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Health impact of chest binding among transgender adults: a community-engaged, cross-sectional study

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ABSTRACT

Chest binding involves the compression of chest tissue for masculine gender expression among people assigned a female sex at birth, particularly transgender and gender non-conforming individuals. There are no peer-reviewed studies that directly assess the health impacts of chest binding, yet transgender community resources commonly discuss symptoms such as pain and scarring. A cross-sectional 32-item survey was administered online to an anonymous, non-random sample of adults who were assigned a female sex at birth and had had experience of binding (n = 1800). Multivariate regression models were used to identify practices associated with self-reported health outcomes. Of participants, 51.5% reported daily binding. Over 97% reported at least one of 28 negative outcomes attributed to binding. Frequency (days/week) was consistently associated with negative outcomes (22/28 outcomes). Compression methods associated with symptoms were commercial binders (20/28), elastic bandages (14/28) and duct tape or plastic wrap (13/28). Larger chest size was primarily associated with dermatological problems. Binding is a frequent activity for many transmasculine individuals, despite associated symptoms. Study findings offer evidence of how binding practices may enhance or reduce risk. Clinicians caring for transmasculine patients should assess binding practices and help patients manage risk.

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Introduction

An increasing body of literature documents the unique health needs of the transgender population, including transmasculine individuals, who were assigned a female sex at birth and identify on the masculine spectrum. This term encompasses individuals who identify as female-to-male, trans men, transgender men, genderqueer, gender non-conforming and other gender identities, who make up an estimated 0.3 to 0.5% of the US natal female population, or approximately 470,893 to 784,822 people in the USA (Conron et al. 2012; Gates 2011). One such unique and understudied health issue in this population is chest binding,

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defined as any activity that involves the compression of breast tissue in order to create a flatter appearance of the chest (Hudson 2004). Transmasculine and some intersex individuals may adopt chest binding as a means of gender expression (Hudson 2004), to cope with gender dysphoria (i.e., distress due to the difference between the individual's sex assigned at birth and gender identity) (Bockting, Knudson, and Goldberg 2006; Manderson 2012), and/or to increase a sense of safety in public spaces (Ekins and King 2006; Lev 2004). Binding is a common practice in transmasculine communities; in one Australian study, 87% of respondents had used binding (Jones et al. 2015). For many transmasculine people, chest binding is considered a necessary rather than elective daily activity due to associated mental and emotional health benefits (Cole and Han 2011). For transmasculine people who desire chest reconstruction surgery ('top surgery'), binding is typically used as an interim measure until surgery can be obtained (Factor and Rothblum 2008). However, not all individuals who bind have access to or are interested in surgery (Factor and Rothblum 2008; Reisner et al. 2013).

Concerns about the long-term physical health effects of binding are prevalent in the transmasculine community (Dutton, Koenig, and Fennie 2008). Past research has explored the effects of chest binding in regards to lactation suppression (Swift and Janke 2003) and gynaecomastia (Huber 2012), but never within transmasculine populations (Maycock and Kennedy 2014). Evidence from case series and community reports demonstrate that binding may lead to a variety of negative health outcomes including pain (Nelson, Whallett, and McGregor 2009), skin excess/ptosis (Berry, Curtis, and Davies 2012; Monstrey et al. 2008), bruising, fractured ribs, pneumothoraces (TransGuys 2014) and infection (Feldman and Goldberg 2006; Hudson 2004). Several dermatological outcomes, specifically skin excess, ptosis, and reduced skin elasticity, can contribute to poor surgical results for individuals who later pursue chest reconstruction surgery (Berry, Curtis, and Davies 2012; Monstrey et al. 2008; Wolter et al. 2015). Current recommendations shared by transmasculine and lesbian, gay, bisexual, transgender and queer community organisations for healthy binding include: wearing a correctly sized binder, avoiding the use of elastic bandages, duct tape or plastic wrap, removing binders when sleeping and limiting binding to 8–12 hours per day (QMunity 2013; Stanford University, Vaden Health Center 2014). These recommendations are largely based on personal experience with binding rather than clinical or population-based studies.

