1872, 1875, 1877) Howden (1909, 1913, 1916, 1918, 1920, 1923, 1926) Johnston (1930, 1932, 1935) Johnston and Whillis (1938, 1942, 1946, 1949, 1954) Johnston et al. (1958) Pick (1883, 1887, 1890, 1893, 1897) Pick and Howden (1901, 1905) Standring (2005, 2008, 2015, 2021) Warwick and Williams (1973) Williams (1989, 1995) Williams and Warwick (1980)	Vulva and all its component structures indexed Normal and (anatomical) variation not indexed Erection and ejaculation indexed, but not orgasm	Single black-and-white line drawing in editions 1–39 Clitoris diminished in size in 13th edition Labeling of clitoris reduced, and labia minora diminished in size in 18th edition Multipart color illustration with photos introduced in 40th edition	Heavily detailed descriptive text with minimal change between editions 1–37 Labium tertium added in 38th edition Changes with aging added in 39th edition Homology removed in 40th edition Adhesions between labia minora added in 41st edition Severe atrophy in postmenopausal females added in 42nd edition	To provide the student and practitioner with an accurate view of the anatomy of the human body and its application to practical surgery
Cunningham's Textbook of Anatomy 12 editions 1902–1981 (12 editions analyzed) Cunningham (1902, 1905, 1909) Robinson (1913, 1918, 1931) Brash and Jamieson (1937, 1943) Brash (1951) Romanes (1964, 1972, 1981)	Vulva and all its component structures indexed Normal and (anatomical) variation not indexed	Same black-and-white line drawing in all 12 editions	Heavily detailed descriptive text with minimal change between editions No mention of diversity, protrusion, or function	For undergraduate students but also for postgraduate studies
Quain's Elements of Anatomy 11 editions 1828–1914 (4 editions analyzed) Quain and Sharpey (1848) Sharpey et al. (1882) Sharpey and Thane (1890) Schäfer et al. (1908)	Vulva and all its component structures indexed Normal and (anatomical) variation not indexed, but "varieties" is a subheading under "vulva" in 11th edition (Schäfer et al., 1908)	Variable black-and-white line drawing	Description of labial protrusion and changes with aging added to 11th edition (Schäfer et al., 1908) Separate paragraph on varieties seen in external female genitalia added to 11th edition (Schäfer et al., 1908)	Not specified

TABLE 1 (Continued)

Textbook	Index	Image	Description	Remit from preface
Buchanan's Manual of Anatomy 8 editions 1906–1950 (5 editions analyzed) Buchanan (1906) Barclay-Smith et al. (1925) Frazer (1937) Wood Jones (1946, 1949)	The term "vulva" not indexed, but all of its component structures indexed Normal and (anatomical) variation not indexed	Black-and-white line drawing (possibly sourced from *Gray's Anatomy*)	Description of labial protrusion in all editions Hottentot apron referenced in editions 1–6, then removed from future editions	A guide to the structure of the human body as it is revealed in the process of dissection
Last's Anatomy 12 editions 1959–2011 (7 editions analyzed) Last (1959, 1984) McMinn (1990, 1994) Sinnatamby (1999, 2006, 2011)	Labia not included in the index until 8th edition (McMinn, 1990); vulva not included until 10th edition (Sinnatamby, 1999) Normal and (anatomical) variation not indexed Erection, ejaculation, and orgasm– male and female –indexed	No image in any edition	Homology between female and male structures included in editions 1–7 The term vulva and a list of female external genitalia included from 8th edition (McMinn, 1990) onwards Reference to labia minora in paragraph on female orgasm included in editions 8–11, then removed	For students in basic and higher surgical training programs and for practicing surgeons
Moore's Clinically Oriented Anatomy 7 editions 1980–2014 (7 editions analyzed) Moore (1980, 1985, 1992) Moore and Dalley (1999, 2006) Moore et al. (2010, 2014)	Vulva and all its component structures indexed Normal not indexed Anomoly (arteries/bones/ muscles/nerves/ other) indexed in 1st and 2nd editions, then removed in 3rd edition Anatomical variation indexed and defined/ described in editions 4–7 Erection indexed (relates to penis); ejaculation and orgasm not indexed	Black-and-white line drawing and dissection drawings (from Grant's Atlas of Anatomy) in editions 1–3 Line drawing changed to color in 4th edition (Moore & Dalley, 1999); dissection drawings changed to color in 5th edition (Moore & Dalley, 2006) Multipart illustration of vulva in editions 6 and 7, including three photos of a vulva with labia minora protruding beyond the labia majora	Description of labial protrusion in editions 1–3 List of functions included in 4th edition (Moore & Dalley, 1999) onwards, but reference to labial protrusion removed	For health science students
Gray's Anatomy for Students 4 editions 2005–2020 (3 editions analyzed) Drake et al. (2005, 2015, 2020)	The term "vulva" is not indexed, but all of its component structures are Normal and (anatomical) variation not indexed Erection (of penis and clitoris) indexed	Color line drawing (overview and close-up), with the labia labelled Three color photos show visible labia minora	Vulva/labia described in two separate areas of the text: regional anatomy and surface anatomy No mention of diversity, protrusion, or function	For students in a variety of professional programs (medical, dental, chiropractic, and physical therapy)

FIGURE 1 Depictions of vulval anatomy included in editions 1–42 of *Gray's Anatomy*, 1858–2021. A single black-and-white line drawing in the first 39 editions was replaced by a multipart color illustration with photographs in the fortieth edition, 2008. Images are reproduced with the permission of Elsevier. (A) This labeled black-and-white diagram of vulval anatomy was reproduced in *Gray's Anatomy*, 1858–1890, editions 1–12 (Gray & Carter, 1858, 1860; Holmes, 1864, 1866, 1869, 1872, 1875, 1877, 1880; Pick, 1883, 1887, 1890); (B) This labeled black-and-white diagram of vulval anatomy was reproduced in *Gray's Anatomy*, 1893–1897, editions 13 and 14 (Pick, 1893, 1897); (C) This labeled black-and-white diagram of vulval anatomy was reproduced in *Gray's Anatomy*, 1901–1909, editions 15–17 (Pick & Howden, 1901, 1905; Howden, 1909); (D) This labeled black-and-white diagram of vulval anatomy was reproduced in *Gray's Anatomy*, 1913–2005, editions 18–39 (Howden, 1913, 1916, 1918, 1920, 1923, 1926; Johnston, 1930, 1932, 1935; Johnston & Whillis, 1938, 1942, 1946, 1949, 1954; Johnston et al., 1958; Davies & Davies, 1962; Davies & Coupland, 1967; Warwick & Williams, 1973; Williams & Warwick, 1980; Williams, 1989, 1995; Standring, 2005); and (E) This labeled, colored multipart image of vulval anatomy was reproduced in *Gray's Anatomy*, 2008–2021, editions 40–42 (Standring, 2008, 2015, 2021)

Cunningham's Textbook of Anatomy (12 editions, 1902–1981)

Cunningham's Textbook of Anatomy was first published in 1902 (Cunningham, 1902) and rivaled the popularity of *Gray's Anatomy*. A total of 12 editions (1902–1981) have been published under various editors (Cunningham, 1902, 1905, 1909; Robinson, 1913, 1918, 1931; Brash & Jamieson, 1937, 1943, Brash, 1951; Romanes, 1964, 1972, 1981). All 12 were analyzed in this research (see Table 1). Each edition included a single black-and-white image of the vulva—an image that remained unchanged in all editions—accompanied by highly detailed textual descriptions that did not include any reference to morphological diversity or function.

Quain's Elements of Anatomy (11 editions, 1828–1914)

Quain's Elements of Anatomy predated *Gray's Anatomy*; indeed, Henry Gray was accused of plagiarizing some of its content (Richardson, 2016). A total of 11 editions (1828–1914) were published under various editors (Quain, 1828, 1832, 1834, 1837; Quain & Sharpey, 1848; Sharpey & Ellis, 1856; Sharpey et al., 1867; Sharpey et al., 1878; Schäfer et al., 1882; Schäfer & Thane, 1890; Schäfer et al., 1908). Four editions were available for analysis in this research (see Table 1).

Unlike *Gray's Anatomy* and *Cunningham's Textbook of Anatomy*, the textual description of the vulva in *Quain's Anatomy* changed significantly between editions, and later editions included reference to labial protrusion and changes with aging:

> The labia majora, by their contact, generally conceal the other parts of the external genitals; not infrequently, however, in old persons, the labia minora project forwards between the labia majora, so as to be visible externally … In young subjects, the labia minora are of a rose-red colour and look like a mucous membrane; but as age advances, they become darker in colour and more like skin. (Schäfer et al., 1908, p. 299)

Buchanan's Manual of Anatomy (8 editions, 1906–1950)

Buchanan's Manual of Anatomy was a highly regarded text with an established place among British anatomy textbooks. A total of eight editions (1906–1950) were published under various editors (Buchanan, 1906, 1914, 1916, 1919; Barclay-Smith et al., 1925; Frazer, 1937; Wood Jones, 1946, 1949). Five editions were available for analysis in this research (see Table 1). In those five editions, the single black-and-white image of the external genital organs was identical to that in *Gray's Anatomy* (image sharing was a common practice), but of great interest was the accompanying text about labia minora:

> They sometimes attain a large degree of development, in which cases they project through the urogenital fissure. In some African women they become so much developed as to reach down to the knees. When this occurs they form what has been called the apron of Hottentots. (Buchanan, 1906, p. 594)

Although the Hottentot reference was removed in the seventh edition in 1946 by Frederick Wood Jones, reference to labia minora protrusion was retained: "They [the labia minora] sometimes attain a large degree of development, in which cases they project from the urogenital cleft" (Wood Jones, 1946, p. 699).

Last's Anatomy (12 editions, 1954–2011)

Last's Anatomy, written for surgeons and surgical candidates, was designed "to be read only with the appropriate prosected parts, a museum specimen and the relevant bones close at hand" (Last, 1984, preface). A total of 12 editions (1954–2011) have been published (Last, 1954, 1959, 1963, 1966, 1972, 1978, 1984; McMinn, 1990, 1994; Sinnatamby, 1999, 2006, 2011). Of these 12 editions, seven were available for analysis in this research (see Table 1). An image of the vulva was not included in any edition; in fact, the vulva was not indexed in early editions, and the component structures were presented as homologies of male structures. Editorial change for the eighth edition in 1990 coincided with the inclusion of "vulva" and "labia" in the index and with a newly added detailed description of the labia, including reference to their role in female orgasm. However, that reference was removed in the last two editions (Sinnatamby, 2006, 2011).

Moore's Clinically Oriented Anatomy (7 editions, 1980–2014)

It was very clear that the remit of *Clinically Oriented Anatomy* extended beyond students and practitioners of surgery:

> The structures described in this book are those which are deemed likely to be of importance to the general practitioner of medicine, dentistry or other health professions. (Moore, 1985, p. vii)

A total of seven editions (1980–2014) have been published (Moore, 1980, 1985, 1992; Moore & Dalley, 1999, 2006; Moore et al., 2010, 2014), and all seven were available for analysis in this research (see Table 1). It is the only textbook series that included *anatomical variation* in the index and provided a general definition and specific examples:

> Anatomy books describe (initially at least) the structure of the body as it is usually observed in people—that is, the most common pattern. However, occasionally a particular structure demonstrates so much variation within the normal range that the most common pattern is found in less than half the time! (Moore et al., 2014, p. 12)

Information about anatomical variation was separately categorized, and "the clinical importance of awareness of such variations" was emphasized (Moore et al., 2014, p. viii). In the first two editions of *Clinically Oriented Anatomy*, the term *anomaly* was used, but subsequent editions replaced this with *anatomical variation*, possibly because *anomaly*, as with the term *malformation*, is commonly associated with structural abnormality.

Clinically Oriented Anatomy was the first of the textbook series to add color photographs of "living anatomy" (Moore, 1992, p. vii). Editions 1–3 described labial protrusion in parous women, although this was removed in later editions:

> In young females and virgins (women who have not engaged in sexual intercourse) the labia minora are usually covered by the labia majora, but in parous women (ones who have borne children) they may protrude. (Moore, 1980, p. 326)

The labeling of vulval structures did not change between editions (Figure 2). A list of functions of the vulva was included from the fourth edition. The sixth and seventh editions included photographs of protruding labia minora, but the accompanying text did not reference the protrusion (Figure 2C; Table 1).

Gray's Anatomy for Students (4 editions 2005–2020)

Gray's Anatomy for Students was intended to be "a student-oriented companion text for *Gray's Anatomy*," written "primarily for students in a variety of professional programs" (Drake et al., 2005, p. xxiii). A total of four editions (2005–2020) have been published (Drake et al., 2005, 2010, 2015, 2020), of which three were available for analysis in this research (see Table 1). In *Gray's Anatomy*, the recent change to a colored illustration of the vulva and the addition of photographs is the result of image sharing with *Gray's Anatomy for Students*. No reference was made to labial protrusion or function, but the color photographs showed protruding labia despite it not being mentioned in the text.

Remit

All of the earlier texts were written for surgeons and surgical students to be read as complementary to the process of dissection, whereas the specified readership for contemporary texts such as *Clinically Oriented Anatomy* and *Gray's Anatomy for Students* was non-surgical students, as noted in the prefaces (Table 1).

Anatomical variation

A general discussion about anatomical variation was included in one text only, *Clinically Oriented Anatomy*. Surgically relevant anatomical variations such as brachial plexus variation (*Gray's Anatomy* and *Clinically Oriented Anatomy*) and accessory renal artery (*Gray's Anatomy*, *Clinically Oriented Anatomy*, *Last's Anatomy*, and *Gray's Anatomy for Students*) were variably included in the contemporary texts. Morphological variation in size, shape, and symmetry of the breast was covered to varying degrees in both historical and contemporary texts, for example, "Their weight and dimensions differ at different periods of life, and in different individuals" (Pick & Howden, 1901, p. 1022) and "The female breasts vary in the size, shape and symmetry—even in the same person" (Moore et al., 2014, p. 103).

Textual description of the vulva

Early textbook descriptions of the vulva were detailed and included neurovascular supply and homologous male structures, but no reference was made to function apart from a role in female orgasm, which was included in some editions of *Last's Anatomy*. Both *Quain's Elements of Anatomy* and *Buchanan's Manual of Anatomy* described labial protrusion as associated with age or race. Early editions of *Clinically Oriented Anatomy* described labial protrusion, but that reference was removed in later editions. *Gray's Anatomy* described labium tertium, adhesions, and severe postmenopausal atrophy but did not mention normal morphological diversity.

Images of the vulva

Apart from *Last's Anatomy*, which never included an image of a vulva, all of the early texts included one labeled black-and-white line drawing of the vulva. Later inclusions of color photographs or "living anatomy" in *Gray's Anatomy*, *Gray's Anatomy for Students*, and *Clinically Oriented Anatomy* resulted in labeled images that included protruding labia minora (unsurprising given the incidence in the general population), but no textual references to the protrusions were included.

DISCUSSION

Firstly, in terms of textual description and illustrations of the vulva, there exists an historical precedent for change in response to socio-political commentaries of the nineteenth and twentieth centuries, and a clear need to adapt contemporary content to the spectrum of normal as constructed by the gender revolution and published

FIGURE 2 Depictions of vulval anatomy included in *Clinically Oriented Anatomy*, 1980–2014. Images are reproduced with the permission of Wolters Kluwer Health, Inc. (A) This labeled black-and-white diagram of vulval anatomy was reproduced in *Clinically Oriented Anatomy*, edition 2 (Moore, 1985); (B) This labeled black-and-white diagram of vulval anatomy was reproduced in *Clinically Oriented Anatomy*, edition 5 (Moore & Dalley, 2006); and (C) This labeled and colored multipart image of vulval anatomy was reproduced in *Clinically Oriented Anatomy*, edition 7 (Moore et al., 2014)

evidence base. Secondly, the concept of normal variation was rarely addressed formally in textbooks but was covered as occasional references to time-honored and surgically important variations that are common to all texts and eras. Thirdly, the remit of the texts that were analyzed was varied or unclear, which might explain the disconnection with contemporary, non-surgical practice.

These findings reinforce that vulval diversity is poorly represented in contemporary anatomy textbooks, a factor that may contribute to entrenching nonrepresentational social norms. In the contemporary anatomy textbooks that were analyzed, there was nothing to give medical graduates a realistic view of the range of normal for female genital appearance. Not one of the textbook series referenced vulval diversity, asymmetry, or measurements. However, some of the current editions did show labial protrusion but with no accompanying description (*Clinically Oriented Anatomy* and *Gray's Anatomy for Students*), listed functions of the vulva (*Clinically Oriented Anatomy*), or described changes with aging (*Gray's Anatomy*).

By contrast, unique references to labial protrusion were made in earlier texts, such as *Quain's Elements of Anatomy* and *Buchanan's Manual of Anatomy*, which were likely influenced by the medical literature of the nineteenth century when discussions of genital anatomy were dominated by race and sexuality. In the twentieth century, newly constructed feminist anatomies seem to have provoked, if anything, "a backlash of deletion" (Moore & Clarke, 1995, p. 290). The clitoris was depicted as less prominent and labeled less frequently in images of the vulva in twentieth-century editions of *Gray's Anatomy*, and it remained under the heading *female reproductive anatomy* despite Kinsey and feminist scholars of the time reasserting the clitoris as the primary orgasmic site and outside of reproductive function (Bennett, 1993).

The linking of sexual function with reproductive function is problematic, particularly considering the gender revolution. Given that "labels hold power" (Moore & Clarke, 1995, p. 292), associating the clitoris and contiguous labia minora with the reproductive system is highly reductive, especially given that the narrative of orgasm in *Gray's Anatomy* pertains solely to the penis. Texts organized by regions rather than by systems of the body included vulval structures in the urogenital region (*Clinically Oriented Anatomy*, *Gray's Anatomy for Students*, and *Last's Anatomy*) and thus avoided the labels "sexual," "generative," and "reproductive."

The convention of homologous organs—"the clitoris is an erectile structure, homologous with the penis" (Gray & Carter, 1858, p. 683)—persisted in *Gray's Anatomy* until the fortieth edition, when it was removed and replaced by a single phrase relating to clitoral function: "important in sexual responses" (Standring, 2008, p. 1280). By contrast, the penile processes of "erection" and "ejaculation" were included in the index and described in detail. *Gray's Anatomy for Students* listed both clitoris and penis under the generic heading of "erectile structures," with the penis described before the clitoris in early editions (Drake et al., 2005), but the order was later switched, with clitoris preceding penis in later and current editions (Drake et al., 2020).

In the twenty-first century, medical framing has once again resulted in the erasure of a sexually responsive structure, the labia minora, and this time as outside the range of normal. If early textbook illustrations were constrained by their educational function, and labia minora protruded to the extent where they could be labeled but not to the point where they could obscure other features, then the move to photographs and the recent publication of normative data sets has created the potential for the inclusion of numerous vulval images in textbooks that reflect the diversity of the general population.

Medical students will already be familiar with the concept of variability in visible structures such as the breast. All texts analyzed covered variation in size, shape, and symmetry of the breasts to differing degrees, whether the texts were published before or during the era of breast augmentation and reduction surgery. The first breast augmentation was performed in 1962 (Coombs et al., 2019). Prior to that, breasts were never surgically enlarged, probably because, as with labia, small breasts were considered youthful while larger, pendulous breasts were regarded as "primitive" and a deformity. Not until the 1950s were small breasts transformed into a medical problem, much as protruding labia have been today (Gilman, 1999).

In 1988, Professor Keith Moore lamented "the frequent lack of awareness of variation by medical and dental practitioners" and concluded, "students should be taught about the variations that are deemed likely to be of importance to the general practitioner of medicine or dentistry" (Moore, 1989, p. 239). However, instead of labial protrusion and asymmetry, recent editions of *Gray's Anatomy* includes labium tertium, a rarely reported anatomical variation with a prevalence of 5.3% (Göttlicher, 1994); labial adhesions, with an estimated prevalence of 0.6%–5% and a peak incidence between 13 and 23 months of age (Bacon et al., 2015); and "post-menopausal females with severe atrophy" (Standring, 2021, p. 1308). *Gray's Anatomy* ignores the most common morphological variations and functions of vulval structures, knowledge that is required for contemporary clinical, including surgical, practice. It reinforces that anatomy has become a "contested domain" (Moore & Clarke, 1995, p. 257) between the descriptions provided in textbooks and the understandings that users and consumers must construe from other sources.

In 2005, urologist Helen O'Connell described the lack of detail about female sexual anatomy in major anatomy textbooks as "blinkered" (O'Connell et al., 2005, p. 1194). In 2016, the editor of *Gray's Anatomy*, Professor Susan Standring, described examples of anatomical knowledge remaining incomplete or controversial as a "work in progress," and in this she included recognition in textbooks of the ranges of normal anatomical variation (Standring, 2016, p. 56).

Readers of the major anatomy texts have become aware of the mismatch between the academic texts and social reality. Two young Norwegian medical students presented a TED talk titled *The Virginity Fraud* (Brochmann & Dahl, 2018a), which received more than two million views. They later published *The Wonder Down Under: A User's Guide to the Vagina* (Brochmann & Dahl, 2018b) after realizing they had previously "misled women by following a medical curriculum that was incorrect even though it was written by doctors" (Rumbelow, 2018).

It is accepted that within the area of anatomy there is "competition for space and time" (Grković et al., 2009, p. 50) and that the

absence of national or international agreed core syllabuses complicates any discussion about what is relevant and what does not need to be taught (Moxham & Pais, 2017; Koppes et al., 2020).

Has this deficiency in anatomy teaching been addressed in other ways? Peer physical examination is sometimes used as an adjunct when learning anatomy, allowing medical students to bridge the gap between basic anatomical knowledge and physical examination. Classmates are readily available subjects on whom to learn normal living anatomy and to practice clinical skills. A high level of acceptability of peer physical examinations of non-intimate regions among medical students, especially among students of the same gender, is supported by several publications (Chang & Power, 2000; Power & Center, 2005; Wearn et al., 2008; Rees et al., 2009; Chen et al., 2011; Consorti et al., 2013). However, only one paper has reported the possibility of using peer physical examination for socially sensitive areas of the body, such as breasts and genitals (Metcalf et al., 1982).

Gynecological teaching associate (GTA) programs use standardized patient methodology to train medical students to conduct patient-centered pelvic examinations (Hopkins et al., 2021). These programs have been the norm in medical curricula since the mid-1980s (Dugoff et al., 2016; Underman, 2020). The role of the GTA as both educator and examiner provides an opportunity to discuss sensitive topics that might not otherwise be addressed. There are, for example, queer-focused GTA programs that provide pelvic examination instruction in a way that emphasizes gender-affirming skills (MacFife, 2019). Similarly, the GTA program might provide students the opportunity to appreciate and discuss the range of genital diversity they will encounter in practice. The combination of a medical anatomy program that introduces a range of genital anatomies and the inclusion of diverse GTAs in sensitive examination programs has the potential for significant pedagogical progress despite each representing "fleeting moments in multi-year medical education" (MacFife, 2019, p. 7).

Limitation of the study

The present investigation had some limitations, due to its focus on selected established textbook series published in each of the nineteenth, twentieth, and twenty-first centuries. Further research might establish whether individual anatomists are sufficiently well versed in contemporary issues to include genital diversity in their planned curricula or whether it is reasonable and appropriate for diversity of vulval morphology and function to fall outside the crowded field of medical anatomy.

CONCLUSIONS

Contemporary medical anatomy textbooks need to evolve, not only to reflect the increasing diversification of society but also to prepare graduates for all aspects of patient care they may encounter. Anatomy textbooks are not only used by future surgeons but also by non-surgical graduates, those for whom postgraduate training does not include anatomy. Currently, anatomy textbooks not only fail to give medical graduates a realistic view of what constitutes "normal" in female genital appearance but also present genital anatomy as binary and do not attempt to address issues of diversification.

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ORCID

Jennifer A. Hayes https://orcid.org/0000-0003-4281-9607

REFERENCES

Allen K, Cuthbert K, Hall JJ, Hines S, Elley S. 2021. Trailblazing the gender revolution? Young people's understandings of gender diversity through generation and social change. *J Youth Stud 2021*:1923674.

AMC. 2020. Australian Medical Council. *Accredited Medical Schools*. Australian Medical Council, Kingston, ACT, Australia. URL: https://www.amc.org.au/accreditation-and-recognition/assessment-accreditation-primary-medical-programs/accredited-medical-schools/ [accessed 06 June 2021]

Andrikopoulou M, Michala L, Creighton SM, Liao LM. 2013. The normal vulva in medical textbooks. *J Obst Gynaecol 33*:648–650.

Bacon JL, Romano ME, Quint EH. 2015. Clinical recommendation: Labial adhesions. *J Pediatr Adolesc Gynecol 28*:405–409.

Barclay-Smith E, Frazer JE, Parsons FG, Wright W. 1925. *Buchanan's Manual of Anatomy*. 5th Ed. London, UK: Baillière, Tindall, and Cox. 682 p.

Bennett P. 1993. Critical clitoridectomy: Female sexual imagery and feminist psychoanalytic theory. *Signs J Women Cult Soc 18*:235–259.

Brash JC (Editor). 1951. *Cunningham's Textbook of Anatomy*. 9th Ed. London, UK: Oxford University Press. 1604 p.

Brash JC, Jamieson EB (Editor). 1937. *Cunningham's Textbook of Anatomy*. 7th Ed. London, UK: Oxford University Press. 1506 p.

Brash JC, Jamieson EB (Editor). 1943. *Cunningham's Textbook of Anatomy*. 8th Ed. London, UK: Oxford University Press. 1158 p.

Brochmann ND, Dahl ES. 2018a. *The virginity fraud*. TED Talk video, 11:32 min. TED Oslo, Oslo, Norway. URL: https://www.ted.com/talks?sort=relev,nce&q=the+virginity+fraud [accessed 06 June 2021]

Brochmann N, Dahl ES. 2018b. *The Wonder Down Under: A User's Guide to the Vagina*. 1st Ed. London, UK: Yellow Kite. 304 p.

Buchanan AM. 1906. *Manual of Anatomy, Systematic and Practical, Including Embryology. Volume 2*. 1st Ed. London, UK: Baillière, Tindall and Cox. 420 p.

Buchanan AM. 1914. *Manual of Anatomy, Systematic and Practical, Including Embryology. Volume 2*. 2nd Ed. London, UK: Baillière, Tindall and Cox. 420 p.

Buchanan AM. 1916. *Manual of Anatomy, Systematic and Practical, Including Embryology. Volume 2*. 3rd Ed. London, UK: Baillière, Tindall and Cox. 460 p.

