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The benefits of expressive writing on sleep difficulty and appearance concerns for college women

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The college years represent an important developmental period in the lives of young women, who report health-related difficulties such as sleep disturbance and body/eating concerns. This study explored whether expressive writing (EW) can decrease health-relevant complaints among college women. College females ($n=111$) were randomised into an EW condition (writing about body concerns) or a control writing condition and completed three 15-min writing sessions. Results indicate that participants in the EW condition reported less sleep difficulty and less body-focused upward social comparison at 8-week follow-up, relative to control participants. For individuals who reported higher perceived stress at baseline, the EW condition resulted in less eating disturbance and less social comparison, relative to the control condition. The effect of EW on eating disturbance for those who were high in stress was partially mediated by the change in upward social comparisons focused on one's body. These findings suggest that EW about body image and appearance concerns may positively influence the trajectory of risk for, or resilience against, future complications as a result of sleep difficulty, eating disturbance and body dissatisfaction.

Keywords: expressive writing; college women; body dissatisfaction; disordered eating; social comparison; sleep difficulty

Introduction

Life transitions necessitate substantial changes in self-concept, worldview and behavioural patterns. Difficulty in acclimating to these changes can lead to a variety of physical and mental health issues, including depressive symptoms (Lee & Gramotnev, 2007) and negative health behaviours (Bell & Lee, 2006). In recent years, *emerging adulthood* (ages 18–25; Arnett, 2000) has been emphasised as an important period in human development, with enduring psychological and physical effects. Nearly 50% of Americans spend this period pursuing higher education (National Center for Education Statistics, 2007); as such, learning to navigate the demands of college is an important experience in the lives of many emerging adults (Dyson & Renk, 2006; Smyth, Heron, Wonderlich, Crosby, & Thompson, 2007). Students who do not successfully manage college life are at risk for depression (Beeber, 1999),

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anxiety (Eisenberg, Gollust, Golberstein, & Hefner, 2007) and increased physical health symptoms (Pritchard, Wilson, & Yamnitz, 2007). The college experience thus represents an area of opportunity for interventions aimed at improving the physical and psychological health of emerging adults.

Gender differences in adjustment to college

College life may be particularly challenging for females, who report higher levels of difficulty adjusting to college life (Fisher & Hood, 1988) than do males. Females are more likely than males to engage in ruminative thought processes (Nolen-Hoeksma & Jackson, 2001), which may contribute to college females' higher levels of depressive symptoms during college (Alfed-Liro & Sigelman, 1998). Females also report engaging in more potentially maladaptive coping strategies (e.g., emotion-focused and avoidant coping), relative to males, who use more adaptive, problem-focused techniques to cope with difficulties of college life (Dyson & Renk, 2006). These differences in response to the stress of college life may result in a variety of health-relevant problems, including sleep difficulty, body dissatisfaction, negative social comparison, and eating disturbance.

Sleep difficulty among college females

Managing college life and its associated stress (e.g. academic and social pressures) may contribute to sleep difficulty for college females. Sleep disturbance and ensuing sleep deprivation can negatively impact concentration, reaction time and performance on cognitive tasks (Tsai, Young, Hsieh, & Lee, 2005), as well as academic achievement (Kelly, Kelly, & Clanton, 2001). Females typically report marked sleep difficulty during emerging adulthood (Abdel-Khalek, 2006) that may be exacerbated during life transitions such as attending college (Tsai & Li, 2004). For example, sleep problems among female students has been associated with increased depression (Regestien et al., 2010) and with greater anxiety and concentration difficulties (Oginska & Pokorski, 2006).

Existing psychoeducational interventions targeting sleep quality have been shown to decrease self-reported sleep difficulty among college students (e.g. Brown, Buboltz, & Soper, 2006). Such interventions typically focus on sleep hygiene recommendations and stress management. Though effective, they require multiple in-person sessions and take 4–8 weeks to complete. Although worsening sleep quality might motivate college students to engage in these existing treatments, a more efficient intervention might be more widely applicable in a college student population.

Body image, eating concerns and social comparison among college females

Difficulty managing college life may leave women vulnerable to body dissatisfaction and disordered eating behaviours (Levine & Smolak, 2006). Among many changes that occur during college, females have increased opportunity to compare their appearance to that of other young women. Social comparison theory (e.g. Buunk & Gibbons, 2006; Festinger, 1954) suggests that comparisons are useful for evaluating status or performance in a relevant domain. The effect of comparisons based on

body shape or appearance, such as comparing one's body shape or weight to that of others, depends on the direction of the comparison.

