

Understanding Eating and Exercise Behaviors in Post Roux-en-Y Gastric Bypass Patients: A Quantitative and Qualitative Study

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Background: Weight regain following gastric bypass (GB) surgery continues to plague many individuals across the United States. However, understanding long-term eating and exercise behaviors to promote and sustain a lower weight following GB surgery is limited.

Method: The purpose of this study was to explore the perceptions and attitudes of eating and exercise behaviors associated with weight maintenance in post-GB patients ($n=24$) 2 or more years postsurgery. Demographic, anthropometric, and food record data were collected. Focus groups and personal interviews were used to understand behaviors and support systems associated with weight stabilization. Focus groups were audio-taped, transcribed, and organized into common themes.

Results: All participants were female, with a mean of 6 years postsurgery, and had a mean age of 51.8 ± 10.5 years. The majority were married (71%) and had a college degree (58%). Although the average weight regain postsurgery was estimated at 16.2 ± 12.7 kg, most of the women (75%) had maintained a significant weight loss of at least 50% of their excess body weight. Themes associated with weight regain emerging from the focus groups included variable family support and a return to "old eating habits."

Conclusion: Focus group participants identified lack of long-term emotional support from family members and limited community support for weight loss surgery patients.

Introduction

OBESITY IS A MAJOR PUBLIC HEALTH CONCERN, as excessive weight gain has been associated with an increased disease risk of type 2 diabetes mellitus, hypertension, cardiovascular disease, dyslipidemia, obstructive sleep apnea, depression, and some types of cancer (endometrium, breast, ovary, prostate, and pancreas).¹⁻⁴ Clinically severe or morbid obesity is defined as a body mass index (BMI) equal to or greater than 40 kg/m^2 .² Individuals who are classified as morbidly obese generally carry 100 pounds or more in excess body weight (EBW).³ The prevalence of severe obesity is increasing at an alarming rate. However, only 1% of more than 15 million severely obese Americans elect to undergo weight loss surgery (WLS) each year.¹ Currently, WLS is reported to be the optimal treatment choice for severely obese individuals.^{3,5} The primary goal of gastric bypass (GB) surgery is to reduce the volume of food consumed by the individual in order to promote a significant amount of weight loss over a relatively short period of time.^{1,5} Results of GB surgery have

proven effective in the majority (75–80%) of patients losing an estimated 65–70% of their excess EBW within the first 2 years following Roux-en-Y gastric bypass (RYGB) surgery.^{1,5}

Recent long-term studies with GB patients report some weight regain following the lowest recorded weight, which is often documented around 2 years postsurgery.⁶⁻¹¹ The rate and amount of weight loss varies not only between surgical procedures but also between individuals who have experienced the same WLS procedure.¹² Reasons for variation in the percent of excess weight loss (EWL) experienced by individuals depends on such variables as preoperative weight, age, gender, socioeconomic status, follow-up compliance, postsurgery physical activity, possible biochemical changes in the gut, and food choices of the individual.¹³⁻¹⁶ Many studies show that, in most cases of recidivism, weight loss failure is due to dietary noncompliance or an inability to change eating, social, and exercise behaviors.¹⁷⁻²² Following WLS, individuals must learn to cope with internal and external eating behavior stimuli, including the family environment, food availability, and emotional stress that may lead to weight

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regain.²³ This represents the complex behavioral and environmental factors associated with weight maintenance and potential weight regain following WLS.

Most WLS studies exploring long-term weight maintenance status and postsurgery behaviors collect survey data,^{13,24–26} but this does not fully explain how or why some individuals are more successful at sustaining a significant weight loss than others with the same WLS procedure. Therefore, this study is a mixed design using both qualitative data from focus groups in addition to diet composition (quantitative) data to explore issues surrounding weight maintenance and strategies to prevent weight gain following WLS. Qualitative research using focus groups is well suited to assess the differences between individuals who have successfully sustained a significant weight loss and those who have regained a substantial amount of weight following surgery. The purpose for using focus groups in this study was to provide rich information including verbal and nonverbal behaviors, plus interaction between the study participants.²⁷ The focus group technique also allowed flexibility in data collection, with probing statements used to cover pertinent weight gain issues raised by the study participants.²⁷ The combination of qualitative and quantitative data in the natural setting was intended to provide a more complete picture of weight maintenance, human behavior, and behavior change in post-GG patients.²⁷

The purpose of this study was to learn more about different factors that promoted or prevented weight maintenance in GB patients more than 2 years postsurgery. The focus groups explored weight maintenance behaviors and factors associated with further weight gain.

