

# A little acceptance is good for your health: Interpersonal messages and weight change over time

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## Abstract

This research examines whether acceptance messages from close others about one's weight predict changes in stressful weight concern and body mass index (BMI) over time. Participants reported weight concern and BMI in three waves of data collection spanning approximately 9 months, and reported the messages they received from parents, friends, and romantic partners concerning their weight in the second wave of data collection. Participants normatively gained weight during the study period. But for vulnerable women, those initially high in weight concern, receiving fewer acceptance messages about weight was associated with weight gain, whereas receiving more acceptance messages was associated with decreases in stressful weight concern and weight maintenance, or even loss, over time. Alternative predictors, mechanisms, and models were also tested.

*Oh I love you, love you the way you are*  
Bobby Vinton (1962)

*There's not a thing that I would change,  
'cause you're amazing just the way you are*  
Bruno Mars (2010)

As song lyrics from two generations illustrate, people intuitively recognize their loved

ones' cravings for messages of acceptance. Generations of psychologists have proposed the same need. Cooley (1902) suggested that people's perceptions of how others see them shape how they feel about themselves. Rogers (1980) argued that acceptance messages that communicate unconditional positive regard nurture human growth. Self and relationship psychologists contend that feeling accepted by close others is a fundamental human need (Baumeister & Leary, 1995; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and conveying that acceptance through responsiveness is the foundation of intimacy and trust within close relationships (Reis, Clark, & Holmes, 2004). The benefit of acceptance messages is not only restricted to emotional and psychological outcomes. Perhaps the most important finding in the field of health psychology to date has been the discovery that social acceptance supports physical health (i.e., Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

Yet, despite the overwhelming evidence suggesting that acceptance is good for people's health and well-being, researchers know

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relatively little about the social and psychological mechanisms that explain such effects. How are acceptance messages perceived and incorporated into the self-concept, and what are the downstream effects of such messages in health and other important domains? This research begins to answer these questions by focusing on the domain of body size, or weight, a domain known to be central to many people's self-concept (e.g., Rodin, Silberstein, & Striegel-Moore, 1984) and crucial for their health (World Health Organization [WHO], 2000). We asked young women to report the messages that they receive from intimate others like parents, friends, and romantic partners about their weight. We then observed whether receiving weight-acceptance messages—but not weight-loss pressure or weight-dismissal messages—predicts beneficial changes in self-concept and weight over a 9-month period of time. Thus, this research will shed light on the ways in which people's social environments relate to important outcomes like health, and our results could have important applications for both people struggling to maintain a healthy weight and the people attempting to support their loved ones' weight-maintenance efforts.

#### *Weight and stressful weight concern*

Weight is an important domain in which to test hypotheses about acceptance, self-concept, and health because most adults gain weight continuously throughout adulthood (Østbye, Malhotra, & Landerman, 2011). Moreover, in North America today, over half of adults and one fourth of children are either overweight or obese (Ogden & Carroll, 2010; Shields, 2006; Tjepkema, 2006), contributing to serious, long-term health problems (WHO, 2000).

In accord with these high rates of obesity, concerns about weight have become so pervasive, particularly among women, that they have been described as a normative discontent (Rodin et al., 1984). Most women and many men possess self-concepts that include weight dissatisfaction. Some have argued that weight dissatisfaction, or *weight concern*, is necessary to motivate behavior change and weight loss (Cash, Novy, & Grant, 1994; Heinberg,

Haythornthwaite, Rosofsky, McCarron, & Clarke, 2000). However, population trends show that even as weight concern remains high, the average body mass index (BMI; i.e., weight in kilograms divided by squared height in meters) has continued to rise (Ogden & Carroll, 2010), suggesting that weight concern is ineffective as a foundation for weight loss. In fact, there is growing evidence that weight concern actually puts people at risk for gaining weight (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Saules, Collings, Wiedemann, & Fowler, 2009; Stice, Rohde, Shaw, & Marti, 2012). Indeed, feeling judged for their weight deters people from engaging in physical activity (Faith, Leone, Ayers, Heo, & Pietrobelli, 2002; Storch et al., 2007; Vartanian & Shaprow, 2008) and increases counterproductive coping behaviors such as binge eating (Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006; Puhl & Brownell, 2006). Moreover, a large body of literature show that stress promotes weight gain both through physiological processes that encourage fat storage (for a review, see Björntorp, 2001) and psychological processes such as overeating to regulate mood (Herman & Polivy, 1980, 1988). Indeed, stress due to weight concern and weight stigma directly undermines self-control and causes increased eating (Major, Eliezer, & Rieck, 2012; Major, Hunger, Bunyan, & Miller, 2014).

#### *The current research: Acceptance is good for your weight*

One factor that may moderate the negative processes through which weight concern leads to weight gain is social acceptance experienced within close relationships. Feeling accepted by close others is essential for well-being (e.g., Reis et al., 2000), provides a secure base for goal pursuit (Feeney, 2004), and buffers the self against the stress of negative events (e.g., Cohen & Wills, 1985; Feiring, Taska, & Lewis, 1996; Yi, Jia, & Zheyu, 2003). For these reasons, social acceptance and support have a wide range of health benefits (Uchino et al., 1996), including benefits for weight maintenance and loss. For example,

within overweight and obese populations, the feelings of belonging and support that people gain by attending weekly weight-loss group meetings can promote weight loss (e.g., Weight Watchers meetings; Heshka et al., 2003). Moreover, simply writing about the importance of family, friends, or social groups as part of a values-affirmation task can lead to weight loss over time (Logel & Cohen, 2011). Social acceptance also helps to assuage weight concerns. Prior research suggests that receiving praise and encouragement about one's weight from family, or even just feeling generally accepted by close others, is associated with decreased weight concern and less negative body image (Gerner & Wilson, 2005; Ricciardelli, McCabe, & Banfield, 2000). Furthermore, warmth and acceptance from family and peers predict more positive body self-esteem (Ata, Ludden, & Lally, 2007). We propose that social acceptance may help people to maintain a healthy weight over time by reducing weight concern, especially for people who are initially high in weight concern and thus are particularly vulnerable to weight gain over time.