Body-related *upward* comparisons (towards women perceived to have 'better' bodies) are associated with increased body dissatisfaction (Stormer & Thompson, 1996), whereas body-related *downward* comparisons (towards women perceived to have 'worse' bodies) are associated with decreased body dissatisfaction (Lin & Kulik, 2002). Differential effects of upward versus downward body-focused comparisons have been shown using cross-sectional (Corning, Krumm, & Smitham, 2006), experimental (Groesz, Levine, & Murnen, 2002), and naturalistic (Leahy, Crowther, & Mickelson, 2007) methods of assessment. As body dissatisfaction is a key risk factor for the development of eating disturbance and clinical-level eating disorders (e.g. Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004) and is prevalent among college females, improving body dissatisfaction (perhaps via experiences such as negative social comparisons) may positively contribute to college females' long-term psychological and physical well-being.

The present study: Intervening against females' psychological distress during college

In this study, we tested the efficacy of a structured expressive writing (EW) intervention (Pennebaker & Beall, 1986) on health-relevant difficulties related to females' transition to college. Structured EW, during which participants write about a stressful experience, has been shown to reduce psychological distress and physical health symptoms, including sleep difficulty, across a variety of participant populations (Frattaroli, 2006; Smyth, 1998). These include, but are not limited to, EW benefit among college students (Lumley & Provenzano, 2003); patients with HIV (Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004), breast cancer (Stanton et al., 2002), asthma/rheumatoid arthritis (Smyth, Stone, Hurewitz, & Kaell, 1999); and prisoners with psychiatric conditions (Richards, Beal, Seagal, & Pennebaker, 2000).

A small group of existing studies have tested the positive effects of EW on sleep difficulty, each with a different participant group and writing topic. These studies have included college students who wrote letters to others who had positive or negative influence (Mosher & Danoff-Burg, 2006), patients undergoing medical treatment who wrote about their condition (cancer; de Moor et al., 2002), medical patients who wrote about a stressful life event (fibromyalgia; Gillis, Lumley, Mosley-Williams, Leisen, & Roehrs, 2006), community individuals with sleep complaints who wrote about their worries (Harvey & Farrell, 2003), and patients with insomnia who wrote about stressful life events (Mooney, Espie, & Broomfield, 2009). In each case, EW outperformed emotionally neutral writing for specific experiences related to sleep difficulty (e.g. self-rated sleep quality). To our knowledge, the effects of EW on social comparison have not yet been examined. Two studies have examined the influence of an EW intervention on body-related experiences (Earnhardt, Martz, Ballard, & Curtin, 2002; Frayne & Wade, 2006). Neither of these studies found support for the efficacy of EW, but both studies have characteristics that make their null findings difficult to interpret.

The primary outcome in Frayne and Wade's (2006) study was disordered eating behaviour (assessed at baseline and at 10-week follow-up); yet, only a small percentage of participants endorsed such behaviours. This may have dramatically reduced the power of the study to demonstrate improvement following EW

(e.g. due to floor effects, statistical power, etc.). Earnhardt and colleagues (2002) examined a small sample of college women ($N=48$) who self-selected participation based on current body dissatisfaction. They found body-related improvement in both the expressive and control groups, which raises concerns about regression to the mean effects. This study also employed substantive, but untested, procedural changes to the EW protocol (e.g. adding an imagery component) that may have distorted the effects of EW on body dissatisfaction. Therefore, no study has yet adequately tested if an EW intervention can positively influence body and eating concerns.

In this study, we extended the traditional EW intervention to address females' health-related difficulties during college. We employed modified writing instructions to focus participants' written narratives on important concerns and experiences related to body image and appearance. As EW can influence both general and specific outcome variables, we assessed multiple health-relevant components of college experience that may be affected by the EW intervention. These outcome variables included sleep difficulty, body dissatisfaction, eating disturbance, and body-focused social comparison.

