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The effect of perceived appearance judgments on psychological and biological stress processes across adulthood

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Abstract

Social self-preservation theory posits that stress is experienced when an aspect of an individual's identity has the potential to be negatively evaluated. Appearance is a central part of identity, however, little research has examined whether perceived appearance judgments are a source of social-evaluative stress. In addition, stress may be an explanatory link in the association between appearance perceptions and depressive symptoms. This study examined whether perceived appearance judgments were associated with increased stress and greater depressive symptoms among adults. Study 1 examined the associations between self-reported appearance judgments and cortisol stress responses in response to a laboratory stressor (TSST) among 71 individuals aged 18–65. Study 2 assessed self-reported appearance judgments and depressive symptoms among 498 adults ages 18–65 via an online survey data collection. Appearance judgment was associated with a stronger cortisol response, higher self-reported stress, and greater depressive symptoms. Stress mediated all associations between appearance judgments and depressive symptoms and neither age nor gender moderated these associations. The findings suggest that appearance judgments contribute to psychological and biological stress processes and demonstrated that stress mediated the association between appearance judgments and depressive symptoms.

Keywords

Appearance Judgments; Depressive Symptoms; Stress; Gender; Age Differences

Chronic psychological stress is a central health concern for men and women across the lifespan. Fear of negative social evaluation is one consistent type of stressor that impacts adults psychological well-being (Dickerson, Gruenewald, & Kemeny, 2004; Dickerson &

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Kemeny, 2004). However, the current literature focuses on performance and identity-related attributes, such as gender or race, when assessing the impact of social judgments on stress and well-being. Fewer studies have investigated how an individual's self perceptions, particularly those encompassing aspects of appearance, are associated with stress, despite the evidence that perceptions of appearance play a significant role in determining who is susceptible to social-evaluative stress (Lupis, Sabik, & Wolf, 2016; Sabik, Lupis, Geiger, & Wolf, 2018). In particular, the role of perceived appearance judgments, that is, feeling negatively about one's own appearance, or feeling that others negatively judge one's appearance, may threaten an individual's sense of his or her social standing, and may contribute to established models of social-evaluative stress.

Both stress and negative appearance perceptions have consistently been independently linked to poor psychological well-being and negative health outcomes, such as depressive symptoms and disordered eating, emphasizing the importance of charting the underlying pathways (Grogan, 2006). Research has demonstrated that these patterns of association affect men and women across cultural groups (Frederick et al., 2007; Ricciardelli, McCabe, Williams, & Thompson, 2007), however exposure to media images prominent in Western culture, which promotes the objectification of people's bodies and focus on appearance, increases body dissatisfaction and associated psychological issues, indicating that exposure to Western culture exacerbates these patterns (Fredrickson & Roberts, 1997; Grabe, Ward, & Hyde, 2008; Moradi, 2010). The present studies seek to expand current stress theories by integrating appearance perception as a factor that increases social-evaluative stress, and that increased stress as a result of appearance perceptions may account for greater depressive symptoms. We do not yet know whether these associations persist for both men and women at different ages, and seek to establish for whom appearance judgments are associated with stress and depressive symptoms.

Appearance Judgments and Acute Psychosocial Stress

Social self-preservation theory (SSPT) posits that stress is experienced when an aspect of an individual's identity has the potential to be judged negatively by others (Dickerson & Kemeny, 2004). Research on this theory has focused primarily on stress experienced as a result of the social evaluation of performance; however, perceptions of appearance is one aspect of an individual's identity that may influence experiences of stress (Geiger, Sabik, Lupis, Rene, & Wolf, 2014; Lupis et al., 2016; Sabik et al., 2018). In particular, being evaluated by others (e.g., the male gaze) often leads women to internalize an outsider's perspective on their bodies and to view their bodies as objects (Fredrickson & Roberts, 1997; Moradi, 2010). Maintaining one's appearance and striving to meet cultural beauty standards is often perceived as high-stakes because of the social evaluation of appearance, and the consequent determination of one's worth as a result. Experiencing social evaluation is stressful, as is established by SSPT. The perception that one's appearance is being socially evaluated may serve to reinforce or heighten the experience of being socially evaluated, and may contribute to experiencing greater stress.

Importantly, stress encompasses not only psychological but also physiological processes. Previous studies have demonstrated that social evaluative threat is specifically linked to the

magnitude of physiological stress responses (Dickerson et al., 2004). Cortisol is the hormonal end product of the hypothalamic pituitary adrenal (HPA) axis, a central system in the body's physiological response to stress. Thus, those who perceive their appearance is judged negatively may not only be particularly vulnerable to stress in social-evaluative situations, but may be more likely to show stronger cortisol responses to stress as well (Sabik et al., 2018).

Emerging evidence suggests that concerns about appearance and external evaluations of appearance affect the way an individual physiologically responds to a stressor. For example, research has demonstrated that anticipation of a social-evaluative body image threat was associated with an increase in cortisol (Ginis, Strong, Arent, & Bray, 2012). Participants in these studies were told they would undergo a socially evaluative experience that primes body image (i.e., being videotaped performing exercises or having body fat evaluated by a researcher while wearing exercise clothing with minimal coverage). Further, just imagining a social-evaluative threat (e.g., trying on swimsuits in front of friends) led college-age women to report higher body shame and social physique anxiety (Lamarche, Bailey, & Gammage, 2015), as did having body composition assessed (Lamarche, Gammage, Klentrou, Kerr, & Faulkner, 2014). Last, college age men who underwent a social-evaluative body assessment showed stronger cortisol increases and higher body shame than men in a control condition (Lamarche, Ozimok, Gammage, & Muir, 2017). Together, these findings suggest that appearance concerns contribute to experiences of social-evaluative threat and may thus affect physiological responses to a stressor.