The Binding Health Project (BHP) is a community-engaged research project that aims to address the dearth of evidence about chest binding. The objectives of this analysis were to: (1) understand the prevalence of negative health outcomes among those who bind, (2) identify risk factors for negative health outcomes and (3) develop preliminary evidence-based recommendations for healthy binding based on these risk factors.

Methods

Study researchers developed a 32-item cross-sectional survey to ascertain information on binding practices, physical and mental health outcomes attributed to binding, quality of patient-provider interactions and use of trans-specific healthcare. Questions were generated through a comprehensive literature review that included peer reviewed sources, community resources and online guides. A four-member pilot group comprised of transmasculine persons who had engaged in chest binding revised the survey prior to distribution for

respectfulness of terminology, question phrasing and relevance; the research team itself also includes individuals who bind. The current analysis using quantitative data to identify risk factors for negative physical health outcomes is somewhat positivist in nature, but is congruent with the transformative paradigmatic framework of the larger study by: (1) the process of community engagement to identify questions and outcomes of interest, (2) the understanding that binding is critical to many individuals' mental health and quality of life and that findings may be use to empower individuals to bind more safely rather than to categorically recommend against binding, (3) a commitment to disseminating these results in ways that are most useful to the community, and (4) the overall goal of diminishing disparities in health and healthcare for this underserved population.

Study population

Survey distribution was completed online. We used the social media outlets Facebook, Twitter, and Tumblr for dissemination. The project also contacted regional, national, and international LGBTQ community organisations through email and posted on web-based forums that serve transgender and gender non-conforming communities. Survey participants received a link to the survey and were encouraged to share the link widely among their own networks. The survey was open to all female assigned at birth (FAAB) and intersex-identified individuals over the age of 18 who bound at the time of the survey or did so at some point in their lives. Informed consent was obtained within the survey and those surveyed participated of their own volition without direct incentives. Participants were given the option to skip any question they did not feel comfortable answering. The study was approved by the Boston University Institutional Review Board. The results were collected anonymously in April and May 2014. A total of 2012 surveys were completed. Surveys from respondents under the age of 18 were discarded (n=212), producing a final sample of 1,800 responses.

Measures

A comprehensive search strategy that assessed peer-reviewed literature and information from health clinics, lesbian, gay, bisexual and transgender organisations and online community resources was used to develop a list of 28 health outcomes potentially associated with binding. An initial literature review was conducted using PubMed, Web of Science and Google Scholar, as well as a backward citation search to identify additional articles. This process yielded a preliminary list of physical health outcomes including shortness of breath (Israel 2001; Morrow and Messinger 2006; Teich 2012), chest pain or discomfort (Israel 2001; Bockting, Knudson, and Goldberg 2006; Nelson, Whallett, and McGregor 2009), back pain (Teich 2012), dermatological issues (scarring, excess skin, rash, cuts) (Berry, Curtis, and Davies 2012; Israel 2001; Morrow and Messinger 2006), overheating (Bockting, Knudson, and Goldberg 2006) and breast changes (Berry, Curtis, and Davies 2012; Monstrey et al. 2008; Nelson, Whallett, and McGregor 2009). We also examined online resources developed for and by individuals who chest bind, such as online guides for transmasculine individuals, web-based forums and YouTube videos, as a means to delineate the specific concerns of this population. Digital media is well documented as an important source of information and social support for many marginalised communities, including lesbian, gay, bisexual,

transgender and queer populations (Alexander 2004; Mehra 2004; Thurlow and Bell 2009), and allowed greater insight into their concerns and experiences with chest binding. Community resources corroborated the outcomes identified in the peer-reviewed literature and additionally identified the following community concerns with binding: poor posture, fungal infections, long-term skin damage, sores, reduced skin elasticity, rib damage, fluid build-up in the lungs, circulation problems, dizziness, headaches and spinal misalignment (Columbia Health 2014; QMunity 2013; Stanford University, Vaden Health Center 2014).