The role of stress

In addition to the main effects of EW, several participant characteristics may moderate responses to the intervention. Participants who are worse off physically or psychologically at baseline (e.g. are in poorer health, are more pessimistic) tend to show increased benefit from EW, relative to those who are better off (as those who are worse off may have more use for an intervention; Bootzin, 1997; Frattaroli, 2006). A recent meta-analysis of over 140 randomised, controlled trials of EW suggests that participants who report higher stress at baseline demonstrate greater improvement, compared to participants who report lower stress (Frattaroli, 2006). As individuals are likely to vary in their stress responses to college difficulties, we investigated whether baseline level of perceived stress moderates the effect of EW.

Hypotheses

We hypothesised that, controlling for baseline scores, participants in the EW group would show less body dissatisfaction and eating disturbance at follow-up, relative to the control group. Consistent with social comparison theory and with previous findings in the area of body-focused social comparison, we also hypothesised that: (1) participants in the EW group would show *lower* levels of upward body-focused social comparison and (2) participants in the EW condition would show *higher* levels of downward body-focused social comparison, relative to the control group. Based on prior work in college student samples, a secondary hypothesis predicted decreased levels of sleep difficulty in the EW group, relative to the control group. Finally, previous data showing the moderating effect of perceived stress on trauma-focused EW led us to examine whether perceived stress operates similarly for a body-focused EW intervention. Although we predicted main effects on our primary and secondary outcome variables, we also explored the moderating effect of perceived stress.

Method

Participants

Participants ($N=111$) included females recruited from introductory psychology classes at a large private university who received course credit (mean age = 18.90 years, $SD=1.01$). Nearly 60% of first-year students enroll in Introductory Psychology at the present university. As such, recruitment through this course is not likely to result in a highly selective subsample of the college population. Most participants were Caucasian (71%), never married (97%), and living with a roommate (81%), reflecting the larger university population (Table 1).

Measures

Eating Disorder Examination Questionnaire

This 29-item measure asks participants to report on behaviours associated with eating and body image (Fairburn & Beglin, 1994). Multiple validation studies and descriptive studies of normative scores have included samples of women in various age categories (ranging from ages 18 to 42), and a substantial portion of each of these samples has been identified as 'full-time student'. The Eating Disorder Examination Questionnaire (EDE-Q) generates overall score and subscale scores for eating concern, shape concern, weight concern and restraint. Only the total score was used

Table 1. Participant characteristics.

	<i>M</i>	<i>SD</i>
	<i>N</i>	Percentage
Age	18.89	1.02
Body mass index	22.65	4.36
<i>Ethnicity</i>		
Caucasian	78	70
African American	8	7
Hispanic/Latina	6	6
Other	19	17
<i>Year in school</i>		
Freshman	71	64
Sophomore	34	31
Junior	5	4
Senior	1	1
<i>Living situation</i>		
On campus with roommate(s)	90	81
On campus, single	6	5
Off campus with parents	4	4
Off campus with roommate(s)	10	9
Off campus, single	1	1
<i>Relationship status</i>		
Never married	108	97
Widowed	1	1
Married or living with someone as if married	2	2

as an outcome measure in this study; we did not predict that the intervention would have differential effects on specific body-related concerns, and using just the total score reduced the number of statistical tests performed. Cronbach's alpha for the total score was 0.88.

Body Image Quality of Life Inventory

A 19-item questionnaire that captures the effects of body image on aspects of psychosocial functioning (Cash & Fleming, 2002). Its scale ranges from -3 (very negative effect) to +3 (very positive effect), with 0 representing no effect. This measure has high internal consistency ($\alpha=0.95$) and convergent validity with assessments of body satisfaction ($r=0.66$) and preoccupation with the self as fat ($r=-0.31$). In this study, Cronbach's alpha was 0.96.

Iowa–Netherlands Comparison Orientation Measure (modified)

Existing measures of body-focused comparisons do not fully capture the distinction between upward and downward comparisons. Upward and downward comparisons have been shown to lead to differential outcomes (e.g. body satisfaction, mood), suggesting that they should be measured separately. The original Iowa–Netherlands Comparison Orientation Measure (INCOM) captures individuals' engagement in social comparison activity, with subscales for upward and downward comparisons (Gibbons & Buunk, 1999). This measure has previously demonstrated good internal consistency: alphas range from 0.78 to 0.85 across two samples. We augmented the INCOM to include a body-focused social comparison scale using items that had the highest factor loadings in the original INCOM validation study. These items were reworded to target body-focused comparisons. For the resulting 8-item scale, Cronbach's alpha coefficients were 0.72 (overall tendency to compare one's body vs. not), 0.72 (upward body-focused comparisons) and 0.79 (downward body-focused comparisons).