However, it remains unclear how appearance-related concerns may affect responses to a more neutral stressor; specifically one that does not explicitly involve threat of appearance evaluations. The current study aims to address this gap by determining how an individual's attitudes about appearance and particularly their perceptions of other's evaluations affect the way their bodies respond to a stressful situation that involves social evaluation. Furthermore, prior work has focused on women, mostly college-aged, leaving the links between appearance concerns and stress responses in older women and men unknown.

Body Esteem, Chronic Stress, and Psychological Well-Being

Body esteem refers to an individual's self-evaluations of various aspects of his or her own body, including self-evaluation of appearance and appearance-related judgments attributed to others (Mendelson, Mendelson, & White, 2001). Messages about how men's and women's bodies should appear are frequently communicated through a variety of sources, including the media as well as interpersonal relationships and interactions (Kozee, Tylka, Augustus-Horvath, & Denchik, 2007). In particular, for women the ideal body tends to be thin (Groesz, Levine, & Murnen, 2002), whereas for men ideal body is lean and muscular (Cafri & Thompson, 2004). Negative body perceptions potentially affect health and well-being, and have been associated with low self esteem, disordered eating behavior, and depressive symptoms (Muehlenkamp & Saris-Baglama, 2002; Olivardia, Pope, Borowiecki, & Cohane, 2004; Stice, Hayward, Cameron, Killen, & Taylor, 2000).

Body esteem has been established as a key predictor of psychological well-being among both women and men (Davison & McCabe, 2005; Olivardia et al., 2004; Sabik, 2013; Stice et al., 2000; Tiggemann & Kuring, 2004). However, we have a limited understanding of the mechanisms linking body perceptions and key aspects of psychological well-being, such as depressive symptoms. Previous research has established that poor body esteem is linked to body shame and rumination (Etu & Gray, 2010; Grabe, Hyde, & Lindberg, 2007), and both shame and rumination have been associated with greater depressive symptoms (Cheung, Gilbert, & Irons, 2004). These pathways suggest that low body esteem may be a source of stress; however, little attention has been given to the role of stress in relation to body esteem and depressive symptoms. We propose that poor body perceptions and negative evaluations of one's body by others may be associated with chronic stress for adults, and that stress may contribute to greater depressive symptoms. In sum, we propose that stress will mediate the association between negative body esteem and experiencing depressive symptoms.

The Current Studies

The current studies aimed at examining the associations between self-reported and physiological stress response and relevant body image constructs, and extending this to examine the associations with depressive symptoms. To address these hypotheses, two studies were conducted. Study 1 investigated links between types of appearance judgments and stress, with stress assessed as both perceived chronic stress and cortisol responses to an acute psychosocial laboratory stress protocol. Study 2 extends study 1 by examining the associations with depressive symptoms, and utilized an online survey to address hypothesis 3 in a larger, community-based sample. Because little is known about whether the aforementioned associations may vary for men and women or across the lifespan, gender and age were examined as moderators in both studies.

Study 1 examines the hypotheses that 1) perception that one's appearance is more negatively judged by others will be associated with stronger physiological (cortisol) stress responses in social-evaluative situations, and 2) perceived negative appearance judgments by others as well as judging one's own appearance negatively will be associated with elevated chronic self-reported stress levels. Study 2 examined the hypothesis 3) chronic self-reported stress will mediate the associations between internal and external appearance judgments and depressive symptoms. To this end, both studies will examine links between body esteem and stress, and we expect this to be consistent across studies. Study 1 will provide insight into the physiological effects of body image on stress response, whereas Study 2 will provide unique insight into whether low body esteem and stress predict unique variance in depressive symptoms.

Method: Study 1

Study 1 aimed to test the hypothesis that particularly feeling one's appearance to be negatively judged by others is associated with an exaggerating cortisol stress response in social-evaluative situations as well as greater self-reported stress.

Participants

Participants were two groups of healthy adults: younger adults (ages 18 – 33, mean = 20.61 ± 3.51 years) and older adults (ages 47 to 65, mean = 55.91 ± 4.93 years) from Brandeis University and the greater Boston area recruited through newspaper, magazine, and online advertisements. The age groups were chosen to examine clear differences in stress responses among younger adults and older adults prior to the onset of most chronic diseases and functional limitations. To be eligible, participants had to meet selection criteria according to standard procedures employed in studies assessing stress induction effects on cortisol reactivity: 1) BMI between 18 and 35 kg/m^2 ; 2) women were in the luteal phase of the menstrual cycle during the time of participation; 3) no psychiatric, endocrine, or cardiovascular diseases, or other specific chronic diseases including autoimmune disorders; 4) not taking psychoactive drugs, beta-blockers, gonadal steroids (hormonal contraceptives), or glucocorticoids; 5) non-smoking; and 6) no previous experience with the stress protocol. After excluding participants with incomplete data ($n = 1$) and outliers in cortisol responses ($n = 3$), the final sample consisted of 71 participants: 36 younger adults (22 men, 14 women) and 35 older adults (15 men, 20 women) with no significant differences in age or sex distribution ($\chi^2 = 2.37, p = .12$). A power analysis indicated that, with the seven predictors in our model and a statistical power level of .80 and an alpha of .05, the sample size would be sufficient to detect an effect of .25, which is considered to be between a medium and a large effect (Cohen, 1988). In addition, Cohen (1998) noted that R^2 values at or above .02 are considered to make unique contributions to the criterion. Previous research on similar variables (social evaluation, physique anxiety, and cortisol) reported medium to large effects (e.g., $\beta = .30-.74$) with 50 participants in their study (Ginis et al., 2012). The study protocol was approved by the local IRB.