We test our proposals by examining the associations among perceived acceptance messages about weight from close others and changes in weight concern and BMI over time in a population known to be vulnerable to weight gain and weight concern: university-age women. This age group affords an excellent opportunity to study these processes because weight gain, although normative throughout adulthood, is especially likely to occur among university-age individuals (Lloyd-Richardson, Bailey, Fava, & Wing, 2009). Furthermore, women report substantially higher levels of weight concern than men, and men's typical goals (i.e., to both lose fat and gain muscle) obscure interpretations of changes in BMI over time (Frederick, Peplau, & Lever, 2006).<sup>1</sup>

We adopted an holistic or social-network approach to quantifying the messages that

participants receive from close others concerning their weight. In response to their expressed weight concerns, participants indicated whether they received, or did not receive, a particular message about their weight from a parent, a close friend, and (if applicable) a romantic partner. We then summed the number of messages that participants received from their network of intimates. Thus, our approach examines the association between cumulative perceived acceptance messages from close others and changes in weight concern and BMI over time.<sup>2</sup>

More specifically, participants reported their levels of stressful weight concern and information necessary to calculate BMI in three waves of data collection spanning an approximately 9-month period of time. In the second wave of data collection, participants also reported whether or not they received *weight-acceptance messages* from a parent, a close friend, and (if relevant) a romantic partner in response to their expressed weight concerns. Weight-acceptance messages reassure the message recipient that his or her weight is acceptable, and generally convey positive regard for the message recipient. Therefore, for women who initially report high concerns about their weight, we propose that weight-acceptance messages in response to expressed weight concerns will predict decreased weight concerns over time, which in turn will predict weight maintenance by interrupting the normative trend to gain weight over time, and by interrupting the typical connection between weight concern and weight gain.

Of course, not all messages about weight that participants perceive from close others will be accepting, and some types of well-intentioned social support can actually

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1. Only 37 men participated in the larger scale longitudinal study from which the current data were drawn, so statistical power was too low to examine whether gender moderates the processes we examine.

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2. This social-network approach to quantifying acceptance messages was also dictated by the nature of the items included in the larger scale longitudinal study from which the current data were drawn. The longitudinal study did not include Likert-type questions about weight messages for each close other, an approach that would have facilitated other ways of quantifying the messages that participants received (e.g., How positive were messages from a particular close other? How frequent were messages from a close other?).

undermine the support recipient's well-being (e.g., Birmingham, Uchino, Smith, Light, & Sanbonmatsu, 2009; Ingram, Betz, Mindes, Schmitt, & Smith, 2001; Stice & Whitenton, 2002). Therefore, in this research, we compare and contrast weight-acceptance messages with two other types of messages that participants may perceive about their weight. *Weight-loss pressure messages* emphasize the importance of losing weight and being thin. Such pressure can come in the form of teasing or put-downs, but can also be more subtle, such as voicing concerns about a close other's weight or suggesting ways to lose weight (Ata et al., 2007). Even when subtle, such pressure from family and friends may lead to body shame and heightened weight concern (Ata et al., 2007; Dunkley, Wertheim, & Paxton, 2001; Stice & Whitenton, 2002). Thus, weight-loss pressure messages may not only be ineffective but may even backfire and facilitate weight gain. Moreover, *weight-concern dismissal messages* attempt to sidestep the issue of a close other's weight concerns. Ample empirical evidence suggests that dismissing a support seeker's concerns invalidates those concerns (e.g., Collins, Ford, Guichard, Kane, & Feeney, 2009), which may convey a lack of positive regard and responsiveness to the support recipient. We propose that weight-concern dismissal messages will be unrelated to changes in weight concern and weight over time.

Finally, in addition to comparing and contrasting different types of weight messages that participants may receive in response to their expressed weight concerns, we also test alternative models and examine whether five plausible alternatives to acceptance messages can explain observed changes in weight concern and BMI over time.

## Method

### *Participants and procedure*

Participants were female students in their 1st or 2nd year of undergraduate studies at a major Canadian university who were recruited to be a part of the Research on Early Adult Life (REAL) project, a large-scale longitudinal study that examined multiple aspects of young

adults' lives (see also Stinson et al., 2008). Data reported in this research were collected during the third, fifth, and sixth waves of online data collection.<sup>3</sup> A total of 187 participants (83% White, 13% South and East Asian, 4% other races;  $M_{\text{age}} = 19.44$ ,  $SD_{\text{age}} = 0.74$ ) completed the third wave of data collection (Time 1).<sup>4</sup> Five to 6 months later, 125 participants (82% White, 14% South and East Asian, 4% other races;  $M_{\text{age}} = 19.80$ ,  $SD_{\text{age}} = 0.67$ ) also completed the fifth wave of data collection (Time 2; attrition from time 1 = 33%). Another 2–3 months later, 100 participants (83% White, 14% South and East Asian, 3% other races;  $M_{\text{age}} = 19.95$ ,  $SD_{\text{age}} = 0.76$ ) also completed the sixth wave of data collection (Time 3; attrition from Time 1 = 47%). Participants had their name entered into a drawing for prizes in appreciation for completing each online questionnaire administered at Times 1 through 3.

