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Prospective Relations between Social Comparison Orientation and Weight Loss Outcomes

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Abstract

Maintenance of weight loss after behavioral intervention tends to be poor, and there is need for an improved understanding of factors that are associated with successful maintenance. Social comparison is known to be a powerful influence on treatment outcomes for group-based behavioral weight loss programs, but little is known about the role of individual differences in *social comparison orientation* (i.e., tendency to value comparison information) in this context. The goal of this study was to examine prospective relations between social comparison orientation and long-term weight loss outcomes (percent weight loss, aerobic-intensity physical activity) among participants in behavioral weight loss treatment. Participants ($n = 161$, $M_{Age} = 54$, $M_{BMI} = 34.4$ kg/m²) completed a measure of social comparison orientation at pre-treatment baseline. Height and weight were measured in the research center and aerobic-intensity physical activity was assessed via accelerometer at baseline, mid- and end-of-treatment, and at 6 and 12 months post-treatment (representing maintenance). Multilevel models tested prospective relations between comparison orientation and treatment outcomes over time, with emphasis on differences during the post-treatment maintenance phase. Stronger (vs. weaker) general comparison orientation was associated with better maintenance of aerobic-intensity physical activity. However, stronger (vs. weaker) orientation toward comparisons with better-off others (i.e., upward comparison) was associated with *less* weight loss success during and after treatment. Social comparison orientation thus shows meaningful relations with long-term maintenance of key outcomes in group-based behavioral weight loss treatment, and warrants further investigation in this context.

Keywords

weight loss; social comparison; physical activity; social process; behavioral treatment

INTRODUCTION

Obesity remains a critical public health problem in the U.S., with rates reaching 38% in recent estimates.¹ The gold-standard behavioral weight loss intervention can produce

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clinically significant weight loss in the short term (i.e., 5-10% weight loss over six months), but many participants in these interventions fail to successfully maintain weight loss and regain weight within the following year.² Consequently, there is a critical need to improve upon the current understanding of barriers to, and facilitators of, long-term success in behavioral weight loss programs. These programs often are delivered in a group format,³ which exposes participants to other individuals who share similar goals.

Such exposure can facilitate *social comparison*, or self-evaluation relative to others.⁴ Social comparison can provide individuals with useful information about their status in a given domain, which can influence relevant behaviors (e.g., meeting behavioral treatment goals).⁵ Individuals differ with respect to their tendency to make and emphasize the importance of comparisons, however.⁶ This construct, called *social comparison orientation*, has been positively associated with weight control intentions and behaviors in cross-sectional assessments of young adults.^{7,8} Comparison orientation also may be related to participants' responses to the group context of weight loss treatment (and thereby, influence their treatment outcomes), and the type of comparison orientation may exert different effects on outcomes.

Specifically, a tendency toward comparison with others who are perceived as successful (*upward comparison*) could afford opportunities to learn how to achieve a similar outcome, boost self-efficacy for achieving such an outcome, or promote friendly competition to motivate weight control behaviors.⁹ Similarly, a tendency toward comparison with others who are perceived as unsuccessful (*downward comparison*) could help individuals to identify behaviors to avoid, or provide satisfaction with one's own achievements. These potential benefits make social comparison one of the most powerful components of group-based behavioral weight loss treatment.⁵ Yet both upward and downward comparison can have negative consequences for health behaviors,¹⁰ and it is not clear which direction of orientation (vs. a general tendency to compare) may be most useful in behavioral weight loss treatment.

At present, little is known about relations between individual differences in comparison orientation and behavioral weight loss outcomes. An improved understanding of these relations, particularly if examined prospectively, would have implications for both research and treatment. For example, such work could provide further insight into a key social process to be harnessed in treatment, and allow for early identification of individuals at risk for poor success with weight loss maintenance. Toward this end, the goal of this study was to examine prospective relations between social comparison orientation and change in treatment outcomes (i.e., weight loss and engagement in aerobic-intensity physical activity), with emphasis on distinctions during post-treatment follow-up assessments (maintenance). Outcomes were assessed objectively at baseline, mid-treatment (6 months), end-of-treatment (12 months), and twice post-treatment (18 and 24 months from baseline) to demonstrate maintenance. Given the group context of weight loss treatment, stronger (vs. weaker) social comparison orientation was expected to predict better weight loss and maintenance over time, as well as greater engagement in aerobic-intensity physical activity. Upward and downward orientation were examined in an exploratory manner.