The majority of young adults were currently in college (85.7%) or had completed college or a graduate degree (14.3%), and most were not currently working (62.9%). The majority of young adults had not been married (94.3%). In the young adult sample, 45.7% identified as White, 34.3% as Asian American, 2.9% as Black or African American, and 5.7% identified as more than one race. Among the older adults in the study, 14.7% reported a high school level education, 11.8% reported having earned a 2-year or vocational degree, 32.4% reported having a college degree, and 32.3% reported attending or completing a graduate degree program. The majority of participants reported being married or living with a spouse (47.1%), whereas 41.2% reported never being married and 11.7% reported being divorced or widowed. In addition, the majority of older adults reported that they were currently employed (60.6%), and identified as White (70.6%), followed by Black or African American (14.7%) and more than one race (5.7%). The remaining participants chose not to disclose their racial group.

Procedure

Data were collected as part of a larger study examining differences in stress response among younger and older adults. Study protocol included having participants complete a series of questionnaires followed by the Trier Social Stress Test (TSST), as described below. The broader study included assessments of self-perceptions, stress, and health behaviors.

Secondary analyses were performed on this data to assess the associations between self-reported body esteem, perceived stress, and stress reactivity.

Participants came to the laboratory on a weekday afternoon between 1:30 and 6:30PM and were seated in a comfortable testing room where the experimenter explained the study protocol and obtained informed consent. Participants had a 45 minute resting period where they were able to acclimate to the laboratory environment and answered a series of questionnaires assessing demographics, health, and trait psychosocial measures, including body esteem and perceived stress prior to completing the TSST. This approach was chosen to avoid stress exposure effects on self-report, while at the same time allowing enough time for psychological reactions to the task of answering questionnaires to dissipate. At the end of this period, the first saliva sample was collected to assess baseline cortisol levels.

Participants were then brought to a separate room where the TSST was administered according to established protocols (Kirschbaum, Pirke, & Hellhammer, 1993). The TSST is a 15-minute standardized psychosocial stress procedure that consists of a mock job interview and mental arithmetic task while standing in front of an evaluative panel comprised of at least one man and one woman as a judge, a microphone, and a video camera. For a full description of the TSST procedure, please refer to Kirschbaum, Pirke, & Hellhammer (1993). After the TSST, participants returned to their private testing room and saliva samples were taken immediately as well as at +10, +30, and +60, and +120 minutes relative to the end of the TSST to capture the full cortisol stress response and subsequent recovery period, as this reliably captures cortisol peak values and recovery (Goodman, Janson, & Wolf, 2017). In total, the experiment took approximately three hours for participants to complete.

Measures

Body mass index.—Height and weight were measured in the lab and body mass index (BMI) was computed as kg/m².

Appearance esteem.—The Body Esteem Scale for Adolescents and Adults (BESAA) assesses evaluations of one's body or appearance (Mendelson et al., 2001). The 23 items scale consists of three subscales: general feelings about appearance (10 items, current study Chronbach's alpha = .87), weight satisfaction (8 items, current study Chronbach's alpha = .91), and evaluations attributed to others about one's appearance (i.e., perceived negative appearance judgments by others or perceived external appearance judgments), which contains 5 items, and in the present study Chronbach's alpha = .82. The appearance and weight subscales were combined in the present study ($r = .729, p < .001$) to represent internalized perceptions of one's own appearance, as previous research has noted a high correlation between these scales (Sabik, 2013). Responses on all items range from 0 (never) to 4 (always), and scores are calculated as means with higher scores indicating more positive appearance judgments. Previous research has noted average BESAA scores ranging from 2.1 to 2.2 for women, and 2.3 to 2.9 for men (Mendelson et al., 2001), which are comparable to the means for the current sample.

Perceived stress.—Participants completed the 10-item Perceived Stress Scale (PSS) to assess self-reported perceived chronic stress (Cohen, Kamarck, & Mermelstein, 1983).

Responses were given on a scale ranging from ‘never’ to ‘very often’ (0 to 4). For example, “In the last month, how often have you felt that you were unable to control the important things in your life?” Answers were summed to calculate a perceived stress score with higher numbers representing more perceived stress and possible scores ranging from 0 to 40 (current study: Cronbach’s alpha = .92). In previous research adults have reported mean PSS scores ranging from 23.18 to 23.67 (Cohen et al., 1983), which is slightly higher than in the present study.

Stress reactivity.—Saliva was collected using the Salivette collection system (Sarstedt, Newton, NC, USA). Samples were stored at -30°C until later analysis. Prior to analysis, Salivettes were thawed and centrifuged and free cortisol concentrations in saliva were measured using commercial chemiluminescence immunoassay (CLIA; IBL-International, Toronto, Canada). All samples were assayed in duplicate and intra- and inter-assay coefficients of variance (CV) were below 10%, indicating high quality in terms of pipetting and assay conditions under which assays were run, respectively. Cortisol response and recovery indices were computed: response was assessed by the participant’s peak value from samples taken immediately post-TSST, +10 minutes, or +30 minutes (whichever was highest) minus the baseline value (sample 1, pre-TSST). The recovery index was computed by taking the individual peak of samples immediately post-TSST, +10 minutes, or +30 minutes and subtracting the last value (sample taken +120 minutes after the TSST).