Buchanan AM. 1919. *Manual of Anatomy, Systematic and Practical, Including Embryology. 2 Volumes*. 4th Ed. London, UK: Baillière, Tindall and Cox. 1743 p.

Chang EH, Power DV. 2000. Are medical students comfortable with practicing physical examinations on each other? *Acad Med 75*:384–389.

Chen JY, Yip AL, Lam CL, Patil NG. 2011. Does medical student willingness to practise peer physical examination translate into action? *Med Teach 33*:e528–e540.

Consorti F, Mancuso R, Piccolo A, Consorti G, Zurlo J. 2013. Evaluation of the acceptability of peer physical examination (PPE) in medical and osteopathic students: A cross sectional survey. *BMC Med Educ 13*:111.

Coombs DM, Grover R, Prassinos A, Gurunluoglu R. 2019. Breast augmentation surgery: Clinical considerations. *Cleve Clin J Med 86*:111–122.

Crouch NS. 2018. In pursuit of the "normal" vulva. *BJOG 125*:1662.

Cunningham DJ. 1902. *Textbook of Anatomy*. Edinburgh, UK: Young J Pentland. 1309 p.

Cunningham DJ. 1905. *Textbook of Anatomy*. 2nd Ed. Edinburgh UK: Young J Pentland. 1388 p.

Cunningham DJ. 1909. *Textbook of Anatomy*. 3rd Ed. London, UK: Oxford University Press. 1427 p.

Davies DV, Davies F (Editors). 1962. *Gray's Anatomy: Descriptive and Applied*. 33rd Ed. London, UK: Longmans, Green and Co. 1632 p.

Davies DV, Coupland RE (Editors). 1967. *Gray's Anatomy: Descriptive and Applied*. 34th Ed. London, UK: Longmans, Green and Co. 1669 p.

Davis S. 2021. Periods on display. *The Lancet 398*:1124–1125.

Deans R, Liao LM, Crouch NS, Creighton SM. 2011. Why are women referred for female genital cosmetic surgery? *Med J Aust 195*:99.

Dickinson RL. 1902. Hypertrophies of the labia minora and their significance. *Am Gynecol 1*:225–254.

Drake RL, Vogl AW, Mitchell AWM. 2005. *Gray's Anatomy for Students*. 1st Ed. Philadelphia, PA: Churchill Livingstone/Elsevier. 1058 p.

Drake RL, Vogl AW, Mitchell AW. 2010. *Gray's Anatomy for Students*. 2nd Ed. Philadelphia, PA: Churchill Livingstone/Elsevier. 1103 p.

Drake RL, Vogl AW, Mitchell AW. 2015. *Gray's Anatomy for Students*. 3rd Ed. Philadelphia, PA: Churchill Livingstone/Elsevier. 1161 p.

Drake RL, Vogl AW, Mitchell AW. 2020. *Gray's Anatomy for Students*. 4th Ed. Philadelphia, PA: Churchill Livingstone/Elsevier. 1058 p.

Dubin SN, Nolan IT, Streed CG Jr, Greene RE, Radix AE, Morrison SD. 2018. Transgender health care: Improving medical students' and residents' training and awareness. *Adv Med Educ Pract 9*:377–391.

Dugoff L, Pradhan A, Casey P, Dalrymple JL, Abbott JF, Buery-Joyner SD, Chuang A, Cullimore AJ, Forstein DA, Hampton BS, Kaczmarczyk JM, Katz NT, Nuthalapaty FS, Page-Ramsey SM, Wolf A, Hueppchen NA. 2016. Pelvic and breast examination skills curricula in United States medical schools: A survey of obstetrics and gynecology clerkship directors. *BMC Med Educ 16*:314.

Federation of Feminist Women's Health Centers. 1981. *A New View of a Woman's Body: A Fully Illustrated Guide by the Federation of Feminist Women's Health Centers*. 1st Ed. New York, NY: Simon and Schuster. 176 p.

Finn G, Ballard W, Politis M, Brown M. 2021. It's not alphabet soup: Supporting the inclusion of inclusive queer curricula in medical education. *Br Student Doc J 5*:27–37.

Frazer JE (Editor). 1937. *Buchanan's Manual of Anatomy*. 6th Ed. London, UK: Baillière, Tindall and Cox. 1772 p.

Giacomini M, Rozee-Koker P, Pepitone-Arreola-Rockwell F. 1986. Gender bias in human anatomy textbook illustrations. *Psychol Women Q 10*:413–420.

Gilman SL. 1985. Black bodies, white bodies: Toward an iconography of female sexuality in late nineteenth-century art, medicine, and literature. *Crit Inq 12*:204–242.

Gilman SL. 1999. *Making the Body Beautiful: A Cultural History of Aesthetic Surgery*. 1st Ed. Princeton, NJ: Princeton University Press. 396 p.

Göttlicher S. 1994. The labium tertium pudendi feminae. A prospective study of 1,180 patients. *Zentralbl Gynakol 116*:419–421.

Gray HF, Carter HV. 1858. *Anatomy: Descriptive and Surgical*. London, UK: John W Parker and Son. 1604 p.

Gray HF, Carter HV. 1860. *Anatomy: Descriptive and Surgical*. 2nd Ed. London, UK: John W Parker and Son. 784 p.

Grković I, Marinović Guić M, Košta V, Poljičanin A, Čarić A, Vilović K. 2009. Designing anatomy program in modern medical curriculum: Matter of balance. *Croat Med J 50*:49–54.

Hayes JA, Temple-Smith MJ. 2021. What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy. *Aust N Z J Obstet Gynaecol 61*:331–338.

Holmes T (Editor). 1864. *Anatomy: Descriptive and Surgical*. 3rd Ed. London, UK: Longmans, Green and Co. 788 p.

Holmes T (Editor). 1866. *Anatomy: Descriptive and Surgical*. 4th Ed. London, UK: Longmans, Green and Co. 788 p.

Holmes T (Editor). 1869. *Anatomy: Descriptive and Surgical*. 5th Ed. London, UK: Longmans, Green and Co. 768 p.

Holmes T (Editor). 1872. *Anatomy: Descriptive and Surgical*. 6th Ed. London, UK: Longmans, Green and Co. 778 p.

Holmes T (Editor). 1875. *Anatomy: Descriptive and Surgical*. 7th Ed. London, UK: Longmans, Green and Co. 788 p.

Holmes T (Editor). 1877. *Anatomy: Descriptive and Surgical*. 8th Ed. London, UK: Longmans, Green and Co. 800 p.

Holmes T (Editor). 1880. *Anatomy: Descriptive and Surgical*. 9th Ed. London, UK: Longmans, Green and Co. 802 p.

Hopkins H, Weaks C, Napier E. 2021. Implementation and utilization of gynecological teaching associate and male urogenital teaching associate programs: A scoping review. *Adv Simul (Lond) 6*:19.

Howarth H, Sommer V, Jordan FM. 2010. Visual depictions of female genitalia differ depending on source. *Med Humanit 36*:75–79.

Howden R (Editor). 1909. *Anatomy: Descriptive and Surgical*. 17th Ed. London, UK: Longmans, Green and Co. 1296 p.

Howden R (Editor). 1913. *Anatomy: Descriptive and Applied*. 18th Ed. London, UK: Longmans, Green and Co. 1311 p.

Howden R (Editor). 1916. *Anatomy: Descriptive and Applied*. 19th Ed. London, UK: Longmans, Green and Co. 1304 p.

Howden R (Editor). 1918. *Anatomy: Descriptive and Applied*. 20th Ed. London, UK: Longmans, Green and Co. 1324 p.

Howden R (Editor). 1920. *Anatomy: Descriptive and Applied*. 21st Ed. London, UK: Longmans, Green and Co. 1366 p.

Howden R (Editor). 1923. *Anatomy: Descriptive and Applied*. 22nd Ed. London, UK: Longmans, Green and Co. 1378 p.

Howden R (Editor). 1926. *Anatomy: Descriptive and Applied*. 23rd Ed. London, UK: Longmans, Green and Co. 1400 p.

Iglesia CB. 2012. Cosmetic gynecology and the elusive quest for the "perfect" vagina. *Obstet Gynecol 119*:1083–1084.

ISAPS. 2020. International Society of Aesthetic Plastic Surgery. *Latest Global Survey from ISAPS Reports Continuing Rise in Aesthetic Surgery Worldwide: Total Surgical and Nonsurgical Procedures Increased by 7.4% in 2019*. 1st Ed. West Lebanon, NH: International Society of Aesthetic Plastic Surgery. 2 p. URL: https://www.isaps.org/wp-content/uploads/2020/12/ISAPS-Global-Survey-2019-Press-Release-English.pdf [accessed 6 November 2021]

James S, Sylvester HC. 2018. Transgender health and its current omission from medical school curriculum: Medical students' perspective. *Adv Med Educ Pract 9*:607–609.

Johnston TB (Editor). 1930. *Anatomy: Descriptive and Applied*. 24th Ed. London, UK: Longmans, Green and Co. 1466 p.

Johnston TB (Editor). 1932. *Anatomy: Descriptive and Applied*. 25th Ed. London, UK: Longmans, Green and Co. 1478 p.

Johnston TB (Editor). 1935. *Anatomy: Descriptive and Applied*. 26th Ed. London, UK: Longmans, Green and Co. 1516 p.

Johnston TB, Whillis J (Editors). 1938. *Anatomy: Descriptive and Applied*. 27th Ed. London, UK: Longmans, Green and Co. 1536 p.

Johnston TB, Whillis J (Editors). 1942. *Gray's Anatomy: Descriptive and Applied*. 28th Ed. London, UK: Longmans, Green and Co. 1558 p.

Johnston TB, Whillis J (Editors). 1946. *Gray's Anatomy: Descriptive and Applied*. 29th Ed. London, UK: Longmans, Green and Co. 1597 p.
Johnston TB, Whillis J (Editors). 1949. *Gray's Anatomy: Descriptive and Applied*. 30th Ed. London, UK: Longmans, Green and Co. 1533 p.
Johnston TB, Whillis J (Editors). 1954. *Gray's Anatomy: Descriptive and Applied*. 31st Ed. London, UK: Longmans, Green and Co. 1565 p.
Johnston TB, Davies DV, Davies F (Editors). 1958. *Gray's Anatomy: Descriptive and Applied*. 32nd Ed. London, UK: Longmans, Green and Co. 1604 p.
Kinsey AC, Pomeroy WB, Martin CE, Gebhard PH. 1953. *Sexual Behavior in the Human Female*. 1st Ed. Philadelphia, PA: W. B. Saunders Company. 842 p.
Koppes DM, Triepels CP, Schepens-Franke AN, Kruitwagen RF, Van Gorp T, Scheele F, Notten KJ. 2020. What do we need to know about anatomy in gynaecology: A Delphi consensus study. *Eur J Obstet Gynecol Reprod Biol 245*:56–63.
Laqueur T. 1992. *Making Sex: Body and Gender from the Greeks to Freud*. 1st Ed. Cambridge, MA: Harvard University Press. 313 p.
Last RJ. 1954. *Anatomy: Regional and Applied*. 1st Ed. Edinburgh, UK: Churchill Livingstone. 665 p.
Last RJ. 1959. *Anatomy: Regional and Applied*. 2nd Ed. Edinburgh, UK: Churchill Livingstone. 741 p.
Last RJ. 1963. *Anatomy: Regional and Applied*. 3rd Ed. Edinburgh, UK: Churchill Livingstone. 849 p.
Last RJ. 1966. *Anatomy: Regional and Applied*. 4th Ed. Edinburgh, UK: Churchill Livingstone. 896 p.
Last RJ. 1972. *Anatomy: Regional and Applied*. 5th Ed. Edinburgh, UK: Churchill Livingstone. 923 p.
Last RJ. 1978. *Anatomy: Regional and Applied*. 6th Ed. Edinburgh, UK: Churchill Livingstone. 598 p.
Last RJ. 1984. *Anatomy: Regional and Applied*. 7th Ed. Edinburgh, UK: Churchill Livingstone. 612 p.
Lawrence SC, Bendixen K. 1992. His and hers: Male and female anatomy in anatomy texts for US medical students, 1890–1989. *Soc Sci Med 35*:925–934.
McDougall LJ. 2013. Towards a clean slit: How medicine and notions of normality are shaping female genital aesthetics. *Cult Health Sex 15*:774–787.
McDougall L. 2021. *The Perfect Vagina: Cosmetic Surgery in the Twenty-First Century*. 1st Ed. Bloomington, IN: Indiana University Press. 257 p.
McMinn RM (Editor). 1990. *Last's Anatomy: Regional and Applied*. 8th Ed. Edinburgh, UK: Churchill Livingstone. 707 p.
McMinn RMH (Editor). 1994. *Last's Anatomy: Regional and Applied*. 9th Ed. Edinburgh, UK: Churchill Livingstone. 705 p.
MacFife B. 2019. *The not-so-typical patient: Gynecological teaching associates and the struggle to queer medicine*. San Francisco State University: San Francisco, CA. Master of Arts Dissertation. 44 p.
Mendelsohn KD, Nieman LZ, Isaacs K, Lee S, Levison SP. 1994. Sex and gender bias in anatomy and physical diagnosis text illustrations. *JAMA 272*:1267–1270.
Metcalf NF, Prentice ED, Metcalf WK, Stinson WW. 1982. Peer group models in examination instruction as an integral part of medical gross anatomy. *J Med Educ 57*:641–644.
Moore KL. 1980. *Clinically Oriented Anatomy*. 1st Ed. Baltimore, MD: Williams and Wilkins. 1257 p.
Moore KL. 1985. *Clinically Oriented Anatomy*. 2nd Ed. Baltimore, MD: Williams and Wilkins. 1101 p.
Moore KL. 1989. Meaning of "normal." *Clin Anat 2*:235–239.
Moore KL. 1992. *Clinically Oriented Anatomy*. 3rd Ed. Baltimore, MD: Williams and Wilkins. 917 p.
Moore KL, Dalley AF. 1999. *Clinically Oriented Anatomy*. 4th Ed. Philadelphia, PA: Lippincott Williams and Wilkins. 1164 p.
Moore KL, Dalley AF. 2006. *Clinically Oriented Anatomy*. 5th Ed. Philadelphia, PA: Lippincott Williams and Wilkins. 1209 p.
Moore KL, Dalley AF, Agur AM. 2010. *Clinically Oriented Anatomy*. 6th Ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams and Wilkins. 1134 p.
Moore KL, Dalley AF, Agur AM. 2014. *Clinically Oriented Anatomy*. 7th Ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams and Wilkins. 1134 p.
Moore LJ, Clarke AE. 1995. Clitoral conventions and transgressions: Graphic representations in anatomy texts, c1900–1991. *Fem Stud 21*:255–301.
Morgan S, Plaisant O, Lignier B, Moxham BJ. 2014. Sexism and anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes. *J Anat 224*:352–365.
Morrison SD, Wilson SC, Smith JR. 2017. Are we adequately preparing our trainees to care for transgender patients? *J Grad Med Educ 9*:258.
Moxham BJ, Pais D. 2017. A critique of utilitarian and instrumentalist concepts for the teaching of gross anatomy to medical and dental students: Provoking debate. *Clin Anat 30*:912–921.
Murciano-Goroff YR. 2015. Differences in the percentage of illustrations showing males versus females in general medicine and general surgery textbooks. *Med Sci Educ 25*:123–126.
NLM. 2019. National Library of Medicine. *The Visible Human Project*. National Library of Medicine, Bethesda, MD. URL: https://www.nlm.nih.gov/research/visible/visible_human.html [accessed 6 June 2021]
O'Connell HE, Sanjeevan KV, Hutson JM. 2005. Anatomy of the clitoris. *J Urol 174*:1189–1195.
Petersen A. 1998. Sexing the body: Representations of sex differences in Gray's Anatomy, 1858 to the present. *Body Soc 4*:1–15.
Pick TP (Editor). 1883. *Anatomy: Descriptive and Surgical*. 10th Ed. London, UK: Longmans, Green and Co. 824 p.
Pick TP (Editor). 1887. *Anatomy: Descriptive and Surgical*. 11th Ed. London, UK: Longmans, Green and Co. 978 p.
Pick TP (Editor). 1890. *Anatomy: Descriptive and Surgical*. 12th Ed. London, UK: Longmans, Green and Co. 1051 p.
Pick TP (Editor). 1893. *Anatomy: Descriptive and Surgical*. 13th Ed. London, UK: Longmans, Green and Co. 1112 p.
Pick TP (Editor). 1897. *Anatomy: Descriptive and Surgical*. 14th Ed. London, UK: Longmans, Green and Co. 1184 p.
Pick TP, Howden R (Editors). 1901. *Anatomy: Descriptive and Surgical*. 15th Ed. London, UK: Longmans, Green and Co. 1096 p.
Pick TP, Howden R (Editors). 1905. *Anatomy: Descriptive and Surgical*. 16th Ed. London, UK: Longmans, Green and Co. 1205 p.
Power DV, Center BA. 2005. Examining the medical student body: Peer physical exams and genital, rectal, or breast exams. *Teach Learn Med 17*:337–343.
Quain J. 1828. *Quain's Elements of Anatomy*. London, UK: Taylor. 700 p.
Quain J. 1832. *Quain's Elements of Anatomy*. 2nd Ed. London, UK: Taylor. 812 p.
Quain J. 1834. *Quain's Elements of Anatomy*. 3rd Ed. London, UK: Taylor. 870 p.
Quain J. 1837. *Quain's Elements of Anatomy*. 4th Ed. London, UK: Taylor and Walton. 910 p.
Quain R, Sharpey W (Editors). 1848. *Quain's Elements of Anatomy*. 5th Ed. London, UK: Taylor, Walton and Maberly and Co. 1017 p.
Rees CE, Wearn AM, Vnuk AK, Sato TJ. 2009. Medical students' attitudes towards peer physical examination: Findings from an international cross-sectional and longitudinal study. *Adv Health Sci Educ Theory Prac 14*:103–121.
Richardson R. 2016. Henry Gray, plagiarist. *Clin Anat 29*:135–139.
Robinson A (Editor). 1913. *Cunningham's Textbook of Anatomy*. 4th Ed. Edinburgh, UK: H. Frowde and Hodder & Stoughton. 1596 p.
Robinson A (Editor). 1918. *Cunningham's Textbook of Anatomy*. 5th Ed. London, UK: Oxford University Press. 1593 p.
Robinson A (Editor). 1931. *Cunningham's Textbook of Anatomy*. 6th Ed. London, UK: Oxford University Press. 1554 p.
Romanes GJ (Editor). 1964. *Cunningham's Textbook of Anatomy*. 10th Ed. London, UK: Oxford University Press. 1014 p.
Romanes GJ (Editor). 1972. *Cunningham's Textbook of Anatomy*. 11th Ed. London, UK: Oxford University Press. 996 p.
Romanes GJ (Editor). 1981. *Cunningham's Textbook of Anatomy*. 12th Ed. London, UK: Oxford University Press. 1078 p.

Rumbelow H. 2018. *Wonder down under: The vagina myths exposed*. The Weekend Australian. 19 January 2018. News Corp Australia, Surry Hills, NSW, Australia. URL: https://www.theaustralian.com.au/news/inquirer/wonder-down-under-the-vagina-myths-exposed/news-story/998f62f0877fe4f14f461e8deeb081fe [accessed 6 June 2021]
Schäfer EA, Thane GD, Thomson A (Editors). 1882. *Quain's Elements of Anatomy. 2 Volumes*. 9th Ed. London, UK: Longmans, Green and Co.
Schäfer EA, Thane GD (Editors). 1890. *Quain's Elements of Anatomy. 3 Volumes*.10th Ed. London, UK: Longmans, Green and Co.
Schäfer EA, Symington J, Bryce TH (Editors). 1908. *Quain's Elements of Anatomy. 4 Volumes*. 11th Ed. London, UK: Longmans, Green and Co.
Sharpey W, Ellis GV. 1856. *The Elements of Anatomy by Jones Quain. Volume 3*. 6th Ed. London, UK: Walton and Maberly and Co. 524 p.
Sharpey W, Thomson A, Cleland JG (Editors). 1867. *Quain's Elements of Anatomy. 2 Volumes*. 7th Ed. London, UK: James Walton. 1147 p.
Sharpey W, Thomson A, Schäfer EA (Editors). 1878. *Quain's Elements of Anatomy. 2 Volumes*. 8th Ed. London, UK: Longmans, Green and Co.
Simonis M, Manocha R, Ong JJ. 2016. Female genital cosmetic surgery: A cross-sectional survey exploring knowledge, attitude and practice of general practitioners. *BMJ Open 6*:e013010.
Sinnatamby CS (Editor). 1999. *Last's Anatomy: Regional and Applied*. 10th Ed. Edinburgh, UK: Churchill Livingstone. 539 p.
Sinnatamby CS (Editor). 2006. *Last's Anatomy: Regional and Applied*. 11th Ed. Edinburgh, UK: Churchill Livingstone/Elsevier. 568 p.
Sinnatamby CS (Editor). 2011. *Last's Anatomy: Regional and Applied*. 12th Ed. Edinburgh, UK: Churchill Livingstone/Elsevier. 548 p
Standring S (Editor). 2005. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 39th Ed. London, UK: Elsevier. 1627 p.
Standring S (Editor). 2008. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 40th Ed. London, UK: Elsevier. 1551 p.
Standring S. 2009. New focus on anatomy for surgical trainees. *ANZ J Surg* 79:114–117.
Standring S (Editor). 2015. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 41st Ed. London, UK: Elsevier. 1584 p.
Standring S. 2016. A brief history of topographical anatomy. *J Anat 229*:32–62.
Standring S (Editor). 2021. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 42nd Ed. London, UK: Elsevier. 1606 p.
Sugand K, Abrahams P, Khurana A. 2010. The anatomy of anatomy: A review for its modernization. *Anat Sci Educ 3*:83–93.
Underman K. 2020. *Feeling Medicine: How the Pelvic Exam Shapes Medical Training*. 1st Ed. New York, NY: New York University Press. 320 p.
Warwick R, Williams PL (Editors). 1973. *Gray's Anatomy*. 35th Ed. London, UK: Longmans, Green and Co. 1471 p.
Wearn AM, Rees CE, Bradley P, Vnuk AK. 2008. Understanding student concerns about peer physical examination using an activity theory framework. *Med Educ* 42:1218–1226.
Williams PL, Warwick R (Editors). 1980. *Gray's Anatomy*. 36th Ed. London, UK: Churchill Livingstone. 1578 p.
Williams PL (Editor). 1989. *Gray's Anatomy*. 37th Ed. London, UK: Churchill Livingstone. 1598 p.
Williams PL (Editor-in-chief). 1995. *Gray's Anatomy*. 38th Ed. London, UK: Churchill Livingstone. 2092 p.
Wood Jones F (Editor). 1946. *Buchanan's Manual of Anatomy*. 7th Ed. London, UK: Baillière, Tindall and Cox. 1616 p.
Wood Jones F (Editor). 1949. *Buchanan's Manual of Anatomy*. 8th Ed. Baltimore, MD: Williams and Wilkins. 1616 p.

AUTHOR BIOGRAPHIES

Jennifer A. Hayes, M.B.B.S., G.C.H.P.E., is an associate professor of topographic anatomy in the Department of Anatomy and Physiology, School of Biomedical Sciences, and a Ph.D. student in the Department of General Practice, Melbourne Medical School at the University of Melbourne in Melbourne, VIC, Australia.

Meredith J. Temple-Smith, B.Sc., M.P.H., D.H.Sc., is a professor in the Department of General Practice, Melbourne Medical School, University of Melbourne, in Melbourne, VIC, Australia. She is Deputy Head and Director of Research Training in the Department of General Practice and her role focuses on increasing research and research capacity in the area of primary care.

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Chapter 8: The Teaching of Vulval Anatomy

This chapter reports on a series of 31 semi-structured interviews conducted with Australian anatomists about the teaching of female genital anatomy. The research was designed to investigate the claim that "genital anatomy education is lacking from all medical and non-medical curricula" (Simonis, 2019, p. 130), a claim for which I had not found an evidential base in my literature search.

I asked participants how they determine the content of anatomy lectures and laboratory classes, including the need for updating that content, the place of anatomical variation in anatomy teaching, and factors that might influence the teaching of female genital anatomy. Interviewing was conducted iteratively (meaning my questions and process were refined over successive interviews), and I commenced deductive analysis after the fifth interview with coding mapped to my questions (Braun & Clarke, 2006). I noted that new concepts and themes around inclusivity had emerged, so questions about how best to address diversity and inclusivity in anatomy teaching were added to subsequent interviews.

Barriers to the teaching of female genital anatomy identified in the interviews included the lack of connection to contemporary clinical practice, the time and technical difficulty involved in regularly updating online presentations, the crowded curriculum, personal sensitivity to teaching vulval anatomy resulting in avoidance measures, and reluctance to introduce inclusive terminology. Facilitators included lived experience, regular use of social media, and institutional initiatives towards inclusivity, including the support of queer colleagues.

The findings were written up and submitted for publication in 2022 during a period of significant change for the discipline of anatomy. A special issue of *The Anatomical*

Record published in February 2022 set the agenda for the discipline to "move forward to create a more diverse, equitable, and inclusive future for students, teachers, colleagues, and everyone else we touch through our work as anatomists" (Organ & Comer, 2022, p. 766). Two of the articles included in that issue (Easterling & Byram, 2022; Smith, 2022) addressed the need for inclusive language in the lecture theatre and laboratory. Smith called for a reform of the language used to describe the anatomy of the reproductive system, and Easterling and Byram recommended ways to use anatomical language that is inclusive of gender diverse individuals.

The paper was initially submitted to *Anatomical Sciences Education* with the title "Teaching female genital anatomy in the twenty-first century", which reflected the language used in the ethics application, interview questions and by the interviewees. The language (not that of the interviewees, whose views are included verbatim in the paper) was subsequently revised under the tutelage of the reviewers, to whom I am indebted and whom I have acknowledged in the body of the paper. Describing surgical procedures performed on genital structures in reproductive systems of binary and non-binary individuals is not a straightforward process. The challenge to use inclusive language faced by the discipline was articulated by several of the interviewees:

> I'm not sure whether or not to use self-identified and then their gender or *assigned at birth*. P17, male, PhD

> I really feel quite ignorant about that and I wouldn't know where to begin. P21, female, PhD

> When I started teaching, the landscape was so different. There were no pronouns to worry about, there were no eggshells to walk on. P22, male, DC

> I had a student come up to me afterwards and say, actually the way you did that was really awful. You were actually so awkward and that made us feel worse. And then a whole heap of students in the student comments, oh my god, everyone else just calls it male and female. Do the same. P9, female, PhD

> You've got to accept that you're not going to get it perfect, and that you need to be refining it, and you've got to accept being brave if you're not coming from lived experience. P29, female, PhD

The paper was published as a research report in *Anatomical Sciences Education* in 2023 (Hayes & Temple-Smith, 2023) and is presented in its final published form below. Note that the references cited in the paper are not reproduced in the references section of the thesis, although naturally they overlap substantially.

