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The economic and social costs of body dissatisfaction and appearance-based discrimination in the United States

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ABSTRACT

This study estimated the social and economic costs of body dissatisfaction and appearance-based discrimination (specifically, weight and skin-shade discrimination) in the United States (USA) in the 2019 calendar year. We used a prevalence-based approach and a cost-of-illness method to estimate the annual cost of harmful appearance ideals for cases of body dissatisfaction and discrimination based on weight and skin shade. Impacts on conditions/illnesses such as eating disorders that are attributable to body dissatisfaction, weight discrimination and skin-shade discrimination were identified through a quasi-systematic literature review, which captured financial, economic, and non-financial costs. For each impact attributable to body dissatisfaction or appearance-based discrimination, annual health system and productivity costs (or labor market costs) were primarily estimated by using a population attributable fraction methodology. Only direct costs that resulted from body dissatisfaction and appearance-based discrimination were included (for example, costs associated with conditions such as depression attributable to body dissatisfaction or appearance-based discrimination). In contrast, indirect costs (e.g. costs associated with a health condition developed following skin bleaching, which was undertaken as a result of body dissatisfaction) were not included. In 2019 body dissatisfaction incurred $84 billion in financial and economic costs and $221 billion

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through reduced well-being. Financial costs of weight discrimination and skin-shade discrimination were estimated to be $200 billion and $63 billion, respectively, and reduced well-being was estimated to be $206.7 billion due to weight discrimination and $8.4 billion due to skin-shade discrimination. Sensitivity testing revealed the costs likely range between $226 billion and $507 billion for body dissatisfaction, between $175 billion and $537 billion for skin-shade discrimination, and between $126 billion and $265 billion for weight discrimination. This study demonstrates that the prevalence and economic costs of body dissatisfaction and weight and skin-shade discrimination are substantial, which underscores the urgency of identifying policy actions designed to promote prevention.

PLAIN ENGLISH SUMMARY

Appearance ideals in the USA have been widely critiqued for placing unfair burden on people of color and women of all race/ethnicity groups, but little is known about the economic consequences of biased appearance standards. To attain a comprehensive understanding of the economic impact of these harmful appearance ideals on the US economy, we estimated the one-year financial, economic and non-financial costs to the economy caused by body dissatisfaction, weight discrimination, and skin-shade discrimination. We considered a wide range of costs, including costs to the healthcare system, workplace, and other costs for individuals, households, employers, and government. We found that the impact of harmful appearance ideals on the USA economy is substantial. In 2019 body dissatisfaction incurred $84 billion in financial and economic costs and $221 billion through reduced well-being. Financial costs of weight discrimination and skin-shade discrimination were estimated to be $200 billion and $63 billion, respectively, and reduced well-being was estimated to be $207 billion due to weight discrimination and $8 billion due to skin-shade discrimination. Women of all race/ethnicity groups bore the bulk of the burden, shouldering 58% of the costs for body dissatisfaction and 66% for weight discrimination. Women bore 50% of the costs for skin-shade discrimination. These costs are substantial and underscore the urgency of identifying effective policy actions to reduce the damaging effects of harmful appearance ideals.

Clinical and Practice Implications

- Clinicians should be aware that body dissatisfaction, which affects people of all genders, racialized identities, and body size groups, can have not only psychological but also economic consequences for affected individuals and families.
- Appearance-based discrimination, including weight and skin-shade discrimination, places unfair social and economic burden on targeted individuals and groups, particularly communities of color and women of all racial/ethnic groups, while also incurring substantial costs to employers

and society; therefore, anti-discrimination policies and interventions in schools, workplaces, healthcare, government, and other settings are needed to reduce these forms of discrimination.

- Our study was the first to offer a comprehensive accounting of the social and economic costs of body dissatisfaction and appearance-based discrimination in the United States, but it should not be the last. Government, non-profit, and individual philanthropic funders should support expansion of the research base by scholars, particularly scholars from communities marginalized by harmful societal appearance ideals, whose work focuses on gendered and racist societal appearance ideals and effective preventive interventions to mitigate the impacts of these harmful ideals.

Introduction

Appearance ideals are socially constructed notions of ideal beauty. In the United States (USA) the most accepted ideals reflect Eurocentric beauty standards (e.g., thinness, light skin, a small nose, and straight hair). This represents the underlying discourses of racism, sexism, and power in societies in which the racial and gender group with institutional and social privilege makes their physical features the ideal (Craig, 2006). These appearance ideals can result in body dissatisfaction (Groesz et al., 2002) for those who feel their bodies do not fit these ideals (i.e., those who internalize harmful appearance ideals), and appearance-based discrimination (Monk, 2015) against those who are perceived as not fitting the ideal (i.e., externalization of harmful appearance ideals).

Findings from existing studies demonstrate that harmful appearance ideals lead to significant negative health consequences such as eating disorders (Stice et al., 2017), depressive episodes (Bornioli et al., 2021), smoking initiation, risky sexual behaviors, and other health risk behaviors (Gillen et al., 2006; Howe et al., 2017; see Table 1). Each of these outcomes can result in an attached economic cost. For example, a person with anxiety or depression may utilize additional healthcare resources or they may need to take time away from work due to their condition, in addition to wage penalties associated with discrimination.'

The current study aims to advance health equity in the US by describing the social and economic costs attributable to the effects of harmful appearance ideals in terms of body dissatisfaction and appearance-based discrimination. Body dissatisfaction is defined as a severe and persistent negative attitude towards one's own physical appearance, originating from a perceived discrepancy between an individual's ideal state of appearance and their actual physical appearance (Heider et al., 2018). For example, an individual may perceive their nose as unattractive if it doesn't meet the Eurocentric beauty ideal of a slim nose. Appearance-based discrimination is defined as the unjust,

Table 1. Summary of attributable impacts and broad approach to determining increased risk attributable to body dissatisfaction and weight and skin-shade discrimination.