Data Analysis Plan—All analyses controlled for BMI. Age and gender group differences were assessed using ANCOVA including both factors. Repeated measures ANCOVA with 6 time points of cortisol samples and gender and age as between-subjects factors were analyzed to assess whether cortisol stress responses were age and gender dependent. Hierarchical regression analysis using SPSS version 23 was used to test study hypotheses. Standardized values (z-scores) for the variables were used in the regression analyses. In step 1 we entered BMI, gender and age in the analysis. Step 2 included the appearance judgment variable (perceived appearance judgment by others or self-perceptions), and step 3 assessed the 2-way interactions between age x appearance judgment and gender x appearance judgment, as well as the 3-way interaction between gender, age, and appearance judgment. These regressions were run assessing maximum cortisol increase and perceived stress as the dependent variables.

Results

Age and gender groups did not differ in their perceived appearance judgments by others (all $p > .45$), however, older men reported more positive self-perceptions than younger men or women ($F(1, 66) = 4.07, p = .05, \eta_p^2 = .06$). No group differences were observed in perceived chronic stress (all $p > .16$). Before testing our hypotheses, we ran a repeated-measures ANOVA without between-subject factors and covariates as a manipulation check. Results confirmed that cortisol values significantly changed over time in a pattern suggesting the TSST was successful in inducing a cortisol stress response ($F(2.44, 708.30) = 33.65, p < .001, \eta_p^2 = .33$). Repeated-measures ANCOVA including all six cortisol values revealed a trend for a time effect ($F(2.42, 159.99) = 2.27, p = .096, \eta_p^2 = .033$), suggesting that the TSST was overall successful in inducing cortisol stress responses. Furthermore, significant

age-by-time and gender-by-time effects on cortisol responses to the TSST (age: $F(2.42, 159.99) = 5.40, p = .003, \eta_p^2 = .076$; gender: $F(2.42, 159.99) = 4.86, p = .006, \eta_p^2 = .069$) indicated that older participants had weaker cortisol responses compared to younger participants and women had weaker responses compared to men.

Next, we examined the unstandardized means, standard deviations, and intercorrelations for study variables (see Table 1). To determine whether perceived external and internal appearance judgments were associated with acute stress response or self-reported stress, a series of hierarchical regression analyses were computed (see Table 2). In addition, all regression analyses data were screened for multivariate outliers by examining Cook's D values for each participant. A Cook's D value greater than 1 indicates that deleting that observation may influence the accuracy of a regression (Stevens, 1984). For all regression analyses, Cook's D values ranged from .00000 to .67055, indicating no significant outliers in the regression analyses.

Assessing the effect of perceived appearance judgments by others on maximum cortisol increase indicated that individuals who felt that others judge their appearance less favorably exhibited a stronger cortisol reaction to the TSST (see Fig. 1). Potential outliers identified in figure 1 were excluded from analyses with no change to the results. Change in R^2 from step 1 to step 2 suggested that the addition of appearance judgments to the regression model accounted for a significant proportion of the variance explained. Further, this association did not vary by age or gender and was accompanied by stronger cortisol recovery (step 2: $B = -1.62, SEB = .643, \beta = -.26^*, R^2 = .323$; for all other interactions $p > .59$). These findings suggest that perceiving others to judge one's appearance negatively resulted in a stronger cortisol stress response but was not associated with the ability to recover from this response. Repeating the above analyses for appearance concerns revealed no significant associations with cortisol indices in any of the investigated groups, supporting the hypothesized central role of perceived appearance judgments by others in eliciting a cortisol stress response in social-evaluative situations. .

To explore our second hypothesis regarding whether appearance perceptions are linked to self-reported chronic stress, we ran regression analyses similar to the above with PSS scores as outcome measure. These analyses revealed that both perceiving more negative appearance judgments by others and judging one's own appearance more negatively were linked to higher perceived chronic stress levels (see Fig. 1). Importantly, these patterns again did not vary by age or gender and the stress-relevance of appearance judgments was statistically emphasized by a significant increase in effect size when entering the appearance variable ($R^2 = .25, p < .001$).

Because the chronic stress associated with negative perceived appearance judgments may dampen HPA axis reactivity, we examined whether perceived chronic stress moderated the association between appearance judgments and cortisol stress response. The interaction between self perceptions and stress was not significant in predicting maximum cortisol increase ($B = -.10, SEB = .15, p = .652$) or cortisol recovery ($B = -.02, SEB = .17, p = .887$), nor was the interaction between perceptions of evaluation by others and stress significant in predicting maximum cortisol increase ($B = -.05, SEB = .11, p = .406$) or recovery ($B = -.02,$

$SEB=.12, p=.898$). Thus, the data show that HPA axis reactivity does not appear to be differentially impacted by stress dependent on appearance judgments.

Discussion: Study 1

Together, these findings support our conceptualization of appearance judgments as significantly associated with stress. Perceiving one's appearance be negatively judged by others appeared to be stressful, in that it not only contributed to psychological stress experiences, but also affected the related physiological stress processes. These findings demonstrate that internalizing appearance concerns that focus on social evaluation from others intensifies the effect of a social evaluative threat on stress response. In other words, feeling that others routinely assess one's appearance increased the effect of social evaluation on stress. Although the effects observed were small to medium in size, this in line with previous studies on body image and stress (Ginis et al., 2012; Lamarche et al., 2014).

It is important to note that this pattern did not significantly vary by gender or by age, despite significant variations in body image by gender and age. In general, women and younger adults are more concerned with appearance issues (Franzoi & Koehler, 1998; Fredrickson & Roberts, 1997); however, this particular aspect of body esteem—feeling judged by others about one's appearance—has a more universal association with stress across gender and age groups. This finding is in keeping with research demonstrating that social-evaluative threat elicits body image threat, shame, and appearance anxiety among women (Lamarche et al., 2015; Lamarche et al., 2014), and extends this work to focus specifically on how the perception of body evaluation from outsiders intensifies the impact of a social-evaluative threat on stress response. Also noteworthy is that this same pattern was significant for both self-reported stress and physiological indicators of stress, demonstrating the robustness of this effect. In order to examine the generalizability of this effect and to examine these patterns in a larger sample, and to determine whether this aspect of evaluative body image impacts depressive symptoms, a second study linking these constructs is needed.