## Measures

### *Time 1*

Participants reported their *weight* in pounds, their *ideal weight* in pounds, and their *height* in feet. Participants also reported their *weight satisfaction* (i.e., "In general, I am satisfied with my weight"; 1 = *strongly disagree* to 7 = *strongly agree*), *weight stress* (i.e., "How often during the past month have you worried about your diet and/or your weight?" 1 = *never* to 5 = *constantly*; "Does it bother you that you do not weigh what you ideally desire?" 1 = *it does not bother me at all* to 5 = *it bothers*

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3. Participants in the REAL project completed 10 waves of online surveys during the first 2 years of their undergraduate studies. Note that the weight-related measures used in this study were not included in every wave, which is why we focus on Waves 3, 5, and 6 in this research: Those were the most proximate waves that included relevant variables.
  4. An additional 10 women were excluded from this research because they indicated at Time 1 that their actual weight was less than their ideal weight. Because so few women expressed the desire to gain weight, there was not adequate power to test whether desiring to lose versus gain weight moderated our proposed effects. Yet, we suspect that the psychological processes underlying the two goals are quite different. Thus, we opted to exclude these few participants from this research.

me a lot), and completed a six-item version of the Body Shape Questionnaire (Evans & Dolan, 1993; e.g., "Have you felt ashamed of your body?" 1 = *never* to 5 = *always*). In addition, participants reported their *self-esteem* by responding to four items drawn from Rosenberg's (1965) Self-Esteem Scale (e.g., "I feel I am a person of worth, at least on an equal basis with others"; 1 = *strongly disagree* to 7 = *strongly agree*), and completed a single-item measure of *general stress* (i.e., "In general, over the last month I have felt stressed"; 1 = *strongly disagree* to 7 = *strongly agree*).

### Time 2

Participants completed the measures of weight and height used at Time 1. In addition, participants answered a series of questions about three *close others*, specifically, a parent, a friend, and a romantic partner (if applicable), whom the participants had identified in a previous wave of data collection. Participants were presented with three 5-item checklists, one checklist for each close other. First, participants indicated whether they had ever *expressed weight concerns* to each of the three close others by selecting, or leaving blank, the item: "I have never expressed concerns about my diet or weight to my [parent/friend/partner]." Next, participants identified *weight messages* that they had received from each close other when the participants had expressed concerns about their diet or weight to the particular close other in the past: "My [parent/friend/partner] assured me that my weight was acceptable"; "My [parent/friend/partner] agreed that I had a reason to be concerned"; "My [parent/friend/partner] offered to help me change my weight"; "My [parent/friend/partner] told me that weight is not important"; and "My [parent/friend/partner] pointed out that his/her own weight is more of a problem than mine." Participants also reported their *feelings after messages* from each close other: "How did you feel after the most recent time you spoke to [parent/friend/partner] about your diet and/or weight concern" (1 = *a lot better* to 5 = *a lot worse*). Finally, participants completed the

same four items from Rosenberg's (1965) Self-Esteem Scale that participants used to report their self-esteem at Time 1, but the four items were reworded to assess participants' *perceived regard* from each close other (e.g., "My [parent/friend/partner] feels that I am a person of worth, at least on an equal basis with others"; 1 = *strongly disagree* to 7 = *strongly agree*).

### Time 3

Once again, participants reported their weight and height. As at Time 1, they also reported ideal weight, weight satisfaction, weight stress, and responded to the six-item Body Shape Questionnaire. They also completed the same measures of self-esteem and general stress that were used at Time 1.

## Results

### Data preparation

#### Accounting for missing data

Independent sample *t* tests comparing participants who had completed all three measurement times with those who had missed at least one measurement time revealed no significant differences on any variable. Moreover, patterns of missing data were explored with the Missing Values module of SPSS 19.0, and Little's MCAR test indicated that the data were missing completely at random ( $\chi^2 = 229.21$ ,  $df = 335$ ,  $p = .967$ ). Therefore, to utilize all available data, we opted to singly impute missing values using the expectation maximization (EM) technique (see Graham, Cumsille, & Elek-Fisk, 2003).

#### Computing BMI

Participants' reported weight (demonstrated to be a reliable method of approximating actual weight; Jeffery, 1996) and height (converted to inches) were used to compute participants' BMI, (lbs  $\times$  704)/in<sup>2</sup>, at Times 1 through 3. BMI change was then computed by subtracting Time 1 BMI from Time 3 BMI, yielding a variable on which positive scores reflected weight gain over the approximately 9-month study period.

### Computing weight concern

Participants' weight satisfaction (transformed to a 5-point scale and reverse-coded), weight stress (two items), and responses to the six-item Body Shape Questionnaire were aggregated to yield a reliable *weight concern* index for Time 1 ( $\alpha = .95$ ) and Time 3 ( $\alpha = .94$ ). *Weight-concern change* was then computed by subtracting Time 1 weight concern from Time 3 weight concern, yielding a variable on which positive scores reflected increased concerns about one's weight over the study period.

### Computing expressed weight concerns

Responses at Time 2 to the item: "I have never expressed concerns about my diet or weight to my [parent/friend/partner]" were coded such that leaving the item blank for a particular close other, thereby indicating that they *did* express concerns, received a score of 1, whereas selecting the item for a particular close other received a score of 0. We then summed participants' responses across close others so that a maximum score of 3 indicated that a participant had expressed concerns about her weight to all three close others.

### Computing messages received about weight

Responses at Time 2 to the item, "My [parent/friend/partner] assured me that my weight was acceptable" were coded such that leaving the item blank for a particular close other received a score of 0, whereas selecting the item for a particular close other received a score of 1. We then summed participants' responses across close others to create a *weight-acceptance* score reflecting the number of accepting messages participants received from the close others. Responses at Time 2 to the items "My [parent/friend/partner] agreed that I had a reason to be concerned" and "My [parent/friend/partner] offered to help me change my weight" were each coded and summed in the same manner, and then the two summary scores were aggregated to create a single *weight-loss pressure* score for each participant, which reflected the number of pressuring messages that participants received

from close others. Finally, responses at Time 2 to the items "My [parent/friend/partner] told me that weight is not important" and "My [parent/friend/partner] pointed out that his/her own weight is more of a problem than mine" were each coded and summed in the same manner, and then the two summary scores were aggregated to create a single *weight-concern dismissal* score that reflected the number of dismissing messages that participants received from close other.<sup>5</sup>

### Computing feelings after messages, self-esteem, and perceived regard

Participants' reports at Time 2 concerning their feelings after receiving weight messages from each close other were reverse-coded and then aggregated across targets ( $\alpha = .62$ ). The four self-esteem items drawn from Rosenberg's (1965) scale were aggregated at Time 1 ( $\alpha = .76$ ) and Time 3 ( $\alpha = .84$ ). The four perceived regard items assessed at Time 2 were aggregated across targets ( $\alpha = .88$ ).