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RESEARCH REPORT

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Teaching vulval anatomy in the twenty-first century: The Australian experience

Jennifer A. Hayes[1,2] | Meredith J. Temple-Smith[1]

[1]Department of General Practice, Melbourne Medical School, University of Melbourne, Parkville, Victoria, Australia

[2]Department of Anatomy and Physiology, School of Biomedical Sciences, University of Melbourne, Parkville, Victoria, Australia

Correspondence
Dr. Jennifer A. Hayes, Department of General Practice, The University of Melbourne, Grattan Street, Parkville, VIC 3010, Australia.
Email: j.hayes@unimelb.edu.au

Abstract

Anatomy has often been regarded as an immutable discipline where everything that needs to be known is known. This article focuses on the teaching of vulval anatomy, the diversification of gender in contemporary society, and the increasing popularity of the Female Genital Cosmetic Surgery (FGCS) industry. The binary language and singular structural arrangements contained in lectures and chapters on "female genital anatomy" are nowadays rendered exclusive and incomplete. A series of 31 semi-structured interviews with Australian anatomy teachers identified barriers and facilitators for teaching vulval anatomy to contemporary student cohorts. Barriers included lack of connection to contemporary clinical practice, time and technical difficulty involved in regularly updating online presentations, the crowded curriculum, personal sensitivity to teaching vulval anatomy, and reluctance to introduce inclusive terminology. Facilitators included lived experience, regular use of social media, and institutional initiatives toward inclusivity including the support of queer colleagues.

KEYWORDS
anatomical variation, anatomy education, curriculum, female genitalia, inclusion, LGBTIQ+, non-binary

INTRODUCTION

Recent publications have suggested that modern medical curricula significantly undervalue vulval anatomy, leading to the perception that graduating students are ill equipped for front-line consultations with patients contemplating female genital cosmetic surgery (FGCS).[1,2]

Early research perpetuated historically entrenched male–female binarism and showed that, when compared to males, females were underrepresented in anatomy texts—with a narrow stereotypical representation of ethnicity, age, and body type—and were primarily identified by their reproductive attributes.[3–8]

Vulval anatomy descriptions in anatomy texts have been shown to be static through time[8,9] and to ignore the spectrum of normal appearance described for the vulva.[9–11] This means that anatomical texts fail to counterbalance the distorted perception in contemporary society that a normal vulva is a "slit like genital hiatus with the labia minora and labia majora coming together in the midline" (Iglesia [12], p. 1083). Nicknamed the "Barbie look" because Barbie has no genital structures,[13,14] this ideal is largely promulgated by the pornography[15] and FGCS industries.[16]

A diverse range of procedures that alter the structure and appearance of the vulva in the absence of pathology are subsumed under the title of FGCS. This includes reduction of the labia minora (labiaplasty), reduction of the clitoral hood (labiaplasty and clitoral hood reduction are often performed together because the structures are contiguous), augmentation of the labia majora (effectively

reducing the relative size of the labia minora), vaginal tightening, and perineoplasty.

In Australia, accurate data are difficult to obtain because most cases are done in the private sector after an Australian Department of Health review of vulval surgery in 2014 changed the criteria for Medicare-funded vulval procedures. The relevant Medicare Benefits Scheme item number does not include gender-affirming surgery. Between January 2011 and December 2021, 23.5% of patients who underwent cosmetic vulval surgery in the public sector were aged 25 years and under.[17]

Increasing demand for FGCS has been said to be due to increased social acceptability of cosmetic surgery procedures,[18] the trend for pubic hair removal,[19,20] and broad population exposure to pornography,[21,22] combined with a poor general understanding of what constitutes a normal vulva.[23-25]

A recently published survey of 433 Australian general practitioners found that 97% had been asked about vulval normality, and 50% had been asked for a referral for labiaplasty surgery.[2] Vulval anatomy is therefore very relevant to the contemporary student cohort who are of an age where some may be questioning the normality of their own anatomy while also training to become medical practitioners who will take their medical anatomy knowledge to frontline consultations.

In addition to a better focus on vulval anatomy, the inclusion of gender/sex and sexual diversity in all aspects of health and medical education has been encouraged.[26-30] Sex relates to biological factors such as chromosome composition (XX for female, XY for male), sex hormones, or sex characteristics,[31] while gender refers to culturally and socially constructed traits of identity.[32] Anatomy is said to be a prime example of a curricular component that has not evolved beyond a binary context of male and female with a heteronormative presentation of genitalia and their function.[33]

A survey of images in anatomical textbooks used at Australian medical schools found "almost complete adherence to a sex/gender binary" (Parker et al. [34], p. 106). There is significant relevance here for genital anatomy. Categorizing perineal structures, including the vulval structures, under chapter headings and lecture titles of "male reproductive system" and "female reproductive system" or "male external genitalia" and "female external genitalia" is problematic because it ignores intersex configurations and the surface and transformed genital anatomy of trans* individuals.[33*]

The estimated proportion of gender-diverse individuals varies between 0.1% and 2.7% of the population depending on inclusion criteria, age of participants, and geographic location,[37] so any university student cohort, and patient population, can be expected to include those who fall outside the gender binary system.

The research study described here was conducted to determine whether vulval anatomy, shown to be inadequately covered in the texts and claimed to be undervalued in the literature, was included by Australian anatomists in their anatomy curricula. The research question, which inquired about whether vulval anatomy was included in anatomy teaching, was best answered using qualitative methods which are useful for describing "uncertain and "immature" concepts; sensitive and socially dependent concepts; and complex human intentions and motivations" (Maudsley [38], p. e95). Although it is not difficult to postulate a range of determinants that might affect the teaching of vulval anatomy, qualitative methods do not test hypotheses. Instead, qualitative methods highlight differences in perspectives and generate hypotheses for future research.

MATERIALS AND METHODS

This study has been reported in accordance with the Standards for Reporting Qualitative Research (SRQR) guidelines.[39] Study protocols were approved by the Human Research Ethics Committee of The University of Melbourne, ID:14564, on 29 September 2020.

A qualitative descriptive approach was chosen from the range of qualitative research approaches available because, unlike grounded theory, phenomenology, and ethnology, it stays close to and describes participants' experiences and perceptions[40] to present the findings in a way that directly reflects the initial research question.[41] A qualitative descriptive approach provides an excellent method to address important issues where the focus is not on increasing theoretical and conceptual understanding, but rather on contributing to change and quality improvement in practice settings.[42]

Semi-structured interviews, which aim to "seek views on a focused topic or, with key informants, for background information or an institutional perspective" (Hammarberg et al. [43], p. 499), were chosen as the most appropriate method of data collection. Semi-structured interviews are an effective method to collect qualitative, open-ended data; explore participant thoughts, feelings, and beliefs about a particular topic; and delve deeply into personal and sometimes sensitive issues.[44] All interviews were conducted by the first author (J.H.), an anatomist at the University of Melbourne, Australia.

Participants were recruited via the Australian and New Zealand Association of Clinical Anatomists (ANZACA) newsletter and conference 2021 and from snowball sampling. No financial reimbursement was offered for participation in the study. Anyone who had current or previous experience teaching anatomy at an Australian tertiary institution was included and there were no other inclusion or exclusion criteria. Demographic data related to sex and educational background only were noted, as numeric data such as age and years of teaching experience were deemed a risk to identification in what is a relatively small pool of teaching anatomists in Australia.

Semi-structured interviews were conducted via Zoom, a video-conferencing platform (Zoom Video Communications, Inc., San Jose, CA). Prior to the interview commencing, participants were required to read a plain language statement to ensure that they were fully informed about what their involvement in the study would entail, to sign the consent form, and to provide permission for the interview to be audio-recorded. Participants' views were sought on the content of anatomy lectures and laboratory classes including the need for updating that content, the place of anatomical variation in anatomy teaching, and factors that might influence the teaching of vulval anatomy.

Interviews were transcribed verbatim, de-identified, and then analyzed by the first author (J.H.). Interviewing was conducted iteratively, and data analysis commenced after the fifth interview. The initial data were analyzed deductively with coding mapped to specific research questions,[45] however, new concepts and themes around inclusivity emerged and questions about how best to address diversity and inclusivity in anatomy teaching were added to subsequent interviews. Data collection continued until the point of data saturation was reached, where no new data were identified.

The second author (M.T.S.) also read the interview transcripts to achieve consensus on major themes and interpretation of data. Both authors are senior cis-female white Anglo-Australian academics. The primary author is a medically trained anatomist with 30 years of experience in teaching anatomy to health professional students, which allowed the study participants to feel comfortable sharing their teaching experience. The second author is a sexual and reproductive health researcher with 40 years of research experience on sensitive issues including diversity, often conducted within marginalized communities. Prior to commencement of data collection, both authors discussed their preconceptions on the study population, and the need to ensure these existing assumptions did not impact data collection and analysis.

RESULTS

Thirty-one interviews were conducted with participants from 16 Australian tertiary institutions. Eighteen of the participants identified as female and 13 identified as male. Twenty-seven of the participants taught topographic anatomy and four participants were identified via snowball sampling because they coordinated subjects which included vulval anatomy. In terms of academic background, six of the participants were medically qualified (MD), four of them also had PhD or specialist qualifications, seven of the participants had allied health degrees in osteopathy (DO), physiotherapy (PT), or chiropractic therapy (DC), and eighteen had or were completing research higher degrees (PhD). Only two of those research higher degrees were in topographic or clinical anatomy (Table 1).

In describing how they became anatomy educators, serendipity was referenced by many participants:

> I became an accidental academic.
>
> (P22, male, DC)

> I literally fell into teaching anatomy.
>
> (P14, male, PhD)

> I was just applying for anything....and then I got the job....and I was like, oh my god, I haven't looked at anatomy for like twelve years.
>
> (P9, female, PhD)

TABLE 1 The demographic characteristics of participants.

Characteristic	Number ($n = 31$)
Sex	
Female	18 (58.1)
Male	13 (41.9)
Role	
Topographic anatomy lecturer or demonstrator	27 (87.1)
Coordinator of subjects including female genital anatomy	4 (12.9)
Background qualification	
Research higher degree (PhD)	18 (58.1)
Medical or allied health degree (MD, PT, DO, DC)	13 (41.9)

Teaching experience of participants ranged from early career demonstrators to retired senior academics. Most of the participants were involved in lecture and laboratory teaching to multiple cohorts of students in undergraduate and postgraduate science, biomedicine, medicine, and allied health degrees. Most had been required to develop new online methods of content delivery during Covid-19 restrictions.

A large amount of data were collected in the interviews. This article focuses on vulval anatomy and inclusivity for which the data were categorized into four major themes: (1) influence and information determining content in anatomy lectures and laboratory classes, (2) motivation for updating lecture content, (3) factors that influence the teaching of vulval anatomy, and (4) inclusivity in anatomy teaching (Table 2).

Theme 1: Determining anatomy content

There were many different sources used by participants when deciding on content of lectures and laboratory classes.

Clinical experience or access to clinical network

Participants with medical and allied health degrees cited their practitioner experience as a major influence on determining lecture content when they were teaching in the same professional curriculum.

> I've worked clinically for almost a decade now. I feel very confident in being able to ascertain what I believe is relevant.
>
> (P3, male, DO)

> I'd rather put everything that I know from my experience in to guide how I'd create that lecture series.
>
> (P23, male, MD)

TABLE 2 The major themes and sub-themes.

Major theme	Sub-themes
Determining anatomy content	• Own clinical experience or access to clinical network • Prescribed curriculum and inherited lectures • Textbooks
Updating anatomy content	• Proactive response to clinical and research advances • Reactive response to student feedback • Barriers are time involved and technical difficulties
Teaching vulval anatomy	• Impact of crowded curriculum and lack of resources • Personal reluctance and student sensitivity identified as major barriers to delivery • Proactivity related to personal experience, teenage children, and social media
Prompts for using inclusive language	• Lived experience and access to resources • Student response

> I probably rely more on my clinical exposure than anything.
>
> (P30, female, PT)

Participants from a health professional background frequently presented content in clinical vignettes.

> I teach around what I call a clinical case conundrum.
>
> (P6, male, MD)

> I usually think of the cases I've some across in my life.
>
> (P24, male, MD)

Teaching academics without a clinical background acknowledged the value of a clinical vignette and some actively sought assistance to create these.

> Now I reach out to a group of clinical surgeons, and I say, tell me some cases.
>
> (P13, female, PhD)

> I'll try and meet with a physiotherapist and ask about common clinical scenarios that we can teach.
>
> (P14, male, PhD)

Access to a clinical network for non-clinical academics, however, was often only irregularly or indirectly available.

> If anything filters through into the clinical skills workshops from anatomy, or from the clinicians that come in there that think students are missing something that would get fed back to us through that bigger team.
>
> (P2, female, DO)

> Most of the subject coordinators will meet annually with the clinicians in their discipline.
>
> (P14, male, PhD)

Prescribed curriculum and inherited lectures

Many participants who came to anatomy teaching from a research background other than topographic anatomy used the prescribed course curriculum and inherited lecture content.

> A lot of it was just teaching what I was told to teach, essentially.
>
> (P18, male, PhD)

> I only teach what I teach just because I teach what other people taught before me.
>
> (P20, female, PhD)

Textbooks

Textbooks were an alternative source of content for many teaching academics particularly, but not exclusively, those who were relatively inexperienced teachers.

> When I first started my career, I would use textbooks to guide the lectures I needed to prepare.
>
> (P14, male, PhD)

> I would probably consult the textbooks to see what it is the students need to know.
>
> (P27, female, PhD)

Participants from non-professional backgrounds also used textbooks as a source of clinical information.

> I do refer to clinical anatomy textbooks because I feel from my educational perspective that's perhaps what's lacking.
>
> (P4, female, PhD)

> They distil the information in ways that I can understand. Because I don't have a professional background and particularly when they're talking about clinical cases, that is a nice bite-sized nugget that I can hang onto.
>
> (P20, female, PhD)

Nearly all participants used textbooks as a source of images for their presentations.

> We all certainly access textbooks for graphics.
>
> (P29, female, PhD)

> .....mostly for image reasons.
>
> (P23, male, MD)

Theme 2: Updating anatomy content

When asked about updating anatomy content only one of the participants viewed updates as unnecessary.

> The nice thing about anatomy, particularly my specialty, is it doesn't change that much.
>
> (P8, female, DO)

Most participants identified changing clinical and research contexts and student feedback as reasons to update but admitted that the time and technical difficulties involved in updating new online presentation formats discouraged them from doing so.

Proactive response to clinical and research advances

Participants with a clinical background updated material based on clinical advances.

> I do change things a bit because I meet with our clinicians regularly, every month really.
>
> (P6, male, MD)

> On an annual basis...because things do change, certainly clinically.
>
> (P23, male, MD)

Those from a research background cited peer-reviewed journals, conference attendance, and social media as drivers for updating content.

> I find that Twitter keeps me quite informed on clinical relevance and the clinical research that's going on in ...It's a really good way to keep up with the current literature.
>
> (P15, male, PhD)

> The conferences etcetera that I attend that will obviously modify the content that we're teaching.
>
> (P29, female, PhD)

Reactive response to student feedback

One participant was motivated to update lectures in response to negative student feedback.

> I got paid out by the students.... I'm like the content hasn't changed. So, I am literally now recording brand new lectures and trying not to have any reference to any year or anything so they can't tell hopefully when they've been published.
>
> (P9, female, PhD)

Barriers are time involved and technical difficulties

Nearly all participants commented on the increased time and technical difficulty of updating online presentations, in many cases created for use during Covid-19 pandemic lockdowns.

> Instead of lectures we're using blended video clips now..... It's more of a hassle to reintroduce the image, reformat the clip, reproduce the clip, reupload the clip. Takes a lot of time.
>
> (P14, male, PhD)

> And so, it's bad, but I don't go back and revise them because it's too much hard work to unpick all the editing.
>
> (P20, female, PhD)

Theme 3: Teaching vulval anatomy

Except for one participant who coordinated a specialist subject, all participants acknowledged that vulval anatomy was underemphasized in their teaching.

Impact of crowded curriculum and lack of resources

A crowded curriculum was cited by many as the reason vulval anatomy was not covered in detail because, in almost all cases, vulval anatomy was included in the time allocated to the reproductive system. Participants prioritized internal pelvic reproductive organs such as uterus and ovaries.

> If you only have one lecture on the female reproductive system you have a considerable amount on ovary and internal organs.
>
> (P7, male, PhD)

> I don't really go into a huge amount of description of the surface, external anatomy, simply because ...I'd have to give up something else.
>
> (P17, male, PhD)

Lack of suitable specimens and resources was also mentioned as a barrier to student engagement.

> You want to be picking up material, making models, feeling your own body, feeling the movements and that kind of thing. The students aren't going to feel their own genital anatomy.
>
> (P31, female, PT)

> You're not going to see that in the cadaver specimens.
>
> (P10, female, PhD)

Personal reluctance and student sensitivity identified as major barriers to delivery

Many participants acknowledged a personal reluctance to cover vulval anatomy.

> Early on in my career I found it difficult to speak about.....a lot of the people in the class were young women of the same age as me.
>
> (P3, male, DO)

> I probably had some reluctance talking to second-year science kids about female external genitalia. I don't know why.
>
> (P7, male, PhD)

> I always find preparing slides quite awkward.
>
> (P10, female, PhD)

> I'm a foreign medical graduate....one of the areas which I found to be most challenging for myself was the genital anatomy of females because, back home, culturally and religiously, we were not taught that.
>
> (P24, male, MD)

One participant had actively sought counseling to overcome a personal block.

> He said one of the best things you can do is just go in there, don't try to make eye contact, and just tell them what you are required to tell them.... And I did try it last year and it worked well.
>
> (P24, male, MD)

Some participants identified hesitancy and reluctance to engage with genital anatomy on the students' part.

> They come with an additional level of anxiety about their own ignorance, I guess. And it's difficult to transition them into a state where they're really comfortable to learn.
>
> (P31, female, PT)

> A lot of the male students I find aren't comfortable with it.
>
> (P30, female, PT)

> We got feedback from students, and it was around their discomfort in that, and it wasn't necessarily female students, it was just students in general.
>
> (P2, female, DO)

Proactivity related to personal experience, teenage children, social media

Some participants, however, were confident and proactive about covering vulval anatomy, and this was often related to lived experience or social media.

> I'm on Tik Tok a lot at night-time. And I've been quite horrified at the number of plastic surgeons who are doing labiaplasties.
>
> (P9, female, PhD)

> I'm a strong advocate for normalizing the language, normalizing the consideration of female genitalia as nothing to be ashamed of.
>
> (P15, male, PhD)

> I'm very much aware that when I get the second-year science students many of them have never been in a room where they've been having an open conversation about all these issues, and it's a very poor education at school. To give them the vocabulary, but just an open frame of mind to be able to talk about these sorts of things, I probably use it as a bit of a platform.
>
> (P29, female, PhD)

Theme 4: Prompts for using inclusive language

Anatomy is said to be a prime example of a curricular component that has not evolved beyond a binary model despite more than half a century of activism from members of the queer community.

Lived experience and access to resources

Many participants had not considered the use of more inclusive language or were uncertain how to do so:

> I really feel quite ignorant about that and I wouldn't know where to begin.
>
> (P21, female, PhD)

Others had taken advice from advisory groups at their institution and begun implementing changes in terminology.

> I did sit down with the head of the Queer Department last year to go over some of my lectures, and just get feedback and things, which was useful...I sought it out because I thought I'm right out of my comfort zone.
>
> (P29, female, PhD)

> I have tutors who works with me who are from the queer community, and that is a brilliant way to seek open and constructive feedback. I don't have any lived experience, so it's really brilliant to be working with them.
>
> (P29, female, PhD)

Student response

Those participants who experimented with inclusive language reported a positive student response:

> I got a whole heap of positive feedback from students saying, oh my god, she's so inclusive.
>
> (P9, female, PhD)

> They appreciate me using different terminology. Instead of saying female, I try to say people with ovaries as much as I can and the alternative for males and people with testes and so on.... I actually got comments on the student evaluation that year...they called me woke.
>
> (P15, male, PhD)

DISCUSSION

The increasing diversification of today's society, the rise of the FGCS industry, and the increasing recognition of non-binary norms are all contemporary social and clinical issues that require anatomists to reconsider the teaching of genital anatomy in their planned curricula. This study identified barriers and facilitators in the teaching of vulval anatomy to contemporary anatomy students whose lived experience includes the confusion of anatomical and societal normal for vulval anatomy and gender diversity.

Modern anatomy teaching is often situated within an integrated curriculum and teaching staff have a wide variety of qualifications and expertise.[46] Participants in this project reflected this mix of medically qualified, allied health professionals and scientists with differing degrees of "clinical connectedness." Participants with medical and allied health degrees cited their practitioner experience as a major influence on determining lecture content, especially when they were teaching in the same professional curriculum. Even if they were not still active participants in clinical practice, they were more likely to have a network of clinical contacts to connect them to contemporary practice, and they were more likely to create clinical vignettes in which to imbed their teaching content.

Participants without a clinical background, and especially those with only irregular or no access to clinicians, fell back on pre-existing curricular structures or inherited lectures to determine lecture content. Others, especially early career anatomy teachers, consulted textbooks for lecture content, and even clinically connected participants turned to textbooks as a source of images, which is especially problematic given recent publications have highlighted the lack of accurate and diverse representation of vulval anatomy within anatomical textbooks.[9-11] In contrast, students have been shown to be more likely to employ web-based platforms to source information rather than textbooks.[47]

Nearly all participants commented that the increased time and technical difficulty of updating online presentations resulted in a reluctance for regular, especially major, content change. In terms of including reference to structural diversity such as that underpinning the increasing demand for FGCS, this is problematic because increased use of technology-led blended learning strategies[48-50] has already raised concerns about the lack of anatomical variation experienced in new course designs.[51] Covid-19-enforced alternate learning strategies have also resulted in reduced exposure to prosected specimens and dissection where students might have previously encountered vulval variation.[52-55]

In teaching vulval anatomy, most participants commented that they were struggling to find adequate time in a crowded curriculum to cover both reproductive and genital anatomy. It is accepted that within the area of anatomy, there is "competition for space and time" (Grković et al. [56], p. 50) and that the absence of national or international agreed core syllabi complicates any discussion about what is relevant and what does not need to be taught.[57,58] This study found that personal sensitivities might also contribute to lack of coverage and many participants acknowledged that they were uncomfortable teaching genital anatomy. The exception was those who had lived experience of genital diversity through community, family, or personal experience.

Student sensitivity was also referenced several times by participants as a reason not to allocate too much time to genital anatomy. Gynecological Teaching Associate (GTA) programs, which use standardized patient methodology to train medical students to conduct patient-centered pelvic examinations,[59] have been

included in medical curricula since the mid-1980s,[60,61] so it makes no sense to avoid introducing detailed genital anatomy earlier in medical anatomy programs. A recent study compared traditional anatomy teaching methods to a mobile learning application, and their effect on the academic achievement and anxiety levels of students learning genital system anatomy.[62] Lower anxiety levels and higher success rates were observed in the students educated in the anatomy of the genital system using the mobile learning application when compared to the standard curriculum, however, the difference in anxiety levels was attributed to repeatable delivery outside a face-to-face laboratory experience rather than the genital anatomy content.

While this study was on the teaching of vulval anatomy, participants offered information that highlighted challenges beyond the initial focus of labiaplasty. Lectures and chapters titled "male reproductive system," "female reproductive system," and reference to male and female genitals make no allowance for trans* individuals; or does it allow for people with intersex variations that make genitals and gender ambiguous. Some participants were de-gendering language as a first step to reorganizing content in a gender-inclusive and more descriptive way. A useful perspective for them came from colleagues within the queer community,† although the burden of educating others cannot always be placed on queer people[63] and institutional advisory groups. Two participants had been encouraged by positive student feedback, but many participants were uncertain about how to proceed and nervous about the student cohort judging their attempts.

There have been numerous ways suggested to update and reform the approach to including sexual and gender minorities in anatomy curricula involving pronouns, allyship symbols, targeted research and grant opportunities, mentorship, and the inclusion of case studies involving intersex individuals and other differences in sexual development.[30,32,64,65]

Scant representation of vulval anatomy and the failure to acknowledge normal vulval morphological diversity serve to reinforce the societal norm promoted by social media and cosmetic surgery websites which normalize cosmetic surgical "repair" of normal genital anatomy. Individuals vulnerable to this marketing will be present in the student cohort. Labiaplasty is but one example of disconnection between static anatomy resources and contemporary practice. Interview findings suggest that this is exacerbated by the lack of clinical context available to many non-clinically trained anatomists, and time and technical challenges involved in regularly updating teaching material. The authors suggest that anatomy teaching groups need to prioritize connectedness with the contemporary issues facing the student population, their future patient population, and clinical colleagues.

Results from this study have implications for both curricular and resource design, mentorship, and professional development strategies. Having a better understanding of how few anatomy teachers experience engagement with clinicians may be one way to help facilitate future contemporary clinical relevancy in anatomy teaching and textbooks. Better support for inclusive communication skills in anatomy teachers calls for bespoke training at individual institutions and a discipline-wide approach to modifying entrenched binarism. The authors are heartened by recent publications that address effective communication training within the discipline.[66,67]

Limitations of the study

This study was the first qualitative analysis of facilitators and barriers to teaching vulval anatomy. One limitation of the study was the recruitment of volunteer participants and use of snowballing which likely resulted in recruitment bias toward participants most passionate about genital anatomy. The intention of this research was to interview participants objectively. Researcher bias could be both a limitation and a strength as shared background and experience facilitated open and honest discussion. The large range of background qualifications and Australian tertiary institutions represented allowed for a broad understanding of the impact of educational background and different institutional settings on participant views.

CONCLUSIONS

The human body exists on a spectrum and should not be represented by singular structural arrangements or two binary points. Anatomy teachers need support to shift how they teach and share anatomical knowledge about vulval anatomy, which is currently both exclusive and scientifically incorrect.

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ORCID

Jennifer A. Hayes https://orcid.org/0000-0003-4281-9607

ENDNOTES

The term trans individual is used to identify a subset of those who fall outside the gender binary.[35,36]

†The term "queer" is used as an inclusive representation of LGBTQ+ individuals who identify as lesbian, gay, bisexual, transgender, queer or questioning, asexual, and/or any additional sexual orientations (e.g., pansexual and demisexual), gender identities (e.g., non-binary), and gender expressions (i.e., gender non-conforming).