METHODS

Participants and Procedure

Procedures were approved by the relevant Institutional Review Board and all individual participants provided written documentation of informed consent to enroll. Community-dwelling adults were recruited via print and radio advertisement. Eligible individuals were those age 18-70 years with BMIs of 27-45 kg/m² who had no contraindications to weight loss participation (e.g., limitations on physical activity) and who completed screening procedures (e.g., 7-day food records). Additional exclusion criteria were pregnancy, recent changes medication that could influence weight, or current/planned participation in a separate weight loss program.¹¹ Participants in three out of five waves of treatment completed self-reports of social comparison orientation at baseline. These participants ($n = 161$) were predominantly women (79%) and identified as Caucasian (69%); the average participant was 54 years old ($SD = 9.44$) with a BMI of 34.4 kg/m² ($SD = 4.67$). Post-baseline assessments took place at 6, 12, 18, and 24 months and involved measurement of height and weight and 7 days of accelerometer wear.

Participants were randomly assigned to one of three behavioral weight loss treatments delivered in 26 treatment sessions over one year.¹¹ All treatments emphasized changes to both diet and physical activity; participants in all treatment conditions set weekly calorie goals between 1200 and 1800 calories per day (depending on their starting weight and weight loss progress) and followed a schedule for progressively increasing their aerobic-intensity activity. Differences between treatments were based on the number and type of psychological techniques used to promote weight loss (e.g., combinations of techniques such as cognitive restructuring, changes to the home environment, and acceptance-based methods).¹¹

Treatment sessions were delivered to groups of 10-14 participants by master's- or doctoral-level clinicians in psychology. The same participants and clinicians met at each session to ensure consistency and promote group cohesion. For the waves of data collection included in the present analyses, there were a total of nine different treatment groups led by one of five group leaders. As a result of random assignment, all groups of participants were heterogeneous with respect to age, gender, racial/ethnic background, and starting weight.

Measures

Iowa-Netherlands Comparison Orientation Measure

(INCOM) uses 23 items to assess an individual's tendency to engage in social comparison and value the resulting information. Items such as *I always pay a lot of attention to how I do things compared with how others do things* are rated on a 5-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This measure has been used to assess comparison orientation in a wide variety of groups (e.g., young adults, patients with chronic illness) and shows strong psychometric properties.⁶ In the present study, Cronbach's alpha was 0.86 for general comparison orientation, 0.91 for upward orientation, and 0.91 for downward orientation.

Treatment outcomes.

Height and weight were measured at each assessment point and were used to calculate baseline BMI. Percent weight loss at each post-baseline assessment was calculated as a percentage of baseline weight. Participants engaged in 7 days of physical activity measurement at each assessment point using waistband ActiGraph GT3X+ tri-axial accelerometers. Minutes per week of moderate- and vigorous-intensity activity were calculated for days with >10 hours of wear time using recommendations by Troiano et al.¹² Minutes of moderate- and vigorous-intensity activity (MVPA) were combined to determine total minutes of engagement in aerobic-intensity activity at each assessment point. Attendance was recorded by the group leader at each treatment session.

Data Analysis

Using an intent-to-treat approach, all participants who were randomized to treatment and received the INCOM at baseline ($n = 161$) were included in the present analyses, affording power > 0.80 to detect small effects in prospective models.¹³ Descriptive statistics are provided for key study variables; t -tests were used to determine differences in study variables by gender (corrected for unequal sample sizes). Hypothesis tests employed a multilevel modeling approach with full maximum likelihood estimation in SAS 9.4 to address missing data (due to attrition) and the nested data structure (i.e., assessment points representing time at level 1, nested within participants at level 2).¹⁴

Models examined interaction effects between the time and INCOM scores (global, upward, and downward orientation in separate models). Baseline BMI, treatment condition, and treatment session attendance were included as covariates in all models. INCOM scores were treated as level-2 moderators of the level-1 effect of time. Continuous covariates were grand mean centered for ease of interpretation. Effect sizes are expressed as Cohen's d for baseline t -tests and semipartial correlation coefficients (sr) for prospective multilevel models.