Impact	Nature and source of risk, prevalence, and impacts	Prevalence of impact*	OR, HR, RR		PAF	
			Female	*Male*	*Female*	*Male*
Body dissatisfaction						
Depression	The OR was derived from Bornioli et al. (2021). The prevalence of depression in the USA was drawn from Hasin et al. (2018). The Global Burden of Disease (GBD) (2019) study was used to adjust for severity and applied to the results in Hasin et al. (2018).	1.0%	1.84	2.85	13%	17%
Eating disorders	For women the OR was derived from Stice et al. (2017) and reflects the average risk across different forms of eating disorders including bulimia nervosa, binge eating disorder, and purging disorders. For men the HR was derived from Neumark-Sztainer et al. (2006). The prevalence of eating disorders was derived from Deloitte Access Economics (2020).	1.9%	2.20	1.87	18%	9%
Alcohol and drug abuse	The OR for women was derived from Bornioli et al. (2021). For men the OR was taken from Field et al. (2014). The prevalence of alcohol and drug abuse was derived from the Substance Abuse and Mental Health Services Administration (SAMHSA; (2019).	7.4%	1.46	2.13	2%	3%
Suicide attempts	The OR for suicide attempts was drawn from Crow et al. (2008), while prevalence was derived from SAMHSA (2019).	0.6%	2.23	1.81	13%	12%
Smoking	The OR was derived from Bornioli et al. (2021). Prevalence of smoking in the US was drawn from the Centers for Disease Control and Prevention (2020).	12.7%	1.56	1.41	8%	4%
Anxiety	The OR was derived from Dooley et al. (2015), based on moderate and severe anxiety. Prevalence data was drawn from Kessler et al. (2012), adjusted for severity using GBD (2019).	6.1%	1.87	1.87	22%	15%
Weight discrimination						
Depression	The OR was derived from Robinson et al. (2017) and applied to prevalence statistics from Hasin et al. (2018) (adjusted for severity based on the GBD, 2019).	1.0%	1.50	1.50	5%	5%
Anxiety	The OR of developing anxiety was 2.39 for people perceiving weight discrimination, based on Hatzenbuehler (2009). Prevalence data was drawn from Kessler et al. (2012), adjusted for severity using the GBD (2019).	6.1%	2.39	2.39	19%	21
Smoking	The OR was drawn from Sutin et al. (2013), with prevalence data from the CDC (2020).	12.7%	1.64	1.64	5%	3%
Weight gain	The OR was derived from Sutin et al. (2013), applied to the proportion of the population with a BMI>/ = 30 kg/m2. The weight distribution for the US population was derived from CDC.	50.6% i	1.72	1.72	1%	0.4%
Remaining high weight	The OR was derived from Sutin et al. (2013), based on the increased risk for the proportion of the population with a BMI =>30 kg/m2. As above, the weight distribution for the population was derived from CDC.	49.4%ii	1.69	1.69	2%	2%
Wage penalty	The average wage penalty by weight class was applied to the relevant portion of the population drawing on data from the CDC (Prevalence of Obesity and Severe Obesity Among Adults: United States, 2017–2018).		n/a			
Drug abuse	The OR for increased risk of drug abuse was drawn from Sutin et al. (2013). The prevalence of drug abuse was drawn from SAMHSA (2019).	7.4%	1.52	1.52	7%	4%

(*Continued*)

Table 1. (Continued).

Impact	Nature and source of risk, prevalence, and impacts	Prevalence of impact*	OR, HR, RR		PAF	
			Female	*Male*	*Female*	*Male*
Skin-shade discrimination						
Depression	The increased risk was derived from Monk (2015).The prevalence of depression was drawn from Hasin et al. (2018) and adjusted for severity based on GBD (2019).	1.0%	1.54	1.54	1%	1%
Hypertension	As above, the link between skin-shade discrimination and hypertension was drawn from Monk (2015). Prevalence data for hypertension was drawn from the CDC (2020).	5.5%	1.94	1.94	1%	1%
Wage penalty	For skin-shade discrimination, the average wage penalty by skin shade was applied to the relevant portion of the working population that fits this distribution based on Monk (2015), and the total Black population estimated to face discriminatory incarceration due to their skin shade Monk (2019).		n/a			

Note: OR = Odds ratio, HR = Hazard ratio, RR = risk ratio, PAF = proportion attributable fraction.*Crude rate, % of population aged ≥ 10.

prejudicial treatment of somebody based on their appearance (Turkmenoglu, 2020). Individuals can face appearance-based discrimination due to a range of physical features, such as their weight, skin shade, disability, and facial features. For instance, an employer may engage in skin-shade discrimination by paying employees with darker skin shades less than their counterparts. We initially sought to estimate costs associated with three forms of appearance-based discrimination, including weight discrimination, skin-shade discrimination, and natural-hair discrimination. However, due to data limitations, this study estimates the costs of the two common forms of appearance-based discrimination for which empirical data are available: weight discrimination against people in general and skin-shade discrimination against Black people.

Past literature has focused on the link between harmful appearance ideals and singular impacts to document negative health consequences of body dissatisfaction and appearance-based discrimination. However, previous studies have not provided holistic cost estimates in economic terms. Thus, a secondary purpose of this study is to demonstrate the array of impacts and costs that should be considered in future similar studies.

Methods

Approach and scope of analyses

The cost of harmful appearance ideals in the USA was estimated using a cost-of-illness method (Frick et al., 2010; Pezzullo, 2020; Segel, 2006). This method entails listing, measuring, valuing, and summing the costs of body dissatisfaction and of discrimination based on weight and skin shade in order to evaluate the economic burden that illness imposes on society as a whole (Jo, 2014).

This study uses a prevalence-based approach (as opposed to an incidence-based approach, the other approach available for cost-of-illness methods; Jo, 2014) to estimate annual costs of harmful appearance ideals in 2019. A prevalence-based approach estimates the total costs of a condition within a year, regardless of when the disease first occurred. The calendar year 2019 was selected as the study period to estimate costs prior to the COVID-19 pandemic. Costs were estimated separately for each pathway (body dissatisfaction, and discrimination based on weight and skin shade) and cannot be summed due to likely potential crossovers.

Each pathway has a range of attributable impacts, such as anxiety disorders, eating disorders, and drug abuse (Table 1). The costs of these impacts were estimated by multiplying the number of individuals who developed the outcome (e.g., an eating disorder) as a result body dissatisfaction or appearance-based discrimination with the per person cost of each impact. For example, of the 45 million people with body dissatisfaction, it was estimated that ~ 1.9%, or 835,756, developed an eating disorder due in large part to their dissatisfaction.

To estimate the financial cost of eating disorders attributable to body dissatisfaction ($9.65 billion), this 835,756 was multiplied by the per person financial cost associated with eating disorders ($11,550.50). This approach to costing was adopted for all attributable impacts.

Selection of inputs

A quasi-systematic literature review was conducted to select inputs for this study. This review sought to identify:

(1) The prevalence of each body dissatisfaction and discrimination based on weight, skin shade and hair discrimination.
(2) The impacts attributable to body dissatisfaction and discrimination based on skin shade and weight (e.g., depression, anxiety, eating disorders, etc.) (see Table S1).
(3) The increased risk of developing these conditions/impacts, due to having body dissatisfaction or discrimination based on skin shade or weight (see Table 1).
(4) The cost inputs associated with each attributable impact (e.g., health and productivity costs associated with eating disorders).

The search terms used to conduct this review are provide in Table S2. This review involved searches in PubMed and CINAHL (for scientific literature) and was supplemented with ad-hoc searches using existing search engines (for grey literature) and snowballing techniques to expand terms. Over 250 abstracts were screened for relevance, and the review process and the selection of inputs followed a structured, hierarchical approach based on quality, generalizability, and internal consistency. The evidence was assessed using the guiding principles of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, with key considerations incorporated including the risk of reporting bias, the precision of effect estimates, the consistency of individual study results, and how directly the evidence answers the question of interest (Siemieniuk & Guyatt, 2022). Based on these criteria, 70 sources were selected and considered for inclusion in the cost-of-illness model. Causal, longitudinal, and nationally representative U.S. studies were prioritized for inclusion in the model. Further explanation for the decision to include 18 of the 70 sources analyzed is contained in Table S1.

The shortlist of sources was independently validated by an expert advisory panel established for the purpose of this study to critically appraise the methodology and inputs used within the modelling.

Table 2. Summary of methods to estimate prevalence and mortality.