Method: Study 2

Study 2 aimed to expand the above findings by assessing the association between appearance judgments and stress, and by examining whether these are associated with depressive symptoms. Furthermore, examining these patterns in a broad age range and for both men and women aimed to assess the generalizability of these processes.

Participants

Participants were 567 individuals recruited through Amazon's Mechanical Turk (Mturk). Mturk is an online marketplace where registered users complete small tasks for payment. Participants recruited through Mturk are generally representative of the population and provide a valid means of collecting data in the social sciences (Berinsky, Huber, & Lenz, 2012). To be eligible, participants were required to be over 18 years old, not students, residents of the United States, and have a Human Intelligence Tasks (HIT) rate of 98% or higher. The HIT rate represents the percentage of time a user's work has been accepted as satisfactory on previously completed tasks. Participants were excluded from analysis for

spending less than 15 minutes on the survey ($n = 35$) or for more than two instances of “straight-lining” (giving the same answer throughout an individual questionnaire; $n = 13$) or both ($n = 10$). An additional 11 participants were excluded from analysis for missing data. Analyses comparing participants with missing data to those with complete data revealed no significant differences on any measure (all $p > .43$). The final sample consisted of 498 individuals (men = 187) with a mean age of 35 years ($SD = 11.35$ years). On average, participants had a high school degree and had completed some college. Participants reported their employment status, and 143 were employed full-time, 47 part-time, 123 keeping house or raising children full-time, 16 retired, and 169 were unemployed.

Procedure

Individuals eligible for the study were given informed consent information and by clicking forward to start the survey, asserted that they had understood and agreed. Participants were redirected to Qualtrics (www.qualtrics.com) where the survey was administered. The survey included questionnaires assessing depressive symptoms, perceived chronic stress, and body esteem as part of a larger study. The full survey took approximately 45 minutes to complete and participants were paid \$2 through Mturk.

Measures

Participants completed the Body Esteem Scale for Adolescents and Adults (BESAA) and the Perceived Stress Scale (PSS) as described in Study 1. BMI was computed based on self-reported height and weight.

Depressive Symptoms.—Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CESD) (Radloff, 1977). The CESD is composed of 20 items (e.g., “I felt depressed”) with responses ranging from 0 (rarely) to 3 (most or all of the time). Responses are summed with higher scores representing more depressive symptoms. Possible scores range from 0 to 60 and scores of 16 or higher are indicative of potentially clinically relevant depressive symptom severity (Radloff, 1977).

Data Analysis Plan—First, means, standard deviations and correlations among study variables were examined. Second, To examine whether stress mediated the association between internal appearance perceptions and depressive symptoms, and between perceived appearance judgments and depressive symptoms, Hayes (2013) method of calculating standard errors and 95% bias corrected bootstrap confidence to examine the indirect effects was used. The indirect effects were calculated using Hayes PROCESS macro (version 3) as the product of the mean bootstrapped sample estimates ($N = 10,000$) of the regression coefficients. According to Hayes (2013), if zero does not lie within the 95% confidence interval produced by the bootstrap estimate, we can conclude that the indirect effect is significant at $p < .05$. In addition, gender and age were examined as potential moderators of the associations in the mediational model using the PROCESS macro. For all analyses, the unstandardized coefficients are reported. In addition, Cook’s D were calculated for all regression analyses to examine potential multivariate outliers, and none were detected, with values ranging from .000 to .036.

Results

Means, standard deviations and correlations among study variables are shown in Table 3. As hypothesized, both negative appearance perceptions and negative perceived appearance judgments were associated with higher levels of stress and greater depressive symptoms. In the current study, 52.2% of participants reported average CESD scores below 16, indicating that about half of the sample reported significant depressive symptoms. Analyses indicated that participants whose scores were over this threshold differed significantly from non-depressed participants on the body esteem measures as well as PSS, with more depressed participants showing lower body esteem and higher stress. These findings are in line with the correlations reported in table 3, showing that higher depressive symptoms are associated with higher stress and lower body esteem. Given the significant negative association between BMI and both appearance perception measures, all subsequent analyses controlled for BMI.

Next we examined whether stress mediated the association between internal appearance perceptions and depressive symptoms. Consistent with the hypothesis, results from bootstrapping analysis revealed a significant indirect effect of stress on the association between internal appearance perceptions and depressive symptoms ($B = -5.21$; $SE = .564$; 95% CI: -6.33 ; -4.13). Both internal appearance perceptions and stress were significantly associated with depressive symptoms, though the association between internal appearance perceptions and depressive symptoms was reduced when stress was included in the model (see Fig. 2). Similarly, we observed a significant indirect effect of stress on the association between perceptions of external appearance judgments and depressive symptoms ($B = -2.91$; $SE = .595$; 95% CI: -4.10 ; -1.76). Furthermore, the association between perceptions of negative appearance judgments and depressive symptoms became non-significant when stress was included in the model (see Fig. 2). As such, these findings support our hypothesis that perceived stress acts as a pathway linking negative internal and external perceptions of appearance and depressive symptoms.

Assessing gender as potential moderator revealed that the above-described pattern of findings applied for both men and women. Gender did not moderate the associations between appearance perceptions and stress ($B = -.255$; $SE = .885$; 95% CI: -1.99 ; 1.48) or depressive symptoms ($B = -.921$; $SE = .906$; 95% CI: -2.70 ; $.86$), nor did gender moderate the associations between perceived negative appearance judgments and stress ($B = -.157$; $SE = .910$; 95% CI: -1.94 ; 1.63), or depressive symptoms ($B = -.781$; $SE = .885$; 95% CI: -2.52 ; $.958$).