A final list of 28 outcomes was compiled based on how frequently the outcome was reported in the literature and community resources, and if binding could plausibly cause the outcome. These outcomes were: rib fractures, back pain, chest pain, rib or spine changes, bad posture, shoulder pain, shoulder joint 'popping', muscle wasting, numbness, headache, overheating, fatigue, weakness, lightheadedness or dizziness, cough, respiratory infections, shortness of breath, heartburn, abdominal pain, digestive issues, breast changes, breast tenderness, scarring, swelling, acne, itch, skin changes and skin infections. The list of binding-associated health outcomes was also reviewed for clarity and patient-centredness through consultation with the pilot group. Survey participants were asked 'Have you experienced any of the following health problems and attribute them to binding?' and selected yes or no for each outcome.

Country of residence, age and gender identity were collected. Participants were presented with 25 gender identity options in addition to a free response option. For the purposes of summarising these data, gender identity responses were then grouped under nine umbrella categories reviewed by the authorship team and pilot group.

To assess frequency of binding, participants were asked, 'How many days on average do or did you bind?' and selected the number of days per week spent binding on average. To assess intensity of binding, participants were asked, 'How many hours on average do or did you bind on those days?' and selected a number between 1 and 24. To assess binding duration, participants were asked, 'How long have you been binding or how long have you bound in the past? (i.e., weeks, months, years)' and selected one of 11 categories ranging from '1 to 3 weeks' to '7+years'. An aggregate measure of total binding, termed 'binding-years' and modeled after the measure of pack-years for cigarette smoking, was developed and calculated by multiplying average intensity, average frequency and duration and scaling to represent the equivalent number of years spent binding at 8 hours per day for 7 days per week.

Participants were asked to select the binding methods that they primarily used with the question, 'What method(s) do/have you used to bind for the majority of the time? You may select multiple boxes.' Options included elastic bandages, shirt layering, sports bras, multiple sports bras, athletic compression wear, neoprene compression wear, duct tape/plastic wrap, binders and other. Participants were able to add free response information to the 'other' category. Free responses were coded and assigned to pre-existing categories or a 'home-made' category that included binding with household items excluding duct tape or plastic wrap. This category included binding with belts, scarves, tight fabric held with pins or tape, back braces, undersized swimsuits, girdles and pantyhose.

Participants were asked to self-report their unbound chest size. The Binding Health Project converted chest sizes from the band and cup sizing (e.g., '38DD') to a single cup sizing regardless of band size (i.e., 'E'). Our use of a single cup sizing method was based on the hypothesis that binding practices and negative health outcomes would be primarily influenced by cup size (the amount of breast tissue extension relative to the chest wall) rather

than band size. Chest size conversions were standardised between international participants using online reference guide SizeGuide (2014, accessed October 2014). Chest size was coded as an ordered categorical variable so that in logistic regression models chest size could be modeled to understand the increased odds associated with a one-unit increase in cup size.

Statistical analysis

The data were analysed in 2015. Descriptive statistics were computed to understand sample demographics, binding practices and frequency of health outcomes. A paired *t*-test was used to analyse change in mood before and after binding. Bivariate odds ratios were calculated to understand the relationship between each of the key covariates and each of the 28 outcomes. Twenty-eight multivariate logistic regression models, one for each of the 28 health outcomes investigated, were constructed to identify factors that were independently associated with each health outcome. Each multivariate model included binding practices (frequency, duration, intensity), binding methods (nine categories) and chest size. The aggregate measure of total binding (binding-years) was not included in multivariate models as it is a linear combination of frequency, duration and intensity, all of which were already included in the model. Missing data were handled with model-wise deletion.