### Descriptive statistics and preliminary analyses

Means, standard deviations, and zero-order correlations among imputed variables are shown in Table 1.

As indicated by the positive mean change in BMI score in Table 1, women's BMIs increased from Time 1 to Time 3 ( $M_s = 24.15$  and  $24.49$ , respectively;  $SD_s = 4.49$  and  $4.87$ , respectively),  $t(176) = 3.70$ ,  $p < .001$ . Put differently, the average height participant gained approximately 2.11 pounds over the study period, suggesting that weight gain was the normative experience for participants. Note

5. We conducted confirmatory factor analyses to test whether the five message types indeed loaded onto three statistically distinct factors. The proposed three-factor model demonstrated reasonable fit,  $\chi^2(3, N = 177) = 4.910$ ,  $p = .18$ ; comparative fit index (CFI) = .975; root mean square error of approximation (RMSEA) = .060; PCLOSE = .339. Moreover, this three-factor model showed significantly better fit than a two-factor model with "assured me that my weight was acceptable" specified to load onto the first factor and the other four types of messages all loading onto the second factor,  $\Delta\chi^2(2, N = 177) = 8.942$ ,  $p = .02$ .

**Table 1.** Descriptive statistics and zero-order correlations among variables

	M	SD	2	3	4	5	6	7	8	9	10	11	12
1. BMI (T1)	24.15	4.49	.19*	.31**	.05	.24**	-.18*	.42**	.12	.01	.05	.11	-.05
2. Change in BMI (T3 - T1)	0.34	1.21	—	.00	.42**	-.01	-.21**	.19*	.04	.00	.09	.10	-.16*
3. Weight concern (T1)	2.87	0.99	—	—	-.27**	.33**	.06	.45**	.43**	-.34**	-.38**	-.39**	.08
4. Change in weight concern (T3 - T1)	0.09	0.49	—	—	—	-.08	-.16*	.02	-.21**	-.04	-.01	.00	.22**
5. Expressed weight concerns (T2)	1.69	0.71	—	—	—	—	.59**	.50**	.51**	.00	.06	-.03	-.19*
6. Weight acceptance (T2)	1.25	0.69	—	—	—	—	—	.01	.31**	.19*	.02	.00	-.01
7. Weight-loss pressure (T2)	0.43	0.43	—	—	—	—	—	—	.49**	-.07	-.01	-.14	-.16*
8. Weight-concern dismissal (T2)	0.53	0.51	—	—	—	—	—	—	—	-.02	-.06	-.23**	-.06
9. Feelings after messages (T2)	3.45	0.61	—	—	—	—	—	—	—	—	.28**	.56**	.01
10. Self-esteem (T1)	5.10	1.14	—	—	—	—	—	—	—	—	—	.48**	-.25**
11. Perceived regard (T2)	6.29	0.62	—	—	—	—	—	—	—	—	—	—	-.22**
12. General stress (T1)	5.38	1.62	—	—	—	—	—	—	—	—	—	—	—

Note. BMI = body mass index; T1 = Time 1; T2 = Time 2; T3 = Time 3.

\* $p < .10$ . \*\* $p < .05$ .

that with an average BMI of 24.15 at Time 1, participants were at the high end of the healthy weight range (18.5–25.0) at the start of the study period. So weight maintenance, rather than weight loss, was a healthy goal for these participants.

In contrast, the mean of zero for change in weight concern indicates that such concerns remained stable from Time 1 to Time 3 on average ( $M_s = 2.87$  and  $2.96$ , respectively;  $SD_s = 0.99$  and  $0.98$ , respectively),  $t < 1$ , *ns*. Moreover, 93.3% of participants reported expressing weight concerns to at least one of their close others. These results replicate earlier research suggesting that weight concerns are a normative discontent for women (Rodin et al., 1984). Indeed, only 6.2% of the sample, or 11 participants, reported that they had not expressed concerns to any of the close others. These nonexpressing participants were also lower in weight concern ( $M = 1.97$ ,  $SD = 0.82$ ) than the rest of the sample ( $M = 2.93$ ,  $SD = 0.97$ ),  $t(176) = 3.72$ ,  $p < .001$ , reflecting the positive correlation between weight concern and expressed concerns reported in Table 1.

We also explored whether romantic relationship status moderated the processes we are studying. This question is germane because people in romantic relationships could report weight messages from a maximum of three, rather than two, close others. Exploratory analyses indicated that people in romantic relationships at Time 2 weighed less at Time 1, expressed less weight concern at Time 3, had higher self-esteem at Time 1, and, unsurprisingly, reported more accepting and dismissing weight messages than their single counterparts, all  $ps < .05$ . Despite these group differences, relationship status did not explain or moderate any of the core results that we will report next.

*Do weight-acceptance messages predict change in BMI as a function of weight concern?*

First, we tested our hypothesis that women who were highly concerned about their weight would report less weight gain to the extent that they perceived accepting messages from others. Change in BMI between

Time 1 and Time 3 was regressed onto: Step 1, mean-centered BMI at Time 1; Step 2, mean-centered weight-acceptance messages and mean-centered weight concern at Time 1; and Step 3, the product term for the Weight Acceptance  $\times$  Weight Concern interaction.<sup>6</sup>

Results of this regression are presented in the top panel of Table 2. As indicated by the results for Step 2, weight concern did not predict change in BMI on its own, whereas more weight-acceptance messages predicted lower change in BMI from Time 1 to Time 3. Moreover, the Weight Acceptance  $\times$  Weight Concern interaction was significant in Step 3, and is depicted in the top panel of Figure 1. For all of the analyses, the results for individuals scoring 1 *SD* below the sample mean (i.e., “low”) and 1 *SD* above the sample mean (i.e., “high”) for each predictor variable were graphed.