Similarly, age did not moderate any of the associations in the mediational models. Age did not moderate the association between appearance perceptions and stress ($B = .020$; $SE = .037$; 95% CI: $-.053$; $.093$) or depressive symptoms ($B = -.014$; $SE = .038$; 95% CI: $-.089$; $.005$), nor between perceived negative appearance judgments and stress ($B = -.068$; $SE = .041$; 95% CI: $-.149$; $.013$) or depressive symptoms ($B = -.037$; $SE = .041$; 95% CI: $-.117$; $.043$).

Discussion

The present studies aimed to expand current stress theory to examine the role of appearance judgments, first in an acute stress context and then as perceived stressors that may lead to greater depressive symptoms. Our findings suggest that perceptions that other people evaluate your looks less positively are associated with cortisol responses to social evaluative situations. Furthermore, both internal and external perceptions of appearance judgments were associated with perceived stress for both men and women, in younger and older adulthood. Expanding on the latter finding in a large sample of adults with a wide age range, we confirmed that both forms of appearance judgments were associated with more depressive symptoms, largely due to their role as perceived chronic stressors. Taken together, these findings indicate that perceived negative appearance judgments by others are associated with the way an individual responds to stress, and also that both internal and external appearance judgments are associated with higher perceived psychological stress, which in turn is linked to greater depressive symptoms.

Perceived appearance judgments by others are linked to stronger cortisol stress responses

The current study found that in general, older and younger men and women did not differ in perceptions of appearance judgments by others while older men reported feeling more positive about their appearance than the other groups. However, no gender differences in how these ratings were linked to chronic stress or cortisol stress responses were observed. As well, one's own internal body perceptions did not predict cortisol response to a social-evaluative situation. In contrast, consistent with our hypothesis based on social-self preservation theory, feeling that one's appearance is judged more negatively by others was associated with elevated cortisol responses to the TSST. Put differently, our findings suggest that for individuals who feel their looks are evaluated more positively, the TSST is less stressful. In contrast, those who feel their looks are judged negatively by others had a stronger stress response. Given that the TSST simulates real-world evaluations (e.g., interviewing for a job), the findings suggest that those who are concerned about other's judgments of appearance may experience greater stress in high-stakes evaluative social situations. It is also important to note that while this study assessed perceived appearance judgments and examined this data in conjunction with the results of the standard TSST protocol to elicit a stress response, an active manipulation of appearance evaluation in the TSST would be relevant to examine in future studies. Other studies that have included appearance evaluation have found associations between appearance evaluation and cortisol stress response (Cloudt, Lamarche, & Gammage, 2014; Lamarche et al., 2014; Lamarche et al., 2017), though these studies did not examine the role of perceived appearance evaluation. Expanding and integrating this work in future studies will further elucidate the role of appearance evaluation and perceptions of this evaluation in stressful contexts. Further, future studies that screen for high and low body esteem prior to exposure to a stressful situation and that assess momentary reactions to the TSST would provide additional clarity and insight into the nature of these associations.

While elevated cortisol responses are not in themselves harmful, particularly when paired with adequate recovery as in the current study, over time these exaggerated responses can lead to wear and tear on the body and eventually to health consequences. Over time, internalized negative appearance perceptions may lead individuals to experience their bodies as a source of stress, even in the absence of others. Thus, both negative appearance judgments as well as negative self-perceptions of appearance may be experienced as a source of repeated or chronic stress. Repeated or chronic exposure to stress has been consistently associated with poor psychological well-being, including depression (Chrousos & Gold, 1998; Goldstein & McEwen, 2002), and the second study followed up by confirming that there are significant associations between perceptions of appearance, stress, and depressive symptoms.

Stress mediates links between appearance judgments and depressive symptoms

Study 2 not only replicated our earlier observation that more negative appearance judgments are linked to higher perceived stress levels, but also further confirmed that stress mediated the link to depressive symptoms. Although causality cannot be determined with these data, the findings provide evidence that appearance judgments, both internal and external, are a crucial and under-acknowledged source of stress and that stress stemming from appearance judgments are associated with the degree to which depressive symptoms are experienced. Thus, stress appears to be a lynchpin in the association between appearance perceptions and negative health outcomes. Interestingly, both internal and external appearance judgments were associated with self-reported stress, indicating that both self-assessments and perceived assessments from others may potentially impact one's perceptions of stress. However, only perceived external appearance judgments were associated with cortisol stress response, suggesting that the social-evaluative aspect of these potential evaluations may be driving the physiological stress response.

This distinction is noteworthy, as it supports the notion that cortisol stress response is specific to socially evaluative aspects of body esteem. In particular, this finding suggests that appearance judgment is an aspect of social evaluation that should be considered in the Social Self Preservation Theory model. Appearance evaluation is a form of social evaluation, and one that is particularly relevant as it is an aspect of body image with broad impact on individuals' self-esteem (Mellor, Fuller-Tyszkiewicz, McCabe, & Ricciardelli, 2010), performance on academic tasks (Hebl, King, & Lin, 2004), and psychological well-being (Fredrickson & Roberts, 1997; Sabik, 2013). In light of these findings, we suggest that researchers working with this theory consider the impact of appearance on their research subjects and the potential downstream effects on health and well-being. In particular, awareness of self-presentation, such as engaging in body surveillance, may heighten this association, and should be considered in future research.