Methods

Participants

Study participants were recruited from rural western South Dakota through newspaper announcements. Interested individuals were screened by phone prior to an in-person interview. The inclusion criteria consisted of generally healthy ambulatory female adults at least 20 years of age. The participants must have had a standard RYGB weight loss procedure at least 2 or more years prior to the study. Two years postsurgery is a common timeframe when most patients have reached weight stabilization and have established a routine eating pattern.^{1,5} Only patients who were weight stable and/or regaining weight were screened for the study.²⁸ Exclusion criteria consisted of individuals with surgical revisions to the original RYGB procedure and other forms of WLS procedures. Pregnant and lactating women were also excluded from the study. This study was approved by the Institutional Review Board at South Dakota State University (SDSU).

In-person orientation, anthropometric measures, and caloric intake estimates

An in-person orientation for the study participants was conducted at the SDSU Nursing Building in Rapid City, South Dakota. The orientation included a demographic questionnaire including information on marital status, education level, comorbidity resolution, and both presurgery and postsurgery weight history information. Anthropometric measures were collected, and education on caloric intake documentation was provided. The anthropometric measures included height measured to the nearest 0.25 inches (Frankfort Horizontal

Plane Stadiometer; Continental Scale Corp., Bridgeview, IL) and weight measured to the nearest 0.25 pounds (Healthometer Electronic Scale; Continental Scale Corp., Bridgeview, IL) and then converted to kilograms. Participants wore light clothing and no shoes during the measurements. BMI was calculated from the anthropometric measures as weight (in kilograms) divided by height (in meters squared).

To assess food and beverage intake, the participants were asked to keep a detailed food record for 7 consecutive days. The study participants were assigned a CalorieKing.com²⁹ web account and received the latest edition of The CalorieKing Calorie, Fat, and Carbohydrate Counter and The CalorieKing Food and Exercise Journal²⁹ to reinforce accurate data collection and journaling of food intake when the Internet was not immediately available. Specific instructions on recording food and beverage intake, accessing the CalorieKing.com²⁹ website, usernames, and passwords were verbally explained and e-mailed to each study participant. The participants were instructed not to change their eating behaviors or food and beverage intake during the 7-day study period. The daily food log activity was monitored by the principal investigator (PI), and the data collected was validated in the focus group discussions.

Focus group protocol

In January 2012, two focus groups using the same predetermined questions were scheduled 60 miles apart to accommodate rural study participants. Before beginning the discussion, the participants were informed about the purpose and nature of the focus group study. The group sessions were scheduled for 2-hour blocks of time in the respective rural communities. The study participants were allowed to attend either focus group location for their convenience. The study participants also received two e-mail reminders to attend one of the two focus group sessions.

The group setting was informal, social, and flexible as driven by a conversation of 8–12 study participants per session.^{30,31} The overall goal was to collect qualitative information about their personal challenges surrounding eating and exercise behaviors in relation to weight maintenance and preventing weight regain. The principal investigator (PI) asked predetermined open-ended research questions (Table 1), followed by probing questions to clarify comments.³¹ The focus group data consisted of conversation comments and tone of voice. A trained research assistant who took notes electronically via a laptop computer also monitored body language. An audiotape recording of the group conversations was transcribed by the PI and research assistant shortly after the focus group sessions. Content analysis was used to categorize the major themes from the focus group conversations.^{27,31–33} Data grouping included looking for repeated themes and phrases throughout the focus group conversations, and selecting verbatim quotes that captured participants' sentiments, views, and opinions. A written report summarized the key themes and comments from the focus group sessions.

Statistical analyses

The qualitative data were collected using the grounded theory research strategy.^{27,33} This approach is an exploratory technique based on what is observed and explained in a focus group session rather than developing a hypothesis based on predetermined expectations.³³

TABLE 1. MAIN RESEARCH QUESTIONS FOR THE FOCUS GROUPS

Focus Group Questions

Please think about your eating behaviors and exercise behaviors in relation to your weight maintenance and/or weight regain concerns following weight loss surgery.