Perceived Stress Scale

A 10-item subjective report of participants' stress levels and their ability to cope with stress (Cohen, Kamarck, & Mermelstein, 1983). Responses are rated on a frequency scale of 0 (never) to 4 (almost always). The Perceived Stress Scale (PSS) has good reliability (Cronbach's alpha of 0.85) and reasonable concurrent validity ($r=0.65$) with a modified version of the College Student Life-Event Scale (as reported by Cohen et al., 1983). In this study, Cronbach's alpha was 0.90.

Pittsburgh Sleep Quality Index

A measure of self-reported sleep quality on seven subscales; this form also generates a 'global' sleep score between 0 and 21 (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), with higher scores representing increased sleep difficulty. The Pittsburgh Sleep Quality Index (PSQI) has both good internal consistency (Cronbach's alpha of 0.83) and good test-retest reliability ($r=0.85$). Cronbach's alpha in this study was 0.70, which is consistent with previous data on college student samples (e.g. Mosher & Danoff-Burg, 2006; see also Brown, Buboltz, & Soper, 2002).

Manipulation check

Participants were asked to complete five questions related to their written narratives. These questions asked participants to rate their post-writing levels of activation and mood, to report how personal and emotional their narratives were, and to rate the extent to which they had previously disclosed the information in their narratives (adapted from prior studies; Pennebaker, Kiecolt-Glaser, & Glaser, 1988; Petrie et al., 2004).

Procedure

In accordance with the protocol approved by our university's Institutional Review Board, participants were recruited from introductory psychology classes using an online scheduling website. After providing informed consent, participants were asked to complete a packet of questionnaires, as described above. Participants were then randomised into either expressive ($n=57$) or control ($n=54$) conditions and asked to write for 15 min before completing a manipulation check. EW instructions were adapted from those used by Hockemeyer and Smyth (2002), which direct participants to write about related aspects of a stressful experience at each session. Session 1 instructed participants to focus on their *deepest thoughts and feelings* about their body image and eating concerns. Instructions for the control group asked participants to write about their plans over the past week. The control activity was framed as time management in an effort to produce similar demand characteristics as in the intervention arm.

After a 15-min break, participants were asked to repeat the writing procedure (i.e. 15 min of writing and manipulation check). EW instructions for the second session directed participants to *evaluate* their thoughts and feelings related to body image and eating. The control group was asked to write about their time management over the past 24 h. Although asking participants to engage in two writing tasks in the same day is a departure from the traditional EW procedure, recent evidence suggests that this design is as effective as writing sessions spaced over 24-h intervals (Chung & Pennebaker, 2008). This procedure was meant to minimise the temporal burden on the part of the participant by reducing the number of visits required for participation, yet to do so in a manner that would preserve the benefit of having three independent writing sessions (Frattaroli, 2006).

A third writing session 1 week later asked participants to write for 15 min and to complete the manipulation check. Although we were conscious of limiting the number of visits required of participants, we scheduled a week in between sessions 2 and 3 to allow participants time to process the thoughts and feelings (EW condition) or information (control condition) associated with the first two sessions. EW instructions for the third session asked participants to *synthesise* their thoughts and feelings about body and eating concerns raised in the previous two sessions, with a focus on how participants could use this information in their everyday lives. Control instructions asked participants to consider their time management with reference to the week ahead. Follow-up assessments were conducted 8 weeks subsequent to participants' third writing sessions; at this last appointment, participants completed all measures from baseline, were debriefed, and were invited to ask questions about the study.

Results

Of the 118 participants randomised, 113 completed the entire protocol, resulting in a 4% dropout rate (five participants, each of whom completed all writing sessions but did not return for follow-up). Those who did not complete the study were evenly distributed in each group (three control, two experimental; $\chi^2=0.39$, $p=0.53$). In addition, two participants were excluded from analyses prior to statistical testing (one received incorrect instructions at Time 2 and one was a non-traditional (age 37) college student). The number of participants who completed the full protocol and were retained for analyses was thus 111.