Furthermore, interventions that target individual's internal perceptions of appearance, and importantly, of the assumptions made about other's evaluation of appearance, may be an effective approach to reduce negative perceptions and consequent stress. Although individuals are unable to control what others think about them, we can exercise some degree of control over our thoughts when we are aware of them. To this end, interventions that

focus on mindful awareness of body image may also be particularly effective in reducing associated stress and improving psychological well-being, as mindfulness may help ground an individual in their body in the present moment, and have been associated with positive body image (Dijkstra & Barelds, 2011; Lavender, Gratz, & Anderson, 2012) as well as reduced social anxiety and greater self-esteem (Rasmussen & Pidgeon, 2011).

Regardless of the developmental changes and life events that vary across adulthood, the current studies did not reveal any age group differences in the associations between either aspect of appearance judgment and stress and depressive symptoms. This reflects previous research demonstrating that body image is relatively stable across the lifespan (Tiggemann, 2004). Younger adults' appearance concerns have been studied extensively, yet comparatively few studies have focused on adults in middle adulthood. Although previous work has suggested that older adults report greater appearance satisfaction compared to younger adults (Grogan, 2011), our findings indicate that at all ages, adults who have negative appearance perceptions are subject to higher average levels of stress and depressive symptoms. It has been suggested that a media exposure gap may be closing as older adults are some of the most frequent television viewers and are increasingly being targeted by advertising (Pruis & Janowsky, 2010; Wadsworth & Johnson, 2008). Our results may reflect that within these cohorts of young and middle-aged adults, media influence and pressure to meet societal appearance standards has extended further into adulthood. Relatively few studies have addressed appearance perceptions during midlife, however, given the potential long-term impact of negative appearance judgments on health and well-being, it is critical that we examine these patterns among understudied age groups. In summary, the current findings suggest that age does not provide any protection against negative appearance judgments, instead, the impact of appearance concerns on stress and depressive symptoms appear to persist throughout adulthood.

As for age, the associations between stress, depression, and appearance judgments tested in the current models were equally relevant for men and women. This contrasts with previous literature describing gender differences in levels of appearance satisfaction, with women reporting lower satisfaction on average compared to men (Feingold & Mazzella, 1998; Markey & Markey, 2005; Pingitore, Spring, & Garfieldt, 1997). However, research on appearance issues among men has grown considerably in the last decade (Daniel & Bridges, 2010; Hargreaves & Tiggemann, 2009; Schuster, Negy, & Tantleff-Dunn, 2013). For example, negative appearance-related commentary has been shown to lead men to report higher levels of disordered eating and body dissatisfaction (Schuster et al., 2013). As societal expectations of appearance seem to be extending into older age groups, men may also be subject to increasing media that reinforces unattainable ideals for their appearance. In line with this idea, exposure to images of the muscular ideal have been found to be associated with lower body satisfaction among men (Hargreaves & Tiggemann, 2009). In summary, the present results suggest that low appearance esteem is a concern for men as well, as it may be a source of stress that is associated with greater depressive symptoms. Failure to consider the effects of low appearance esteem on stress and depressive symptoms among men may result in health practitioners overlooking this factor as a potential contributor to men's well-being.

Limitations

Of note, although the current studies did not find age differences in stress and health effects of appearance judgments, the cross-sectional design does not allow for investigation of how appearance judgments change within individuals as they age. Future research that employs a longitudinal design can track changes in appearance perceptions through life transitions and may provide insight into whether these patterns vary over time. Furthermore, this approach may be able to assess age differences in appearance perceptions from both a developmental as well as a cohort perspective. Next, the sample in this study was relatively homogeneous with regard to race/ethnicity, and it is possible that these patterns differ among ethnic groups. Future research comparing ethnic groups will elucidate these patterns. In addition, perceived stress was assessed using the PSS, which asks about stressor frequency experienced over the last month. Although typically used as a chronic stress measure, expanding the time period beyond one month might be a fruitful direction for future studies. In addition, depressive symptoms are only one indicator of psychological well-being, and future research that examines more positively-valenced constructs, such as life satisfaction or happiness, may contribute to our knowledge of how stress and psychological well-being are associated. The sample in the present study had a high proportion of depressed participants, and thus may not represent the general population. Last, only one assessment of body image was included in the present study. The assessment of additional factors in conjunction with perceived appearance may explain additional variance and should be considered in future research.

Conclusion

Appearance concerns have long been considered a women's health issue (Grogan, 2006), yet the mechanisms that lead from negative appearance perceptions to health have been underexplored. Further, the majority of research in this area has focused on young women (Pope, Phillips, & Olivardia, 2000; Tylka, Bergeron, & Schwartz, 2005), and processes linking body image and depressive symptoms are not well understood among men or in the years beyond young adulthood. The current studies add to our understanding of the complex associations between appearance judgments, stress, and depressive symptoms. Our findings indicate that stress is an important biological and psychological mechanism linking appearance judgments with an indicator of psychological well-being. By establishing that appearance judgments are linked to stress processes, which in turn affect depressive symptoms, we are better prepared to interrupt this unhealthy pathway and enhance psychological well-being across the lifespan.

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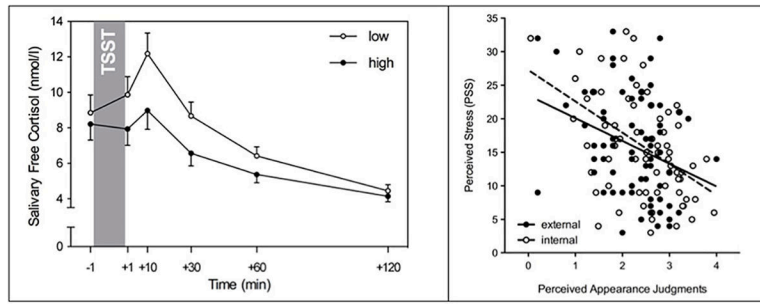


Figure 1. Perceived external appearance judgments (median split; high=more positive judgments, low: less positive judgments) moderated cortisol stress responses (left), while perceiving more negative appearance judgments (internal and external) were linked to higher perceived stress levels (right). Note that higher scores indicate more perceived positive appearance judgments.