Epidemiology domain	Method of estimation
Prevalence	
Weight discrimination	Prevalence estimates for weight discrimination were derived by multiplying estimates of the proportion of people who have perceived weight discrimination by the number of people in the US population (Robinson et al., 2017; Spahlholz et al., 2016). Where these prevalence estimates or their associated outcomes were specific to people in a certain weight category, the weight distribution for the population was derived from US Centers for Disease Control and Prevention (CDC) (Fryar et al., 2020).
Skin-shade discrimination	Prevalence was derived by segmenting the Black population in the US into 10 skin shades on a scale from 'very light' to 'very dark' (Kreisman & Rangel, 2015). Since impacts in the literature were presented for people based on their skin shade, the number of people in each skin shade category informed the prevalence for the modeling, by impact. There was insufficient evidence available for other communities such as Asian Americans, Native Americans, Latin Americans, etc.
Natural hair discrimination	The estimates were drawn from a study by Johnson and Bankhead (2014), which captured self-reported experiences of natural hair discrimination among Black women in the US. The study estimated that one-quarter of US women identifying as being of African descent are affected by natural hair discrimination.
Body dissatisfaction	Estimates were drawn from Fallon et al. (2014), which used the Body Areas Satisfaction Subscale (BASS) of the Multidimensional Body-Self Relations Questionnaire (MBSRQ). These estimates were adjusted to consider differences by age (Table S3a) and standardized to the age-sex distribution of the general US population, for people aged 10 years and older (Table S3b).
Mortality	
Excess mortality risk associated with attributable conditions	A range of sources informed the risk of premature mortality (for ages ≥ 10), which varied by attributable health condition. The mortality crude rate (rate per 100,000 people) for depression was 0.80%. This was based on the deaths by suicides in 2019 from CDC Wonder (Sutin et al., 2021); of total deaths by suicide, 50% are attributable to depression based on evidence from Greenberg, Fournier, Sisitsky, Pike, et al. (2015). The crude rate for anxiety was 0.03% (Sutin et al., 2021); of total deaths by suicide, 10% are attributable to anxiety (Stice et al., 2017). The crude rate for alcohol and drug abuse was 1.55% (Sutin et al., 2021), presented as a proportion of total hospitalizations and emergency department visits due to drug and alcohol use in 2019. The crude rate for eating disorders is 0.19% (McClure et al., 2011). We note that the attributable impacts may be a risk factor for other health conditions which can result in premature mortality, however these are not captured as they are beyond the direct impacts included in this study.

Sources and further details for each estimate are listed in Tables 1, 2 and 3 and Tables S12–16.

Prevalence and attributable impacts

The prevalence of body dissatisfaction varies considerably in the literature, depending on how it is defined and measured (Bucchianeri et al., 2013; Esnaola et al., 2010; Karazsia et al., 2017; Moehlecke et al., 2020; Quittkat et al., 2019; Wang et al., 2019). To determine the one-year prevalence of body dissatisfaction among the population aged 10 years

Table 3. Summary of cost types and estimation method.

Cost type and components	Description and methods	Conditions for which this cost was estimated, by pathway
Health system costs		
Medical services including inpatient and outpatient costs	Costs were taken from existing cost of illness studies and adjusted for changes in prevalence and inflation. Where unit health costs were not provided in 2019 dollars, they have been inflated based on the personal health care price index from Centers for Medicare & Medicaid Services (1.4%) (Centers for Medicare & Medicaid Services, 2022). Health unit costs and data sources for body dissatisfaction and discrimination based on skin shade and weight are provided in Table S12.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety, drugs and alcohol abuse. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse and having a BMI ≥30 kg/m2. For weight discrimination this was estimated for depression and hypertension.
Pharmaceutical costs (i.e., prescription drugs)	Pharmaceutical costs were also taken from existing cost of illness studies when available and adjusted for prevalence and inflation based on the personal health care price index (Neumark-Sztainer et al., 2006). See Table S12 for detailed sources.	
Productivity costs		
Reduced employment associated with attributable conditions	Estimates were drawn from the literature for each attributable condition/illness and then multiplied by US general population employment rates (U.S. Bureau of Labor Statistics, 2022c) and average weekly earnings by age and gender (U.S. Bureau of Labor Statistics, 2022d). Earnings were adjusted to incorporate employment benefits (adjusted upwards by 1.46) (U.S. Bureau of Labor Statistics, 2022b). The relative reduction in employment associated with attributable conditions and illnesses is shown in Table S9a.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety. For skin-shade discrimination, this was estimated for anxiety, depression. For weight discrimination this was estimated for depression.

(*Continued*)

Table 3. (Continued).

Cost type and components	Description and methods	Conditions for which this cost was estimated, by pathway
Reduced employment due to discrimination	For discrimination based on skin shade and weight, the employment gap was derived based on the lower likelihood of employment for each of skin shade and weight discrimination when comparing: • An individual who has darker skin shades (medium or dark skin shades) compared to one with lighter skin shades, within the same race. Specifically, this was applied to Black working females and males of a 'dark' or 'very dark' skin shade as categorized by Monk (2015). • An individual who reports having experienced weight discrimination compared to one who does not. This was applied to White working females with a BMI of 30 or higher, White working males with a BMI between 25-30 and Hispanic working females with a BMI of 25 or higher. The relative reduction in employment is shown in Table S9a and S14.	This was estimated for skin-shade discrimination and weight discrimination only.
Wage losses	Wage gaps attributable to discrimination based on skin shade and weight were also estimated. For skin-shade discrimination, the average wage penalty by skin shade was applied to the relevant portion of the working population that fits the skin shade distribution based on Monk (2015). This applied to Black working females and males of a 'dark' and 'very dark' skin shade (6.3% wage gap for both sexes) (Kreisman & Rangel, 2015). A similar approach was used to estimate wage penalties associated with weight discrimination drawing on data from the CDC (2022). This was applied to white working females with a BMI of 25 or higher (7.5% reduction in wages) (Han et al., 2009), and Black working females with a BMI of 30 or higher (4.9%).	
Absenteeism and presenteeism	Unit costs have been taken directly from existing cost of illness studies where available and adjusted for changes in prevalence and inflation (see Table S13). A wage inflation parameter of 2.5% was used to inflate values to 2019 dollars (Federal Reserve Bank of St Louis, 2022). Where productivity costs do not already incorporate employee benefits, these were added based on the ratio of wages and salaries to total employee compensation (U.S. Bureau of Labor Statistics, 2022b).	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety, drugs and alcohol abuse and smoking. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse, having a BMI ≥30 kg/m2 and smoking. For weight discrimination this was estimated for depression and hypertension.

(*Continued*)

Table 3. (Continued).