1. How do you feel about your experience with weight loss surgery and your current weight status?
2. What comes to mind after looking at your diet recall information from CalorieKing.com?
3. In your home environment, do you receive emotional support to sustain your weight loss and/or to prevent weight regain following weight loss surgery?
4. In your working environment, do you receive emotional support to sustain your weight loss and/or to prevent weight regain?
5. In your social environment, do you receive emotional support to sustain your weight loss and/or to prevent weight regain in relation?
6. After considering your current eating and exercise behaviors, what type of family, professional, and/or community support would be most beneficial to you in preventing weight regain?

Results

Demographic, anthropometric, and comorbidity characteristics of the 24 study participants have been previously published.³⁴ Briefly, the sample population mean age was 51.8 ± 10.5 years and the majority (71%) of the women were married at 75.0 ± 32.4 mean months post-WLS. The mean pre-BMI was reported at 49.9 ± 12 compared to the mean post-WLS BMI at 33.7 ± 7.5 . A statistically significant improvement from presurgery to postsurgery was found in depression ($p < 0.005$), diabetes ($p < 0.001$), high blood pressure ($p < 0.001$), high cholesterol ($p < 0.001$), and sleep apnea ($p < 0.02$).

Table 2 represents the diet composition estimates collected from the food records. The mean total caloric intake was reported at $1,429 \pm 411$ kcal per day. The mean percent of cal-

ories calculated from carbohydrate, protein, and fat was 43%, 17%, and 39% respectively. Alcohol consumption of three or more drinks per week was reported from 4 of 24 (17%) participants. Frequency of fast food consumption defined as three or more meals per week was reported in 46% (11 of 24) of the food logs. Seventy-one percent (17 of 24) of the subjects recorded consuming 100 calories or more from beverages on a daily basis. The beverage calories reported in the food logs were predominately from specialty coffee drinks, soda, sports drinks, and alcohol, which accounted for approximately 163 calories per day or 11% of the total daily caloric intake. Meal frequency among the study participants varied from three meals and no snacks to three meals and three snacks per day, with no distinct daily pattern observed.

A total of 18 study participants attended one of the two focus group discussions. The emergent themes from the focus groups were categorized into weight regain; food choice awareness and eating behaviors; family, work, and social support; emotional stress; and perceived personal needs for a support group. Quotes supporting these themes are provided in Table 3.

Perceived management of weight and weight regain

Overall, the study participants recognized that some of their regained weight was related to their food and beverage choices. The participants consistently identified eating when not hungry, high caloric intake by eating too fast, eating the "wrong" type of food, and slipping back into "old eating habits." A couple of subjects speculated that decreasing their physical activity level had contributed to their weight gain. Of the individuals who have maintained a lower stable weight, positive comments demonstrated satisfaction with their current weight.

Perceived food choice awareness and eating behaviors

In general, the study participants responded with surprise and disappointment after electronically recording their food intake for 7 consecutive days. The focus group members

TABLE 2. DIET COMPOSITION FOR THE STUDY SAMPLE POPULATION

Diet composition (N=24)	Mean/standard deviation (SD)	Minimum	Maximum
Total calories	1,429 ± 411	728	2,685
Carbohydrate, g	158.3 ± 71.0 (43% kcal) ^a	20	348
Fiber, g	10.5 ± 4.9	3	21
Protein, g	55.4 ± 16.8 (17% kcal) ^a	17	95
Fat, g	61.6 ± 27.0 (39% kcal) ^a	18	146
Saturated fat, g	19.0 ± 9.9	3	47
Total cholesterol, mg	164.9 ± 56.5	47.9	278.9
	<i>n</i> (%)		
Alcohol ^b	4/24 (17%)		
Fast food meals ^c	11/24 (46%)		
Beverages ^d	17/24 (71%)		
Fruit/vegetable servings ^e	7/24 (29%)		

Source: Adapted from Benson-Davies et al., Energy Balance Following Gastric Bypass Surgery: A Pilot Study of Daily Caloric Intake and Step Count. *Surg Patient Care* 2013; 8:25.

^aPercentage of total caloric intake.

^bNumber of patients who consume three or more alcohol drinks per week.

^cNumber of patients who consume three or more fast food meals per week.

^dNumber of patients who consume more than 100 calories per day in the form of soda, specialty coffees, and sport drinks.