We first performed independent samples *t*-tests on baseline scores for all outcome variables to determine any pre-existing differences between writing conditions. No significant differences emerged for any of our outcome measures. Responses to manipulation check items showed that participants in the EW group rated their written narratives as more personal ($p<0.01$) and more emotional ($p<0.01$) than did participants in the emotionally neutral control writing group at each session, suggesting that the manipulation was successful.

Each of our analysis of covariance (ANCOVA) models is presented as predicting a specific outcome, controlling for the effects of baseline scores on that outcome. If an ANCOVA model showed a statistically significant main effect of writing condition on a given outcome variable (i.e., $p<0.05$), we present least squares mean (LSM) values for each group, and standardised between-treatments (follow-up) effect sizes (Cohen's *d*) to help determine the clinical or practical significance of the effect. Interpretation of Cohen's *d* is typically anchored at 0.20 (small), 0.50 (medium) and 0.80 (large; see Cohen, 1992). Please refer to Table 2 for each of these values, as well as unadjusted mean scores on each outcome variable by writing condition at baseline versus follow-up.

Main effects of writing group

Group was a significant predictor of sleep difficulty ($F(2,108)=5.31$, $p=0.02$), with the EW group showing lower levels of sleep disturbance at follow-up, relative to

Table 2. Change scores and ANCOVA test values for each outcome variable by writing condition.

	Expressive		Control		<i>F</i> -value	df	<i>p</i> -value	Cohen's <i>d</i>
	<i>M</i>	SD	<i>M</i>	SD				
Sleep difficulty	-1.02	3.00	0.41	2.70	5.31	2108	0.02	0.36
Eating disturbance	-0.04	0.69	0.14	0.62	2.02	2108	0.16	0.08
Body dissatisfaction (BIQLI)	0.26	17.56	0.26	17.71	0.17	2108	0.68	0.02
Body-focused social comparison	-0.09	2.97	0.50	3.52	0.09	2108	0.76	0.05
Body-focused upward social comparison	0.12	1.79	0.74	1.93	4.30	2108	0.04	0.33
Body-focused downward social comparison	-0.26	2.00	-0.22	2.70	0.32	2108	0.57	0.17

controls (EW LSM = 6.09, control LSM = 7.20; Cohen's $d = 0.36$). Group did not predict post-intervention levels of body image quality of life (BIQLI; $F(2,108) = 0.17$, $p = 0.68$) or disordered eating symptoms (EDE-Q total scores; $F(2,108) = 2.02$, $p = 0.16$). With reference to body-focused social comparison, group did not predict general tendency to compare one's body with others ($F(2,108) = 0.09$, $p = 0.76$) or body-focused downward comparison ($F(2,108) = 0.32$, $p = 0.57$). Group did predict body-focused upward comparison ($F(2,108) = 4.30$, $p = 0.04$): participants in the EW condition reported less body-focused upward comparison at follow-up, relative to participants in the control condition (EW LSM = 3.48, control LSM = 3.81; Cohen's $d = 0.33$).

Moderating effect of perceived stress

We also tested for moderating effects of baseline perceived stress level on the effect of the writing activity on our main outcome variables. There were no significant interactions between stress and group for sleep difficulty ($F(4,106) = 2.37$, $p = 0.13$) or body-focused downward social comparison ($F(4,106) = 2.15$, $p = 0.15$). A statistical trend existed for the interaction between stress and group assignment for body image quality of life ($F(4,106) = 3.58$, $p = 0.06$). Although this effect did not reach statistical significance at the 0.05 level, it was in the hypothesised direction: participants reporting higher baseline stress endorsed less body dissatisfaction in the EW condition than in the control condition, whereas the differences between writing conditions was negligible for participants reporting lower baseline stress.

Significant interactions were found between perceived stress and group for overall body-focused social comparison ($F(4,106) = 5.55$, $p = 0.02$), body-focused upward comparison ($F(4,106) = 5.14$, $p = 0.03$) and eating disturbance ($F(4,106) = 4.45$, $p = 0.037$). These interactions show differences between individuals who reported high and low levels of baseline stress. At follow-up, those with high stress endorsed less body-focused social comparison (particularly upward comparison) and less eating disturbance in the EW group, relative to the control group. The differences between writing groups for participants who reported low stress at baseline was not significant. Figure 1 illustrates the treatment effect of EW on eating disturbance at high and low levels of perceived stress (determined by a median split).