Cost type and components	Description and methods	Conditions for which this cost was estimated, by pathway
Informal care	Informal care costs were calculated using an opportunity cost approach. The proportion of people receiving support from a caregiver for each attributable condition was multiplied by the number of hours of care provided. The opportunity cost of an hour of care was estimated using general population average weekly earnings and employment rates from the BLS, with earnings adjusted to incorporate employment benefits. The opportunity cost of a caregiver's time was estimated to be $22.48 per hour. A summary of informal care hours and data sources are provided in Table S9b.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety. For skin-shade discrimination, this was estimated for anxiety, depression. For weight discrimination this was estimated for depression.
Loss of lifetime earnings	To estimate premature mortality, the discounted future value of lifetime earnings was multiplied by deaths associated with attributable conditions. Lifetime earnings are discounted at a rate of 3% (Murray et al., 2012), and incorporate employment rates and average lifetime earnings based on the age-gender distribution of deaths.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety, drugs and alcohol abuse. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse. For weight discrimination this was estimated for depression.
Other costs		
Efficiency losses—reduced taxation	Efficiency losses capture the reduced economic efficiency associated with the need to levy taxes to fund the provision of government services and replace lost employment taxes (Browning, 1987). Lost taxation revenue was estimated by multiplying an average personal income tax rate and average indirect taxation rate to lost earnings. The average rates of taxation were derived based on Internal Revenue Service tax statistics data and were 23.8% average personal income tax rate, 7.1% average indirect tax rate (OECD, 2019) and 25.7% average company tax rate (Pomerleau, 2018). These tax rates were then multiplied by the total productivity impacts (including informal care costs) and by the burden of taxation to derive efficiency losses.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety, drugs and alcohol abuse and smoking. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse, having a BMI ≥30 kg/m2 and smoking. For weight discrimination this was estimated for depression, hypertension and reduced employment due to discrimination.
Efficiency losses—government expenditures	Efficiency losses associated with government expenditure were estimated by applying rates of payment from the federal government to the total health expenditure and by the burden of taxation. Based on data from the Centers of Medicare and Medicaid Services (2022), the federal government pays for 29% of total health expenditure on average, while state and local governments fund 16.10%. This was multiplied by total health expenditure and by the burden of taxation to derive efficiency losses. Income tax was estimated to impose a burden of $0.33 for every dollar of tax levied, based on an average taken across multiple academic studies.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety, drugs and alcohol abuse. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse, having a BMI ≥30 kg/m2. For weight discrimination this was estimated for depression and hypertension.

(*Continued*)

Table 3. (Continued).

Cost type and components	Description and methods	Conditions for which this cost was estimated, by pathway
Prison expenditure	Annual prison expenditure per person was derived from the Federal register for 2017 ($36,299) and inflated to 2019 ($37,969) using the inflation rate derived from Consumer Price Index growth (1.8%) (U.S. Bureau of Labor Statistics, 2022a). This was applied to the total estimated number of people in prison in 2019 due to skin-shade discrimination, to arrive at the annual prison expenditure attributable to skin-shade discrimination. This was applied to Black males and females aged 10 years or above, of the darkest tercile as derived from Kreisman and Rangel (2015).	This was estimated for skin-shade discrimination only.
Societal impact of wage losses	This reflects the reduction in economic efficiency from a suboptimal allocation of talent with the labor market, causing a reduction in output. A key assumption in this modeling is that the wage gap represents an inefficient use of labor resources, and that societal output would be higher in the absence of discrimination based on skin shade and weight. Analysis of the results in Hsieh et al. (2019) indicates that close to 20% of the possible gain in GDP could be realized if wage gaps did not persist in 2010. When compared to the size of the wage gaps that existed in 2010 for women of all races and Black men (U.S. Bureau of Labor Statistics, 2011), societal output can be estimated to be higher by an amount approximately equal to two-thirds (63%) of the wage gap. This was applied to the wage gap estimate derived in this study. A summary of the wage gap and data sources is provided in Table S15.	This was estimated for skin shade and weight discrimination only.
Reduced well-being		
Reduced well-being	The value of reduced well-being was measured using the burden of disease methodology (Murray, 1994), by multiplying Disability Adjusted Life Years (DALY) by the value of a statistical life year (VSLY), estimated to be $307,167 in 2019 based on the mid-point of Office of Management and Budget recommendation in 2003 (a VSLY of $5.5 million) and inflated to 2019 dollars using CPI inflation. A discount rate of 3% was used for future burden of disease costs (Murray, 1994). No discounting was applied to future DALY estimates when presented in terms of DALY (Vos et al., 2020). The DALY in this study capture the reduction in quality of life (measured through years of healthy life lost due to disability or YLD) and premature death (measured through years of life lost due to premature death or YLL) for people experiencing body dissatisfaction or discrimination based on skin shade and weight. The YLD were estimated by multiplying disability weights by the prevalence of body dissatisfaction and discrimination based on skin shade and weight and adjusted to consider the mean duration of the condition. A summary of the disability weights by condition, used to estimate the YLD in this study, is provided in Table S16.	For body dissatisfaction, this cost was estimated for depression, suicide attempts, eating disorders, anxiety. For skin-shade discrimination, this was estimated for anxiety, depression, drug abuse, having a BMI ≥30 kg/m2 and smoking. For weight discrimination this was estimated for depression.

or older, estimates were drawn from Fallon et al. (2014), which uses a sample of roughly 1,900 adults in the US.[1] This source was selected because it leveraged US data, adopted a robust measurement technique for BD, and the results were conservative relative to other research on this topic (see Fiske et al., 2014).

Fallon et al. (2014) measured body dissatisfaction with the Body Areas Satisfaction Subscale (BASS) of the Multidimensional Body-Self Relations Questionnaire (MBSRQ), which uses a five-point scale ranging from (1) *very dissatisfied* to (5) *very satisfied* to measure participant's satisfaction with nine specific areas of their bodies (i.e., face, hair, lower torso, mid-torso, upper torso, muscle tone, weight, height and overall appearance). Scores are averaged across the nine areas to yield a single body dissatisfaction score, where lower scores represent greater dissatisfaction. While there are various cut-off points in the literature for classifying people as being body dissatisfied, this report uses a cut-off score of 2.75, in line with established practices (Frederick et al., 2007).[2] We note that further work is needed to establish a consistent and robust measurement of body dissatisfaction across the literature with varying degrees of severity; see the Discussion section. These estimates were also adjusted to consider differences by age and sex before being multiplied by the current age-sex distribution of the general USA population (details on these calculations are provided in Table S3a).

The prevalence of each of the three forms of appearance-based discrimination (weight discrimination, skin-shade discrimination and natural-hair discrimination) was estimated using a range of sources from literature (Table 1). The prevalence of skin shade and natural-hair discrimination are respectively based on (1) the estimated prevalence of natural-hair discrimination among Black women in the US and (2) the prevalence of skin-shade discrimination among the Black population. Prevalence estimates were limited to these groups due to inadequate requisite data surrounding the prevalence and impacts for other ethnic/racial communities. Prevalence estimates for weight discrimination were derived by multiplying estimates of the proportion of people who report perceived weight discrimination by the number of people in the USA population (Robinson et al., 2017; Spahlholz et al., 2016). Where these prevalence estimates or their associated outcomes were specific to people in a certain weight category, the weight distribution for the population was derived from US Centers for Disease Control and Prevention (CDC) (Fryar et al., 2020).

This study also quantified the health conditions attributable to body dissatisfaction and discrimination based on weight and skin shade to capture the lifetime loss in productivity and reduced well-being from these pathways.

A range of sources informed the risk of these conditions and their attributable impacts (Table 1).

Cost estimation and approach

Tangible economic costs were generated through a population attributable fraction (PAF) approach (World Health Organization, 2022) or through direct cost estimation. The PAF represents the proportional reduction in population disease or mortality (e.g., anxiety) that would occur if exposure to beauty ideals (from body dissatisfaction or discrimination based on skin shade or weight) were reduced to zero. The PAF approach for each impact i involved multiplying the PAF (which is sex specific s) by the average costs per person C and by the prevalence P of that impact in a given year (equation 1). In some instances, the PAF was multiplied by total costs T for each impact attributable to body dissatisfaction and discrimination based on skin shade and weight (equation 2).

$$Cost_i = PAF_{si}\, x\, C_i\, xP_i \tag{1}$$

$$Cost_i = PAF_{si}\, x\, T_i \tag{2}$$

For example, to estimate the financial cost of eating disorders attributable to body dissatisfaction ($3.43 billion for girls aged 15–19), the PAF (19% for girls aged 15–19) was multiplied by the financial cost per person of an eating disorder ($9,781.33) and prevalence of eating disorders among girls with body dissatisfaction (350,505 girls aged 15–19).