Results

The majority of participants lived in the USA (68.1%) or Canada (13.5%), with 38 countries represented in total (Table 1). Participants' age ranged from 18 to 66 years old, with a median age of 23 years. Participants reported over 70 unique gender identity terms that were not mutually exclusive. Transgender or masculine identities were most common (79.5 and 68.1%, respectively), with 33.8% identifying as genderqueer or agender, and some representation from feminine-identified and intersex individuals. The majority had not undergone a chest reduction or reconstruction surgery (86.9%), but many were interested in or planning to obtain surgery in the future (66.6%).

There was large variation in how concerned participants were about the effects of binding on their physical health, with the median participant somewhat concerned (3 on a scale from 1 to 5). Self-reported mental health effects were almost universally positive, with qualitative data indicating decreases in suicidality, anxiety and dysphoria and increased self-esteem, confidence and ability to go out safely in public. Participants reported an increase in self-reported mood with binding; those reporting 'very positive' and 'positive' mood increased from 7.5% to 69.9% with binding. On average, respondents' rating of their mood before and after binding significantly increased from a 2.1 to a 3.8 on a 5-point scale (mean difference = 1.73, 95%CI: 1.67, 1.79).

Binding was a daily occurrence for most participants, with 51.5% binding seven days per week on average (Table 2). When binding, participants bound for an average of 10 hours per day. Most participants in the sample (78%) had bound for at least a year. The median duration of binding was two years. Unbound chest size varied widely.

Binding methods were diverse, although the majority reported using a commercial binder (87.2%). Sports bras (33.1%), layering shirts (24.0%), layering multiple sports bras (18.6%) and using elastic or other bandages (16.5%) were the next most common methods.

Table 1. Sample characteristics.

	Percent (*n*) (*n* = 1800 except where indicated)
Geographical location	
USA	68.13 (1226)
Canada	13.49 (243)
United Kingdom	7.16 (129)
Other European	5.89 (106)
Oceania	3.83 (69)
Latin America	0.22 (4)
Middle East	0.11 (2)
Africa	0.11% (2)
Asia	0.50 (9)
Unknown	0.55 (10)
Age (years)	
18–24	57.7 (1040)
25–34	32.7 (589)
35–44	7.1 (127)
45–54	1.7 (31)
54–66	0.7 (13)
Gender identity categories (not mutually exclusive)	
Transgender	79.5 (1431)
Male or masculine	68.1 (1227)
Genderqueer/bigender	34.2 (616)
Agender	33.8 (608)
Feminine	12.8 (230)
Masculine female	6.6 (118)
Cisgender	1.7 (31)
Intersex	1.3 (24)
Other	0.6 (10)
Top surgery (*n* = 1796)	
Had already had top surgery	13.1 (236)
Planning on getting top surgery	66.6 (1,197)
Not planning on getting top surgery	12.9 (232)
Unsure	7.3 (131)
How concerned are you about the effects of binding on your health? (*n* = 1788)	
1 (Not concerned at all)	15.4 (275)
2	25.1 (448)
3	28.6 (512)
4	18.6 (333)
5 (Very concerned)	12.3 (220)
How would you rate your overall mood on a scale of 1–5 before binding? (*n* = 1799)	
1 (Very negative)	31.1 (559)
2	38.4 (691)
3	23.0 (414)
4	5.2 (93)
5 (Very positive)	2.3 (42)
Mean	2.1
How would you rate your overall mood on a scale of 1–5 after binding? (*n* = 1799)	
1 (Very negative)	1.3 (23)
2	4.3 (78)
3	24.5 (441)
4	50.5 (909)
5 (Very positive)	19.3 (348)
Mean	3.8

Experiencing any health outcome related to binding was nearly universal, with 97.2% of participants reporting at least one negative outcome they attributed to binding. The most commonly reported outcomes were back pain (53.8%), overheating (53.5%), chest pain (48.8%), shortness of breath (46.6%), itching (44.9%), bad posture (40.3%) and shoulder pain

Table 2. Distribution of binding practices, binding methods and chest size.