Exploratory analyses: Explanatory value of a change in upward social comparison

In order to account for the meaningful outcome differences between writing groups based on level of perceived stress, we considered the effect that a change in an individual's tendency to compare her body to others might have on her body and eating concerns. Subsequent to testing the planned models (previously reported), we conducted an ANCOVA on follow-up EDE-Q scores that included baseline EDE-Q score, change in body-focused upward social comparison, the effects of perceived stress score and writing group, and the interaction term of perceived stress score and writing group (previously significant at the 0.05 level). Including the change in body-focused upward social comparison from baseline to follow-up reduced the interaction to non-significance ($F(5,105) = 2.74$, $p = 0.10$; please refer to Table 3). A Sobel test on this difference was significant ($z = 2.14$; $p = 0.03$), suggesting that the benefit of EW for females who were under high stress at baseline was mediated by

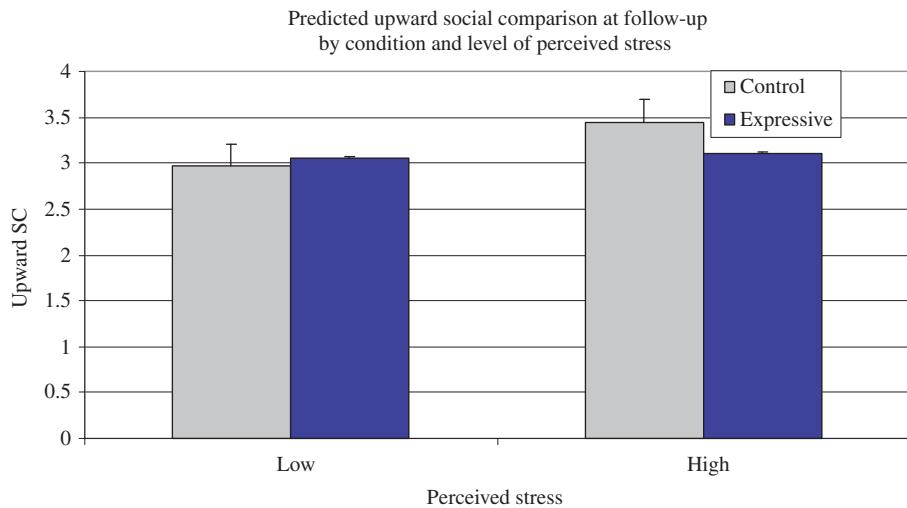


Figure 1. Body-focused upward social comparison at follow-up by writing condition and perceived stress (median split).

Table 3. ANCOVA models testing partial mediation via a change in body-focused upward social comparison.

Change in body-focused upward social comparison	<i>M</i>	SD
Control condition	0.74	1.93
Expressive condition	0.12	1.79
<i>β</i>		<i>p</i>
<i>Model 1</i>		
Baseline EDE score	0.93	0.001
Perceived stress	-0.23	0.01
Writing condition	-0.57	0.14
Perceived stress × writing condition	-0.76	0.037
<i>Model 2</i>		
Baseline EDE score	0.93	0.001
Change in appearance-focused upward social comparison	0.12	0.07
Perceived stress	-0.03	0.01
Writing condition	-0.45	0.25
Perceived stress × writing condition	0.72	0.10

the differential change in body-focused upward social comparison from baseline to follow-up (Figure 2). These findings indicate that EW seemed to buffer young women experiencing high stress against an increase in body-focused upward social comparison during the adjustment to college, in turn reducing these women's risk of subsequent eating disturbance.

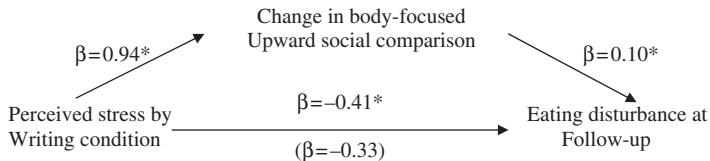


Figure 2. Partial mediation model showing the indirect effect of perceived stress and EW about body concerns on eating disturbance through a change in body-focused upward social comparison.