The PAFs were derived based on the prevalence rate of that condition together with the risk ratio (RR, or odds ratio or hazard ratio where the RR was not available; see equation 3; Zhang & Kai, 1998). The RR was drawn from a range of sources (Table 1). Where only an OR is provided, it was converted into RR using prevalence as shown in equation 4 (Zhang & Kai, 1998).

$$PAF_{si} = \frac{P_i\, x\, (RR_i - 1)}{P_i\, x\, (RR_i - 1) + 1} \tag{3}$$

$$RR_i = \frac{RR_i}{1 - PR_i + (PR_i\, x\, OR_i)} \tag{4}$$

The total cost of body dissatisfaction reflects the sum of the costs of each impact attributable to body dissatisfaction (e.g., eating disorders, depression, etc.). Similarly, the total cost of discrimination based on skin shade and weight reflects the sum of the costs of each impact attributable to appearance-based discrimination (e.g., hypertension). The direct cost estimation method was used for labor market outcomes of skin-shade discrimination, which manifest as reduced

employment (also referred to as the human capital approach).[3] This method involved applying the average loss in wages from reduced employment and the earnings differential for those employed due to skin-shade discrimination to the total working population affected by skin-shade discrimination (Table 3).

Cost types

The collective socioeconomic costs encompass financial, economic, and non-financial costs. Financial costs modelled in this study include health-system costs, productivity costs, and costs associated with discriminatory incarceration due to skin shade. Productivity costs are measured according to the human capital method, which takes into account the lost "market value" of that individual's future contribution to production in a society if they had continued to work in full health; thus, it includes wage losses, reduced employment, and informal caregiving costs. Economic costs include efficiency losses associated with the need to levy additional taxes to fund services provided because of body dissatisfaction or appearance-based discrimination (e.g., additional healthcare for attributable conditions), and recoup lost tax revenue due to body dissatisfaction or appearance-based discrimination (e.g., due to lower employment).

Non-financial costs include loss of well-being that captures the reduction in quality of life, measured as Years Lost to Disability (YLD), and premature death, measured as Years of Life Lost (YLL), for people experiencing impacts of body dissatisfaction (e.g., depression, smoking) and discrimination based on weight and skin shade (Table 2). The value of reduced well-being was measured by multiplying Disability Adjusted Life Years (DALY), which is the sum of YLDs and YLLs, by the Value of a Statistical Life Year (VSLY). Based on international and Australian research the VSLY is $307,167 in 2020 dollars (Deloitte Access Economics, 2020).

Two main approaches were adopted to estimate each cost component. First, where available, existing cost estimates for each impact were extracted directly from the literature. For example, the health and productivity costs of major depressive disorder were taken from Greenberg, Fournier, Sisitsky, Simes, et al. (2021). Per person or per unit costs for each impact were updated based on the number of people affected in 2019. Otherwise, cost components were estimated by aggregating raw data inputs (Table 2). For example, the labor market outcomes of skin-shade discrimination were computed by multiplying the average loss in wages from reduced employment and wage penalty associated with darker skin shades by the total working population affected by skin-shade discrimination.

Sensitivity analysis

In economic evaluation, sensitivity analysis is a technique used to determine how different values of an input variable will influence a particular output

variable under the given conditions and assumptions (Jo, 2014). By creating a set of scenarios, it can determine how changes in one variable will impact the target variable and reveal which parameters are the key drivers of the results. In this study, sensitivity analysis was conducted on prevalence, VSL, and estimates relating to the underlying risk of developing a condition. For example, Bornioli et al. (2021) found that women with body dissatisfaction were 1.84 times more likely to develop severe depressive episodes, and this was tested in sensitivity analysis. Key sensitivities specific to body dissatisfaction and discrimination based on skin shade and weight were also tested in our modelling where relevant. The effects of risky behaviors such as alcohol use or smoking in a single year fail to capture the full impact of a risky behavior over the life course. As such, sensitivity testing includes the possible long-term effects and risk for future loss of healthy life from smoking as an example.

Specific inputs were selected from the literature and include main estimates as well as upper and lower bound confidence intervals. For example, the sensitivity tests for the increased risk of developing depression attributable to body dissatisfaction were drawn from lower and upper bound confidence intervals of Bornioli et al. (2021). A summary of sensitivity analysis inputs is provided in Table S4.

Data analysis and ethical considerations

Data were collected from public data sources and literature (see Tables 1, 2 and 3). The data were compiled and analyzed in Microsoft Excel. As no individual patient data were collected, this study did not require ethics approval.

Results

Body dissatisfaction

Prevalence and costs

The overall 1-year prevalence of severe body dissatisfaction in 2019 was estimated to be 16% of the population aged 10 years or older, representing 45 million people (Figure 1, Table S3a-b).

The combined financial and economic costs of severe body dissatisfaction were estimated to be $84 billion in 2019, equivalent to $1,900 per

Table 4. Total economic and social costs of body dissatisfact**ion.**

Cost component	Total cost ($m)	Cost per person with severe body dissatisfaction ($)	Proportion of total cost (%)
Health-system costs	9,060	204	3
Productivity losses	68,566	1,545	23
Efficiency losses	6,464	146	2
Loss of wellbeing	220,614	4,972	72
Total	**304,704**	**6,867**	**100**

Components may not sum due to rounding.

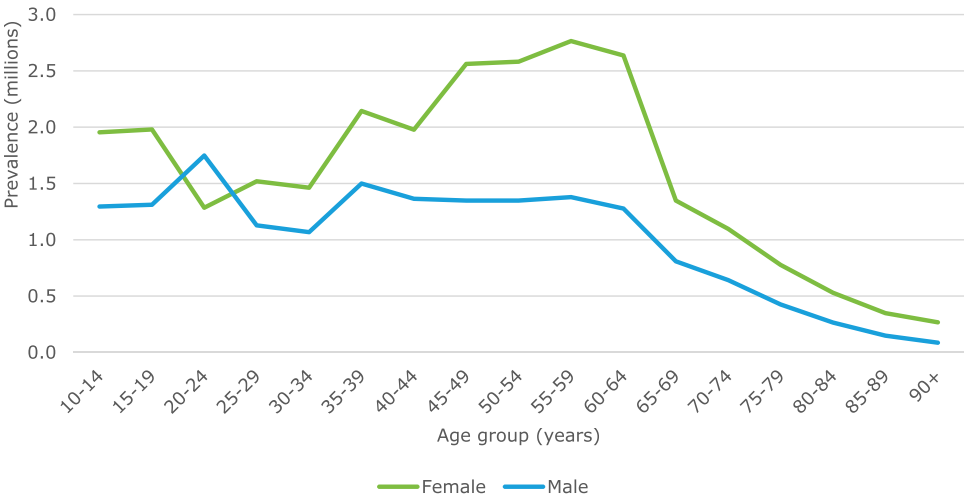

Figure 1. Prevalence of body dissatisfaction by five-year age group (Fallon et al., 2014).

person in the US with severe body dissatisfaction (Table 4). The largest share of these costs was accounted for by anxiety due to body dissatisfaction ($34 billion or 41%), followed by depression ($15 billion or 18%). Individuals impacted by body dissatisfaction bore approximately one-third (32%) of the total financial and economic costs, while the government bore 29% and employers bore 14%. The remaining 25% of the costs was borne by friends and family (informal carers), the society and healthcare payers.