As predicted, for women who had high concerns about their weight at Time 1, the more weight-acceptance messages that they received from close others, the less their weight changed,  $b = -.66$ ,  $t(172) = -3.44$ ,  $p < .001$ . In concrete terms, women high in weight concern who received low levels of weight-acceptance messages from their close others experienced an *increase* in BMI of 0.75 units between Time 1 and Time 2, which is a statistically significant weight gain relative to baseline BMI at Time 1,  $t(172) = 8.23$ ,  $p < .001$ . In contrast, women high in weight concern who received high levels of weight-acceptance messages from their close others experienced a *decrease* in BMI of 0.17 units over the same time period, which reflects weight maintenance (or marginally significant weight loss) relative to baseline BMI at Time 1,  $t(172) = -1.84$ ,  $p = .067$ . In

contrast, weight-acceptance messages were unrelated to change in BMI among women who were low in weight concern at Time 1,  $b = -.05$ ,  $t < 1$ . Such women experienced an increase in their BMI of approximately 0.41 units over the study period, regardless of the level of accepting messages they received from close others, which is a statistically significant weight gain relative to baseline BMI at Time 1,  $t(172) = 4.34$ ,  $p < .001$ .

*Is the relation between weight-acceptance messages and change in BMI explained by change in weight concern?*

Recall that we proposed that for women high in weight concern at Time 1, high levels of weight-acceptance messages from close others will predict decreased weight concern over time, which in turn will predict stable (or decreased) BMI over time (i.e., Weight Acceptance  $\times$  Weight Concern  $\rightarrow$  changes in weight concern  $\rightarrow$  changes in BMI). Our hypotheses reflects *mediated moderation* (Morgan-Lopez & Mackinnon, 2006), in which path *a* from the predictor variable (i.e., weight-acceptance messages) to the mediator (i.e., change in weight concern from Time 1 to Time 3) is conditional upon the level of a moderator variable (i.e., weight concern at Time 1), but path *b* from the mediator to the outcome (i.e., change in BMI from Time 1 to Time 3) is unconditional.

The first step in this specific mediated moderation analysis is to establish whether path *a*, which reflects the association between weight-acceptance messages and change in weight concern from Time 1 to Time 3, is moderated by participants' initial level of weight concern at Time 1. To test this hypothesis, change in weight concern between Time 1 and Time 3 was regressed onto: Step 1, mean-centered BMI at Time 1; Step 2, mean-centered weight-acceptance messages and mean-centered weight concern at Time 1; and Step 3, the product term for the Weight Acceptance  $\times$  Weight Concern interaction. The regression results are presented in the bottom panel of Table 2. The essential Weight Acceptance  $\times$  Weight Concern interaction was statistically significant, indicating that path *a* in the mediation model was indeed moderated

6. Although it is not immediately intuitive to enter mean-centered BMI at Time 1 as a control variable in an analysis predicting change in BMI, this approach accounts for any confounding between Time 1 BMI and magnitude of change in BMI over time (for a similar analytic approach using change scores, see Blascovich, Seery, Mugridge, Norris, & Weisbuch, 2004). This method also aids interpretation of the regression results by setting the intercept at the average initial BMI, allowing us to determine whether weight-acceptance messages predict weight loss or gain over time. Moreover, the parameter estimates for predictors are unaffected by including Time 1 BMI as a control variable in the regression.

**Table 2.** Results of hierarchical regressions predicting change in BMI and change in weight concern from Time 1 to Time 3

Predictor	Step 1	Step 2	Step 3	$\Delta R^2$
<i>DV: Change in BMI (model total <math>R^2 = .102</math>)</i>				
Step 1				.037*
BMI at T1	.19*	.18*	.14 <sup>†</sup>	
Step 2				.035*
Weight concern at T1		-.05	-.05	
Weight acceptance		-.18*	-.21**	
Step 3				.030*
Two-way interaction			-.18*	
<i>DV: Change in weight concern (model total <math>R^2 = .109</math>)</i>				
Step 1				.003
BMI at T1	.05	.13	.10	
Step 2				.106**
Weight concern at T1		-.30**	-.30**	
Weight acceptance		-.12 <sup>†</sup>	-.14 <sup>†</sup>	
Step 3				.021*
Two-way interaction			-.15*	

Note.  $N = 176$ . BMI = body mass index; DV = dependent variable; T1 = Time 1;  $\Delta R^2$  = change in  $R^2$ .

<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ .

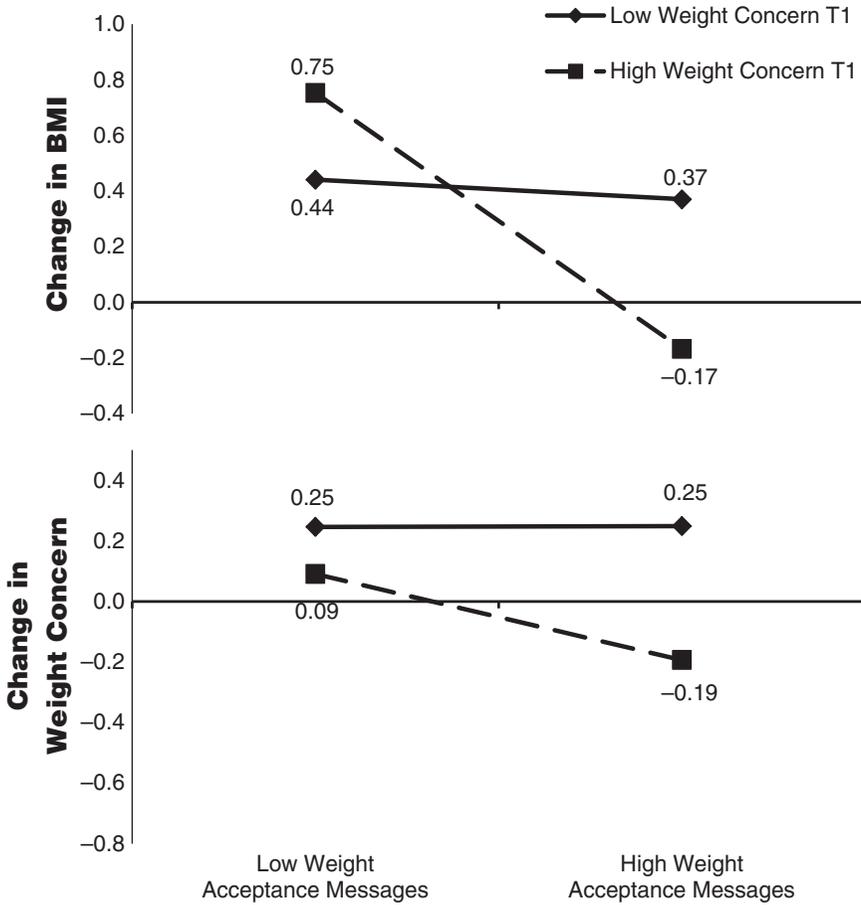
by participants' initial level of weight concern at Time 1. This interaction is depicted in the bottom panel of Figure 1. For women who had high concerns about their weight at Time 1, the more weight-acceptance messages that they received from close others, the less weight concern they experienced over time,  $b = -.21$ ,  $t(172) = -2.67$ ,  $p < .001$ . In contrast, weight-acceptance messages did not predict changes in weight concern among women who were initially unconcerned about their weight,  $b = .00$ ,  $t < 1$ .

The second step of this mediated moderation analysis is to test whether path  $b$ , which reflects the association between changes in weight concern and changes in BMI from Time 1 to Time 3, is statistically significant controlling for all other variables in the model. To test this hypothesis, we added change in weight concern from Time 1 to Time 3 to a new Step 4 of our earlier regression predicting change in BMI (see the top panel of Table 2). Results revealed that change in weight concern from Time 1 to Time 3 indeed predicted change in BMI between Time 1 and Time 3 controlling for all other variables in the model,  $b = .40$ ,  $t(171) = 5.57$ ,  $p < .001$ ,  $\Delta R^2 = .138$ ,  $p < .001$ , indicating that path  $b$  in our mediation model was statistically significant.

The final step of this mediated moderation analysis is to test whether the indirect path from the predictor variable to the outcome variable through the mediator variable is statistically significant. We used Preacher and Hayes's (2008) Indirect macro for SPSS, set for 5,000 bootstrap samples, to estimate the 95% bias-corrected confidence intervals of the indirect path (i.e., the product of paths  $a$  and  $b$ ). Using this method, the indirect path is considered statistically significant at  $\alpha = .05$ , and mediated moderation present, when zero is not contained within the 95% confidence interval. As anticipated, results revealed that the indirect path (i.e., Weight Acceptance  $\times$  Weight Concern  $\rightarrow$  changes in weight concern  $\rightarrow$  changes in BMI) was statistically significant (indirect path =  $-.104$ ;  $SE = .057$ ; 95% CI  $[-.244, -.015]$ ).

#### *Do weight-loss pressure or weight-concern dismissal messages predict change in BMI as a function of weight concern?*

Next, we examined whether the other assessed weight messages from close others predicted change in BMI as a function of weight concern, over and above the effect of accepting messages. Change in BMI



**Figure 1.** Top panel: Change in body mass index (BMI) from Time 1 to Time 3 as a function of baseline weight concern and weight-acceptance messages from close others. Bottom panel: Change in weight concern from Time 1 to Time 3 as a function of baseline weight concern and weight-acceptance messages from close others. T1 = Time 1. Results are graphed for individuals scoring 1 SD below the sample mean (i.e., “low”) and 1 SD above the sample mean (i.e., “high”) for each predictor variable.

from Time 1 to Time 3 was regressed onto: Step 1, BMI at Time 1; Step 2, mean-centered weight-acceptance, mean-centered weight-loss pressure, mean-centered weight-concern dismissal, and mean-centered weight concern at Time 1; and Step 3, the product terms for each Weight Message  $\times$  Weight Concern interaction. Results are presented in Table 3. Weight-acceptance messages still negatively predicted change in BMI when shared variance with other weight messages were controlled, and the previously reported Weight Acceptance  $\times$  Weight Concern interaction was also maintained in this more complex analysis.

An intriguing Weight-Loss Pressure  $\times$  Weight Concern interaction also emerged and is graphed in Figure 2. Weight-loss pressure messages did not predict BMI change for women high in weight concern at Time 1,  $b = -.26$ ,  $t < 1$ , but weight-loss pressure messages positively predicted BMI change for women low in weight concern at Time 1,  $b = 1.19$ ,  $t(168) = 3.05$ ,  $p = .003$ . In other words, as predicted, weight-loss pressure does not appear to facilitate weight loss. In fact, in support of prior research indicating that receiving such pressure can have harmful effects (e.g., Ata et al., 2007; Dunkley et al.,

**Table 3.** Change in BMI as a function of weight messages and weight concern

Predictor	DV: Change in BMI (model total $R^2 = .170$ )			
	Step 1	Step 2	Step 3	$\Delta R^2$
Step 1				.037*
BMI at T1	.19*	.12	.09	
Step 2				.064*
Weight acceptance		-.21**	-.29**	
Weight-loss pressure		.17†	.17†	
Weight-concern dismissal		.06	.06	
Weight concern at T1		-.13	-.12	
Step 3				.069**
Weight Acceptance $\times$ Weight Concern at T1			-.22**	
Weight-Loss Pressure $\times$ Weight Concern at T1			-.25**	
Weight-Concern Dismissal $\times$ Weight Concern at T1			.12	

Note.  $N = 176$ . BMI = body mass index; DV = dependent variable; T1 = Time 1;  $\Delta R^2$  = change in  $R^2$ .