	Percent (*n*) (*n* = 1800)
Median hours per day spent binding (IQR)	10 (8, 12)
Median days per week spent binding (IQR)	7 (4, 7)
Median duration of binding (IQR)	2 years (1 year, 4 years)
Binding method used (all that apply)	
Binders	87.2 (1570)
Sports bras	33.1 (597)
Shirt layering	24.0 (432)
Multiple sports bras	18.6 (335)
Elastic or other bandage	16.5 (298)
Athletic compression wear	15.3 (276)
Neoprene compression wear	6.6 (118)
Duct tape or plastic wrap	4.3 (78)
Homemade	3.1 (55)
Chest size (*n* = 1515)	
A	12.7 (193)
B	24.0 (364)
C	23.8 (361)
D	15.0 (227)
E	16.2 (245)
F or larger	8.3 (125)

(38.9%) (Table 3). Of the categories examined, skin/soft tissue and pain symptoms were most common, with 76.3% of respondents reporting any skin/tissue concern and 74.0% reporting any pain-related concern.

Odds ratios and confidence intervals for all bivariate regression models and for the 28 multivariate regression models are provided in the Supplemental Data for this paper. In bivariate analyses, binding-years was associated with 24 of 28 outcomes. Intensity was associated in bivariate analyses with 15 of 28 outcomes. However, after adjusting for binding practices, binding method and chest size in the multivariate models, intensity was only positively associated with skin infections and negatively associated with four outcomes.

In multivariate models, frequency was the factor most consistently associated with negative health outcomes (22 of 28 outcomes) (Table 4). Duration was also independently associated with 13 of 28 outcomes. Larger chest size was independently associated with higher odds of 11 of the 28 outcomes. Chest size was consistently associated with skin and soft tissue outcomes, unassociated with pain, general or respiratory outcomes and inconsistently associated with musculoskeletal, neurological or gastrointestinal outcomes. Commercial binders were the binding method most consistently associated with negative outcomes (20/28), followed by elastic or other bandages (14/28) and duct tape or plastic wrap (13/28).

Discussion

This study provides the first empirical evidence on the prevalence and correlates of self-reported health outcomes related to chest binding among transmasculine individuals. While the self-reported health impacts of binding vary greatly, nearly all respondents experienced at least one negative health effect. This finding suggests that chest binding may impact the health of many transmasculine individuals.

Binding frequency, or average days per week spent binding, was the factor most consistently associated with risk for self-reported negative health outcomes in adjusted analyses (22/28 outcomes). This suggests that taking 'off' days from binding could potentially reduce

Table 3. Prevalence of self-reported health outcomes attributed to binding.

Health outcome (all that apply)	Percent (*n*) (*n* = 1800)
Pain	
Chest pain	48.8 (878)
Shoulder pain	38.9 (700)
Back pain	53.8 (969)
Abdominal pain	14.5 (262)
Any pain outcome	74.0 (1333)
Musculoskeletal	
Rib fractures	2.8 (50)
Rib or spine changes	11.6 (209)
Bad posture	40.3 (726)
Shoulder joint 'popping'	12.3 (221)
Muscle wasting	5.4 (97)
Any musculoskeletal outcome	46.8 (843)
Neurological	
Numbness	15.7 (282)
Headache	19.1 (344)
Lightheadedness or dizziness	27.8 (500)
Any neurological outcome	41.0 (738)
Gastrointestinal	
Digestive issues	11.3 (203)
Heartburn	11.1 (200)
Any gastrointestinal outcome	17.7 (318)
Generalised	
Overheating	53.5 (963)
Fatigue	27.2 (489)
Weakness	17.3 (311)
Any generalised outcome	61.7 (1112)
Respiratory	
Cough	17.2 (310)
Respiratory infections	3.4 (62)
Shortness of breath	46.6 (839)
Any respiratory outcome	50.7 (914)
Skin/tissue	
Breast changes	27.5 (495)
Breast tenderness	33.9 (611)
Scarring	7.7 (138)
Swelling	4.3 (77)
Acne	33.8 (608)
Itch	44.9 (808)
Skin changes	15.2 (273)
Skin infection	5.3 (95)
Any skin/tissue issue	76.3 (1375)
Any of the above	97.2 (1750)

risk for negative health impacts. This is notable given that over half of participants bind daily and do not regularly take off days.