Table 4 summarizes costs attributable to body dissatisfaction by cost component. Total financial costs of body dissatisfaction were estimated to be $77.6 billion (this excludes efficiency losses). The estimated health-system costs associated with body dissatisfaction were $9.1 billion, which account for 11% of the total financial and economic costs. Productivity losses associated with body dissatisfaction were estimated to cost $68.6 billion, accounting for 81% of the total financial and economic costs. Reduced workforce participation accounted for the largest share of total productivity losses (39%) at $27 billion. The loss in economic efficiency due to health outcomes attributable to body dissatisfaction was $6.5 billion in 2019. Table S5a-c details costs by cost component and attributable impact.

In 2019 there were an estimated 718,000 DALYs due to body dissatisfaction, which is equivalent to a total reduction in well-being of $220.6 billion in 2019. The wellbeing loss associated with body dissatisfaction was made up of depression ($92.1 billion), suicide attempts ($1.1 billion), eating disorders ($53.0 billion), anxiety ($53.1 billion), and drug and alcohol abuse ($21.3 billion) (Table S6).

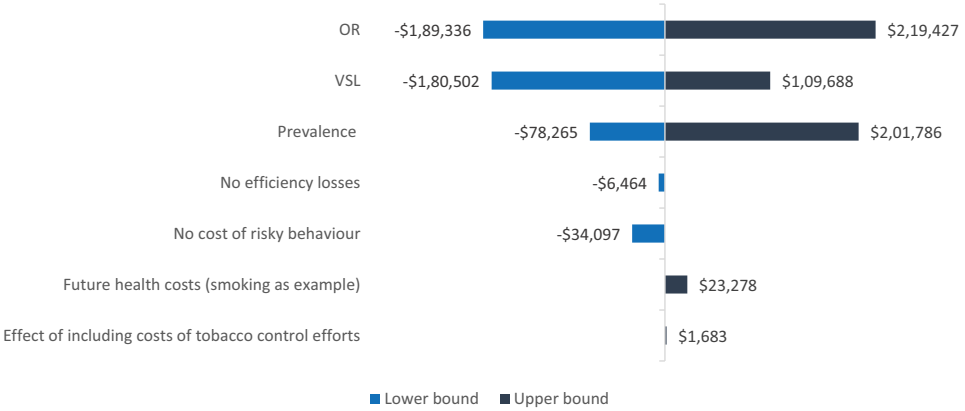

Figure 2. Sensitivity analysis on total costs of body dissatisfaction, by parameter varied (deviation from the base case) ($millions). See Table S4 for a detailed list of inputs used in the sensitivity analysis.

Sensitivity analysis

The results of the sensitivity analyses showed the total costs of severe body dissatisfaction likely range between $226.4 billion and $506.5 billion (Figure 2). The results were most sensitive to changes in estimates relating to the underlying risk of developing a condition such as depression. A detailed list of the sensitivity results is provided in Table S7, while Table S4 provides a detailed summary of the inputs used for sensitivity analysis.

Appearance-based discrimination

Prevalence and costs

This study found that in 2019, an estimated 34 million people in the US were affected by weight discrimination, 27 million by skin-shade discrimination, and 5 million by natural hair discrimination (Table S8a-c summarizes results by 5-year age groups). Overlaps between the experiences of the different forms of discrimination could not be quantified due to insufficient empirical evidence.

The combined financial and economic costs of weight discrimination and skin-shade discrimination were estimated to be $200 billion and

Table 5. Total economic and social costs of weight discrimination.

Cost component	Total cost ($m)	Cost per person ($)	Proportion of total cost (%)
Health-system costs	$18,457	$281	5%
Productivity losses	$51,479	$784	13%
Wage loss societal impact	$73,703	$1,122	18%
Employment losses	$45,273	$689	11%
Prison operating costs	NA	NA	NA
Efficiency losses	$10,806	$165	3%
Loss of wellbeing	$206,682	$3,147	51%
Total	**$406,400**	**$6,187**	**100%**

Components may not sum due to rounding.

Table 6. Total economic and social costs of skin-shade discrimination.

Cost component	Total cost ($m)	Cost per person ($)	Proportion of total cost (%)
Health-system costs	$210	$3	0%
Productivity losses	$1,290	$20	2%
Wage loss societal impact	$30,032	$457	42%
Employment losses	$27,931	$425	39%
Prison operating costs	$948	$14	1%
Efficiency losses	$2,404	$37	3%
Loss of wellbeing	$8,417	$128	12%
Total	**$71,233**	**$1,084**	**100%**

Components may not sum due to rounding.

$63 billion, respectively (Tables 5 and 6). Individuals impacted by skin shade and weight discrimination, and their families and friends, bore 58% of the total financial and economic costs, while the government bore 30%, employers bore 3%, and the rest of the society bore 8%. Women bore 66% ($269 billion) of the total costs of weight discrimination, and 50% ($36 billion) of the total costs of skin-shade discrimination. Total financial costs were estimated to be $249.3 billion across both types of discrimination (this excludes efficiency losses).

The estimated health-system costs associated with skin-shade discrimination were $200 million, while those attributable to weight discrimination were $18 billion. Productivity losses associated with the health conditions were estimated to cost $51 billion associated with weight discrimination and $1.0 billion associated with skin-shade discrimination. Reduced workforce participation accounted for the largest share of total productivity losses (36%) at $19.0 billion.

Employment losses associated with labor-market discrimination were $45.3 billion due to weight discrimination and $27.9 billion due to skin-shade discrimination. Wage losses from labor-market discrimination were $73.7 billion attributable to weight discrimination and $28.5 attributable to skin-shade discrimination. Wage losses from discriminatory incarceration were $1.5 billion, all of which was due to skin-shade discrimination. Discriminatory incarceration also incurred $0.9 billion in prison operating costs. The loss in economic efficiency was $11.0 billion due to weight discrimination and $2.4 billion due to skin-shade discrimination. Table S9a-e summarize costs by cost component and attributable impact.

In 2019, the wellbeing loss was $206.7 billion due to weight discrimination, reflecting lost wellbeing from depression ($33.0 billion), anxiety ($98.9 billion), higher weight ($53.6 billion) and drug abuse ($21.1 billion). The wellbeing loss was $8.4 billion due to depression attributable to skin-shade discrimination (Table S10).