† $p < .10$ . \* $p < .05$ . \*\* $p < .01$ .

2001; Gillison, Standage, & Skevington, 2006; Williams, Grow, Freedman, Ryan, & Deci, 1996), perceiving weight-loss pressure from close others was associated with weight gain over time for women who were initially unconcerned with their weight. Thus, in support of our key hypothesis, weight-acceptance messages, rather than weight-loss pressure or weight-concern dismissal messages, predicted healthy weight outcomes among women who were highly concerned about their weight.

#### Testing alternative models and explanations

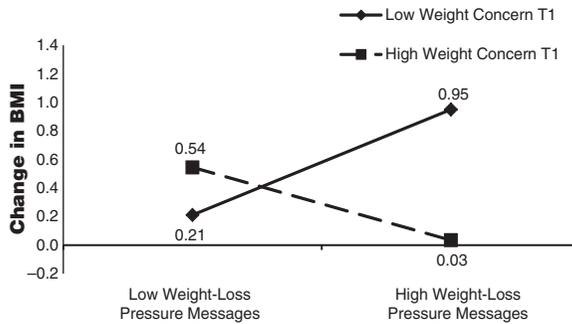
##### Does change in BMI predict weight-acceptance messages?

Because we assessed weight-acceptance messages at Time 2 and predicted change in BMI from Time 1 to Time 3, it is also plausible to propose that changes in BMI, particularly decreases in BMI, predict increases in weight-acceptance messages. To test this alternative model, we regressed weight-acceptance messages (reported at Time 2) on: Step 1, mean-centered BMI at Time 1, and Step 2, change in BMI from Time 1 to Time 2. Results indicated that change in BMI from Time 1 to Time 2 did *not* predict weight-acceptance messages reported at Time 2,  $b = -.05$ ,  $t < 1$ .

Follow-up analyses indicated that change in weight concern between Time 1 and Time 2 did not moderate this null effect. Furthermore, change in BMI between the second wave of data collection of the REAL project (approximately 10 months prior to Time 2) and Time 2 did not predict weight-acceptance messages at Time 2,  $t < 1$ . However, when we regressed change in BMI from Time 2 to Time 3 on: Step 1, mean-centered BMI at Time 2, and Step 2, weight-acceptance messages measured at Time 2, the more weight-acceptance messages that participants received, the less their weight changed between Time 2 and Time 3,  $b = -.17$ ,  $t(174) = -2.37$ ,  $p = .019$ . These results suggest that our proposed model (i.e., weight-acceptance messages  $\rightarrow$  change in BMI) fits the data better than the alternative model (i.e., change in BMI  $\rightarrow$  weight-acceptance messages).

##### Does change in BMI explain the association between weight-acceptance messages and change in weight concern?

Because changes in weight concern were measured concurrently with changes in BMI in this research, it is plausible to propose that the Weight Acceptance  $\times$  Weight Concern interaction predicts changes in BMI through



**Figure 2.** Change in body mass index (BMI) from Time 1 to Time 3 as a function of baseline weight concern and weight-loss pressure messages from close others. T1 = Time 1. Results are graphed for individuals scoring 1 *SD* below the sample mean (i.e., “low”) and 1 *SD* above the sample mean (i.e., “high”) for each predictor variable.

some mechanism not captured in the current research, and that BMI change in turn predicts changes in weight concern (i.e., Weight Acceptance  $\times$  Weight Concern  $\rightarrow$  changes in BMI  $\rightarrow$  changes in weight concern). We have already described results demonstrating that weight-acceptance messages and weight concern interact to predict changes in BMI (alternative path *a*; see top panels of Table 1 and Figure 1). Moreover, when we added change in BMI to a new Step 4 of our earlier regression predicting change in weight concern (see the bottom panel of Table 2), results revealed that change in BMI from Time 1 to Time 3 also predicted change in weight concern between Time 1 and Time 3,  $b = .39$ ,  $t(171) = 5.57$ ,  $p < .001$  (i.e., alternative path *b*). Finally, bootstrap analyses confirmed that the indirect path from the Weight Acceptance  $\times$  Weight Concern interaction to changes in BMI to changes in weight concern was also statistically significant (indirect path =  $-.049$ ;  $SE = .027$ ; 95% CI [ $-.116$ ,  $-.006$ ]).

Thus, the underlying process through which weight-acceptance messages predict changes in BMI remains unclear. Our hypothesis, which is grounded in the extant literature (i.e., Bjornthorp, 2002; Herman & Polivy, 1980, 1988; Major et al., 2012; Major et al., 2014), is that weight-acceptance messages support weight maintenance by reducing stressful weight concern. However, we cannot rule out the possibility that weight acceptance may support weight maintenance for some other reason that is not

yet recognized in the research literature, and weight maintenance may in turn reduce weight concern.