Discussion

Based on previous findings, we held two broad sets of hypotheses for this study. We hypothesised that a structured EW intervention specifically focused on an aspect of self-concept that is meaningful to college females (i.e. body and eating concerns) would lead to health-related benefits in (1) general outcomes such as sleep difficulty, and (2) body- and eating-related attitudes and behaviours, including eating disturbance, body dissatisfaction, and the tendency to engage in body-focused social comparisons. We hypothesised significant main effects of the writing intervention on each of these outcomes. We also tested the potential moderating effect of perceived stress to further identify whether highly stressed college females experienced greater benefit from engaging in EW, relative to writing about an emotionally neutral topic (i.e. time management).

The effect of structured EW on sleep difficulty

As noted, the traditional trauma-focused EW instructions have shown benefits for sleep difficulty in medical patients (de Moor et al., 2002; Gillis et al., 2006), poor sleepers (Harvey & Farrell, 2003; Mooney et al., 2009), and college students (Mosher & Danoff-Burg, 2006). In this study, we extended investigation of EW effects on sleep by examining whether writing about a specific stressful experience would produce benefit. Indeed, women who engaged in EW reported less sleep difficulty at the end of 8 weeks, relative to their control-writing counterparts; this difference was of small to moderate effect size. With reference to the actual changes, the EW group reported a reduction in their sleep disturbance from baseline to follow-up, whereas the neutral writing condition reported an increase.

Despite our use of targeted writing instructions (focused on body image and eating), we nonetheless found that EW led to reduced sleep difficulty. It is possible that body and eating concerns represent stressors that interfere with sleep (e.g. by inducing ruminative thoughts that create cognitive activation; see Watkins, 2008, for review) and that targeting these stressors reduces such interference. Further research will be necessary to replicate the effect of body-focused EW on sleep problems and to determine pathways to explain this effect. This study provides preliminary evidence to indicate that the process of expressing, evaluating, and synthesising one's feelings about specific highly personal topics (such as body and eating concerns) can improve reported sleep.

The effect of structured EW on body and eating concerns

Despite the body-related focus of our EW instructions, and although this study was adequately powered to detect moderate (and thus clinically meaningful) effect sizes

for a sample of healthy college females, we did not find significant main effects of writing condition on eating disturbance, body dissatisfaction, or most social comparison outcomes. The lack of main effects is generally consistent with previous research on the effects of EW on body- and eating-related attitudes and behaviours (Earnhardt et al., 2002; Frayne & Wade, 2006). We did, however, find evidence to suggest that participants in the EW condition reported less body-focused upward social comparison at follow-up, relative to participants in the control condition. This effect was qualified by an interaction with baseline level of perceived stress: the salutary effect of EW on upward body-focused social comparison was stronger for those who reported high stress prior to the intervention, relative to those who reported lower stress.

Females who reported higher perceived stress at the outset of this study also experienced increased benefit from EW. That is, young women who reported high stress and then received the EW intervention subsequently reported reductions in their eating disturbance; those who reported high stress and received the control activity experienced increased disordered eating symptoms. For individuals who reported low perceived stress at the outset, there was no difference in disordered eating between writing conditions at follow-up (as both conditions showed increases). This finding is consistent with results from meta-analytic studies of experimental EW (Frattaroli, 2006).

In this study, main and moderated effects on body-focused upward comparison suggest that a subset of our sample was buffered against the negative effects of stress observed in the control condition. This buffering phenomenon has been demonstrated in previous EW studies (e.g. Sloan, Marx, Epstein, & Dobbs, 2005; Zakowski, Ramati, Morton, Johnson, & Flanigan, 2004). In each study, EW protected participants from worsening that occurred in control conditions (i.e. tracking natural history without an active intervention). However, buffering in this study was observed for only changes in body-focused upward social comparison, and was a bit more complex than the buffering effects found in previous studies. Participants in our control condition experienced an increase (worsening) in their body-focused upward comparisons, whereas participants in the EW condition experienced no change. The interaction with perceived stress for this outcome demonstrates that for participants who reported high perceived stress at baseline, those in the EW condition were protected from increased body-focused upward comparison that was endorsed by control participants. There was no difference between writing conditions for participants who reported low stress at baseline; all participants experienced increased body-focused upward comparisons.

Taken together, our findings suggest that women who are highly stressed may be at risk for additional health-compromising experiences (e.g. disordered eating behaviours) and an EW intervention may help to protect them from the negative effects of stress. An EW intervention focused on body concerns may be most effective for, and therefore could be targeted towards, females who experience high perceived stress during college. Even women who report managing college life without excessive stress, however, may experience improved sleep quality as a result of an EW intervention focused on body and eating concerns.