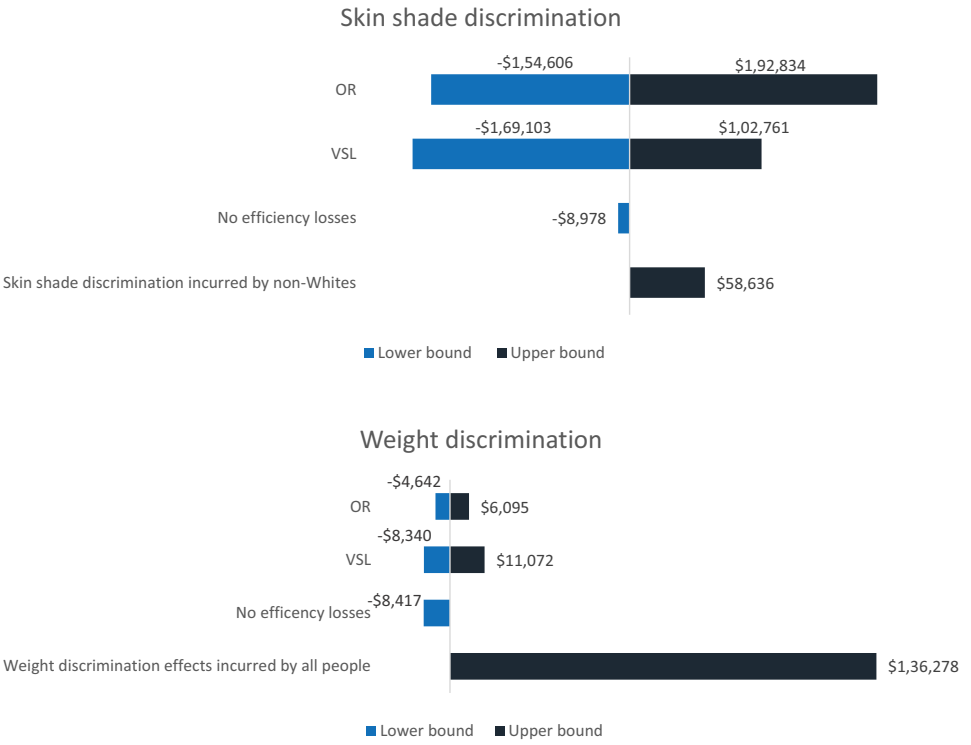

Figure 3. Sensitivity analysis on total costs of skin shade and weight discrimination, by parameter varied (deviation from the base case) ($millions). See Table S4 for a detailed list of inputs used in the sensitivity analysis.

Sensitivity analysis

The results of the sensitivity analyses showed the total cost for skin-shade discrimination likely ranges between $175 and $537 billion, while for weight discrimination it varies between $126 and $265 billion (Figure 3; Table S11a-b). The results were most sensitive to changes in estimates relating to the PAF.

Discussion

Economic cost frameworks are important for determining policy to advance health equity. There are always budget constraints, so cost models can inform effective and equitable funding by outlining the economic costs incurred by public health issues (Roldós & Breen, 2021). An economic cost approach can also communicate the significance of conditions, such as body dissatisfaction, that may have been normalized to the point that they are not considered "real" public health issues. This study aims to advance health literacy and equity in the USA by highlighting the significant economic, and thus social, costs associated with body dissatisfaction and with discrimination based on skin

shade and on weight. Further, the exploratory and complex nature of this work opens the pathway for further investigation into harmful appearance ideals, both in terms of the scope and depth of analysis, including the determination of key variables and parameter estimates.

Prevalence and outcome estimates from this study indicate that beauty ideals create widespread negative impact in the USA through the pathways explored in this report, and likely even more through other pathways (e.g., iatrogenic surgeries) that are outside the scope of this study. Our analysis shows that these beauty ideals are associated with a range of negative impacts, which in turn incur economic costs, including the direct costs of treatment for health conditions, lost individual and caregiver productivity costs, and broader societal costs, in addition to the substantial loss in well-being. Eating disorders, anxiety, depression and alcohol and other drug abuse are among the key health impacts associated with harmful appearance ideals. This study found that the costs likely range between $226.4 billion and $506.5 billion for body dissatisfaction, between $175 and $537 billion for skin-shade discrimination, and between $126 and $265 billion for weight discrimination.

The substantial combined financial, economic, and wellbeing costs of severe body dissatisfaction and discrimination based on skin shade and weight in the USA reported here demonstrate the scale and extent of these issues. While the majority of costs related to harmful beauty ideals were borne by individuals impacted by them, a large proportion of the costs is borne by every taxpayer. The gender disparity, with women bearing more than two-thirds of the total costs, also highlights its association with entrenched gender inequity. The findings in this report underscore the urgent need to address body dissatisfaction and discrimination based on skin shade and weight in the USA to help reduce attributable economic and social costs, as well as concurrent healthcare inequities based on a number of salient variables such as gender orientation, sexual orientation, race/ethnicity, and social class.

Furthermore, this study is consistent with previous research showing that skin-shade discrimination is more commonly perpetrated against people of color with darker skin shades, and weight discrimination is more commonly perpetrated against people of a higher weight (Ciciurkaite & Perry, 2018; Gonzalez-Barrera, 2019). Given these groups are already vulnerable to other forms of structural disadvantage and discrimination, such as employment prejudice and poorer healthcare, normative appearance ideals can perpetuate, further entrench, and augment the impact of existing prejudices and inequities (Egbeyemi, 2019).

Our study underscores the enormous social and economic costs of harmful appearance ideals, offering the most comprehensive accounting of the costs to date for USA society. Understanding of these costs is vital for both policy-makers and community advocates to create evidence-based priorities and policies. For instance, effective interventions can be compared not only in

terms of their immediate and longer-term effects on reducing body dissatisfaction but also in terms of their potential for long-term cost savings to individuals, families, employers, and government, thus providing illuminating empirical data to guide how best to allocate resources to interventions with highest potential for a significant and lasting impact on society. Similarly, our findings provide valuable economic data to support initiatives led by policymakers and community advocates to advance effective interventions in educational, workplace, medical, or other settings to reduce and prevent weight and skin-shade bias or to prohibit these forms of discrimination outright through law change. For instance, in the dozens of U.S. states and municipal jurisdictions that have enacted laws since 2019 to prohibit natural-hair discrimination, amendments to statute could be advanced to add bans on skin-shade discrimination in workplaces, schools, public accommodations, healthcare, and other settings. Some progress has been made in enacting legislation to prohibit weight discrimination, with New York City being the most recent municipality to enact such policy, and more jurisdictions could similarly enact and evaluate protective policy against weight discrimination.

Tackling harmful beauty ideals will likely require a range of interventions, underpinned by evidence and supported by multi-sector partnerships, to help drive broader social change. Potential interventions include promoting safer digital spaces (The Guardian, 2021), encouraging diversity in advertising (Ambwani et al., 2021; McClure et al., 2011), regulating the sale of harmful products (Hall, 2021), tax incentives and laws to end appearance-based discrimination (Han et al., 2009), education at schools to promote body confidence and healthy development (McLean et al., 2016), and increasing mental health support services (Sutin et al., 2021).

The limited scope of available literature led to several limitations in this study. First, this study did not include costs associated with the longer-term physical and psychological health sequelae of body dissatisfaction and discrimination based on skin shade and weight that persist or emerge over time, such as chronic physiological dysregulation resulting from perceived weight discrimination (Daly, Sutin, & Robinson, 2019) and gastrointestinal impairment or organ damage due to use of over-the-counter diet pills, laxatives, and/or diuretics for weight loss (Steffen et al., 2007; Stickel & Shouval, 2015; Yen & Ewald, 2012). Longer-term social consequences, such as housing instability and employment instability (Shannon et al., 2017), were also not included. As such, the cost estimates in this study are likely to substantially underestimate the true cost of harmful beauty ideals.