*Are weight-acceptance messages a proxy for other variables?*

We tested five plausible *alternative predictors* of change in BMI: (a) the act of expressing weight concerns, regardless of the type of message received; (b) feeling better after weight messages, regardless of the type of message received; (c) perceiving positive regard from close others; (d) self-esteem; and (e) general stress not specific to weight concern. In a series of five hierarchical regressions, change in BMI from Time 1 to Time 3 was regressed onto: Step 1, mean-centered BMI at Time 1; Step 2, mean-centered (alternative predictor); Step 3, mean-centered weight concern at Time 1; and Step 4, the product term for the (Alternative Predictor)  $\times$  Weight Concern interaction. None of the alternative predictors independently predicted change in BMI, all  $t_s < 1$ , with the exception of a main effect of general stress already reported in Table 1. However, none of the alternative predictors interacted with weight concern to predict change in BMI, all  $t_s < 1.60$ , all  $p_s > .111$ . Moreover, when we conducted a series of five hierarchical regressions in which change in BMI from Time 1 to Time 3 was regressed onto: Step 1, mean-centered BMI at Time 1; Step 2, mean-centered weight-acceptance messages, mean-centered weight concern at Time 1,

mean-centered (alternative predictor); Step 3, the product term for the Acceptance Messages  $\times$  Weight Concern interaction, the key interaction remained significant when controlling for each of the alternative predictors, all  $b$ s  $> -.15$ , all  $p$ s  $< .05$ . The same was true when we included all five alternative predictors in Step 2 of a single regression,  $b = -.16$ ,  $t(167) = -2.02$ ,  $p = .045$ .<sup>7</sup>

## Discussion

Classic theories, not to mention song lyrics, argue that people want to hear that others accept them (i.e., Baumeister & Leary, 1995; Cooley, 1902; Reis et al., 2000; Reis et al., 2004; Rogers, 1980). This study investigated the potential benefits of such acceptance in a domain critical to health and well-being and central to most women's self-concepts: weight. Our results demonstrated that although the young women in this study normatively gained weight over the 9-month study period, for women initially high in weight concern, perceiving acceptance messages in response to their expressed weight concerns moderated change in weight over time. Perceiving fewer acceptance messages about weight in response to one's concerns was associated with weight gain, whereas perceiving more acceptance messages in response to one's concerns was associated with weight maintenance or even loss. Moreover, these effects were explained by changes in weight concern over time, suggesting that accepting messages about weight in response to expressed weight concerns may be internalized by message recipients, thereby reducing weight concerns and in turn supporting healthy weight-maintenance efforts.

Our data could not rule out an alternative model, whereby acceptance messages lead to weight maintenance by some other mechanism, and weight maintenance in turn reduces weight concerns. To determine the directionality of associations between weight concern and weight loss and to establish a causal order,

future research should assess both weight concern and BMI at multiple points in time to examine their simultaneous effects over time, and conduct experiments in which weight concern is manipulated and downstream BMI change is observed.

We have distinguished between three types of interpersonal messages about weight: weight-acceptance messages that are associated with reduced stressful weight concern, weight-loss pressure that may actually reinforce or introduce such stress, and weight-concern dismissal that does not provide a means of dealing with weight concern. A different way to conceptualize these interpersonal messages may be according to Birmingham and colleagues' two orthogonal dimensions of social support: positivity and negativity (Birmingham et al., 2009). Weight acceptance could represent primarily positive (i.e., helpful) support that is low in negativity (i.e., not upsetting). In contrast, weight-loss pressure may represent an ambivalent type of support that is both positive and negative, and weight-concern dismissal may represent a type of indifference that is neither positive nor negative.

Some have argued that weight concern is necessary to motivate people to engage in healthy exercise and eating behaviors (Cash et al., 1994; Heinberg et al., 2000). But this research contributes to a growing body of research disputing the effectiveness of weight concern alone as an impetus for weight maintenance or loss (Neumark-Sztainer et al., 2006; Saules et al., 2009; Stice et al., 2012) and instead connecting the stress of weight concern and stigma to overeating and weight gain (i.e., Major et al., 2014). Yet, our research also suggests that these opposing views may be reconciled. The influence of weight concern on weight loss or maintenance may depend on the social context in which such concerns exist. When weight concern occurs in a social context replete with stigmatization and negative attitudes about being overweight (Puhl & Heuer, 2009), weight concern may primarily reflect the knowledge that one's weight could lead to rejection, a belongingness threat that could lead to stress and shame that interfere with weight loss or maintenance attempts.

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7. The obtained null effects for feelings after messages may be due to the relatively low reliability of that measure.

However, when weight concern occurs in a social context full of acceptance about one's weight, weight concern may no longer reflect concerns that one's social bonds are in jeopardy. In this scenario, a social context that conveys weight-acceptance messages may free individuals to act on their personal concerns or internal motivations about their weight without fear that their success or failure will influence their ability to meet fundamental belongingness needs.

In a sense, then, weight-acceptance messages may allow people to act autonomously on their weight-management goals. The motivation to achieve or maintain a healthy weight would be considered autonomous if the goal is of one's own choosing and is guided by internal and self-determined values (e.g., personal relevance, importance of maintaining a healthy weight; see Deci & Ryan, 1985). An abundance of evidence suggests that individuals with autonomous motivations to regulate their weight are more successful in achieving their goals compared to individuals with externally controlled motivations (Gillison et al., 2006; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004; Power, Ullrich-French, Steele, Daratha, & Bindler, 2011; Silva et al., 2010; Williams et al., 1996). Thus, in this research, when participants perceived weight-loss pressure from close others in response to their expressed weight concerns, participants' weight motivations may have become contingent on these external demands. Such a controlling environment may have thwarted participants' needs for autonomy, such that their inner motivations were weakened and their attempts to regulate weight became less successful. In contrast, weight acceptance from close others may have freed participants of such external demands and allowed them to draw from their inner motivational resources to regulate their weight.

### Conclusions

Women frequently express concerns about their weight to close others, yet few studies have assessed women's perceptions of the messages they receive in response to such concerns. As such, the current research fills a gap in the literature by illustrating the types

of messages that people receive from close others, and demonstrating the links between such messages and changes in self-concept and weight over time. Specifically, perceiving weight-acceptance messages in response to one's expressed weight concerns seems to provide a necessary context of positive regard for women high in weight concern that allows them to maintain a healthy weight over time and avoid normative weight gain. Practically, our results may point to ways to facilitate positive weight-management outcomes by harnessing and shaping the messages of support that are offered to women high in weight concerns as part of health interventions.

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