REFERENCES

1. Deans R, Liao LM, Crouch NS, Creighton SM. Why are women referred for female genital cosmetic surgery? *Med J Aust*. 2011;195:99.

2. Simonis M, Manocha R, Ong JJ. Female genital cosmetic surgery: a cross-sectional survey exploring knowledge, attitude and practice of general practitioners. *BMJ Open*. 2016;*6*:e013010.
3. Giacomini M, Rozee-Koker P, Pepitone-Arreola-Rockwell F. Gender bias in human anatomy textbook illustrations. *Psychol Women Q*. 1986;*10*:413–20.
4. Lawrence SC, Bendixen K. His and hers: male and female anatomy in anatomy texts for US medical students, 1890–1989. *Soc Sci Med*. 1992;*35*:925–34.
5. Mendelsohn KD, Nieman LZ, Isaacs K, Lee S, Levison SP. Sex and gender bias in anatomy and physical diagnosis text illustrations. *JAMA*. 1994;*272*:1267–70.
6. Morgan S, Plaisant O, Lignier B, Moxham BJ. Sexism and anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes. *J Anat*. 2014;*224*:352–65.
7. Murciano-Goroff YR. Differences in the percentage of illustrations showing males versus females in general medicine and general surgery textbooks. *Med Sci Educ*. 2015;*25*:123–6.
8. Petersen A. Sexing the body: representations of sex differences in Gray's anatomy, 1858 to the present. *Body Soc*. 1998;*4*:1–15.
9. Hayes JA, Temple-Smith MJ. New context, new content—rethinking genital anatomy in textbooks. *Anat Sci Educ*. 2022;*15*:943–56.
10. Andrikopoulou M, Michala L, Creighton SM, Liao LM. The normal vulva in medical textbooks. *J Obst Gynaecol*. 2013;*33*:648–50.
11. Beni R, Fisher L, Longhurst GJ. The importance of diverse and accurate descriptions of genital anatomy in textbooks. *Anat Sci Educ*. 2022;*15*:985–8.
12. Iglesia CB. Cosmetic gynecology and the elusive quest for the "perfect" vagina. *Obstet Gynecol*. 2012;*119*:1083–4.
13. Alinsod R. Overview of vaginal rejuvenation, new frontiers in pelvic surgery. *Presented at the annual meeting of the National Society of cosmetic physicians and the American Academy of cosmetic gynecologist*. Las Vegas, NV; 2006.
14. Iglesia CB, Yurteri-Kaplan L, Alinsod R. Female genital cosmetic surgery: a review of techniques and outcomes. *Int Urogynecol J*. 2013;*24*:1997–2009.
15. Howarth H, Sommer V, Jordan FM. Visual depictions of female genitalia differ depending on source. *Med Humanit*. 2010;*36*:75–9.
16. Mowat H, McDonald K, Dobson AS, Fisher J, Kirkman M. The contribution of online content to the promotion and normalisation of female genital cosmetic surgery: a systematic review of the literature. *BMC Womens Health*. 2015;*15*:110.
17. Australian Government. *Requested Medicare items processed from January 2011 to December 2021*. Canberra, ACT: Australian Government; Services Australia; 2022. Available from: http://medicarestatistics.humanservices.gov.au/statistics/do.jsp?_PROGRAM=%2Fstatistics%2Fmbs_item_standard_report&DRILL=ag&group=35533&VAR=services&STAT=count&RPT_FMT=by+state&PTYPE=calyear&START_DT=201101&END_DT=202112. Accessed 9 Jun 2022.
18. Bonell S, Barlow FK, Griffiths S. The cosmetic surgery paradox: toward a contemporary understanding of cosmetic surgery popularisation and attitudes. *Body Image*. 2021;*38*:230–40.
19. Herbenick D, Schick V, Reece M, Sanders S, Fortenberry JD. Pubic hair removal among women in the United States: prevalence, methods, and characteristics. *J Sex Med*. 2010;*7*:3322–30.
20. Sharp G, Tiggemann M, Mattiske J. The role of media and peer influences in Australian women's attitudes towards cosmetic surgery. *Body Image*. 2014;*11*:482–7.
21. McDougall LJ. Towards a clean slit: how medicine and notions of normality are shaping female genital aesthetics. *Cult Health Sex*. 2013;*15*:774–87.
22. Sharp G, Tiggemann M, Mattiske J. Factors that influence the decision to undergo labiaplasty: media, relationships, and psychological well-being. *Aesthet Surg J*. 2016;*36*:469–78.
23. Hayes JA, Temple-Smith MJ. What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy. *Aust N Z J Obstet and Gynaecol*. 2021;*61*:331–8.
24. Howarth C, Hayes J, Simonis M, Temple-Smith M. "Everything's neatly tucked away": young women's views on desirable vulval anatomy. *Cult Heal Sex*. 2016;*18*:1363–78.
25. Moran C, Lee C. What's normal? Influencing women's perceptions of normal genitalia: an experiment involving exposure to modified and nonmodified images. *BJOG*. 2014;*121*:761–6.
26. DuBois LZ, Shattuck-Heidorn H. Challenging the binary: gender/sex and the bio-logics of normalcy. *Am J Hum Biol*. 2021;*33*:e23623.
27. James S, Sylvester HC. Transgender health and its current omission from medical school curriculum: medical students' perspective. *Adv Med Educ Pract*. 2018;*9*:607–9.
28. Morrison SD, Wilson SC, Smith JR. Are we adequately preparing our trainees to care for transgender patients? *J Grad Med Educ*. 2017;*9*:258.
29. Roberts C, Shiman LJ, Dowling EA, Tantay L, Masdea J, Pierre J, et al. LGBTQ+ students of colour and their experiences and needs in sexual health education:'you belong here just as everybody else'. *Sex Educ*. 2020;*20*:267–82.
30. Štrkalj G, Pather N. Beyond the sex binary: toward the inclusive anatomical sciences education. *Anat Sci Educ*. 2021;*14*:513–8.
31. Kirchengast S. Human sexual dimorphism–a sex and gender perspective. *Anthropol Anz*. 2014;*71*:123–33.
32. Smith TC. Re-examining our roots: queer history and anatomy. *Anat Rec (Hoboken)*. 2022;*305*:968–82.
33. Finn G, Ballard W, Politis M, Brown M. It's not alphabet soup: supporting the inclusion of inclusive queer curricula in medical education. *Br Student Doc J*. 2021;*5*:27–37.
34. Parker R, Larkin T, Cockburn J. A visual analysis of gender bias in contemporary anatomy textbooks. *Soc Sci Med*. 2017;*180*:106–13.
35. Keener E. The complexity of gender: it is all that and more…. In sum, it is complicated. *Sex Roles*. 2015;*73*:481–9.
36. Killermann S. *What does the asterisk in "trans*" stand for? It's pronounced metrosexual*. Austin, TX; 2020. Available from: https://www.itspronouncedmetrosexual.com/2012/05/what-does-the-asterisk-in-trans-stand-for/. Accessed 10 Oct 2022.
37. Goodman M, Adams N, Corneil T, Kreukels B, Motmans J, Coleman E. Size and distribution of transgender and gender nonconforming populations: a narrative review. *Endocrin Metab Clin*. 2019;*48*:303–21.
38. Maudsley G. Mixing it but not mixed-up: mixed methods research in medical education (a critical narrative review). *Med Teach*. 2011;*33*:e92–104.
39. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med*. 2014;*89*:1245–51.
40. Sandelowski M. Whatever happened to qualitative description? *Res Nurs Health*. 2000;*23*:334–40.
41. Bradshaw C, Atkinson S, Doody O. Employing a qualitative description approach in health care research. *Glob Qual Nurs Res*. 2017;*4*:1–8.
42. Chafe R. The value of qualitative description in health services and policy research. *Healthc Policy*. 2017;*12*:12–8.
43. Hammarberg K, Kirkman M, de Lacey S. Qualitative research methods: when to use them and how to judge them. *Hum Reprod*. 2016;*31*:498–501.
44. DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: a balance of relationship and rigour. *Fam Med Community Health*. 2019;*7*:e000057.
45. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;*3*:77–101.
46. McMenamin PG, Eizenberg N, Buzzard A, Fogg Q, Lazarus M. A broad perspective on anatomy education: celebrating teaching diversity and innovations. *Med J Aust*. 2016;*204*:90–96.

47. Barry DS, Marzouk F, Chulak-Oglu K, Bennett D, Tierney P, O'Keeffe GW. Anatomy education for the YouTube generation. *Anat Sci Educ*. 2016;*9*:90–6.
48. Evans DJ, Huat BB, Wilson TD, Smith CF, Nirusha L, Wojciech P. Going virtual to support anatomy education: a STOP GAP in the midst of the Covid-19 pandemic. *Anat Sci Educ*. 2020;*13*:279–83.
49. Longhurst GJ, Stone DM, Dulohery K, Scully D, Campbell T, Smith CF. Strength, weakness, opportunity, threat (SWOT) analysis of the adaptations to anatomical education in the United Kingdom and Republic of Ireland in response to the Covid-19 pandemic. *Anat Sci Educ*. 2020;*13*:301–11.
50. Smith CF, Pawlina W. A journey like no other: anatomy 2020! *Anat Sci Educ*. 2020;*14*:5–7.
51. Cullinane DP, Barry DS. Breaking the norm: anatomical variation and its key role in medical education. *Anat Sci Educ*. 2022;*15*:803–805.
52. Moszkowicz D, Duboc H, Dubertret C, Roux D, Bretagnol F. Daily medical education for confined students during coronavirus disease 2019 pandemic: a simple videoconference solution. *Clin Anat*. 2020;*33*:927–8.
53. Pather N, Blyth P, Chapman JA, Dayal MR, Flack NA, Fogg QA, et al. Forced disruption of anatomy education in Australia and New Zealand: an acute response to the Covid-19 pandemic. *Anat Sci ed*. 2020;*13*:284–300.
54. Srinivasan DK. Medical Students' perceptions and an anatomy Teacher's personal experience using an e-learning platform for tutorials during the Covid-19 crisis. *Anat Sci Educ*. 2020;*13*:318–9.
55. Xiao J, Evans DJ. Anatomy education beyond the Covid-19 pandemic: a changing pedagogy. *Anat Sci Educ*. 2022;*15*:1138–44.
56. Grković I, Marinović Guić M, Košta V, Poljičanin A, Čarić A, Vilović K. Designing anatomy program in modern medical curriculum: matter of balance. *Croat Med J*. 2009;*50*:49–54.
57. Koppes DM, Triepels CP, Schepens-Franke AN, Kruitwagen RF, Van Gorp T, Scheele F, et al. What do we need to know about anatomy in gynaecology: a Delphi consensus study. *Eur J Obstet Gynecol Reprod Biol*. 2020;*245*:56–63.
58. Moxham BJ, Pais D. A critique of utilitarian and instrumentalist concepts for the, a critique of utilitarian and instrumentalist concepts for the teaching of gross anatomy to medical and dental students: provoking debate teaching of gross anatomy to medical and dental students: provoking debate. *Clin Anat*. 2017;*30*:912–21.
59. Hopkins H, Weaks C, Napier E. Implementation and utilization of gynecological teaching associate and male urogenital teaching associate programs: a scoping review. *Adv Simul*. 2021;*6*:19.
60. Dugoff L, Pradhan A, Casey P, Dalrymple JL, Abbott JF, Buery-Joyner SD, et al. Pelvic and breast examination skills curricula in United States medical schools: a survey of obstetrics and gynecology clerkship directors. *BMC Med Educ*. 2016;*16*:1–7.
61. Underman K. *Feeling medicine: how the pelvic exam shapes medical training*. Manhattan, NY: NYU Press; 2020, Aug 18.
62. Bolatli G, Kizil H. The effect of mobile learning on student success and anxiety in teaching genital system anatomy. *Anat Sci Educ*. 2022;*15*:155–65.
63. Mikulak M. For whom is ignorance bliss? Ignorance, its functions and transformative potential in trans health. *J Gend Stud*. 2021;*30*:819–29.
64. Cooper KM, Auerbach AJJ, Bader JD, Beadles-Bohling AS, Brashears JA, Cline E, et al. Fourteen recommendations to create a more inclusive environment for LGBTQ+ individuals in academic biology. *CBE Life Sci Educ*. 2020;*19*:es6.
65. Lazarus M, Sanchez AA. *Redefining anatomical language in healthcare to create safer spaces for all genders*. Lens, 17 May 2021. Melbourne, VIC: Monash University; 2021. Available from: https://lens.monash.edu/@medicine-health/2021/05/17/1383207/redefining-anatomical-language-in-healthcare-to-create-safer-spaces-for-all-genders. Accessed 22 Oct 2022.
66. Easterling L, Byram J. Shifting language for shifting anatomy: using inclusive anatomical language to support transgender and nonbinary identities. *Anat Rec*. 2022;*305*:983–91.
67. Finn G, Danquah A, Matthan J. Colonization, cadavers, and color: considering decolonization of anatomy curricula. *Anat Rec*. 2022;*305*:938–51.

AUTHOR BIOGRAPHIES

Jennifer A. Hayes, M.B.B.S., G.C.H.P.E., is an associate professor of topographic anatomy in the Department of Anatomy and Physiology, School of Biomedical Sciences, and a graduate (PhD) student in the Department of General Practice, Melbourne Medical School, at the University of Melbourne, in Melbourne, Vic., Australia. She has retired from teaching and her research interest is in genital and gender diversity.

Meredith J. Temple-Smith, B.Sc., M.P.H., D.H.Sc., is a professor of primary care research, Deputy Head, and Director of Research Training in the Department of General Practice, Melbourne Medical School, University of Melbourne, in Melbourne, Vic., Australia. Her role focuses on increasing research and research capacity in the area of primary care.

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Chapter 9: Anatomical Variation in Anatomy Curricula: The Australian Experience

I asked my 31 interview participants about the broader context of teaching anatomical variation. The paper presented below reports the outcomes of that broader discussion. The participants used many different terms to define the same anatomical concepts and took different approaches to introducing them. Most participants waited for the discovery of examples to prompt discussion in a human tissue laboratory setting, and many participants only covered variations with later years students, especially medical students, citing content load and student negativity as reasons not to cover variation with less experienced or non-professional student groups.

The paper reproduced below was submitted to *Anatomical Sciences Education* on 30 April 2023. Note that the references cited in the paper are not reproduced in the references section of the thesis, although naturally they overlap substantially.

Anatomical variation in anatomy curricula: the Australian experience

Jennifer A. Hayes[1, 2], Meredith J. Temple-Smith[1]

[1]Department of General Practice, Melbourne Medical School, University of Melbourne, Parkville, Victoria, Australia

[2]Department of Anatomy and Physiology, School of Biomedical Sciences, University of Melbourne, Parkville, Victoria, Australia

Running Title: Anatomical variation in anatomy curricula

Correspondence to: Assoc. Prof. Jennifer A. Hayes, Department of General Practice, The University of Melbourne, Grattan Street, Parkville VIC 3010, Australia. E-mail: j.hayes@unimelb.edu.au

ABSTRACT

Normal, in anatomy, encompasses a range of morphologies including the most common, as well as others which are termed variations and appear less frequently though are not considered abnormal. Recent trends in anatomy education have limited exposure to dissection and prosected specimens and thereby diminished students' opportunistic encounter with variation. A series of thirty-one semi structured interviews was undertaken with Australian anatomy teachers to identify barriers and facilitators for teaching anatomical variation to contemporary student cohorts. All participants agreed that anatomical variation was an important and time-honored component of anatomy education. There were, however, many different terms used by participants to define the same anatomical concept and different approaches to introducing it. Very few participants provided a working definition to students

or covered the concept in lectures, with most waiting for the discovery of examples in a human tissue laboratory setting to prompt discussion. Many participants only covered variations with later year students, especially medical students, citing content load and student negativity as reasons for omitting variation with less experienced or non-professional student groups. A simple one version account of the human body may be easier to teach, understand and remember but simplicity is not an alternative to accuracy. Variant anatomy belongs in every anatomists' portfolio. The task of all anatomists is to unify nomenclature, to gain knowledge of the most frequent and clinically and socially relevant variations, and to incorporate this knowledge into their teaching.

Keywords: anatomical variation, anatomy education, medical education

INTRODUCTION

The history of the concepts of *normality* and *anatomical variation* is inextricably linked with the history of human anatomy itself (Sanudo et al., 2003). Many centuries and dissections by famous anatomists such as Vesalius, Da Vinci and Gray were necessary before *normal* in anatomical terms was defined as a range by "aggregating observed variations" (Cryle and Stephens, 2017, p.92).

It is still difficult to find clear definitions of *normality* and *anatomical variation* in anatomy textbooks (Hayes and Temple-Smith, 2022) and the peer-reviewed literature (Kachlik et al., 2020). The clearest working definitions were provided by Willan and Humpherson who defined *normality* as embracing "a range of common morphologies" including "those that are most common", whilst *anatomical variations* "are less frequent but not considered abnormal" or pathological. (Willan and Humpherson, 1999, p.186). A singular anatomical *normal* has been described as only "a model, a useful fiction" (Zytkowski et al., 2021, p.9) and the impact of skewing social perception to one specific notion of *normal* , in the case of vulval morphology, has been linked to the contemporaneous rise of the Female Genital Cosmetic Surgery Industry (Moran and Lee, 2014; Howarth et al., 2016; Sharp et al., 2016; Moran and Lee, 2018; Hayes and Temple-Smith 2021).

Students traditionally encountered anatomical variations in the laboratory setting but changing trends in anatomy education (Willan and Humpherson, 1999; Standring, 2009; Lazarus et al., 2012; Singh et al., 2015) compounded by Covid-19-enforced reliance on technology-led blended learning strategies (Evans et al., 2020; Longhurst et al., 2020; Smith and Pawlina, 2021) have caused concern about the lack of anatomical variation encountered in contemporary course designs (Cullinane and Barry, 2022).

In the past, anatomists and surgeons have been accused of a lack of interest in anatomical variation from an educational perspective (Moore 1989; Willan and Humpherson 1999; Bergman 2011, Smith, 2021) and a survey of surgical and radiological curricula in Canada and Australia indicated that anatomical variation was only covered at training scheme level and was largely absent at undergraduate level (Raikos and Smith, 2015). A recent systematic review exposed the paucity of representation of anatomical variation in the medical education literature; "It is concerning that anatomical variation has little or no role in medical education today" (Nzenwa et al., 2023, p. 2).

The initial aim of this study was to determine the extent to which vulval anatomy is covered in contemporary anatomy courses (Hayes and Temple-Smith, 2023), but interview participants were also asked about the broader context of teaching anatomical variation. This paper reports on the outcomes of that broader discussion. The research questions were: How and where is anatomical variation covered in contemporary anatomy courses? and What are the barriers and facilitators for teaching anatomical variation? The insights from the interviews reflect educational practice in Australia today and contribute to understanding the place of anatomical variation in contemporary anatomy curricula.

METHOD

This study has been reported in accordance with the Standards for Reporting Qualitative Research (SRQR) guidelines (O'Brien et al., 2014). Study protocols were approved by the Human Research Ethics Committee of The University of Melbourne, ID:14564, on 29 September 2020.

Semi-structured interviews were chosen as the most effective method to collect qualitative, open-ended data from Australian anatomists about whether anatomical variation was included in their anatomy curricula. Qualitative methods are useful when the focus is not on increasing

theoretic and conceptual understanding, but rather contributing to change and quality improvement in practice setting (Chafe, 2017). Qualitative methodology is especially useful for describing "uncertain" and "immature" concepts; sensitive and socially dependent concepts; and complex human intentions and motivations" (Maudsley, 2011, p.e95). During the semi-structured interview process, a conversational dialogue with the participant was established (Morse and Field, 1995) which allowed the interviewer to explore in detail the experiences and motives of the interviewee (Rubin and Rubin, 2012). Because the qualitative research method is subjective, it also allowed for a smaller number of respondents, a significant advantage during Covid-19 restrictions on travel and campus attendance.
All interviews were conducted by the first author (J.H.), an anatomist at the University of Melbourne, Australia.

Thirty-one Australian anatomists were recruited for interviewing via the Australian and New Zealand Association of Clinical Anatomists (ANZACA) newsletter and conference 2021 and from snowball sampling. Having current or previous experience teaching anatomy at an Australian tertiary institution was the only criterion for inclusion and there were no exclusion criteria.

Semi-structured interviews were conducted via Zoom, a videoconferencing platform (Zoom Video Communications, Inc., San Jose, CA). Prior to being interviewed, participants read a plain language statement containing information about what involvement in the study would entail and signed a consent form which included permission for audio-recording of the interview.

Interviews were transcribed verbatim, de-identified and then analyzed inductively, initially by breaking down the transcripts into units using a coding system. The coded units were then clustered based on their shared concepts to develop themes, where a theme refers to "an

abstract entity that brings meaning and identity to a current experience and its variant manifestations" (DeSantis and Ugarriza, 2000, p.362). Data collection continued until the point of data saturation was reached, where no new data was identified.

Participants' views were sought on the content of their lectures and laboratory classes, the need for updating that content, the place of anatomical variation in anatomy teaching, factors that might influence the teaching of anatomical variation in general, and vulval anatomy in particular, and how best to address diversity and inclusivity in anatomy teaching. Only views pertinent to the inclusion of anatomical variation in anatomy teaching are included in the results section below.

RESULTS

Interviews were conducted with thirty-one participants who taught topographic anatomy or coordinated subjects that included anatomy, from sixteen Australian tertiary institutions. Demographic data of the participants have been described elsewhere and are shown in Table 1 (Hayes and Temple-Smith, 2023). Thirteen of the participants identified as male and eighteen identified as female. Six of the participants were medically qualified (MD), four of whom also had specialist qualifications or PhD, and seven of the participants had allied health degrees in physiotherapy (PT), chiropractic therapy (DC), or osteopathy (DO). Eighteen had or were completing research higher degrees (PhD), only two of which were in topographic or clinical anatomy.

Table 1 The demographic characteristics of participants (Hayes and Temple-Smith, 2023)

Characteristic	Number (n=31)
Sex	
Female	18 (58.1)
Male	13 (41.9)
Role	
Topographic anatomy lecturer or demonstrator	27 (87.1)
Coordinator of subject including female genital anatomy	4 (12.9)
Background qualification	
Research higher degree (PhD)	18 (58.1)
Medical or allied health degree (MD, PT, DO, DC)	13 (41.9)

Results related to the teaching of vulval anatomy have been published separately (Hayes and Temple-Smith, 2023), and this paper is focused only on participants' views about the place of anatomical variation in contemporary anatomy teaching. Following analysis, data was categorized into four major themes:1) terminology, 2) method of introduction, 3) target audience, and 4) barriers to including anatomical variation in anatomy teaching (Table 2).

Table 2 The major themes and sub-themes.

Major theme	Sub-themes
Lack of standardized terminology to describe anatomical variation	• Variety of terminology used
Introducing normal variation	• Formal presentation in lectures • Serendipitous encounter in laboratory
Not all student groups were introduced to anatomical variation	• Later year students only • Medical students only
Barriers to inclusion of anatomical variation in anatomy teaching	• Crowded curriculum • Participant lack of knowledge • Student negativity to learning anatomical variation

All participants agreed that anatomical variation was an important and time-honored component of anatomy teaching.

Theme 1: Lack of standardized terminology to describe anatomical variation

There were many different words used by participants to describe the concept of anatomical variation.

> "I wouldn't use normal anatomical, I would say it's a classic anatomical distribution or presentation, however we can also see this uncommon or non-classical anatomical presentation" (P1, female, MD)

> "Normal variation, pathological variation" (P7, male, PhD)

> "I say subtyping or subcategories of normal" (P11, male, PhD)

> "This is our typical representation of what happens but there's plenty of atypical representations" (P12, male, DO)

> "I used the word skewed" (P24, male, MD)

Theme 2: Introducing normal variation

Participants either introduced the concept of anatomical variation formally or they left it to serendipity.

Formal presentation in lectures

A few participants formally addressed anatomical variation in lectures.

> "It really starts from the very first lecture. I'm saying…. not everything is going to look like a textbook. Not everything's going to look the same. So, this is normal variation" (P9, female, PhD)

"Straight up I say that there is variation and that we are looking at a textbook figure here and a textbook figure is not what we look like" (P10, female, PhD)

"It's in the lectures that I'll talk about it. I don't leave it for chance that it might come up. So, it's actually a part of my lecture slides" (P27, female, PhD)

"In the opening lecture I give them a spiel" (P31, female, PhD)

Serendipitous encounter in laboratory

Anatomical variation was mostly broached when discovered in a human tissue laboratory setting.

"It's more a cropping up sort of thing" (P17, male, PhD)

"More serendipitous" (P18, male, PhD)

"I would wait until they came across it in the lab" (P20, female, PhD)

"It's more when we come across it really" (P21, female, PhD)

"We wait for it to occur in the lab and then we talk about it more in detail" (P26, female, PhD)

Theme 3: Not all student groups were introduced to anatomical variation

Participants taught at all levels of undergraduate and postgraduate anatomy education in pre-medical, medical, allied health and non-health professional cohorts. Many participants selectively covered anatomical variation with later year or medical student cohorts only.

Later year students only

"Given that I teach mainly first and second years, and my main priority is getting them to understand anatomy, I would say that [variation] it's not important" (P8, female, DO)

"In the earlier stages of undergrad, I don't think variation is overly important" (P18, male, PhD)

Medical students only

"…. the physiotherapist, sports science, OTs, and speech pathology, I would never really talk to them about anatomical variation" (P27, female, PhD)

"Usually, clinical cohorts that see and need an understanding of variation will be quite receptive to that" (P14, male, PhD)

Theme 4: Barriers to inclusion of anatomical variation in anatomy teaching

Content load, lack of knowledge on the participant's part, and student negativity towards learning about variation were cited as reasons not to cover the concept of variation with early undergraduate or non-medical student groups.

Crowded curriculum

"We are only able to teach textbook anatomy because we just don't have time for anything else" (P2, female, DO)

"It's just a struggle to get students to understand normal anatomy. So, if you chucked on a 'in 30% of patients this can happen', then you can lose a lot of students" (P5, female, PhD)

Participant's lack of knowledge

One participant expressed doubts about their own knowledge of anatomical variation and offered this as a barrier to teaching the concept.

> "I rarely mention anatomical variation…. I think a part of it is that there would be so much of it that I don't know…. I don't engage with that literature as part of my standard teaching practice" (P8, female, DO)

Student negativity to learning anatomical variation

Many participants expressed the view that students found anatomy challenging enough to learn, even without anatomical variations, and were reluctant to impose the additional content load on the students.