RESULTS

Descriptive Information

Table 1 shows descriptive statistics for key study variables at baseline. On average, participants reported stronger upward than downward orientation ($t[157] = 3.75$, $p = 0.0003$, $d = 0.30$). Men and women did not differ on these variables at baseline ($ps > 0.05$), with the exception of upward orientation: men reported stronger upward orientation than women ($t[48.67] = 2.05$, $p = 0.046$, $d = 0.42$). As a result, gender was examined as a moderator of upward orientation effects (gender $\times$ orientation $\times$ time), though these effects were not significant ($ps > 0.30$). Treatment conditions did not differ on any key variables and condition also did not moderate any of the effects reported below ($ps > 0.30$). Approximately 25% of the variability in percent weight loss and 40% of the variability in MVPA were attributable to consistent between-person differences across time (ICCs = 0.25, 0.40 respectively). In each case, within-person change across time and error accounted for the remaining variability.

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Percent weight loss.—Controlling for baseline BMI, treatment condition, and treatment session attendance, there were no interaction effects between time and general or downward comparison orientation for predicting percent weight loss ($ps > 0.29$). There was an interaction effect between time and upward orientation, however ($F[346] = 4.56$, $p = 0.03$, $sr = -0.17$; see Table 1). As shown in Figure 1 (top panel), participants' weight loss peaked at end-of-treatment and then decreased. However, those who began treatment with *weaker* upward orientation achieved and maintained greater weight loss through 24 months.

MVPA.—With baseline BMI, treatment condition, and treatment session attendance controlled, there were no interaction effects between time and upward or downward orientation for predicting MVPA ($p > 0.60$). There was an interaction between time and general comparison orientation, however ($F[502] = 3.16$, $p = 0.04$, $sr = 0.14$; see Table 1). The bottom panel of Figure 1 shows that participants' MVPA also peaked in the second half of treatment and then decreased. However, participants who began treatment with *stronger* general comparison orientation engaged in greater MVPA at 18 and 24 months, suggesting greater maintenance of a key treatment outcome.

DISCUSSION

Weight loss maintenance after behavioral treatment tends to be poor,¹⁵ and early indicators of long-term outcomes would inform research and treatment efforts. Social comparison is recognized as a critical mechanism of change in group-based behavioral weight loss treatment,⁵ but there has been little attention to individual differences in comparison orientation as a predictor of treatment outcomes. The present study examined prospective relations between comparison orientation and key treatment outcomes over two years, which encompassed a yearlong weight loss treatment and one year of follow-up (maintenance). Average scores for comparison orientation were comparable to those of the general population;⁶ upward orientation was stronger than downward orientation, and was higher for men than for women. As the majority of existing studies relevant to social comparison and weight control focus on women, the current findings suggest that further investigation of upward orientation among men in this context may be warranted.

As predicted, stronger comparison orientation predicted better maintenance of aerobic-intensity physical activity through follow-up, with a difference of more than 25 minutes of activity per week for those 1 standard deviation above and below the mean. Comparison orientation previously has been associated with concurrent reports of physical activity.⁸ To our knowledge, however, this is the first study to demonstrate a prospective, long-term relation between social comparison orientation and objective assessments of a critical weight loss maintenance behavior.¹⁶ In contrast, stronger (vs. weaker) upward orientation was associated with lesser weight loss and maintenance after treatment ended. Participants with stronger upward orientation achieved approximately 2% less weight loss at each follow-up point. Importantly, by 12 months post-treatment, those with stronger upward orientation dropped to well below the treatment goal of 10% weight loss.¹¹ In contrast, those with

weaker upward orientation remained much closer to this goal. Such differences could have important health implications and deserve additional study.

In general, upward comparison may result in frustration or depressed mood, as the comparer has evidence that they could be doing better, or that they may never achieve the target's level of success.¹⁷⁻¹⁹ More specifically, comparisons with others who are especially successful in weight loss treatment may prompt such negative affect; poor regulation of negative affect, in turn, is associated with low weight control success.²⁰ Clarifying to what extent behavioral weight loss participants make upward (vs. downward) comparisons toward their treatment group members, and how these tendencies may change during treatment, will provide further insight into such processes. Such work also may help to explain why a general tendency to compare positively predicts physical activity engagement, but a tendency to compare upward negatively predicts overall weight loss success.

Strengths, Limitations, and Future Directions

Strengths of this study include a prospective longitudinal design, objective assessment of weight loss and physical activity, and use of a validated self-report measure of social comparison orientation. An important limitation to be addressed in future research is the current lack of information about particular comparisons; for example, how many and what type of comparisons were made toward treatment group members, how these comparisons may have changed over the course of treatment, and whether a subset of these comparisons were particularly beneficial (vs. detrimental) for weight loss outcomes. Of unique interest may be relations between comparisons and adherence to behavioral techniques taught in treatment, as adherence to these techniques may mediate relations between comparisons and treatment outcomes.