Current community resources largely recommend reducing binding intensity (i.e., hours per day spent binding) to reduce negative physical effects (Hudson 2004; TransGuys 2014), but our data do not necessarily support this recommendation, as intensity was largely unassociated with physical health outcomes in multivariate analyses. Based on this study, individuals may consider reducing the frequency of binding, in addition to or instead of reducing the daily intensity of binding, to minimise or prevent negative physical symptoms.

Binding intensity was associated with many outcomes in bivariate analyses, which may be why binding intensity is perceived to be associated with negative health impacts. However, after adjusting for other binding practices, intensity was unassociated with most outcomes in multivariate models, and was in fact negatively associated with four outcomes (numbness, lightheadedness, fatigue and weakness). This puzzling finding may indicate

Table 4. Summary of multivariate regression models for 28 self-reported outcomes.[a]

		Intensity (hours/day)	Frequency (days/week)	Duration (years)	Chest size	Binders	Shirt layering	Sports bra	Multiple sports bras	Elastic or other bandage	Athletic compression wear	Neoprene compression wear	Duct tape or plastic wrap	Home-made
Pain	Chest pain					1.6				1.5			2.6	
	Shoulder pain		1.2	1.1		2.5	1.5						2.1	
	Back pain		1.1			2.2	1.4			1.5			2.8	
	Abdominal pain												2.0	
MSK	Rib Fractures		1.4							2.4	2.3			
	Rib or spine changes		1.4	1.2		3.3	1.6			1.8			2.1	
	Bad posture		1.2	1.2	1.1	1.9	1.5			1.6				
	Shoulder joint 'popping'		1.2			2.1				1.7				
	Muscle wasting		1.3	1.3		3.5								
Neuro	Numbness	.95	1.2	1.1	1.1	1.6				1.7			3.0	
	Headache					2.5	1.5			1.5			2.3	
	Lightheadedness/ dizziness	.96				1.7				1.7				
GI	Digestive issues		1.1			2.3								
	Heartburn		1.2	1.1	1.2						1.7			
Gen.	Overheating		1.2	1.1		1.9	1.4			1.5	1.4			
	Fatigue	.95	1.1			2.9				1.7	1.4		2.6	
	Weakness	.95	1.1			1.9						1.8	3.2	
Resp.	Cough		1.2		1.1	2.3	1.7			1.6				
	Respiratory infections		1.5					2.0						
	Shortness of breath		1.1			2.1	1.4			1.4			2.8	
Skin or tissue	Breast changes		1.2	1.1	1.1	2.9		.61					1.9	2.6
	Breast tenderness				1.2		1.4							
	Scarring		1.3	1.2	1.2				1.8					
	Swelling				1.2	2.8				2.0			2.9	
	Acne		1.3	1.1		2.0			1.4					
	Itch		1.1	1.1	1.1		1.4						2.3	
	Skin changes		1.2	1.2	1.2	2.3			2.1		1.6			
	Skin infection	1.1	1.3	1.3	1.3		2.0							
Total positively associated		1	22	13	11	20	11	1	3	14	5	1	13	1

[a]Each row contains the significant associations (adjusted odds ratios [AORs]) from a multivariate regression model with the outcome listed on the left side of the row. Covariates are listed in the columns. Blank cells indicate the association was not significant at $p < 0.05$. For all AORs and 95% confidence intervals for each model, as well as the results from the bivariate models, please refer to the appendix.

Abbreviations: Gen = generalised; GI = gastrointestinal; MSK = musculoskeletal; Neuro = neurological; Resp = respiratory.

issues of reverse causation whereby individuals who experience negative health outcomes reduce their average binding intensity, so that lower intensities appear associated with negative outcomes. Given that many community resources recommend reducing binding intensity if negative symptoms are experienced, this explanation is plausible, but longitudinal data are needed to fully understand the relationship between binding intensity and negative physical outcomes.