> "Students, they find anatomy quite challenging, and it seems that we don't want to overload them with standard anatomy and then learning the variations" (P14, male, PhD)

> "I'm a big fan of anatomical variation. I would teach it a lot more if I had time to" (P20, female, PhD)

> Students only want to know…." are we going to be examined on this?" (P21, female, PhD)

> "They'll be like oh, we don't want to look at that because that's not what will be flagged for the flag test" (P26, female, PhD)

DISCUSSION

As surgical techniques and radiological interventions evolve, knowledge of relevant anatomical variation is even more critical to the success of modern-day procedures. Failure to identify variant anatomy is a commonly cited technical error in procedural injuries at a significant cost to health systems (Oyebode, 2013; Kowalczyk and Majewski, 2021). Whilst the clinical significance of anatomical variability is well represented in the literature (Ogeng'o, 2013), attention has been drawn to a significant gap in the literature regarding anatomical variation in medical education (Alraddadi, 2021; Nzenwa et al., 2023).

Interviews in this study examined the presentation of anatomical variation in contemporary Australian anatomy teaching.

There was remarkable variation in the terminology used by participant educators to describe the concept of anatomical variation. One participant reported a reluctance to engage at all because of not knowing enough about anatomical variation.

Mixed educational backgrounds of participants may explain the differing terminology used for the concept of anatomical variation and lack of confidence on the one participant's part to teach variation at all. Traditionally, anatomy education focused on surgical training and knowledge-based competency and was most often delivered by medical/surgical qualified instructors (Burgess and Ramsay-Stewart, 2015). Modern teaching combines all the anatomical sciences (anatomy, embryology, histology, and neuroscience) within an integrated curriculum and teaching staff with a wide variety of qualifications and expertise (Craig et al., 2010; McMenamin et al., 2016). Participants in this project reflected the mix of medically qualified, allied health professional and science graduates from different anatomy learning environments which has previously been reported as impacting on the content delivered in lectures and laboratory classes (Hayes and Temple-Smith, 2023). Participants without a clinical background are more likely to rely on pre-existing curricular structure or inherited

lecture content or to consult textbooks for lecture content, a cyclical reiteration of historic structure and content (Hayes and Temple-Smith, 2023).

As previously noted, it's hard to find clear definitions of *normality* and *anatomical variation* in anatomy textbooks (Hayes and Temple-Smith, 2022) and the peer-reviewed literature (Kachlik et al., 2020). Confoundingly, the terms *anomaly*, *abnormal*, *aberrant* and *malformation* have been used interchangeably with variation and pathology in the past (Tubbs et al., 2018; Hayes and Temple-Smith, 2022), and this may be another reason for mixed terminology. Bergman's iconic *Comprehensive Encyclopedia of Human Anatomic Variation* asked, 'Where does one draw the line between a variation that is accepted as "normal" (the so-called normal variant) and a variation that is considered "abnormal" (Tubbs et al., 2018, p.xvii)?

Most participants struggled to find an appropriate time to introduce the concept of anatomical variation into a crowded curriculum, and only a few of the participants formally addressed anatomical variation in lectures. It has been previously suggested that this is not an ideal method for introducing the concept of variation. A survey of 302 UK medical students rated lectures as ineffective for teaching anatomical variation (Kerby et al., 2011), but that was recently challenged by Nzenwa et al., "it is more likely that lectures are rated poorly because anatomical variations are simply not reflected or discussed in them" (Nzenwa et al., 2023, p. 12).

The most common method of introduction was to wait for laboratory encounters, an experience which is not so successfully replicated in today's technology-led blended learning strategies (Cullinane and Barry, 2022). Prosected specimens may no longer be available to demonstrate variants to students and the demise of dissection has prevented an active discovery process. Contemporary medical students spend less hours on the wards than their

predecessors, which diminishes their opportunistic anatomy experience, meaning that contemporary students are heavily reliant on the concepts and clinical relevance of normal range and variations being formally introduced to them (Standring, 2009).

There have been numerous ways suggested for anatomists to reform their approach to variant anatomy: via analyses of radiological images during laboratory sessions (Favelier et al., 2015; Davy et al., 2017), using a cadaver re-assignment system that allows students to work on multiple specimens (Sprunger, 2008), using cadaveric computed tomography (CT) scanning to identify variations pre-dissection (Ellozy et al., 2009), creating three-dimensional digital models of anatomical variations identified during dissection (Moore et al., 2017), digitization of inhouse medical museum specimens of variations (Marreez et al., 2010)

Many participants selectively covered anatomical variation with later year or medical student cohorts only. Surveys of anatomy faculty in the US showed that most agreed that pre-clinical medical education was the best time to introduce variation (Buongiorno et al., 2020) and that "strategies which explicitly and deliberately call attention to normal variation and its clinical relevance may help students develop an appreciation for variability" (Royer, 2018, p.89.1).

Expert educational committees in the USA and Netherlands included anatomical variation in their core curricula (Leonard, 1996; General Plan Anatomy 1999) but the United States Medical Licensing Examination (USMLE) content outline and the Anatomical Society core syllabus for anatomy (Smith et al., 2016) did not. In Australia there is a mix of graduate and undergraduate medical programs offered, and some of the graduate programs additionally set anatomy as a prerequisite subject. There is no standardized anatomy curriculum across all medical schools and both the Australian and New Zealand Association of Clinical Anatomists (ANZACA) and the Australian Medical Students' Association (AMSA) had actively called

for the development of national standards in anatomical education (Chapuis et al., 2010; Farey et al., 2014; AMSA, 2018).

An awareness of anatomical variation is as important in a socio-political context as in a clinical context. Hayes and Temple-Smith recently used the contemporary issues of female genital cosmetic surgery and gender diversity to highlight the impact of singular structural arrangements and inherent binarism on all contemporary student cohorts, not just medical students (Hayes and Temple-Smith, 2022).

Participants were especially challenged by the difficulty of balancing the introduction of an appreciation of variability without referring to numerous specific variations which provoked a negative student response. Concern about introducing too many examples has previously been addressed by Royer who reported that "students exposed to common and clinically relevant variations (e.g., brachial plexus composition and relationships) through a focused module reported a significant increase in their appreciation of the clinical significance of variation, and a significant decrease in their belief that learning about variation is boring" (Royer, 2018, p.89.1). Kiss suggested a standardised shortlist of nine anatomical variations to be taught in regular anatomy classes: variations in the circle of Willis, missing dorsalis pedis artery, internal carotid artery pseudoaneurysm in the sphenoidal sinus, cervical ribs, linguofacial trunk, retro-oesophageal right subclavian artery and variations in coronary artery branches, liver anatomy and caecum and appendix (Kiss, 2018).

Variant anatomy belongs in all anatomists' portfolio of knowledge and skills, regardless of educational background. The concept belongs in all anatomy curricula, not just medical curricula, if the discipline of anatomy is to contribute to contemporary discourses about *normal morphological diversity* versus *singular standardised ideal* (Hayes and Temple-Smith, 2023).

The task at hand is to unify nomenclature, gain knowledge of the most frequent and clinically and socially relevant variations, and incorporate that knowledge into all aspects of teaching, not only to the next generation of clinicians.

Strengths and limitation

This study was the first qualitative analysis of barriers to teaching anatomical variation in Australian Universities. The large range of background qualifications of participants and the number of Australian tertiary institutions represented allowed for a better understanding of the impact of educational background and institutional environment on participant views. Another strength of the research was the shared background and experience of the interviewer which facilitated open and honest discussion, nonetheless researcher bias should not be overlooked as a potential limitation.

CONCLUSION

The human body exists on a spectrum and should never be represented by singular structural arrangements. A simple one version account of the human body may be easier to teach, understand and remember but simplicity is not an alternative to accuracy. This study showed that the confidence of anatomy teachers to teach anatomical variation has been undermined by confused terminology and their own lack of knowledge, decreased opportunity for serendipitous encounter with variant structural arrangements, and student resistance to increased content load.

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NOTES ON CONTRIBUTORS

JENNIFER A. HAYES, M.B.B.S., G.C.H.P.E., is an associate professor of topographic anatomy in the Department of Anatomy and Physiology, School of Biomedical Sciences, and a graduate (PhD) student in the Department of General Practice, Melbourne Medical School, at the University of Melbourne, in Melbourne, Vic., Australia. She has retired from teaching and her research interest is in genital and gender diversity.

MEREDITH J. TEMPLE-SMITH, B.Sc., M.P.H., D.H.Sc., is a professor of primary care research, Deputy Head, and Director of Research Training in the Department of General Practice, Melbourne Medical School, University of Melbourne, in Melbourne, Vic., Australia. Her role focuses on increasing research and research capacity in primary care.

LITERATURE CITED.

Alraddadi A. 2021. Literature review of anatomical variations: clinical significance, identification approach, and teaching strategies. Cureus 13:e14451

Australian Medical Students Association. 2022. Policy Document, Anatomy Curriculum and Body Donation https://www.amsa.org.au/common/Uploaded%20files/AMSA/Policy/B/Anatomy%20(2022).pdf

Bergman RA. 2011. Thoughts on human variations. Clin Anat 24:938-40.

Burgess AW, Ramsey-Stewart G. 2015. The importance of surgeons teaching anatomy, especially by whole-body dissection. Med J Aust 202:18-9.

Buongiorno C, Wilson C, Goldberg C, Royer D. 2020. Educational dilemma? Investigating how we teach anatomic variation in medical school curricula. FASEB J 34:S1.04588

Chafe R. 2017. The value of qualitative description in health services and policy research. Health Policy 12:12-18.

Chapuis P, Fahrer, M, Eizenberg N, Fahrer C, Bokey L. 2010. Should there be a national core curriculum for anatomy? ANZ J Surg 80:475-477.

Craig S, Tait N, Boers D, McAndrew D. 2010 Review of anatomy education in Australian and New Zealand medical schools. ANZ J Surg 80:212-6.

Cryle P, Stephens E. 2017. Normality: A Critical Genealogy. Chicago, IL: University of Chicago Press. 440 p.

Cullinane DP, Barry DS. 2022. Breaking the norm: Anatomical variation and its key role in medical education. Anat Sci Educ 00:1-3

Davy S, O'Keeffe GW, Mahony N, Phelan N, Barry DS. 2017. A practical description and student perspective of the integration of radiology into lower limb musculature anatomy. Ir J Med Sci 186:409-417

DeSantis L, Ugarriza DN. 2000 The concept of theme as used in qualitative nursing research. West Jour Nurs Res 22:351-372.

Ellozy SH, Lerner SM, Reidenberg JS, Weintraub JL, Lefkovitz Z, Marin ML, Laitman JT. 2009. Cadaver computed tomography: Virtual dissection as a tool for teaching anatomy. FASEB J 23:S1.480.4

Evans DJ, Huat BB, Wilson TD, Smith CF, Nirusha L, Wojciech P. 2020. Going virtual to support anatomy education: A STOP GAP in the midst of the Covid-19 pandemic. Anat Sci Educ 13:279-283

Farey JE, Sandeford, JC, Evans-McKendry GD. 2014. Medical students call for national standards in anatomical education. *ANZ Journal of Surgery*, *84*(11), 813- 815.

Favelier S, Germain T, Genson PY, Cercueil JP, Denys A, Krause D, Guiu B. 2015. Anatomy of liver arteries for interventional radiology. Diagn Interv Imaging 96:537-546

General Plan Anatomy. 1999. Objectives of the teaching of anatomy/embryology in medical curricula in The Netherlands. Appendix 2. Eur J Morphol 37:288-325

Hayes JA, Temple-Smith MJ. 2021. What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy. Aust N Z J Obstet and Gynaecol 61:331–338

Hayes JA, Temple-Smith MJ. 2022. New context, new content-Rethinking genital anatomy in textbooks. Anat Sci Ed 15:943-56.

Hayes JA, Temple-Smith MJ. 2023. Teaching vulval anatomy in the twenty-first century: the Australian experience. Anat Sci Ed xxx

Howarth C, Hayes J, Simonis M, Temple-Smith M. 2016. 'Everything's neatly tucked away': young women's views on desirable vulval anatomy. Cult Health Sex. 18:1363-1378.

Ogeng'o J. 2013. Clinical significance of anatomical variations. Anat J Afr 2:57-60.

Kachlík D, Varga I, Báča V, Musil V. 2020. Variant Anatomy and Its Terminology. Medicina 56:713. https://doi.org/10.3390/medicina56120713

Kerby J, ShukurZN, Shalhoub J. 2011. The relationships between learning outcomes and methods of teaching anatomy as perceived by medical students. Clin Anat 24:489-497

Kiss P. 2018. Where variations are most important: how to teach human anatomy to medical students. Int J Anat Var 11:73-4

Kowalczwk KA, Majewski A. 2021. Analysis of surgical errors associated with anatomical variations clinically relevant in general surgery. Review of the literature. Translat Res Anat 23:100107

Lazarus MD, Chinchilli VM, Leong SL, Kauffman GL Jr. 2012. Perceptions of anatomy: critical components in the clinical setting. Anat Sci Ed 5:187-199

Leonard RJ. 1996. A clinical anatomy curriculum for the medical student of the 21st Century: Gross anatomy. Clin Anat 9:71-99

Longhurst GJ, Stone DM, Dulohery K, Scully D, Campbell T, Smith CF. 2020. Strength, weakness, opportunity, threat (SWOT) analysis of the adaptations to anatomical education in the United Kingdom and Republic of Ireland in response to the Covid-19 pandemic. Anat Sci Educ 13:301-11

Marreez YM, Willems LN, Wells MR. 2010. The role of medical museums in contemporary medical education. Anat Sci Ed 3:249-253

Maudsley G. 2011. Mixing it but not mixed-up: mixed methods research in medical education (a critical narrative review). Med Teach 33:e92-104.

McMenamin PG, Eizenberg N, Buzzard A, Fogg Q, Lazarus M. 2016. A broad perspective on anatomy education: celebrating teaching diversity and innovations. Med J Aust 204:57.

Moore KL. 1989 Meaning of "normal". Clin Anat 2:235-239

Moore CW, Wilson TD, Rice CL. 2017. Digital preservation of anatomical variation: 3D-modelling of embalmed and plastinated cadaveric specimens using uCT and MRI. Ann Anat 209:69-75

Moran C, Lee C. 2014. What's normal? Influencing women's perceptions of normal genitalia: an experiment involving exposure to modified and nonmodified images. BJOG 121:761-766.

Moran C, Lee C. 2018. 'Everyone wants a vagina that looks less like a vagina': Australian women's views on dissatisfaction with genital appearance. J Health Psychol. 23:229-239.

Morse JM, Field PA. 1995. Nursing research: The application of qualitative approaches. Cheltenham: Nelson Thornes. 208 p.

Nzenwa IC, Iqbal HA, Bazira PJ. 2023. Exploring the inclusion of anatomical variation in medical education. Anat Sci Ed 00:1-16

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. 2014. Standards for reporting qualitative research: A synthesis of recommendations. Acad Med 89:1245–1251.

Oyebode F. 2013. Clinical errors and medical negligence. Med Princ Pract 22:323-33

Raikos A, Smith JD. 2015. Anatomical variations: How do surgical and radiology training programs teach and assess them in their training curricula? Clin Anat 28:717-24

Rubin HJ, Rubin IS. 2012. Qualitative Interviewing: The Art of Hearing Data. 3rd Ed. California:Sage Publications, Thousand Oaks. 265 p.

Royer DF. 2018. Variation: Anatomical constant, clinical imperative, educational dilemma. FASEB J 32:S1.89.1

Sañudo JR, Vázquez R, Puerta J. 2003. Meaning and clinical interest of the anatomical variations in the 21st century. Eur J Anat 7:1–3.

Sharp G, Tiggemann M, Mattiske J. 2016. Factors that influence the decision to

undergo labiaplasty: media, relationships, and psychological well-being. Aesthet Surg J 36:469-478.

Singh R, Tubbs RS, Gupta K, Singh M, Jones DG, Kumar R. 2015. Is the decline of human anatomy hazardous to medical education/profession? A review. Surg Radiol Anat 37:1257-1265

Smith HF. 2021. Anatomical variation and clinical diagnosis. Diagnostics (Basel) 11:247

Smith CF, Finn GM, Stewart J, Atkinson MA, Davies DC, Dyball R, et al. 2016. The anatomical society core regional anatomy syllabus for undergraduate medicine. J Anat 228:15-23

Smith CF, Pawlina W. 2020. A journey like no other: Anatomy 2020! Anat Sci Educ 14:5-7

Sprunger LK. 2008. Facilitating appreciation of anatomical variation and development of teamwork skills in the gross anatomy laboratory using a cadaver reassignment system. J Vet Med Educ 35:110-117

Standring S. 2009. New focus on anatomy for surgical trainees. ANZ J Surg 79:114–117.

Tubbs RS, Shoja MM, Loukas M (Editors). 2016. Bergman's comprehensive encyclopedia of human anatomic variation. Hoboken, New Jersey: Wiley-Blackwell. 1456 p.

United States Medical Licensing Examination®. 2022. Step 1 content outline and specifications. https://www.usmle.org/sites/default/files/2022-01/USMLE_Content_Outline_0.pdf

Willan PL, Humpherson JR. 1999. Concepts of variation and normality in morphology:

Important issues at risk of neglect in modern undergraduate medical courses. Clin Anat 12:186–190.

Żytkowski A, Tubbs RS, Iwanaga J, Clarke E, Polguj M, Wysiadecki G. 2021. Anatomical normality and variability: Historical perspective and methodological considerations. Trans Res Anat 23:100105.

Chapter 10: Discussion

The beauty of the vulva cannot be described in words but can easily be illustrated. Figure 1 is preoperatively; Figure 2 is immediately post-operatively after labial reduction and clitoral hood plasty. (Scholten, 2009, p. 291)

Scholten's Figure 1 (2009, p. 290)

Scholten's Figure 2 (2009, p. 291)

Doctors who empathise with their patients will surely understand their desire for correction. (Gress, 2017, p. vii)

10.1 Background

Independent of place and time, a woman's cultural and social value is influenced by her genitalia. The ideal vulva may differ culturally and historically, but what doesn't change is the fact that to be a woman is to have a particular culturally prescribed and

approved vulval appearance. That appearance is only approved when it passes visual inspection, by herself or others. This may be after she is born, because she has clearly defined female genital characteristics, or when she is old enough to compare herself to others or receive a partner's reassurance. Unfortunately, it may also be after she has recovered from "corrective" feminising genital surgeries, performed soon after birth to satisfy normative genital appearance expectations, or has survived culturally sanctioned mutilation procedures in her teens, or has healed from FGCS (Green, 2005).

The most authoritative of the commentaries on FGCS comes from cosmetic surgeons; they pathologise labial protrusion, creating the societal perception that any variation from a narrow, idealised vulval appearance is abnormal and requires surgical repair to achieve perfection and enhance function. Counternarratives that affirm normal diversity come from less-authoritative feminist art and literature, coffee table books, and activist websites such as *The Labia Library* (Women's Health Victoria, 2011), *The Vulval Gallery* (Women's Health Victoria, 2017), *This is a Vulva* (Carol, 2018), *Petals* (Karras, 2003), and Jamie McCartney's (2011) Great Wall of Vagina. There has been no contribution from the discipline of anatomy, which arguably has authority equal to or greater than that of the cosmetic surgeons, and no commercial interest.

In this research project, I aimed to test a broad personal theory that the discipline of anatomy and its practitioners were failing their contemporary student cohorts by not embracing new knowledge and sociocultural change to inform clinical practice. Embedded in this failure to evolve was an apologist mentality for the complexity of the human body, which has resulted in "simplification and universalization" (Moore & Clarke, 1995, p. 255) to one version, easier for anatomists to teach and easier for students to learn. The FGCS industry provided the perfect context to test this theory

because it is based on the premise of one idealised version of normality. There are obvious falsehoods to be challenged, and anatomists could and should make an important contribution to this process. Instead, the discipline of anatomy has been openly criticised as missing in action from its role in education and preparation of the next generation of GPs who will be advising patients contemplating labiaplasty (Simonis, 2019).

My aims in this PhD research were to establish whether an evidence base for normality in labia existed (because anatomy is an evidence-based discipline), and whether that evidence base was conveyed in anatomy textbooks and teaching. If the claim that "genital anatomy education is lacking from all medical and non-medical curricula*"* (Simonis, 2019, p. 130) is correct, then we are graduating doctors who are insufficiently informed about normal variation in vulval anatomy to assess and advise patients seeking FGCS.

10.2 Key Findings

In addition to the specific findings already described in the results chapters, several overarching observations arose from my work that are relevant to contemporary anatomy education.

10.2.1 The Normal Vulva Shows a Diverse Arrange of Morphology, Including Labial Protrusion, Pigmentation and Asymmetry

In terms of establishing what is *normal* for labial morphology, my literature search identified 12 studies, published between 2005 and 2021, which had measured genitalia in 2300 pre-pubertal and adolescent girls and pre- and post-menopausal women from nine countries and varied ethnicities. These studies confirmed and defined a range of normal variation. Labia minora varied in length and width, were

wider in pre-menopausal women, protruded often, and asymmetry between right and left labia was common (Hayes & Temple-Smith, 2021).

10.2.2 Diverse Vulval Morphology is not Included in Anatomy Textbooks

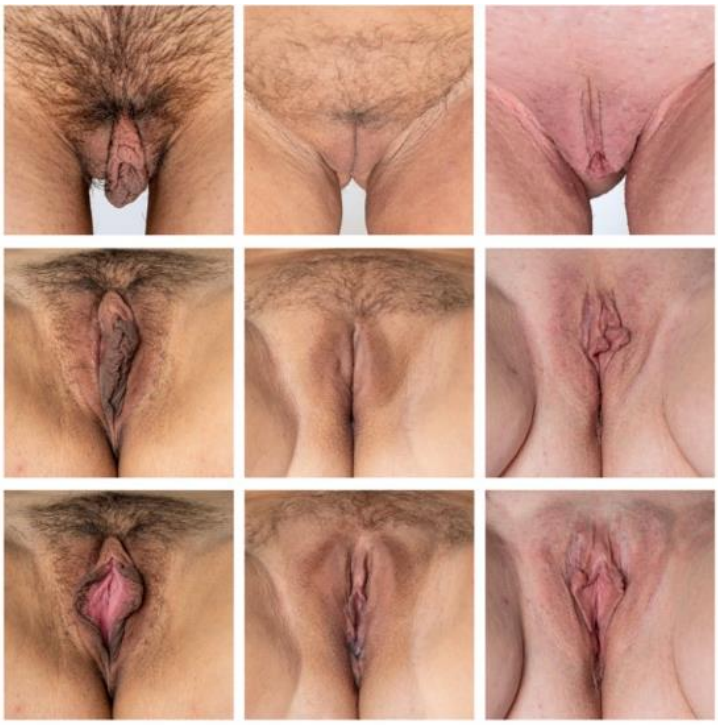
My work on anatomical textbooks showed that *Buchanan's Manual of Anatomy* (1906–1950) contained an historical precedent for content to reflect socio-political commentaries of the times, but analysis of contemporary texts highlighted that the standard textbook description of the vulva, accompanied by a standard image, was largely disconnected from what is important about the labia in terms of contemporary social issues. There was no description of normal structural diversity, and brief or no mention of functional importance and changes with the onset of sexual activity, after childbearing and with menopause (Hayes & Temple-Smith, 2022).

Early textbook illustrations were probably constrained by their educational function, so that labia minora protruded only to the extent that they could be labelled but not to the extent that they obscured other features. The move to include photographs and the recent publication of normative datasets means that there is now the potential for numerous vulval images to be included in textbooks to reflect the diversity of the general population (Figure 16, Figure 17).

Contemporary anatomy textbooks are not just for future surgeons. They should also support our non-surgical graduates, those for whom postgraduate training does not include anatomy, so that they are fully conversant with normal genital diversity when consulted by women who are concerned about their genital appearance. Textbooks need to acknowledge, in text and imagery, symmetrical and asymmetrical, non-protruding and visible, pigmented, and non-pigmented labia minora. These are normal

morphological variations that are currently better represented in artworks, books and websites (see section 10.1).

Figure 16. Normal variation of the vulva



Source: created by the author, with written consent from participants for use as a teaching resource and for inclusion in the thesis

Figure 17. Structures of the vulva

Attention has previously been drawn to the mismatch between academic texts and social reality. Two young Norwegian medical students created a TED talk in 2018 titled *The Virginity Fraud* (Brochmann & Dahl, 2018a) about the hymen, which received more than 2 million views. They later published *The Wonder Down Under: A User's Guide to the Vagina* (Brochmann & Dahl, 2018b) after researching the anatomy and physiology of vulval structures, saying that they had been misled "by following a medical curriculum that was incorrect even though it was written by doctors. That's the reason we wrote this book … medical textbooks are ... riddled with errors" (Rumbelow, 2018).

10.2.3 Anatomists use Textbooks to Source Content and Images for Their Teaching

When asked during the interviews about their use of anatomy textbooks, early career anatomy teachers, especially, consulted textbooks extensively for lecture content, and even experienced, clinically connected participants turned to textbooks as a source of images. This is especially problematic given recent publications have highlighted the lack of accurate and diverse representation of vulval anatomy within anatomical textbooks (Andrikopoulou et al., 2013; Beni et al., 2022; Hayes & Temple-Smith, 2022).

10.2.4 Anatomy Teaching may be Significantly Disconnected from Contemporary Clinical and Changing Socio-Political Contexts Because of Iterative Teaching Practices

The anatomists I interviewed came from a mix of medically qualified, allied health professional and research higher degree backgrounds. Those without a clinical background tended to deliver content that reiterated lecture material inherited from

previous incumbents or used the content that they themselves had been taught as undergraduates. These iterative teaching practices perpetuate a disconnect between anatomy content and contemporary context, as embodied by female genital anatomy and the FGCS industry.

Mixed educational backgrounds may also explain the differing terminology used for the concept of anatomical variation, and even the lack of confidence on one participant's part to teach variation at all (described in chapter 9; Hayes & Temple-Smith, under review). If the teaching of anatomical variation is reserved only for medical students, then lack of emphasis on anatomical variation is another outcome of teaching what you were taught if you come from a non-medical background.

Presenting only a singular anatomical *normal* has been described as "a model, a useful fiction" (Żytkowski et al., 2021, p. 9) and, in the case of vulval morphology, has been linked to the contemporaneous rise of the FGCS Industry (Hayes & Temple-Smith, 2021; Howarth et al., 2016; Moran & Lee, 2014, 2018; Sharp et al., 2016). In Australia in the last decade, 23.5% of labiaplasty procedures were performed on girls and women aged 25 years and under (Barnard et al., 2023), so the contemporary anatomy cohort can be expected to include students considering labiaplasty, making normal vulval morphological diversity an issue that all students (not just medical students) and clinical colleagues face.