In addition, there is ample evidence that both upward and downward comparisons may have positive or negative effects on health behaviors, depending on factors such as the motivation for a given comparison and the extent of identification with a target.^{19,21-23} For example, research in the domain of appearance comparison (i.e., comparing on attractiveness or body shape) consistently shows negative effects of upward comparisons on body dissatisfaction and eating behavior.²⁴ This type of comparison may be key to the observed negative relation between upward orientation and weight loss treatment success. The present study did not assess these contextual aspects of individual instances of comparison, and they remain key next steps for future work. Additional information about comparison context (i.e., *when* a given comparison is useful, in addition to *for whom*) will further inform treatment modifications and the optimal tailoring of weight loss treatment, which may improve its effectiveness. Finally, although this study provides needed information about men's comparison orientation, gender differences should be interpreted with caution, as the number of men included was small.

CONCLUSIONS

Together, the present findings demonstrate that individual differences in social comparison orientation predict the maintenance of weight loss and physical activity engagement after behavioral weight loss treatment. Although greater emphasis on comparison (general)

predicts better maintenance of aerobic-intensity physical activity, an emphasis on upward comparison predicts lesser success with weight loss. These results indicate that greater attention to individual differences in comparison orientation during behavioral weight loss treatment is needed, and that early identification of participants who show strong upward orientation may enable targeted intervention to promote successful weight loss and maintenance.

References

1. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL. Trends in obesity among adults in the United States, 2005 to 2014. *JAMA*. 2016; 315: 2284–2291. [PubMed: 27272580]
2. Christian JG, Tsai AG, Bessesen DH. Interpreting weight losses from lifestyle modification trials: using categorical data. *Int J Obesity*. 2010; 34: 207–209.
3. Butryn ML, Webb V, Wadden TA. Behavioral treatment of obesity. *Psychiatr Clin North Am*. 2011; 34: 841–859. [PubMed: 22098808]
4. Festinger L. A theory of social comparison processes. *Hum Relat*. 1954; 7: 117–140.
5. Hartmann-Boyce J, Johns DJ, Jebb SA, Aveyard P. Effect of behavioural techniques and delivery mode on effectiveness of weight management: Systematic review, meta-analysis and meta-regression. *Obesity Rev*. 2014; 15: 598–609.
6. Gibbons F, Buunk B. Individual differences in social comparison: development of a scale of social comparison orientation. *J Pers Soc Psychol*. 1999; 76: 129–142. [PubMed: 9972558]
7. Corning AF, Krumm AJ, Smitham LA. Differential social comparison processes in women with and without eating disorder symptoms. *J Couns Psychol*. 2006; 53: p. 338–349.
8. Luszczynska A, Gibbons FX, Piko BF, Tekozel M. Self-regulatory cognitions, social comparison, and perceived peers' behaviors as predictors of nutrition and physical activity: A comparison among adolescents in Hungary, Poland, Turkey, and USA. *Psychol Health*. 2004 19: 577–593.
9. Suls J, Martin R, Wheeler L. Social comparison: Why, with whom, and with what effect? *Curr Dir Psychol Sci*. 2002 11: 159–163.
10. Arigo D, Suls JM, Smyth JM. Social comparisons and chronic illness: research synthesis and clinical implications. *Health Psychol Rev*. 2014 8: 154–214. [PubMed: 25053133]
11. Butryn ML, Forman EM, Lowe MR, Gorin AA, Zhang F, Schaumberg K. Efficacy of environmental and acceptance-based enhancements to behavioral weight loss treatment: The ENACT trial. *Obesity*. 2017; 25: 866–872. [PubMed: 28337847]
12. Troiano RP, Berrigan D, Dodd KW, Mâsse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. *Med Sci Sports Exerc*. 2008 40: 181–188. [PubMed: 18091006]
13. Maas CJ, Hox JJ. Sufficient sample sizes for multilevel modeling. *Methodology*. 2005; 1: 86–92.
14. Allison PD. Handling missing data by maximum likelihood. *SAS Global Forum*. 2012 Haverford, PA: Statistical Horizons.
15. MacLean PS, Wing RR, Davidson T et al. NIH working group report: innovative research to improve maintenance of weight loss. *Obesity*. 2015; 23: 7–15. [PubMed: 25469998]
16. Swift DL, Johannsen NM, Lavie CJ, Earnest CP, Church TS. The role of exercise and physical activity in weight loss and maintenance. *Prog Cardiovasc Dis*. 2014; 56: 441–447. [PubMed: 24438736]
17. Feinstein BA, Hershenberg R, Bhatia V, Latack JA, Meuwly N, Davila J. Negative social comparison on Facebook and depressive symptoms: Rumination as a mechanism. *Psychol Pop Media Cult*. 2013; 2: 161–170.
18. Vogel EA, Rose JP, Okdie BM, Eckles K, Franz B. Who compares and despairs? The effect of social comparison orientation on social media use and its outcomes. *Personality and Individual Differences*. 2015; 86: 249–256.
19. Arigo D, Smyth JM, Suls JM. Perceptions of similarity and response to selected comparison targets in type 2 diabetes. *Psychol Health*. 2015; 30: 1206–1220. [PubMed: 25871344]