In addition to frequency, duration (number of years spent binding regardless of frequency or intensity) was independently and positively associated with 13 health outcomes, particularly skin and soft tissue outcomes and musculoskeletal outcomes. Reducing duration by delaying the onset of binding, if possible, may reduce the risk of experiencing the negative physical outcomes explored in this study. For individuals experiencing significant gender dysphoria, chest reconstruction surgery offers a way to decrease risks associated with duration and often results in improved quality of life (Newfield et al. 2006; World Professional Association for Transgender Health 2012). For most, however, surgery is not always desired, can be difficult to access and often involves financial hardship in addition to the risks and recovery period that accompany surgery.

Commercial binders were the binding method most consistently associated with negative health outcomes, possibly because such binders have the potential to provide more compression than other binding methods. This finding is inconsistent with community perceptions that commercial binders represent the safest option (Cole and Han 2011; Hudson 2004; QMunity 2013; Stanford University, Vaden Health Center 2014; TransGuys 2014). This study lacked sufficient detail about participants' binding practices to determine if binders are uniformly risky, or if practices such as wearing multiple binders or overly tight binders drove the heightened risk associated with binders in this study. Elastic and other bandages, duct tape and plastic wrap were all commonly associated with negative health outcomes, a finding consistent with existing community recommendations against their use. Sports bras, layering sports bras and neoprene or athletic compression wear were the binding methods least commonly associated with negative outcomes, and therefore may be the safest options for binding.

Larger chest sizes were primarily associated with self-reported skin and soft tissue health outcomes. Excess risk associated with larger chest sizes could potentially be mitigated by practicing good skin care, choosing safer binding methods or reducing duration or frequency of binding.

Although binding is associated with many negative physical health outcomes, it is also associated with significant improvements in mood and mental health. In response to open-ended questions about mental health effects and motivations for binding, participants consistently affirmed that the advantages of binding outweighed the negative physical effects. Many participants said that binding made them feel less anxious, reduced dysphoria-related depression and suicidality, improved overall emotional wellbeing and enabled them to safely go out in public with confidence.

Clinical implications and conclusions

Based on the findings of this and other studies, healthcare providers should be aware that many transmasculine individuals practise chest binding and familiarise themselves with potential physical outcomes associated with binding, in addition to the mental health benefits. Clinicians should regularly assess their transgender patients' binding practices, any

symptoms the patient attributes to binding, and motivations for binding in order to understand the risks and benefits of binding for each patient. Where necessary, clinicians should compare the physical harms caused by binding with the mental health or quality of life benefits reported by the patient. Following this assessment, providers should use their clinical judgement to prioritise symptoms and engage in shared decision-making with patients to devise a suitable treatment plan. Addressing the negative physical effects of binding should not necessarily take priority over mental health benefits, but in some cases, it will be suitable for clinicians to advise against binding if physical outcomes are sufficiently severe.

Healthcare providers may be able to help their patients reduce negative outcomes associated with binding by recommending 'off-days' from binding when possible, avoiding elastic bandages, duct tape and plastic wrap as methods for binding and using caution with commercial binders. Providers should counsel patients on how to prevent specific symptoms that this study found were common, such as practising good skin hygiene to avoid skin issues and treat symptoms as they arise. Clinicians may also be able to help interested patients reduce the duration of their binding by connecting patients with resources and referrals for top surgery, thereby limiting the duration of binding and its associated negative health outcomes, as well as potentially improving quality of life (Newfield et al. 2006).

While this study suggests that there are many negative health outcomes associated with chest binding, health providers should avoid making categorical recommendations against binding due to its positive effects on mental health and quality of life. Instead, clinicians might usefully work with patients to understand their motivations for binding, to minimise risk and to empower patients with the most current research to make informed decisions about binding that support all aspects of their physical and mental health.

Disclosure statement

No potential conflict of interest was reported by the authors.

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