10.2.5 Female Genital Anatomy, in General, is Poorly Covered in Anatomy Teaching but That Could Change if Certain Barriers Were Overcome

My interviews with Australian anatomists identified barriers and facilitators to the teaching of vulval anatomy to contemporary anatomy students whose lived experience includes the confusion of anatomical and societal normal for vulval anatomy.

In teaching vulval anatomy, most interview participants reported struggling to find adequate time in a crowded curriculum to cover both reproductive and genital anatomy. COVID-19-enforced alternate learning strategies reduced exposure to prosected specimens and dissection that might have exposed students to vulval variation (Moszkowicz et al., 2020; Pather et al., 2020; Srinivasan, 2020; Xiao & Evans, 2022). Personal sensitivities may also contribute to lack of coverage: many participants acknowledged that they were uncomfortable teaching genital anatomy to a young mixed-gender student cohort. One participant had actively sought counselling to overcome a personal block. Some participants were reluctant to teach genital anatomy because they feared a backlash from students if they failed to appropriately navigate the gendering of reproductive structures, whilst others were encouraged by positive student feedback. Those who had lived experience of genital diversity through community, family or personal experience were the most comfortable in teaching genital anatomy.

Overall, the interviews revealed that discipline of anatomy is awakening to broader sociocultural change in terms of diversity and inclusivity, and that anatomists are motivated to engage with these discourses if institutional and discipline support is available.

10.3 Implications of These Findings for Anatomy Education and Resources

This PhD began in response to my concern about the flourishing FGCS industry. Every year, thousands of women submit to costly and potentially risky surgery to achieve the flat Barbie doll vulva – with no protuberances beyond the labia majora – promulgated as normal in the media. Multiple factors play into the increasing demand for labiaplasty, including the lack of accurate information about normal female genital

appearance, the propagation of misinformation on social media and the internet (Howarth et al., 2016; Moran & Lee, 2014, 2018; Sharp et al., 2016; Truong et al., 2017), and the exposure of previously unfamiliar anatomy by the popular practice of pubic hair removal (Boddy, 2020; Braun & Tiefer, 2009; Schick et al., 2011; Sharp et al., 2016).

Cosmetic surgeons, some of whom carry a great deal of professional credibility and authority, promote labiaplasty by pathologising protruding labia minora as hypertrophic, although their use of the term hypertrophy is debated (Hailparn, 2014). Indeed, this version of labial hypertrophy, based on protrusion of labia minora beyond labia majora, is a normal variant according to the wide range of labial morphology and measurements described in the first of my PhD publications (Hayes & Temple-Smith, 2021). The studies I analysed showed significant variation in labial length and labial width, and that it was more common to have protruding labia minora than not.

All the studies, apart from two studies on pre-pubertal subjects, shared the common objective of establishing a normative numeric data resource for preoperative counselling when labiaplasty is desired for aesthetic reasons only. Most datasets were culturally (and sometimes reproductive stage) specific, but the 12 datasets represent different ethnicities and heterogenous groups of women around the world. Normative datasets have also been shown to be useful when planning reconstructive or transgender surgery (Akbiyik & Kutlu, 2010; Chalmers et al., 2014). Now, they can also provide a much-needed evidence base for inclusion of female genital anatomy in anatomy textbooks and teaching.

10.4 The Contemporary Relevance of Male Genital Diversity and Gender Diversity in Anatomy Education

Although male genital anatomy and gender diversity were not part of my research focus they became relevant to and incorporated in my inclusive teaching practice.

10.4.1 The Normal Penis Shows a Diverse Range of Morphology as Well

The social, cultural and psychological pressures related to the size of male genitalia are similar to those relating to female genital diversity (Sharp & Oates, 2019). Numerous references to penile enlargement exist historically in various cultures (Zaccaro et al., 2022). In today's culture, pornography plays an essential role in promoting the perception that "bigger is better" (Zaccaro et al., 2022), and internet advertisments target men who are concerned about their penile size (which is usually normal). Some of these men feel the need to increase the size of their penis in order to boost their self-esteem and sexual performance (Ghanem et al., 2012).

Published datasets for normal penile size range employ variable methods of penile measurement and come from diverse populations. In 2015, Veale et al. published a meta-analysis of 20 studies with over 15,500 subjects, but the variability between the studies was too large to create a standard (Veale et al., 2015). Unlike labial hypertrophy though, the term "micropenis" is clearly defined as a normally formed penis whose stretched length falls below 2.5 standard deviations of normal median for a patient's age, which is 7.5 cm for adult men (Ghanem et al., 2012). True micropenis is the only indication for surgery in the public sector, and involves a collaborative approach between urologists and plastic surgeons (Campbell & Gillis, 2017).

In 1971, Kelley and Eraklis (1971) performed the first recorded penile augmentation procedure for the treatment of micropenis in the paediatric population, after which the

adult population became interested in the same procedure for cosmetic and psychological reasons. Multiple techniques aim to either elongate the penis or enlarge its circumference (Bizic & Djordjevic, 2016; Ghanem et al., 2012). These procedures, performed largely in private settings (Ghanem et al., 2012), are the subject of ongoing medical and ethical debate due to low long-term success rates and high complication rates, including permanent penile deformity and dysfuction (Li et al., 2006; Shprits et al., 2017; Vardi, 2006). As a result no scientific societies publish specific guidelines on penile augmentation (Bettocchi et al., 2022).

10.4.2 Genital Anatomy is a Spectrum That Includes Intersex and Trans*

Even though this PhD began in response to my concerns about the flourishing FGCS industry, it evolved alongside the gender revolution. Heightened visibility of nonbinary gender identities within contemporary media and politics provoked widespread debate about definitions of gender, sex and sexuality, such as how genetics, gonadal hormones and secondary sex characteristics should be used to define strict binary categories (DuBois & Shattuck-Heidorn, 2021). Whether enforcing the use of male and female bathrooms or regulating testosterone levels of girls and women in sport, biological norms are used to discriminate (Karkazis et al., 2012). Yet the discipline of anatomy has persisted with these biological norms.

Most of the contemporary anatomy texts I analysed categorise perineal structures, including the vulval structures, under chapter headings of “male reproductive system” and “female reproductive system” or “male external genitalia” and “female external

genitalia". This is problematic because it ignores both intersex configurations and the surface and transformed genital anatomy of trans* individuals[11] (Finn et al., 2021).

Human embryos share the same reproductive and genital structures until approximately eight weeks of gestation, when the sex-undifferentiated foetus gradually develops the genital structures that we identify as male or female. Differentiation occurs through the intervention of genetically determined hormonal factors.

The external genitalia develop from a membrane and folds between the inner thighs known as the cloacal membrane and cloacal folds. Cranially, the cloacal folds unite to form the genital tubercle. Caudally, they split into urethral folds anteriorly and anal folds posteriorly. Genital swellings appear either side of the urethral folds (Figure 18).

In the female embryo oetrogens are responsible for development of the vulva. Under their influence, the genital tubercle lengthens to form the clitoris. The genital swellings and urethral folds form the labia majora and labia minora respectively, the area between the urethral folds forming the vestibule into which the urethra and vagina open.

In the male embryo, androgens from the testes in the form of dihydrotestosterone produce rapid lengthening of the genital tubercle, which becomes the penis. The urethral folds are pulled up to form the urethral groove before closing over to form the

[11] Here the term "trans* individual" is used to identify a subset of those who do not fit into the gender binary (Keener, 2015; Killermann, 2020).

penile urethra. The genital swellings move caudally to eventually form the scrotum (Figure 18).

Figure 18. Development of the female and male external genitalia

Source: Velkey et al. (2015)

These developmental processes are not as binary as presented here, and deliver a spectrum of possibilities that sometimes result in less clearly defined male or female genital configurations, termed intersex. About 1 in 2000 children are born with atypical genital appearance related to complex genetic and hormonal conditions, as well as anatomical anomalies (Liao et al., 2015). Affected individuals have often undergone "corrective" genital surgeries to satisfy normative genital appearance expectations (Michala et al., 2014), although these surgical interventions are increasingly characterised as violations of human rights (Liao et al., 2015).

Because the genital structures retain their hormonal sensitivity beyond the developmental stage, feminising and virilising hormones can be used in gender transition. Oestrogen and anti-androgen treatment (for male-to-female [MTF] transition) and testosterone treatment (for female-to-male [FTM] transition) produce marked and partly irreversible changes in genital structures (Meyer et al., 2020).

Like intersex individuals themselves, the surface and transformed anatomy of transitioning individuals after hormonal and surgical treatment does not conform with entrenched biological norms. For a birth-assigned MTF transition there are five genital reconstructive procedures, including penectomy (total removal of the penis), clitoroplasty (creation of clitoris), labiaplasty (creation of labia), orchidectomy (removal of testes) and vaginoplasty (creation of vagina) (Sutcliffe et al., 2009). For birth-assigned FTM transition there are eight surgeries, including a total abdominal hysterectomy with bilateral salpingo-oophorectomy (removal of ovaries and uterine tubes), vaginectomy, urethroplasty (urethral manipulation), metoidioplasty (using the overdeveloped clitoris created by hormonal therapy to construct a microphallus), phalloplasty (creation of a phallus), and scrotoplasty (creation of scrotum) or the insertion of testicular prostheses.

It has been debated whether any of these are key considerations for anatomical and clinical skills components of a medical curriculum (Finn et al., 2021). In an MTF trans woman, for example, the neovagina is a blind cuff lacking a cervix (no PAP smear required) that lies more posteriorly and is better examined with an anoscope than a speculum. A trans woman retains a prostate gland and the risk of prostatic malignancy. An FTM trans man who has not had his ovaries and/or uterus removed still requires regular screening for malignancy (Gorton & Erickson-Schroth, 2017; Wesp & Deutsch, 2017). Given that the estimated proportion of gender-diverse individuals varies between 0.1% and 2.7% of the population depending on inclusion criteria, age of participants and geographic location (Goodman et al., 2019), any university student cohort, and patient population, can be expected to include those who fall outside the gender binary system, so an argument can be made to at least acknowledge that a spectrum exists for genital morphologies.

10.5 My own Teaching Practice

As a result of my research, I propose and teach that the human body exists on a spectrum and should not be represented by singular structural arrangements or two binary points. I do this using two extra slides in my lecture (Figure 19, Figure 20).

Figure 19. Normal morphology and functions of the labia minora

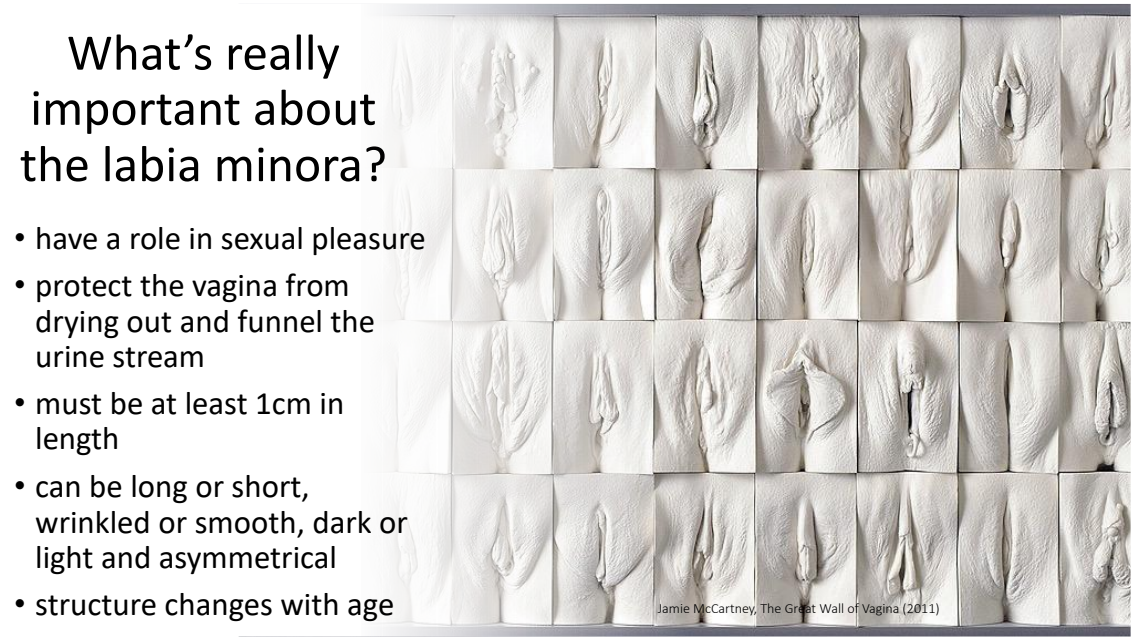
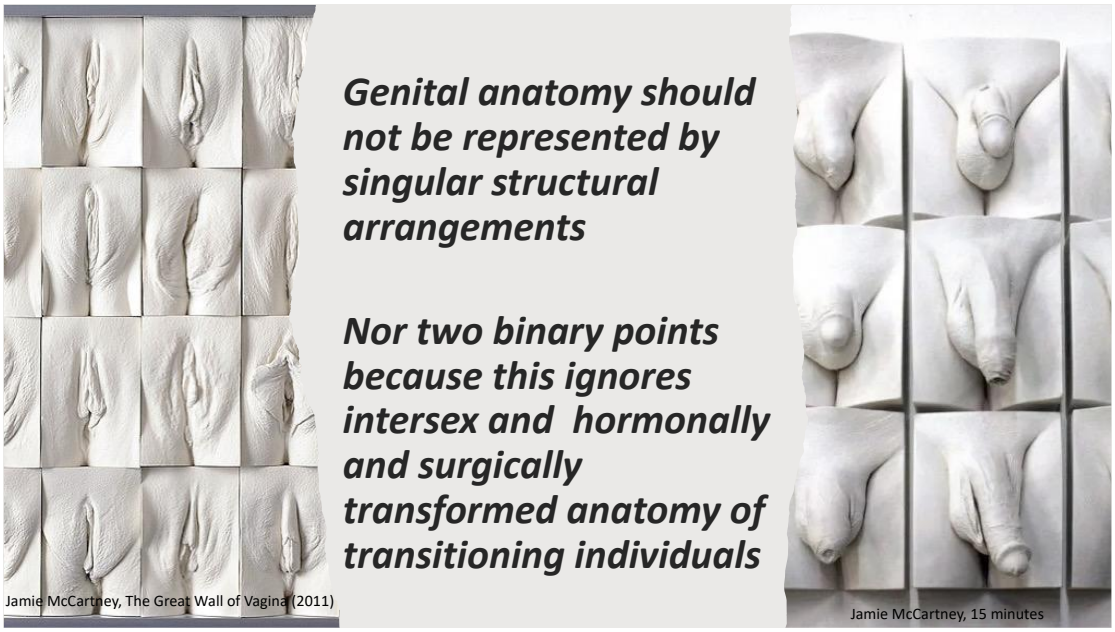


Figure 20. The human body exists on a spectrum



And every time I do so, I receive feedback such as the following:

> [A] gynaecologist observed my labia, she made a comment about the protrusion and its asymmetry but never really directly reassured me that it was completely common and “normal”. She made more of a comment along the lines of "if this becomes a problem later on, you can have an operation to remove it". I was quite shocked and ever since then her comment stuck to me and constantly made me think that I had an [sic] abnormal labia … Your lecture today finally made me feel like I received that reassurance I honestly wanted from my gynaecologist from 8 years ago! (Emailed quote from an anatomy major student, used with permission)

> As a woman, a member of the queer community and with many friends who identify as gender fluid and trans, the stories I’ve heard and impact I’ve seen of clinicians not using inclusive language, misgendering and being ignorant of variation is so harmful. It is not talked about enough and I’m so excited that you are now starting this conversation and revolution in anatomical teaching. (Emailed quote from an anatomy major student, used with permission)

In fact, revolution is a recurring theme in student feedback and supervision requests, as the following quotes from my anatomy major students demonstrate.

> I was just wondering what your career path has looked like and how I might find myself **fighting** [emphasis added] for the same thing you are in the future?

> … your work… has inspired me to work towards **sparking change** [emphasis added] in increasing diversity of anatomical representation and teachings.

10.6 Overcoming Barriers to Change

My research highlights significant barriers to the introduction of genital and gender diversity into anatomy education. Anatomy teachers need support to shift how they teach and share anatomical knowledge about vulval anatomy, which is currently both exclusive and scientifically incorrect. But there is definitely an enthusiasm to revamp outmoded terminology and teaching practices. Having a better understanding of how few anatomy teachers experience engagement with clinicians, and how widespread the practice is of iterative teaching of unchanged content, may be a starting point to evoke change towards future contemporary clinical relevancy in anatomy teaching and textbooks. Better support for inclusive communication skills in anatomy teachers calls for bespoke training at individual institutions and a discipline-wide approach to modifying entrenched binarism. The need for effective communication training within the discipline has been highlighted recently (Easterling & Byram, 2022; Finn et al., 2022) but there is no formal discipline position on if and how to rebadge the "male and female systems" terminology. These are all changes which need to be made, and that change may well be driven by student demand.

10.7 Strengths and Limitations of the Study

I am cognisant of the trans-exclusive politics embedded in terminology such as female genital anatomy, and that not all or only women have vulvas. Avoiding the genitalia-centred gender binary proved an insurmountable task when writing about a subject matter embedded in that very construct. As a white, cisgendered woman who writes from a position of privilege, I regret being unable to offer a solution to that dilemma in this thesis, and hope that in the near future the discipline of anatomy will have successfully addressed the complex issue of trans inclusivity and gender fluidity.

The textbook analysis had some limitations, due to its focus on selected established textbook series published in the 19th, 20th and 21st centuries, in addition to COVID-limited access. Inclusion of textbooks published in series only, and the restriction to English-language texts, means that there may be texts that acknowledge gender and genital diversity that were not included in my analysis.

My interview-based research constitutes the first known qualitative analysis of facilitators and barriers to teaching vulval anatomy. It suffered from limitations in the recruitment of participants and use of snowballing, which likely resulted in recruitment bias towards participants most passionate about genital anatomy. The impact of COVID-19 restrictions on teaching practices limited the time of some volunteers who expressed interest in being involved but were too busy. My intention was to interview participants objectively and, whilst researcher bias could be both a limitation and a strength, shared background and experience facilitated open and honest discussion. The large range of background qualifications and Australian tertiary institutions represented in the participant pool allowed for a broad understanding of the impact of educational background and different institutional settings on participants' views.

10.8 Conclusion and Future Directions

My overall aim was to test a long-held personal perception that anatomy as a discipline is not evolving its teaching and resources to keep pace with new knowledge and sociocultural change, and therefore clinical practice, especially non-surgical practice. I also observed a tendency to simplifying content to one version of the human body, which is easier to teach and learn. This failure was explored in the

context of labiaplasty, where a lack of accurate morphological information has allowed social norms to confuse *ideal* with *normal*.

In researching the anatomy of vulval morphology I established a published database for normality that can be included in anatomical texts and teaching. I have also shown that visual depiction of vulval morphology has, if anything, simplified over time, and does not include a true representation of normally diverse structural morphology. In interviews with anatomists, I discovered an enthusiasm for change and, in many cases, a search for support to overcome barriers such as the crowded curriculum and personal sensitivities to facilitate the teaching of detailed and accurate information.

The interview process revealed that anatomists are waking up to sociocultural changes in inclusivity and diversity and variation. As such, the answer to the question "should anatomy be contributing to the discourse about *normal* versus *ideal*?" is a resounding yes, but there are barriers to doing so. If, as a discipline, we can move forward to create diverse and inclusive content, we can and will add an authoritative voice to that discourse through our students, graduates, colleagues, and contacts established through our work. The future is bright, and progress is evident in ground-breaking special issues of journals such as *The Anatomical Record* in 2022, which was dedicated to ethics, equality, diversity and inclusion in the discipline, as well as the International Federation of Associations of Anatomists' and American Association for Anatomy's recent commitment to develop guidelines to support equality, diversity and inclusion.

Women and their bodies deserve better recognition from anatomy and anatomists than has historically been the case. The results of my research will inform the future development of anatomy curricula and resources, and inclusivity guidelines, and

enable the discipline of anatomy to enter and influence contemporary discourses about genital and gender diversity.

References

Abdulcadir J, Dewaele R, Firmenich N, Remuinan J, Petignat P, Botsikas D, Brockmann C. In vivo imaging–based 3-dimensional pelvic prototype models to improve education regarding sexual anatomy and physiology. *J Sex Med* 2020; *17*(9):1590-602.

Agrawal N, Singh P, Ghuman NK, Sharma C, Yadav G, Gothwal M, Jhirwal M. The anatomical measurements of vulva in Indian women: A cross-sectional prospective study. *Int J Gynecol Obstet* 2022; *158*(1):153–61.

Akbiyik F, Kutlu AO. External genital proportions in prepubertal girls: A morphometric reference for female genitoplasty. *J Urol* 2010; *184*(4):1476–1481. doi: 10.1016/j.juro.2010.06.023.

Alinsod R. 2006. *Overview of vaginal rejuvenation, new frontiers in pelvic surgery*. *NSOCP/AAOCG*, Las Vegas.

Alter GJ. Aesthetic labia minora and clitoral hood reduction using extended central wedge resection. *Plast Reconstr Surg* 2008; 122(6):1780-9.

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Arlington, VA: American Psychiatric Publishing, 991pp.

American College of Obstetricians and Gynecologists (ACOG) Committee on Gynecologic Practice. Elective female genital cosmetic surgery: ACOG committee opinion, Number 795. *Obstet Gynecol* 2020; *135*(1):e36–e42. doi: 10.1097/AOG.0000000000003616.

Amos N, McCabe M. Positive perceptions of genital appearance and feeling sexually attractive: Is it a matter of sexual esteem? *ArchSex Behav* 2016: *45*: 1249–1258.

Andrikopoulou M, Michala L, Creighton SM, Liao LM. The normal vulva in medical textbooks. *J Obstet Gynaecol* 2013; *33*(7): 648–650. doi: 10.3109/01443615.2013.807782.

Attorney-General's Department (2005). *Guidelines for the classification of publications 2005*. https://www.legislation.gov.au/Details/F2008C00129

AUGS-IUGA. 2022. Joint report on terminology for cosmetic gynecology. *Int Urogynecol J* 2022; 33(6):1367–1386.

Australian Government Department of Human Services. 2014. *Vulvoplasty report*. https://www1.health.gov.au/internet/main/publishing.nsf/Content/E393B5FFC5978400CA257EB9001EEC59/$File/Vulvoplasty_Review_Report.pdf

Australian Medical Council. (2022). *Accredited medical schools*. https://www.amc.org.au/accreditation-and-recognition/assessment-accreditation-primary-medical-programs/accredited-medical-schools/

Australian Medical Students Association (AMSA). (2018). *Policy document, anatomy curriculum*. https://www.amsa.org.au/sites/amsa.org.au/files/Anatomy%20Curriculum%20Policy%20%282018%29.pdf

Bagnol B, Mariano E. Vaginal practices: Eroticism and implications for women's health and condom use in Mozambique. *Culture, Health & Sexuality*. 2008; *10*(6):573–85.

Barnard E, Gillam L, Grover S, Guillemin M. Understanding adolescent girls' and young women's health-seeking for female genital cosmetic surgery: How can clinicians help their patients? *J Paediatr Child Health* 2023; *59*(1):95-99. doi: 10.1111/jpc.16248.

Bartholin T. 1668. *Bartholinus anatomy: Made from the precepts of his father, and from the observations of all modern anatomists, together with his own ...* London: Nich Culpeper and Abdiah Cole. Retrieved 20 Oct 2022 from https://www.proquest.com/books/bartholinus-anatomy-made-precepts-his-father/docview/2248497504/se-2

Basaran M, Kosif R, Bayar U, Civelek B. Characteristics of external genitalia in pre- and postmenopausal women. *Climacteric* 2008; *11*(5):416–421. doi: 10.1080/13697130802366670.

Beni R, Fisher L, Longhurst GJ. The importance of diverse and accurate descriptions of genital anatomy in textbooks. *Anat Sci Educ* 2022; *15*(5):985–8.

Bergman EM, Verheijen IW, Scherpbier AJ, Van der Vleuten CP, De Bruin AB. Influences on anatomical knowledge: The complete arguments. *Clin Anat* 2014; 27(3):296–303.

Bettocchi C, Checchia AA, Falagario UG, Ricapito A, Busetto GM, Cormio L, Carrieri G. Male aesthetic genital surgery: Recommendations and gaps to be filled. *Int J Impot Res* 2022; *34*(4): 392–403.

Bizic MR, Djordjevic ML. 2016. Penile enhancement surgery: An overview. *Eur Med J* 2016; *4*(1):94–100.

Boddy, J. Re-thinking the zero tolerance approach to FGM/C: The debate around female genital cosmetic surgery. *Curr Sex Health Rep* 2020; 12:302–313

Bonell S, Barlow FK, Griffiths S. The cosmetic surgery paradox: Toward a contemporary understanding of cosmetic surgery popularisation and attitudes. *Body Image* 2021; 38:230–240.

Boston Women's Health Book Collective. 1973. *Our bodies, ourselves: A book by and for women* (2nd ed). New York: Simon and Schuster, 276pp.

Braun V. In search of (better) sexual pleasure: Female genital 'cosmetic'surgery. *Sexualities* 2005; *8*(4):407–24.

Braun V. Female genital cosmetic surgery: A critical review of current knowledge and contemporary debates. *J Women's Health* 2010;*19*(7):1393–407.

Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006; *3*(2):77–101.

Braun V, Kitzinger C. Telling it straight? Dictionary definitions of women's genitals. *J Socioling* 2001; *5*(2):214–32.

Braun V, Tiefer L. The "designer vagina" and the pathologisation of female genital diversity: Interventions for change. *RadPsyNet* 2009; 8:1.

Brochmann N, Dahl ES (2018a). *The virginity fraud*. TED Talk. [video]. https://www.ted.com/talks?sort=relevance&q=the+virginity+fraud [accessed 06 June 2021].

Brochmann N, Dahl ES. 2018b. *The wonder down under: A user's guide to the vagina*. London: Yellow Kite.

Brodie K, Alaniz V, Buyers E, Caldwell B, Grantham E, Sheeder J. et al. A study of adolescent female genitalia: What is normal? *J Pediatr Adolesc Gynecol* 2019; *32*(1): 27–31. doi: 10.1016/j.jpag.2018.09.007.

Brown IB. 1866. *On the curability of certain forms of insanity, epilepsy, catalepsy, and hysteria in females*. London: Robert Hardwicke. 85pp.

Cain JM, Iglesia CB, Dickens B, Montgomery O.Body enhancement through female genital cosmetic surgery creates ethical and rights dilemmas. *Int J Gynecol Obstet* 2013; *122*(2):169-72.