20. Elfhag K, Rössner S. Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obes Rev.* 2005; 6: 67–85. [PubMed: 15655039]
21. Buunk B, Ybema J. Social comparisons and occupational stress: The identification contrast model In: Buunk BP, Gibbons FX, eds *Health coping, and well-being: Perspectives from social comparison theory*. Mahwah, NJ: Lawrence Erlbaum; 1997: 359–388.
22. Schokker MC, Keers JC, Bouma J, Links TP, Sanderman R, Wolffenbuttel BH, Hagedoorn M. The impact of social comparison information on motivation in patients with diabetes as a function of regulatory focus and self-efficacy. *Health Psychol.* 2010; 29: 438–445. [PubMed: 20658832]
23. Vähäsarja K, Kasila K, Kettunen T, Rintala P, Salmela S, Poskiparta M. ‘I saw what the future direction would be...’: Experiences of diabetes risk and physical activity after diabetes screening. *Br J Health Psychol.* 2015; 20: 172–193. [PubMed: 24506505]
24. Myers TA, Crowther JH. Social comparison as a predictor of body dissatisfaction: A meta-analytic review. *J Abnorm Psychol.* 2009; 118: 683–698. [PubMed: 19899839]

Figure 1.

Prospective relations between baseline social comparison orientation (SCO) and weight loss treatment outcomes over 24 months (m). MVPA = moderate-to-vigorous physical activity. Models controlled for baseline BMI, treatment condition, and session attendance. ± 1 SD used for illustrative purposes.

Table 1.

Descriptive statistics for key variables at baseline and model estimates for relations between social comparison orientation and treatment outcomes ($n = 161$).

Baseline Assessment		<i>M (SD)</i>
General SCO		33.37 (7.96)
Upward SCO		14.71 (5.97)
Downward SCO		13.18 (5.26)
BMI (kg/m ²)		34.42 (4.67)
MVPA (minutes per week)		48.28 (80.11)

	Percent Weight Loss <i>B (SE)</i>	MVPA <i>B (SE)</i>
Fixed Effects		
Intercept	2.32 (2.71)	103.32 (40.31) *
Time	2.49 (0.73)	-15.37 (9.36)
General SCO	0.02 (0.07)	-0.59 (1.08)
General SCO*Time	-0.02 (0.02)	0.48 (0.27) *
Random Effects		
Intercept	13.05 (2.31) ***	3867.40 (618.59) ***
Residual	32.30 (2.01) ***	6347.21 (384.48) ***
Fixed Effects		
Intercept	2.33 (1.81)	93.11 (27.53) **
Time	2.85 (0.46)	0.87 (5.88)
Upward SCO	0.03 (0.10)	-0.68 (1.46)
Upward SCO*Time	0.05 (0.10) *	-0.02 (0.37)
Random Effects		
Intercept	12.36 (2.24) ***	3934.32 (629.27) ***
Residual	32.28 (2.02) ***	6390.38 (389.08) ***
Fixed Effects		
Intercept	1.92 (1.83)	81.19 (27.28) **
Time	2.42 (0.47)	-1.90 (5.93)
Downward SCO	0.07 (0.11)	0.22 (1.63)
Downward SCO*Time	-0.03 (0.03)	0.21 (0.42)
Random Effects		
Intercept	12.89 (2.29) ***	3982.14 (617.92) ***
Residual	32.47 (2.01) ***	6345.89 (383.40) ***

* Note: $p < 0.05$

** $p < 0.01$

 $p < 0.001$; SCO = social comparison orientation (assessed at baseline); MVPA = moderate-to-vigorous intensity physical activity; min = total minutes of activity over 7 days (per assessment); all models controlled for baseline BMI, treatment condition, and session attendance (estimates not shown); percent weight loss assessed at 6, 12, 18, and 24 months.

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