We also explored a potential mechanism by which EW resulted in less eating disturbance for individuals who reported high perceived stress. Previous research has identified social comparison as a pathway through which social expectations of appearance (e.g. thin-ideal media images, teasing related to weight) can be

detrimental to females' mood, body satisfaction and weight concerns (Bessenoff, 2006). Social comparison is also a process through which other body-focused interventions have shown positive effects (Lew, Mann, Meyers, Taylor, & Bower, 2007; Murray, 2006). This study provides additional evidence to support this general idea: writing about body and eating concerns buffered more highly stressed women against increases in body-focused upward comparison that occur over the course of one semester (as seen in the more highly stressed control condition). This buffering against an increase in body-focused upward comparison, in turn, reduced symptoms of disordered eating for college females who experienced high stress.

In sum, prior evidence and these findings suggest that interventions aimed at modifying college females' social comparison processes may have salutary effects on body concerns. In clinical settings, EW focused on body concerns such as social comparison may be used as a homework activity between therapy sessions (Smyth, Nazarian, & Arigo, 2008). When used as an adjunct to individual psychotherapy in a college counselling centre, clients who complete EW activities between sessions show greater progress and reduced symptoms of depression and anxiety, relative to clients who complete emotionally neutral writing assignments (Graf, Gaudiano, & Geller, 2008). Our data suggest that the effects of EW under such conditions may be particularly beneficial for females who experience high perceived stress during college, and may positively impact other health and well-being outcomes during later development.

Limitations and future directions

This study benefited from a reasonably large sample and low attrition rate (4%) over 8 weeks. Recruitment targeted a population of ostensibly healthy college females (i.e. participants were purposely not screened for, or selected on the basis of, any current transition-related difficulty). The moderating effect of perceived stress on some of our outcome variables suggest that this intervention may be optimally effective for those experiencing high stress; this may have limited our ability to detect significant main effects. An additional limitation of this study is our use of the Perceived Stress Scale to quantify stress. As this measure captures global stress, rather than college-specific stress, we cannot conclude that the stress reported by participants in this study was related (or unrelated) to college demands. Continuation of this research could examine the effects of EW in college samples that are screened for increased distress or dysfunction (i.e. high stress or anxiety), or who seek treatment for such difficulties. Extending the use of EW to students with more serious problems (e.g. individuals with eating or sleep disorder diagnoses) would also increase our understanding of the clinical implications of this intervention.

As is often the case with college student samples, the timing of our data collection was constrained by an academic calendar that did not allow for multiple follow-up assessments. An optimal schedule would allow for both short- and long-term follow-up assessments that indicate the potential duration of the intervention's benefits. Addressing this logistical issue is an area of opportunity for future work. Finally, all of the baseline and follow-up information collected in this study was based on retrospective self-report. Although this is consistent with much of the extant literature on EW among college students, it would be desirable to use more objective (e.g. polysomnography data, cortisol level) and/or naturalistic (e.g. sleep diaries, ecological

momentary assessment methods) measures of change in future investigations of EW on psychosocial difficulties related to college life and emerging adulthood.

Conclusions

The implications of this study are threefold. First, writing about body concerns in a personal and emotional way may reduce sleep difficulty and body-focused upward comparison among college females. Second, such writing improves eating disturbance and specific types of social comparison among college females who report high perceived stress. Third, these findings highlight the associations between perceived stress, eating disturbance, body dissatisfaction, and social comparison. In particular, upward social comparison may be a mechanism through which eating disturbance may be positively influenced by an EW intervention.

Many college women experience health-relevant difficulties, including appearance concerns (Neighbors & Sobal, 2007), disordered eating symptoms (Levine & Smolak, 2006), and sleep disturbance (Howell, Jahrig, & Powell, 2004). Although most students successfully overcome these challenges, the lingering effects of negative experiences can have long-term implications. For instance, body dissatisfaction and consequent symptoms of disordered eating are associated with increases in physical complaints (e.g. pain) and health care utilisation (Lock, Reisel, & Stiener, 2001). Sleep difficulty has been shown to significantly predict mortality, over and above all other causes of death in an older adult population (Dew et al., 2003). Intervening against these negative effects during college, using a brief and easily administered activity such as EW about a personal topic, may thus positively influence females' long-term trajectory of risk or resilience.

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