Campbell J, Gillis J. A review of penile elongation surgery. *Transl Androl Urol* 2017; *6*(1):69.

Carol J. 2018. *This is a vulva*. https://www.thisisavulva.com/about

Chafe R. The value of qualitative description in health services and policy research. *Healthc Policy* 2017; *12*(3):12.

Chalmers DJ, O'Donnell CI, Casperson KJ, Berngard SC, Hou AH, Nuss GR. et al. Normal anatomic relationships in prepubescent female external genitalia. *J Pediatr Uro*. 2014; *10*(6): 1117–1121. doi: 10.1016/j.jpurol.2014.04.011.

Chang EH, Power DV. Are medical students comfortable with practicing physical examinations on each other? *Academic Medicine* 2000; *75*(4):384–389.

Chapuis P, Fahrer M, Eizenberg N, Fahrer C, Bokey L. Should there be a national core curriculum for anatomy? *ANZ J Surg* 2010; *80*(7–8):475–7.

Chen JY, Yip AL, Lam CL, Patil NG. Does medical student willingness to practise peer physical examination translate into action? *Med Teach* 2011; *33*(10):e528–e540.

Chibnall K, McDonald K, Kirkman M. Pathologising diversity: Medical websites offering female genital cosmetic surgery in Australia. *Cult Health Sex* 2020; *22*(1):64–80.

Chinkangsadan T, Ruanphoo P, Bunyavejchevin S. Variation of genital appearance in Thai women. *Thai J Obstet Gynaecol* 2020; *28*(2):112–119. doi: 10.14456/tjog.2020.15.

Choi HY, Kim KT. A new method for aesthetic reduction of labia minora (the deepithelialized reduction labioplasty). *Plast Reconstr Surg*. 2000; *105*(1):419–22.

Chubak B. Historical and ethical perspectives on vulvoplasty. *Sex Med Rev* 2020; *8*(4):542–7.

Colquhoun HL, Levac D, O'Brien KK, Straus S, Tricco AC, Perrier L, Kastner M, Moher D. Scoping reviews: Time for clarity in definition, methods, and reporting. *J Clin Epidemiol* 2014; *67*(12):1291–4.

Commonwealth of Australia. (n.d.). Medicare Benefits Schedule - item 35534. *MBS Online.* http://www9.health.gov.au/mbs/fullDisplay.cfm?type=item&qt=ItemID&q=35534 [accessed Mar 19, 2023]

Consorti F, Mancuso R, Piccolo A, Consorti G, Zurlo J. Evaluation of the acceptability of Peer Physical Examination (PPE) in medical and osteopathic students: A cross sectional survey. *BMC Med Educ* 2013; *13*(1), 111.

Cornwell B. 2020. Sheela na gig. *Parabola*. https://parabola.org/2020/01/21/sheela-na-gig/

Craig S, Tait N, Boers D, McAndrew D. Review of anatomy education in Australian and New Zealand medical schools. *ANZ J Surg* 2010; *80*(4): 212–6.

Crouch NS, Deans R, Michala L, Liao LM, Creighton SM. Clinical characteristics of well women seeking labial reduction surgery: A prospective study. *BJOG* 2011; 118(12):1507–10.

Crouch NS. 2019. Female genital anatomy. In SM Creighton & LM Liao (Eds.), *Female genital cosmetic surgery: Solution to what problem*? Cambridge: Cambridge University Press.

Cryle P, Stephens E. 2017. *Normality: A critical genealogy*. Chicago, IL: University of Chicago Press, 440pp.

Cunha FI, Silva LM, Costa LD, Vasconcelos FR, Amaral GT. Nymphoplasty: Classification and technical refinements. *Revista Brasileira de Cirurgia Plástica* 2011; 26:507–11.

Dally A. 1991. *Women under the knife: A history of surgery*. London: Hutchinson Radius. 289pp.

Davis KB. 1929. *Factors in the sex life of twenty-two hundred women*. New York: Harper & Brothers. 430pp.

Deans R, Liao LM, Crouch NS, Creighton SM. Why are women referred for female genital cosmetic surgery? [letter] *Med J Aust* 2011; *195*(2):99. doi: 10.5694/j.1326-5377.2011.tb03223.x

De Freitas AG. New classification of hypertrophy of the labia minora and correlation with indicated surgical techniques. *Revista Brasileira de Cirurgia Plástica* 2018; *33*(1). doi: http://www.dx.doi.org/10.5935/2177-1235.2018RBCP0010

DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: A balance of relationship and rigour. *Fam Med Community Health* 2019;7(2).

Desai SA, Dixit VV. Audit of female genital aesthetic surgery: Changing trends in India. J Obstet Gynaecol India. 2018; 68: 214–220.

DeSantis L, Ugarriza DN. The concept of theme as used in qualitative nursing research. *West J Nurs Res*. 2000; 22(3):351–72.

Dickinson RL. Hypertrophies of the labia minora and their significance. *American Gynecology* 1902; *1*(3):225–254.

Dingwall EJ (Ed.). *Woman: An historical, gynaecological and anthropological compendium* . London: Heinemann.

Dobbeleir JM, Van Landuyt K, Monstrey SJ. Aesthetic surgery of the female genitalia. *Semin Plast Surg* 2011; 25(2):130–141.

Drysdale K, Russell A, Glover A. 2010. *Labiaplasty: Hungry beast*. ABC TV Australia. https://vimeo.com/10883108

DuBois LZ, Shattuck-Heidorn H. Challenging the binary: Gender/sex and the bio-logics of normalcy. *Am J Hum Biol* 2021; 33:e23623.

Easterling L, Byram J. Shifting language for shifting anatomy: Using inclusive anatomical language to support transgender and nonbinary identities. *Anat Rec* 2022; *305*(4):983-91.

Edwardes A. 1969. *The jewel in the lotus: A historical survey of the sexual culture of the East*. London: Tandem, 224pp.

Eglin S, Harris S, Jones D (Executive Producers). (2007–). *Embarrassing Bodies* [TV Series]. Maverick Television: Channel 4.

Ellsworth WA, Rizvi M, Smith B, Cohen B, Dinh T. Labia minora reduction: Guidelines for procedure choice. *Plast Reconstr Surg* 2010; 125:216e–7e.

Farey JE, Sandeford JC, Evans-McKendry GD. Medical students call for national standards in anatomical education. *ANZ J Surg* 2014; *84*(11):813–5.

Felicio YD. Plástica do púbis e da genitália externa: Uas décadas de experiência. *Revista Brasileira de Cirurgia Plástica* 2011; 26:321–7.

Finn G, Ballard W, Politis M, Brown M. It's not alphabet soup: Supporting the inclusion of inclusive queer curricula in medical education. *The British Student Doctor Journal* 2021; *5*(2): 27–37.

Gallo PG, Mbuyi NT, Bertoletti A. 2010. Stretching of the labia minora and other expansive interventions of female genitals in the Democratic Republic of the Congo (DRC). In GC Denniston, FM Hodges, M Fayre Milos (Eds.), *Genital autonomy: Protecting personal choice* (pp. 111-124), Dordrecht: Springer.

Ghanem H, Glina S, Assalian P, Buvat J. Position paper: Management of men complaining of a small penis despite an actually normal size. *J Sex Med* 2013; *10*(1):294–303.

Giacomini M, Rozee-Koker P, Pepitone-Arreola-Rockwell F. Gender bias in human anatomy textbook illustrations. *Psychol Women Q*, 1986; *10*(4), 413–420.

Gilman SL. Black bodies, white bodies: Toward an iconography of female sexuality in late nineteenth-century art, medicine, and literature. *Crit Inq* 1985; *12*(1):204–242.

González-Isaza P, Sánchez-Borrego R. Topographic labiaplasty A new concept to improve aesthetic and functional results. *Aesthetic Medicine* 2021; *12*(1):204–242.

Goodman MP. Female cosmetic genital surgery. *Obstet Gynecol* 2009; *113*(1):154–9.

Goodman M, Adams N, Corneil T, Kreukels B, Motmans J, Coleman E. Size and distribution of transgender and gender nonconforming populations: A narrative review. *Endocrin Metab Clin* 2019; *48*(2):303–321.

Gorton RN, Erickson-Schroth L. Hormonal and surgical treatment options for transgender men (female-to-male). *Psychiatr Clin North Am* 2017; *40*(1):79–97.

Green FJ. From clitoridectomies to 'designer vaginas': The medical construction of heteronormative female bodies and sexuality through female genital cutting. *Sexualities, Evolution & Gender* 2005; *7*(2):153–87.

Gress S. 2017. *Aesthetic and functional labiaplasty*. Cham: Springer, 119pp.

Gulia C, Zangari A, Briganti V, Bateni ZH, Porrello A, Piergentili R. Labia minora hypertrophy: Causes, impact on women's health, and treatment options. *Int Urogynecol J* 2017; *28*(10):1453–61.

Gurley G. My vagina monologue. *Observer*, 27 Oct 2003.

Haidich AB. Meta-analysis in medical research. *Hippokratia* 2010; *14*(Suppl 1):29.

Hailparn TR. What is a girl to do?: The problem of adolescent labial hypertrophy. *Obstet Gynecol* 2014; *123*:124S–5S.

Hayes JA, Temple-Smith MJ. What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy. *Aust N Z J Obstet Gynaecol* 2021; 61:331–338.

Hayes JA, Temple-Smith MJ. New context, new content – rethinking genital anatomy in textbooks. *Anat Sci Educ* 2022; *15*:943–56.

Hayes JA, Temple-Smith MJ. Teaching vulval anatomy in the twenty-first century: The Australian experience. *Anat Sci Educ* 2023. https://doi.org/10.1002/ase.2264

Herbenick D, Reece M, Schick V, Sanders SA, Dodge B, Fortenberry JD. Sexual behavior in the United States: Results from a national probability sample of men and women ages 14–94. *J Sex Med* 2010; 7:255–65.

Hickman T. 2013. *God's doodle: The life and times of the penis*. New York, NY: Soft Skull Press, 272pp.

Hodgkinson DJ, Hait G. Aesthetic vaginal labioplasty. *Plast Reconst Surg* 1984; 74:414–6.

Howarth C, Hayes J, Simonis M, Temple-Smith M. 'Everything's neatly tucked away': young women's views on desirable vulval anatomy. *Cult Health Sex* 2016; 18:1363–1378.

Howarth H, Sommer V, Jordan FM. Visual depictions of female genitalia differ depending on source. *Med Humanit* 2010; *36*(2), 75–79.

Iglesia CB, Yurteri-Kaplan L, Alinsod R. Female genital cosmetic surgery: A review of techniques and outcomes. *Int Urogynecol J* 2013; 24:1997–2009.

International Society of Aesthetic Plastic Surgery. 2019. *ISAPS international survey on aesthetic/cosmetic procedures*. https://www.isaps.org/wp-content/uploads/2020/12/Global-Survey-2019.pdf

Jacobs A. 2005. A feminist classic gets a makeover. *The New York Times*, 17 July. https://www.nytimes.com/2005/07/17/books/review/a-feminist-classic-gets-a-makeover.html

Jodoin A, Dubuc E. Labia minora surgery in the adolescent population: A cross-sectional satisfaction study. *J Sex Med* 2021; *18*(3):623–31.

Kandela P. Clitoridectomy. *The Lancet* 1999; *353*(9162):1453.

Karras N. (2003). *Petals*. San Diego: Crystal River Publishing.

Karkazis K, Jordan-Young R, Davis G, Camporesi S. Out of bounds? A critique of the new policies on hyperandrogenism in elite female athletes. *Am J Bioethics* 2012; *12*(7):3–16.

Kaya AE, Doğan O, Yassa M, Başbuğ A, Özcan C, Çalışkan E. Do external female genital measurements affect genital perception and sexual function and orgasm? *Turkish J Obstet Gynecol* 2020; *17*(3):175.

Keener E. The complexity of gender: It is all that and more…. In sum, it is complicated. *Sex Roles* 2015; 73:481–9.

Kelley JH, Eraklis AJ. A procedure for lengthening the phallus in boys with exstrophy of the bladder. *J Pediatr Surg* 1971; 6:645–9.

Killermann S. 2020. What does the asterisk in "trans*" stand for? *It's Pronounced Metrosexual*, Austin, TX. URL: https://www.itspronouncedmetrosexual.com/2012/05/what-does-the-asterisk-in-trans-stand-for/ [accessed 10 October 2022].

Kinsey AC, Pomeroy WB, Martin CE, Gebhard PH. 1953. *Sexual behavior in the human female.* Philadelphia: Saunders, 842pp.

Krissi H, Ben-Shitrit G, Aviram A, Weintraub AY, From A, Wiznitzer A, Peled Y. Anatomical diversity of the female external genitalia and its association to sexual function. *Eur J Obstet Gynecol Reprod Biol* 2016; 196: 44–47. doi: 10.1016/j.ejogrb.2015.11.016.

Kreklau A, Vâz I, Oehme F, Strub F, Brechbühl R, Christmann C, et al. Measurements of a "normal vulva" in women aged 15–84: A cross-sectional prospective single-centre study. *BJOG* 2018; *125*(13):1656–1661. doi: 10.1111/1471-0528.15387.

Lange M, Hage JJ, Karim RB, Amant F. An algorithm for labia minora reduction based on a review of anatomical, configurational, and individual considerations. *Arch Plast Surg* 2023; *50*(1):17–25.

La Rocque CL, Cioe J. An evaluation of the relationship between body image and sexual avoidance. *J Sex Res* 2011;*48*(4): 397–408.

Lawrence SC, Bendixen K. His and hers: Male and female anatomy in anatomy texts for US medical students, 1890–1989. *Soc Sci Med*, 1992; *35*(7):925–934.

Learner HI, Rundell C, Liao LM, Creighton SM. 'Botched labiaplasty': A content analysis of online advertising for revision labiaplasty. *Obstet Gynaecol* 2020; 40:1000–5.

Leonard RJ. A clinical anatomy curriculum for the medical student of the 21st century: Gross anatomy. *Clin Anat* 1996; *9*(2):71–99.

Li CY, Kayes O, Kell PD, Christopher N, Minhas S, Ralph DJ. Penile suspensory ligament division for penile augmentation: indications and results. *Eur Urol* 2006; 49:729-33.

Liao LM, Creighton SM. Requests for cosmetic genitoplasty: How should healthcare providers respond? *BMJ* 2007; *334*(7603):1090–1092. doi: 10.1136/bmj.39206.422269.BE.

Liao LM, Wood D, Creighton SM. Parental choice on normalising cosmetic genital surgery: Between a rock and a hard place. *BMJ* 2015; 351:h5124.

Lista F, Mistry BD, Singh Y, Ahmad J. The safety of aesthetic labiaplasty: A plastic surgery experience. *Aesthet Surg J* 2015; *35*(6):689–95.

Lloyd J, Crouch NS, Minto CL, Liao LM, Creighton SM. Female genital appearance: "Normality" unfolds. *BJOG* 2005; *112*(5):643–646. doi: 10.1111/j.1471-0528.2004.00517.x.

Lloyd JA, Steinberger E. Survey and analysis of educational efforts in reproductive biology and human sexuality in American medical schools. *J Reprod Med* 1980; *24*(1):17–21.

Long E. 1774. *The history of Jamaica or, a general survey of the ancient and modern state of that island, with reflections on its situation, settlements, inhabitants, climate, products, commerce, laws, and government* (vol. 2). London: T Lowndes, 601pp.

Lowe J, Black KI. Female genital cosmetic surgery. *Aust NZ J Obstet Gynaecol* 2021; 61:325–7.

Lykkebo AW, Drue HC, Lam JUH, Guldberg R. The size of labia minora and perception of genital appearance: A cross-sectional study. *J Low Genit Tract Dis* 2017; *21*(3):198–203. doi: 10.1097/LGT.0000000000000308.

McCartney J. 2011. *Great wall of vagina*. London: Fine Art Studios. https://www.thegreatwallofvulva.com [accessed 23 Aug 2022].

Maas SM, Hage JJ. Functional and aesthetic labia minora reduction. *Plast Reconstr Surg* 2000; *105*(4):1453–6.

Maudsley G. Mixing it but not mixed-up: Mixed methods research in medical education (a critical narrative review). *Med Teach* 2011; *33*(2):e92–104.

Mauriceau F, Chamberlen H. 1736. *The diseases of women with child, and in child-bed: as also the best means of helping them in natural and unnatural labours. With fit remedies for the several indispositions of new-born babes. To which is prefix'd an exact description of the parts of generation in women*. London: Cox and Clarke, 373 pp.

Mazloomdoost D, Crisp CC, Westermann LB, Benbouajili JM, Kleeman SD, Pauls RN. Survey of male perceptions regarding the vulva. *Am J Obstet Gynecol* 2015; *213*(5):731-e1.

McDougall LJ. Towards a clean slit: how medicine and notions of normality are shaping female genital aesthetics. *Cult Health Sex* 2013; 15:774–787.

McDougall L. 2021. *The perfect vagina: Cosmetic surgery in the twenty-first century*. Bloomington: Indiana University Press. 257pp.

McHanwell S, Atkinson M, Davies DC, et al. A core syllabus in anatomy for medical students – adding common sense to need to know. *Eur J Anat* 2007; 11:3–18.

Mendelsohn KD, Nieman LZ, Isaacs K, Lee S, Levison SP. Sex and gender bias in anatomy and physical diagnosis text illustrations. *JAMA* 1994; *272*(16):267–1270.

Metcalf NF, Prentice ED, Metcalf WK, Stinson WW. Peer group models in examination instruction as an integral part of medical gross anatomy. *Acad Med* 1982; *57*(8), 641–4.

Meyer G, Boczek U, Bojunga J. Hormonal gender reassignment treatment for gender dysphoria. *Dtsch Arztebl Int* 2020; *117*(43):725–732.

Michala L, Liao LM, Wood D, Conway GS, Creighton SM. Practice changes in childhood surgery for ambiguous genitalia*? J Pediatr Urol* 2014; *10*(5):934–9.

Michala L. 2019. Clinical evidence of the effects of female genital cosmetic surgery. In SM Creighton & LM Liao (Eds.), *Female genital cosmetic surgery: Solution to what problem*? (pp. 51–57). Cambridge: Cambridge University Press.

Moore LJ, Clarke AE. Clitoral conventions and transgressions: Graphic representations in anatomy texts, c1900-1991. *Fem Stud* 1995; *21*(2), 255–301.

Moran C, Lee C. What's normal? Influencing women's perceptions of normal genitalia: An experiment involving exposure to modified and nonmodified images. *BJOG* 2014; 121:761–766.

Moran C, Lee C. 'Everyone wants a vagina that looks less like a vagina': Australian women's views on dissatisfaction with genital appearance. *J Health Psychol* 2018; 23:229–239.

Morgan S, Plaisant O, Lignier B, Moxham BJ. Sexism and anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes. *J Anat* 2014; *224*(3):352–365.

Morse JM, Field PA. 1995. *Nursing research: The application of qualitative approaches*. Nelson Thornes.

Moszkowicz D, Duboc H, Dubertret C, Roux D, Bretagnol F. Daily medical education for confined students during coronavirus disease 2019 pandemic: A simple videoconference solution. *Clin Anat* 2020; 33:927–8.

Motakef S, Rodriguez-Feliz J, Chung MT, Ingargiola MJ, Wong VW, Patel A. Vaginal labiaplasty: Current practices and a simplified classification system for labial protrusion. *Plast Reconstr Surg* 2015; *135*(3):774–788.

Moxham BJ, Plaisant O, Smith CF, Pawlina W, McHanwell S. An approach toward the development of core syllabuses for the anatomical sciences. *Anat Sci Educ* 2014; *7*(4), 302–311.

Moynihan R. The making of a disease: Female sexual dysfunction. *BMJ* 2003; *326*(7379):45–47. doi: 10.1136/bmj.326.7379.45.

Munn Z, Peters MD, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol* 2018; 18:1–7.

Murciano-Goroff YR. Differences in the percentage of illustrations showing males versus females in general medicine and general surgery textbooks. *Med Sci Educ* 2015; *25*(2):123–126.

Netter FH. 2014. *Atlas of human anatomy* (6th ed.). Philadelphia: Saunders/Elsevier, 532pp.

Nicolette J. Searching for women's health: A resident's perspective. *J Women's Health Gend Based Med* 2000; *9*(7):697–701.

Nurka C, Jones B. Labiaplasty, race and the colonial imagination. *Aust Fem Stud* 2013; *28*(78):417–42.

Nurka C. 2019. *Female genital cosmetic surgery: Deviance, desire and the pursuit of perfection*. Switzerland: Palgrave Macmillan, 268pp.

O'Connell HE, Eizenberg N, Rahman M, Cleeve J. The anatomy of the distal vagina: Towards unity. *J Sex Med* 2008; *5*(8):1883–91.

Omar H, Bein Bahrain1: Representation and local situation: Female circumcision in Egypt from a cross-cultural perspective. *Adv Appl Sociol* 2022; *12*(9):484–507.

Oranges CM, Sisti A, Sisti G. Labia minora reduction techniques: a comprehensive literature review. *Aesthet Surg J* 2015; *35*(4):419–31.

Organ JM, Comer AR. Evolution of a discipline – The changing face of anatomy. *Anat Rec* 2022; *305*(4):766–71.

Our Bodies Ourselves Today. 2023. *Our bodies, ourselves: The nine U.S. editions*. https://www.ourbodiesourselves.org/about-us/our-history/publications/our-bodies-ourselves-the-nine-u-s-editions/

Pappis CH, Hadzihamberis PS. Hypertrophy of the labia minora. *Paediatr Surg Int* 1987; *2*(1):50–1.

Parekh B. 2000. *Rethinking multiculturalism: Cultural diversity and political theory*. Basingstoke: Macmillan, 379pp.

Parker R, Larkin T, Cockburn J. A visual analysis of gender bias in contemporary anatomy textbooks. *Soc Sci Med* 2017; *180*, 106–113.

Pather N, Blyth P, Chapman JA, Dayal MR, Flack NA, Fogg QA, Green RA, Hulme AK, Johnson IP, Meyer AJ, Morley JW. Forced disruption of anatomy education in Australia and New Zealand: An acute response to the Covid-19 pandemic. *Anat Sci Ed* 2020; 13:284–300.

Pérez GM, Tomas Aznar C, Bagnol B. Labia minora elongation and its implications on the health of women: A systematic review. *Int J Sex Health* 2014; 26:155-71.

Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *JBI Evid Implement* 2015; *13*(3):141–6.

Petersen, A. Sexing the body: representations of sex differences in Gray's Anatomy, 1858 to the present. *Body Soc* 1998; *4*(1):1–15.

Plowman TM. The perfect vagina. *Reprod Health Matters*. 2010; *18*(35):111–4.

Power DV, Center BA. Examining the medical student body: Peer physical exams and genital, rectal, or breast exams. *Teach Learn Med* 2005; *17*(4):337–343.

Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Women's Health Committee. Vaginal "rejuvenation" and cosmetic vaginal procedures. *Aust N Z J Obstet Gynaecol* 2019. doi: 10.1111/ajo.12999.

Royal Australian College of General Practitioners (RACGP). 2015. *Female genital cosmetic surgery: A resource for general practitioners and other health professionals*. https://www.racgp.org.au/getattachment/be129a58-028c-4f78-ae06-78bf5b6fb38a/Female-genital-cosmetic-surgery.aspx

Ramsey S, Sweeney C, Fraser M, Oades G. Pubic hair and sexuality: A review. *J Sex Med* 2009; 6:2102–2110.

Rees CE, Wearn AM, Vnuk AK, Sato TJ. Medical students' attitudes towards peer physical examination: Findings from an international cross-sectional and longitudinal study. *Adv Health Sci Educ* 2009; *14*(1):103–121.

Rees EL. 2015. *The vagina: A literary and cultural history*. London: Bloomsbury Academic, 356pp.

Rees Y. 2021. *All about Yves: Notes from a transition*. Sydney: Allen & Unwin, 307pp.

Riederer BM, Spinosa JP, Macchi V, Porzionato A, De Caro R, McHanwell S, Moxham B. Clinically-orientated anatomy: Five exemplars to portray the concept. *Eur J Anat* 2018; *22*(2):157–172.

Royal College of Obstetricians and Gynaecologists (RCOG) Ethics Committee. 2013. *Ethical opinion paper: Ethical considerations in relation to female genital cosmetic surgery (FGCS)*. London: Royal College of Obstetricians and Gynaecologists. https://www.rcog.org.uk/globalassets/documents/guidelines/ethics-issues-and-resources/rcog-fgcs-ethical-opinion-paper.pdf. [Accessed 21 July 2020]

Rubin HJ, Rubin IS. 2012. *Qualitative interviewing: The art of hearing data* (3rd ed.). Thousand Oaks, CA: Sage.

Rumbelow H. 2018. Wonder down under: The vagina myths exposed. *The Weekend Australian*, 19 January. https://www.theaustralian.com.au/news/inquirer/wonder-down-under-the-vagina-myths-exposed/news-story/998f62f0877fe4f14f461e8deeb081fe [accessed 6 June 2021].

Sacher BC. 2019. The normal vulva and vagina. In Bornstein J (Ed.), *Vulvar disease: Breaking the myths* (pp. 7–20). Cham: Springer.

Satinsky S, Reece M, Dennis B, Sanders S, Bardzell S. An assessment of body appreciation and its relationship to sexual function in women. *Body image* 2012; *9*(1):137–144.

Schick VR, Rima BN, Calabrese SK. E vulva lution: The portrayal of women's external genitalia and physique across time and the current Barbie doll ideals. *J Sex Re*s 2011; 48:74–81.

Schober JM, Alguacil NM, Cooper RS, Pfaff DW, Meyer-Bahlburg HF. Self-assessment of anatomy, sexual sensitivity, and function of the labia and vagina. *Clin Anat* 2015; *28*(3):355–62.

Scholten E. Female genital cosmetic surgery–the future. *J Plast Reconstr Aesthet Surg* 2009; 62:290–291.

Shweder RA. The goose and the gander: The genital wars. *Global Discourse* 2013; *3*(2):348–366.

Sharp G, Tiggemann M, Mattiske J. Predictors of consideration of labiaplasty: An extension of the tripartite influence model of beauty ideals. *Psychol Women Q* 2015; *39*(2):182-93.

Sharp G, Tiggemann M, Mattiske J. Factors that influence the decision to undergo labiaplasty: Media, relationships, and psychological well-being. *Aesthet Surg J* 2016; 36:469–478.

Sharp G, Oates J. Sociocultural influences on men's penis size perceptions and decisions to undergo penile augmentation: A qualitative study. *Aesthet Surg J* 2019 *39*(11):1253–1259. https://doi.org/10.1093/asj/sjz154.