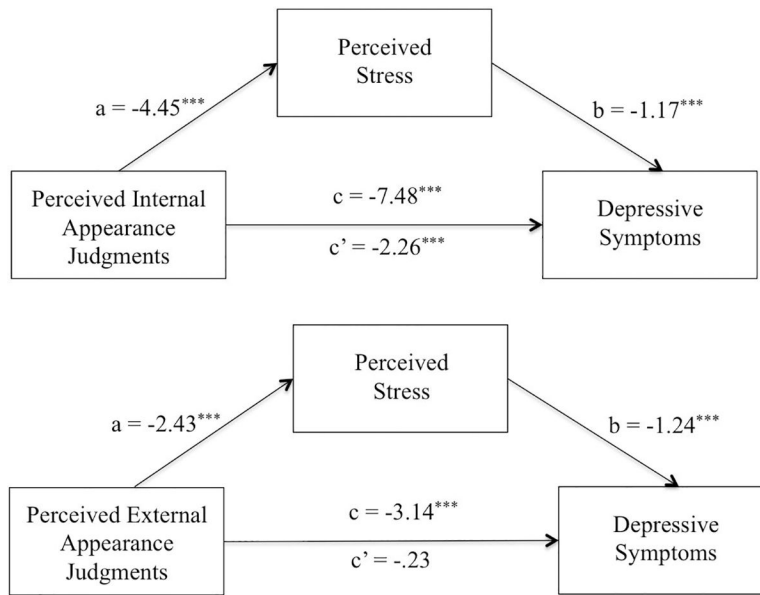


Figure 2. Chronic stress mediated links between perceived internal (top) and external (bottom) appearance judgments and depressive symptoms.

Table 1.

Means, standard deviations, and intercorrelations among study 1 variables.

Variable	M	SD	1	2	3	4	5	6
1. Body Mass Index	25.26	3.60	--	--	--	--	--	--
2. Internal Appearance Judgments	2.46	.79	-.32**	--	--	--	--	--
3. External Appearance Judgments	2.25	.72	-.18	.61***	--	--	--	--
4. Stress (PSS)	15.86	7.65	-.03	-.49***	-.32**	--	--	--
5. Maximum Cortisol	2.54	6.01	-.14	-.07	-.33**	-.03	--	--
6. Cortisol Recovery	6.76	6.24	.01	-.13	-.28*	.02	.64***	--

Note.

* $p < .05$

**

$p < .01$

*** $p < .001$.

Study 1 regression analysis summary for appearance judgment and perception, age, and gender predicting maximum cortisol increase and perceived stress.

Table 2.

Predictors:	Maximum Cortisol Increase						Perceived Stress					
	External Appearance Judgments		Internal Appearance Judgments		External Appearance Judgments		Internal Appearance Judgments		External Appearance Judgments		Internal Appearance Judgments	
	B	SEB	β	B	SEB	β	B	SEB	β	B	SEB	β
Step 1												
BMI	-.47	.19	-.28*	-.49	.21	-.29*	-.05	.26	-.03	-.43	.25	-.20
Gender	-3.59	1.30	-.30***	-4.20	1.51	-.35***	2.07	1.79	.14	.28	1.78	.02
Age	-.21	1.30	-.02	.14	1.50	.01	-2.49	1.78	-.16	-1.34	1.77	-.09
Step 2												
Appearance Judgment (IV)	-2.72	1.16	-.45*	-1.42	1.07	-.24	-4.36	1.59	-.57**	-5.22	1.26	-.68**
Step 3												
Age x Appearance	1.25	2.14	.14	1.78	2.64	.18	.32	2.93	.03	2.51	3.12	.20
Gender x Appearance	-1.28	1.70	-.16	-1.74	1.89	-.20	3.56	2.32	.35	1.06	2.22	.09
Age x Gender x Appearance	2.48	2.71	.23	.98	3.39	.08	-1.14	3.72	-.08	-1.36	4.00	-.09

Note.

* $p < .05$.

*** $p < .01$.

Interaction terms contained appearance judgment for models 1 and 3, and appearance perception for models 2 and 4. For model 1, $R^2 = .298$; R^2 (step 2) = .122**. For model 2, $R^2 = .184$; R^2 (step 2) = .035. For model 3, $R^2 = .186$; R^2 (step 2) = .109**. For model 4, $R^2 = .301$; R^2 (step 2) = .247**.

Table 3.

Means, standard deviations, and intercorrelations among study 2 variables.

Variable	M	SD	1	2	3	4	5	6	7
1. Body Mass Index	28.12	8.27	--	--	--	--	--	--	--
2. Age	35.07	11.35	.02	--	--	--	--	--	--
3. Gender	--	--	-.03	.07	--	--	--	--	--
4. Internal Appearance Judgments	1.81	.83	-.46***	-.01	-.13**	.91	--	--	--
5. External Appearance Judgments	1.84	.83	-.30***	-.09	.05	.56***	.78	--	--
6. Stress	19.11	8.36	.02	-.20**	.06	-.35***	-.22***	.88	--
7. Depression	18.21	12.96	.09	-.17**	.00	-.49***	-.21***	.81***	.92

Note.

* p < .05

** p < .01

*** p < .001.

Chronbach's alpha is reported for study measures along the diagonal.