Our review identified various gaps in the literature around the impacts of body dissatisfaction and appearance-based discrimination. For example, while there is a large body of evidence surrounding the impact of body dissatisfaction on disordered eating in men, there is less evidence linking body dissatisfaction to clinical diagnoses of eating disorders in men. In some cases, this

study relied on non-U.S. based samples for certain estimates of impacts, reducing generalizability to the U.S. population. For example, the odds ratio adopted for anxiety is based on an Irish sample. To obtain more precise estimates, more U.S.-specific research is needed. Furthermore, some financial impacts were not estimated because their costs are not well quantified in literature. For body dissatisfaction this includes the costs of certain behavioral disorders (e.g., peer problems and chronic emotional distress), low self-esteem, risky sexual behavior, worse educational outcomes and professional engagement, and the use of risky cosmetic products and procedures. For weight and skin-shade discrimination, this includes employment and health outcomes associated with discrimination.

Variation in the definition and measurement of body dissatisfaction indicates the need for a consistent definition and measure of body dissatisfaction, which would improve research quality and cross-cultural validity (Kling et al., 2019). The lack of consistency in measurement complicated our comparisons across studies, population groups, and contexts. A consistent measure for determining, across cultural contexts, when body dissatisfaction should be considered persistent and severe would improve tremendously any investigations of the costs of appearance ideals. This is evident in the results presented in the relevant literature. For example, Fiske et al. (2014) found that the prevalence of body dissatisfaction among U.S. adults varied between 11%-72% for women and 8%-61% for men, depending on how it is defined and measured.

Findings from this study emphasize the need for research and resources invested into interventions to reduce the impacts of harmful appearance ideals. This includes research addressing specific forms of appearance-based discrimination that were not quantified (e.g., hair discrimination) or which were not included in this report (e.g., height discrimination), and other manifestations of appearance-based discrimination such as the well-documented suboptimal healthcare provision for people of a high weight (Phelan et al., 2015; Tomiyama et al., 2018). It is also important to improve understanding of the intersectionality between different forms of appearance-based discrimination.

More research is needed to better understand the prevalence and impacts of skin-shade discrimination for other communities of color (Rondilla & Spickard, 2007; Ryabov, 2016). The lack of available evidence has meant that some impacts in this study, such as incarceration, are based largely on studies with the Black community. Where gaps exist the best available estimate from the literature has been used in sensitivity testing (e.g., to demonstrate what the cost might be if skin shade discrimination leads to a wage gap for all workers of color). Furthermore, for costs related to skin shade discrimination, controls for race were carefully considered to understand how appearance-based discrimination differs for people of the same race, but with different skin shades.

However, more work is needed to enable researchers to further disentangle the effects of appearance-based discrimination from other forms of racial and gender discrimination and identify the incremental costs.

In addition, it is acknowledged that the present study relied on other studies for information about individuals' race or ethnicity as it relates to experiences of appearance-based discrimination and body dissatisfaction. However, the racial and/or ethnic identity of certain communities in the USA is complex, and source data often lack more detailed information about individuals' race or ethnicity. It is recommended that future research identify race and ethnicity separately to enable researchers to understand how outcomes differ for different subgroups and to ensure individuals' racial and ethnic backgrounds are accurately represented in the data.

Across both body dissatisfaction, more research is needed to better understand the experiences of people in transgender and gender nonbinary communities. Body dissatisfaction and weight, skin shade, and hair discrimination affect transgender and gender nonbinary communities, but how these experiences are patterned by age, sex assigned at birth, and other important factors is not yet known. In addition, discrimination targeting transgender and gender nonbinary communities for their gender expression is widespread and likely to profoundly affect employment and other economic indicators, but more research is needed to help inform costing analyzes like those presented in this report for cisgender women and men.

Conclusions and implications for equity and prevention

Sensitivity testing revealed that the costs likely range between $226.4 billion and $506.5 billion for body dissatisfaction, between $175 and $537 billion for skin-shade discrimination, and between $126 and $265 billion for weight discrimination. Our study has important implications for health equity and policy change initiatives for prevention, offering new insights into the disproportionate economic burden of harmful appearance ideals borne especially by women and people of color with darker skin shades. This disproportionate burden is largely due to racism, sexism, classism, ableism, and other problematic societal systems that shape, maintain, and often magnify harmful appearance ideals. Across both pathways, women bore the majority of costs; 58% or $177 billion for body dissatisfaction, 66% or $269 billion for weight discrimination, and 50% or $36 billion for skin-shade discrimination. Due to appearance-based discrimination, people of color with darker skin shades experienced a wage penalty and faced costs related to discriminatory incarceration, depression, and hypertension.

Appearance ideals in the USA have been widely critiqued for placing unfair burden on people of color and women of all race/ethnicity groups, but the economic consequences of biased appearance standards have not yet received the research attention they merit. This study holistically considers the range of impacts associated with harmful appearance ideals and estimate attributable costs. Results indicate that the economic impacts are substantial and underscore the urgency of continued research investigation, particularly to identify policy actions that can effectively intervene on and mitigate the impacts of harmful appearance ideals.

List of abbreviations

C	Costs per person
DALY	Disability-adjusted life years
GRADE	Grading of Recommendations Assessment, Development and Evaluation
P	Prevalence of an impact in a given year
PAF	Population attributable fraction
RR	Risk ratio
T	Total costs for each impact
US	United States
VSLY	Value of a statistical life year
YLD	Years Lost to Disability
YLL	Years of Life Lost

Notes

1. Empirical evidence around trends in the prevalence of body dissatisfaction by age is inconclusive. For example, some studies suggest that body dissatisfaction is higher among adolescents and decreases as people age (see Esnaola et al., 2010; Moehlecke et al., 2020). In contrast, Wang et al. (2019) find that 95% of individuals experience relatively stable body dissatisfaction from adolescence through to adulthood. Quittkat et al. (2019) find that only in men did older age predict a lower level of importance of appearance. In the absence of more conclusive evidence, this study conservatively assumes that the prevalence of younger age groups is based on the average prevalence across the population (i.e., no age adjustment has been made).
2. The other convention in the literature is to use a cut-off score of 3. However, 2.75 was selected given the focus of this work on manifestations of body dissatisfaction which can lead to attributable health impacts, as opposed to poor body image in general (which is more prevalent throughout the USA). There are variations in the literature around how body dissatisfaction is defined and measured and the associated severity. For example, Fiske et al. (2014) find the prevalence of body dissatisfaction among US adults varies between 11%-72% for women and 8%-61% for men, depending on how it is defined and measured.

3. For example, see CDC, Part II: Economic Impact Analysis—Cost of Illness: The Second of a Five Part Series. Available from: https://www.cdc.gov/dhdsp/programs/spha/economic_evaluation/docs/podcast_ii.pdf

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Disclosure statement

PC Diedrichs is an independent consultant to Dove and was on the Dove Self-Esteem Project Global Advisory Board from 2013-2016. The authors declare no other conflicts of interest in relation to this work.

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Authors' contributions

This study was conceived of by S. Bryn Austin, Jared Streatfeild, and Simone Cheung. Rhiannon Yetsenga, Rhea Banerjee, Jared Streatfeild and Katherine McGregor conducted literature reviews, conducted analyses, reviewed and revised the manuscript, and provided critical input. All authors reviewed and revised the manuscript and provided critical input.

Availability of data and materials

The data that support the findings of this study are all publicly available, and sources can be found in the Appendix.

Competing interests

PCD is an independent consultant to Dove and was on the Dove Self-Esteem Project Global Advisory Board from 2013–2016. The authors declare no other conflicts of interest in relation to this work.

Ethical approval and consent to participate

No individual patient data were collected; therefore, this study did not require ethics approval.

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