Shprits S, Bahouth Z, Vardi Y. Penile enlargement surgery: Is it feasible? *J Genit Syst Disord* 2017; 6:1.

Simonis M, Manocha R, Ong JJ. Female genital cosmetic surgery: A cross-sectional survey exploring knowledge, attitude and practice of general practitioners. *BMJ Open* 2016; *6*(9):e013010.

Simonis M. 2019. Female genital cosmetic surgery and the role of the general practitioner. In SM Creighton & LM Liao (Eds.), *Female genital cosmetic surgery: Solution to what problem*? (pp. 107–117). Cambridge: Cambridge University Press.

Smarrito S. Classification of labia minora hypertrophy: A retrospective study of 100 patient cases. *JPRAS Open* 2017; 13:81–91.

Smith CF, Finn GM, Stewart J, McHanwell S. Anatomical Society core regional anatomy syllabus for undergraduate medicine: The Delphi process. *J Anat* 2016; *228*(1), 2–14.

Smith TC. Re-examining our roots: Queer history and anatomy. *Anat Rec* 2022; *305*(4):968–82.

Spriggs M, Gillam L. Body dysmorphic disorder: Contraindication or ethical justification for female genital cosmetic surgery in adolescents. *Bioethics* 2016; 30:706–713.

Srinivasan DK. Medical students' perceptions and an anatomy teacher's personal experience using an e-learning platform for tutorials during the covid-19 crisis. *Anat Sci Educ* 2020; 13:318–319.

Sutcliffe PA, Dixon S, Akehurst RL, Wilkinson A, Shippam A, White S, Richards R, Caddy CM. Evaluation of surgical procedures for sex reassignment: A systematic review. *J Plast Reconstr Aesthet Surg* 2009; 62:294–306.

Tavakol M, Sandars J. Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part II. *Med Teach* 2014; *36*(10):838–48.

The Aesthetic Society's Cosmetic Surgery National Data Bank: Statistics 2019. *Aesthet Surg J* 2020; *40*(Suppl 1):1–26.

Tiggemann M, Hodgson S. The hairlessness norm extended: Reasons for and predictors of women's body hair removal at different body sites. *Sex Roles* 2008; 59:889–97.

Tranfield D, Denyer D, Smart P. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br J Manag* 2003; *14*(3):207–22.

Truong C, Amaya S, Yazdany T. Women's perception of their vulvar appearance in a predominantly low-income, minority population. *Urogynecology* 2017; *23*(6):417–9.

Vardi Y. Is penile enlargement an ethical procedure for patients with a normal-sized penis? *Eur Urol* 2006; *49*(4):609–11.

Veale D, Miles S, Bramley S, Muir G, Hodsoll J. Am I normal? A systematic review and construction of nomograms for flaccid and erect penis length and circumference in up to 15,521 men. *BJU Int* 2015; *115*(6):978–86.

Velkey JM, Hall AH, Robboy SJ. 2015. Normal vulva: Embryology, anatomy, and histology. In JM Velkey, AH Hall, SJ Robboy (Eds.), *Vulvar pathology* (pp. 3–17). NY: Springer.

Vesalius A, Richardson WF, Carman JB. 2007. *On the fabric of the human body. A translation of De humani corporis fabrica libri septum, Book V, The organs of nutrition and generation*. Novato, California: Norman Publishing, 257pp.

Watson E. 2019. *Vulva*. Bristol: Blacklight Productions. https://vimeo.com/308741598/ [accessed 23 Aug 2022]

Wearn AM, Rees CE, Bradley P, Vnuk AK. Understanding student concerns about peer physical examination using an activity theory framework. *Med Educ* 2008; *42*(12):1218–1226.

Wesp LM, Deutsch MB. Hormonal and surgical treatment options for transgender women and transfeminine spectrum persons. *Psychiatr Clin North Am* 2017; *40*(1):99–111.

Whitehorn J, Ayonrinde O, Maingay S. Female genital mutilation: Cultural and psychological implications. *Sex Relation Ther* 2002; *17*(2):161–70.

Widschwendter A, Riedl D, Freidhager K, Azim SA, Jerabek-Klestil S, D'Costa E. et al. Perception of labial size and objective measurements – is there a correlation? A cross-sectional study in a cohort not seeking labiaplasty. *J Sex Med* 2020; *17*(3):461–469. doi: 10.1016/j.jsxm.2019.11.272.

Wiegman R. 1995. *American anatomies: Theorising race and gender*. Durham: Duke University Press, 267pp.

Wilkie G, Bartz D. Vaginal rejuvenation: A review of female genital cosmetic surgery. *Obstet Gynecol Surv* 2018; 73:287–292.

Willan PL, Humpherson JR. Concepts of variation and normality in morphology: Important issues at risk of neglect in modern undergraduate medical courses. *Clin Anat* 1999; 12:186–190.

Women's Health Victoria. 2011. *The labia library*. www.labialibrary.org.au/ [accessed 28 Apr 2023].

Women's Health Victoria. 2017. *The vulva gallery*. www.thevulvagallery.com/ [accessed 28 Apr 2023].

World Health Organization. 2023. *Prevalence of female genital mutilation*. https://www.who.int/teams/sexual-and-reproductive-health-and-research-(srh)/areas-

of-work/female-genital-mutilation/prevalence-of-female-genital-mutilation [accessed 4 April 2023]

Xiao J, Evans DJ. Anatomy education beyond the Covid-19 pandemic: A changing pedagogy. *Anat Sci Educ* 2022; 15:1138–44.

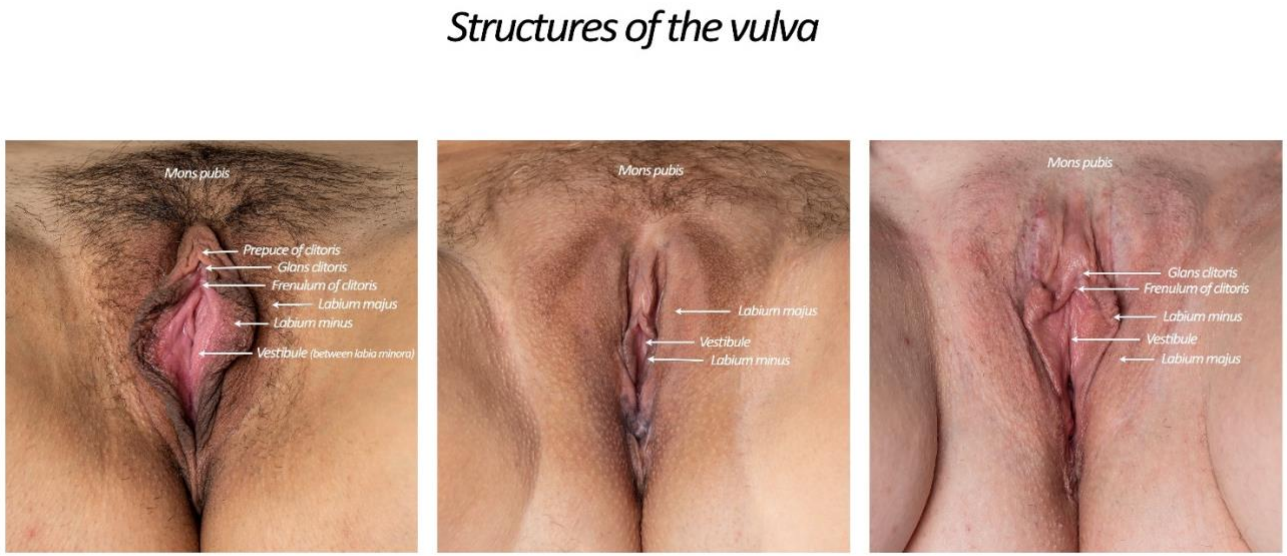
Yang E, Hengshu Z. Individualized surgical treatment of different types of labia minora hypertrophy. *Aesthetic Plast Surg* 2020; *44*(2):579–85.

Zaccaro C, Subirà D, López-Diez I, Manfredi C, Ascensios-Vargas JP, Moncada-Iribarren I. History and future perspectives of male aesthetic genital surgery. *Int J Impot Res* 2022; *34*(4):327–31.

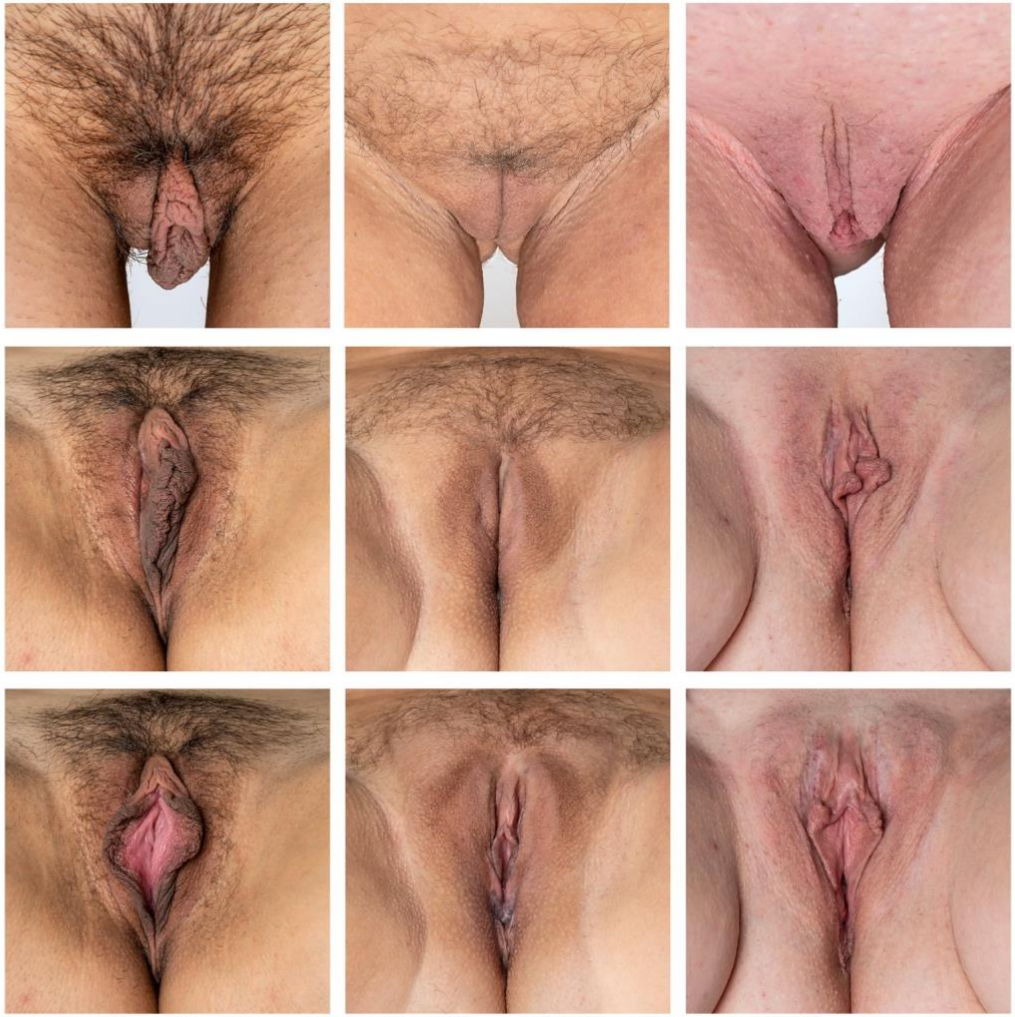
Zielinski RE. *Private places–private shame: Women's genital body image and sexual health* (Doctoral dissertation, University of Michigan).

Żytkowski A, Tubbs RS, Iwanaga J, Clarke E, Polguj M, Wysiadecki G. Anatomical normality and variability: Historical perspective and methodological considerations. *Trans Res Anat* 2021; 23:100105.

Appendix A


Structures of the vulva
Mons pubis
Prepuce of clitoris
Glans clitoris
Frenulum of clitoris
Labium majus
Labium minus
Vestibule (between labia minora)
Mons pubis
Labium majus
Vestibule
Labium minus
Mons pubis
Glans clitoris
Frenulum of clitoris
Labium minus
Vestibule
Labium majus

Normal variation of the vulva



Appendix B

Office of Research Ethics and Integrity

Human Ethics Application Approval

ATTENTION: Prof Meredith Temple-Smith

5850 - General Practice

The University of Melbourne

Research Application

Reference Number: 2021-14564-21444-3
Project Title: Is female genital anatomy taught to medical students?

Dear Prof Meredith Temple-Smith,

The Committee agreed to **approve** the amendment application on the basis that it meets the requirements of the National Statement on Ethical Conduct in Human Research (2007, Updated 2018). Please see overleaf, *Summary Details for the Approved Human Ethics Project* and *Conditions of Approval*. It is your responsibility to ensure that all people associated with the Project are made aware of what has been approved.

Desk-based elements of your project and face-to-face research can commence now, as can data collection that can be conducted online or via telephone, subject to necessary approvals or amendments to ethics applications.

Please consult the COVID-19 website for research guidance, FAQ and updates. https://staff.unimelb.edu.au/covid-19-response/research-activity

If you have any queries on these matters, or require additional information, please contact me using the details below. Please quote the ethics ID number and the title of the Project in any future correspondence.

Yours sincerely,

MRS Marianela Delgado-Henriquez

Research Ethics Officer

Human Ethics Team
Office of Research Ethics and Integrity | Research, Innovation & Commercialisation
Level 5, Alan Gilbert Building, 161 Barry Street, Carlton
The University of Melbourne, Victoria 3010, Australia
T: (03) 8344 4387 E: mdelgado@unimelb.edu.au

Summary Details for the Approved Human Ethics Project

Project Title:	Is female genital anatomy taught to medical students?
Reference Number:	2021-14564-21444-3
Approval Date:	29/09/2020
Expiry Date:	22/09/2025
Responsible Human Ethics Committee	LNR 4D
Project Supervisor	Prof Meredith Temple-Smith
Other Investigators	A/Prof Jennifer Hayes
External Investigators	

Documents table:

Document Type	File Name	Date	Version
Consent form	Consent form Hayes		
Recruitment materials	PLS Hayes-amended		

Recruitment materials	Recruitment material Hayes-amended		
Plain Language Statement (PLS)	HRE-Project Application Hayes	09/09/2020	
Recruitment materials	Recruitment material Hayes	09/09/2020	
Interview questions and/or themes	Interview schedule Hayes	09/09/2020	
Consent form	Consent form Hayes	09/09/2020	
Other	PLS Hayes	09/09/2020	
Other	Revised Standard-Application-for-HESC-Review	29/09/2020	
Recruitment materials	PLS Hayes-14564-amended	02/09/2021	2
Recruitment materials	Recruitment material Hayes-14564-amended	02/09/2021	2
Consent form	Consent form Hayes-14564-amended	02/09/2021	2
Recruitment materials	Recruitment material Hayes-14564-amended	02/09/2021	2

Conditions of Approval:

Research projects are normally approved to the anniversary date of the approval. Projects may be renewed yearly for up to a total of three years upon receipt of a satisfactory annual report. If a project is to continue beyond three years, two optional extensions of one year each (3+1+1) will need to be applied for. Anything beyond 5 years will need a new application to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

1. **Limit of Approval:** Approval is limited strictly to the research as submitted in your Project application.
2. **Variation to Project:** Any subsequent variations to the Project must be notified formally to the Committee for consideration and approval before they are implemented. If the Committee considers that the proposed changes are significant, you may be required to submit a new application.
3. **Incidents or adverse events:** Researchers must report immediately to the Committee anything that could affect the ethical acceptability of the project, including adverse effects on participants or unforeseen events. Failure to do so may result in suspension or cancellation of approval.
4. **Monitoring:** All projects are subject to monitoring at any time by the Committee.
5. **Annual Report:** An annual report must be submitted each year on the anniversary of project approval, and at the conclusion of the project. Ethics approval will lapse if an annual report is not submitted.
6. **Auditing:** All projects are subject to audit by members of the Committee.

29 September 2020

Prof M.J. Temple-Smith

General Practice
The University of Melbourne

Dear Prof Temple-Smith

I am pleased to advise that the General Practice Human Ethics Advisory Group has approved the following Minimal Risk Project.

Project title: **Is female genital anatomy taught to medical students?**
Researchers: **Prof M J Temple-Smith, A/Prof J A Hayes**
Ethics ID: **2057799.1**

The Project has been approved for the period: **29-Sep-2020 to 31-Dec-2020.**

It is your responsibility to ensure that all people associated with the Project are made aware of what has actually been approved.

In line with government directives on social distancing during the COVID-19 pandemic, research activity that involves researchers being physically present for data collection with human participants (such as face-to-face field work, experimental and cohort studies, clinical trials etc) cannot currently commence and will need to be deferred and rescheduled. In exceptional circumstances, where such activities are part of priority research, including that directly related to the University's COVID-19 response, approval to commence may be given by the relevant Dean and endorsed by the Deputy Vice-Chancellor Research.

Desk-based elements of your research project can commence now, as can data collection that can be conducted online or via telephone, subject to necessary approvals or amendments to ethics applications.

Researchers will be advised by the University when other elements of planned and approved data collection can commence. Please consult the COVID-19 website for research guidance, FAQ and updates. https://staff.unimelb.edu.au/covid-19-response/research-activity

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

(a) **Limit of Approval:** Approval is limited strictly to the research as submitted in your Project application.

(b) **Amendments to Project:** Any subsequent variations or modifications you might wish to make to the Project must be notified formally to the Human Ethics Advisory Group for further consideration and approval before the revised Project can commence. If the Human Ethics Advisory Group considers that the proposed amendments are significant, you may be required to submit a new application for approval of the revised Project.

(c) **Incidents or adverse affects:** Researchers must report immediately to the Advisory Group and the relevant Sub-Committee anything which might affect the ethical acceptance of the protocol including adverse effects on participants or unforeseen events that might affect continued ethical acceptability of the Project. Failure to do so may result in suspension or cancellation of approval.

(d) **Monitoring:** All projects are subject to monitoring at any time by the Human Research Ethics Committee.

(e) **Annual Report:** Please be aware that the Human Research Ethics Committee requires that researchers submit an annual report on each of their projects at the end of the year, or at the conclusion of a project if it continues for less than this time. Failure to submit an annual report will mean that ethics approval will lapse.

(f) **Auditing:** All projects may be subject to audit by members of the Sub-Committee.

Please quote the ethics registration number and the name of the Project in any future correspondence.

On behalf of the Ethics Committee I wish you well in your research.

Yours sincerely

NOTE: signature removed for security purposes

Appendix C

Appendix 4: Recruitment Materials

Project: Is female genital anatomy taught to medical students?

1. ANZACA newsletter notice:

Calling all anatomists. I have recently commenced a full-time PhD. The goal of my PhD project is to better understand the teaching of morphological variation, using female genital anatomy as a focus, to medical students.

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne. Ethics ID number 14564

If you are interested in learning more about this project, or are interested in participating, please email me, Assoc Prof Jenny Hayes, at j.hayes@unimelb.edu.au .

2. Email to interested participants:

Dear _____,

I am writing to you as a fellow anatomist. I have recently commenced a full-time PhD. The goal of my PhD project is to better understand the teaching of morphological variation, using female genital anatomy as a focus, to medical students.

A recent published survey of 433 Australian general practitioners (GPs) revealed that more than half had been consulted by women and girls seeking female genital cosmetic surgery and 75% thought they had inadequate relevant knowledge to advise them. Acquisition of this knowledge might begin in undergraduate teaching and from anatomy textbooks, but it has been claimed that descriptions of female genital anatomy are sparse in medical textbooks, and that detailed morphological study of the vulva, including normal variation, is not included in medical training.

How can I participate?
With your consent, your contribution in the project will involve participating in a Zoom-facilitated and recorded interview that will take approximately 45 minutes to complete. The interview will involve answering questions about your educational background, teaching content and curriculum design practices. You are under no obligation to participate in the interview.

Further information about the project is attached to this email as a separate document.

How do I get started?
If you wish to participate in an interview, please email me j.hayes@unimelb.edu.au, to organise a time.

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne.

Thank you in anticipation and kind regards,

Appendix D

Appendix 1: Plain Language Statement
Department of General Practice
Faculty of Medicine, Dentistry and Health Science

THE UNIVERSITY OF MELBOURNE

Project: Is female genital anatomy taught to medical students?

Assoc Prof Jenny Hayes (j.hayes@unimelb.edu.au) - Department of General Practice
Prof. Meredith Temple-Smith (m.temple-smith@unimelb.edu.au) - Department of General Practice

Dear Colleague,

Thank you for considering participating in this project. The goal of this project is to better understand the teaching of morphological variation, using female genital anatomy as a focus, to medical students.

A recent published survey of 433 Australian general practitioners (GPs) revealed that more than half had been consulted by women and girls seeking female genital cosmetic surgery and 75% thought they had inadequate relevant knowledge to advise them. Acquisition of this knowledge might begin in undergraduate teaching and from anatomy textbooks, but it has been claimed that descriptions of female genital anatomy are sparse in medical textbooks, and that detailed morphological study of the vulva, including normal variation, is not included in medical training.

How can I participate?
With your consent, your contribution in the project will involve participating in a Zoom-facilitated and recorded interview that will take approximately 45 minutes to complete. The interview will involve answering questions about your educational background, teaching content and curriculum design practices. You are under no obligation to participate in the interview.

What are the risks to me of participating?
Your participation in this research is entirely voluntary and you are free to withdraw from participating at any time. Your identity will be kept confidential and no identifying information about you, or your responses will be released. If you choose to withdraw, all identifiable data collected up to that point will be excluded and deleted.

What are the benefits to me of participating?
We will talk about how you include morphological variation and female genital anatomy in your teaching to students. This discussion may be useful in future teaching and curriculum design.

How will the data be managed and used?
We wish to record your interview and require your consent to do so. We will manage all collected interview data. All recordings and transcripts will be securely stored on a University of Melbourne data repository with password-only access. You will have the opportunity to view and approve the transcript of your interview before it is used in the study.

Ethics ID number 14564

The data you provide will be managed and held as strictly confidential, and any potentially identifiable information (e.g., names of universities or departments) will be removed from any data that are released.

Results of the research project will be published in peer-reviewed journals or conference proceedings which will be communicated to you via email at a later date.

How do I get started?
If you wish to participate in an interview, please email Jenny Hayes j.hayes@unimelb.edu.au, who will arrange and conduct the interview. Jenny is an experienced anatomist undertaking a PhD and will be the only person in this study who knows your identity.

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne ID:14564. If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Research Integrity Administrator, Office of Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 8344 1814 or Email: research-integrity@unimelb.edu.au. All complaints will be treated confidentially. In any correspondence, please provide the name of the research team or the name or ethics ID number of the research project.

Thank you in anticipation

NOTE: signature removed for security purposes

Appendix E

Appendix 2: Consent Form
Department of General Practice
Faculty of Medicine, Dentistry and Health Science

Project: Is female genital anatomy taught to medical students?

Assoc Prof Jenny Hayes (j.hayes@unimelb.edu.au) - Department of General Practice
Prof. Meredith Temple-Smith (m.temple-smith@unimelb.edu.au) - Department of General Practice

Participant Name: _____

Please read the following statements carefully before confirming your participation and consent to the interview.

1. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written plain language statement to keep.
2. I understand that the purpose of this research is to is to better understand the teaching of morphological variation, using female genital anatomy as a focus, to Australian medical students
3. I understand that my participation in this project is for research purposes only.
4. I acknowledge that the possible effects of participating in this research project have been explained to my satisfaction.
5. In this project I will be required to participate in a one-on-one interview with the researcher.
6. I understand that with my consent, my interview will be audio-taped, and any written transcript of the interview will use a code to refer to me.
7. I understand that my participation is voluntary and that I am free to withdraw from this project anytime without explanation or prejudice and to withdraw any unprocessed data that I have provided.
8. I understand that the data from this research will be stored at the University of Melbourne and will be responsibly disposed of five years after the release of the final publication relating to this data.
9. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements; my data will be password protected and accessible only by the named researchers.
10. I understand that after I sign and return this consent form, it will be retained by the researcher.

If you agree with all the statements above and would like to take part in the study, please sign below and contact researcher Assoc Prof Jenny Hayes j.hayes@unimelb.edu.au to organise a time for your interview. Thank you for your collaboration.

Signature: _____ Date:_____

Ethics ID number 14564

Appendix F

Appendix 3: Interview Schedule

The list below represents the tenor and breadth of the questions to be asked. The order of questions may be altered, and the number of questions will be reduced after piloting. I will aim to ask between 4 and 8 questions per interview.

Questions in bold represent those most likely to be asked in interviews.

Questions in italics represent prompts that will be piloted and may be used subsequent to the initial question if it is not understood or a brief response is given.

Theme 1 – Educational background and experience

1. **How is what you teach and how you teach affected by your own personal educational experience, your professional experience, your area of expertise and the presence or absence of a clinical support network?**

Can you tell me about your teaching experience and philosophy?

Can you tell me about your clinical experience and network?

Can you tell me about your main area of research?

Theme 2 – Lecture and curriculum content

2. How do you determine what anatomy content to include in your teaching (lectures, practical classes, curricula?

How often do you revisit lecture and curriculum content and make changes? What drives the changes you make?

3. How should content change with new clinical practices?

Do you think of these changes only in a surgical context?

What content is vocationally relevant for non-surgical graduates?

Theme 3 – Concepts of normality and anatomical variation

4. How important are the concepts of normal and anatomical variation to contemporary anatomy education?

Do you have a working definition for the terms that you share with your students?

Are the concepts explicitly included in your teaching and can you tell me how?

What are the best methods and resources for students to acquire an understanding of these concepts?

How do students respond when you teach variation from a standard human model?

Theme 4 – Teaching about external genitalia

5. Labiaplasty is a practical example of the concept of what is normal in contemporary clinical practice? How, and in what detail, do you cover anatomy of the external genitalia in your teaching?

For what reasons might this content be under-emphasised or excluded from contemporary medical anatomy course?

Are there any reasons why these lectures might be avoided by anatomists?

6. A recent survey of GP's revealed that more than half had been consulted by women and girls seeking female genital cosmetic surgery (FGCS) and 75% thought that they had inadequate relevant knowledge to advise them.

What sort of information might they be lacking?

At what educational juncture and by whom should this information be covered in your opinion?

What are the implications for this omission?

Appendix G

WILEY

Top Cited Article 2021-2022

Congratulations to:

Jennifer A. Hayes

whose paper has been recognized as a top cited* paper in:

AUSTRALIAN AND NEW ZEALAND JOURNAL OF OBSTETRICSAND GYNAECOLOGY

What is the anatomical basis of labiaplasty? A review of normative datasets for female genital anatomy

** Among work published in an issue between 1 January 2021 – 15 December 2022*