^eNumber of subjects who consumed three or more servings of fruits/vegetables per day.

TABLE 3. FOCUS GROUP THEMES AND QUOTES FROM WEIGHT LOSS SURGERY STUDY PARTICIPANTS (N=18)

Themes	Quotes
Perception of weight management and weight regain	"I regained some, I think, because I started drinking some Coke."
	"I suppose that I did not do everything that I was supposed to. It is really hard."
	"I changed jobs with really crazy hours, and I was not able to go to the gym, so I slipped back into my bad habits."
	"My weight has stayed very stable."
	"Weight slowly came back, a few pounds each year."
	"I'm eating even when I'm not hungry. I have recently gained 15 lbs."
	"This past year, I have gone through a lot of family stressors and have slid back on my eating and exercise behaviors. Probably I have gained 15 plus pounds."
	"I find if I let myself get hungry, I eat faster which usually means I eat more."
	"I know I've been eating the wrong stuff."
	"I still have a food addiction."
	"Head hungry."
	"Slipped back into same old type of habits."
	"The weight just creeps up on you!"
	"I love to eat out. I put it in my purse."
Perception of food choice awareness and eating behaviors	"This was a learning experience. Wow! I have some work to do."
	"Carb count was really an eye-opener."
	"I don't want to know what the calories are in my coffee."
	"I don't eat that much food. It is what I'm eating that's the problem."
	"I learned that a cheese stick, crackers, and an apple is over 200 calories, which is a lot of calories."
	"I eat better now than I have been because I need to get back on track."
	"We are a casserole-type family. We eat casseroles several times a week."
	"I need is to get back into eating for 20 minutes, and then put it away instead of continuing to eat lunch for 2 hours."
Perception of family, work, and social Support	"I need to get it out of my head that I do need to clean my plate."
	"My food choices are my biggest problem."
	"He [husband] is picking up things in the grocery store that I should not be eating."
	"It [family support] is slipping after 3 years."
	"My husband did well at first. He lost 30 pounds. He is a 'junk-food junkie' and now he has regained his 30 pounds."
	"My mom is my biggest support, and I have some friends at work. I have lost 200 lbs."
	"I don't have any support but myself, so I have to take care of myself. I see the importance of being your own support group; your own cheerleader, and I have become very rigid. When I go to bed, I lay out my food and have a plan. I do not have someone to support me, so I have had to become a very rigid marshal of myself."
	"When you don't have a weight problem, you don't think about it." (comment about support from coworkers)
	"No one at work knows I had it [WLS], and it's not something that I want to share."
	"I got it [family support] at the beginning, but it's not there anymore. They are all heavy too."
	"My mom is self-destructive and disapproving. She's a saboteur. She says that she wants to help me, but then she makes me brownies. It's frustrating."
	"I made a drastic change." (in response to no support from her husband)
	"My husband has said nothing. No comment, no compliment, no nothing."
	"Nobody really supports anybody there [at work]."
Dealing with emotional stress	"It is very, very hard for me to avoid eating when I'm stressed."
	"I eat things that I shouldn't." (when stressed)
	"I go for a walk when I'm stressed"
	"I'm still finding myself."
	"I solve all the problems in the world when I walk."
	"I teach water aerobics and swim for 2 hours."
	"My stress release is to pound on the piano."
	"Reading my cookbooks makes me so sick. It's a stress release for me."
Perceived personal needs for a support group	"No support group within driving distance."
	"Support group meets at a time that I cannot attend."
	"I am not interested in attending a support group."
	"Overall, I find the meetings helpful, if only to hear and share stories, failures, successes, and recipes."
	"The support group was not helpful to me."
	"Childcare prevents me from attending."
	"I would love a support group!"
	"We need a support group."
	"There was a small support group here in town and it is no longer. It was really, really good. I definitely miss it."
"We don't have a support group."	

specifically verbalized a high carbohydrate intake and the overall unhealthy quality of food choices. Cheese was discussed as one of the main contributors of calories and fat in the diet. Most of the focus group members agreed that their postsurgery eating habits had evolved with less awareness and mindfulness of their food choices. Specific examples included more convenience foods in the diet and an increased consumption of beverages with calories.

Perceived family, work, and social support

Overall, the study participants most frequently mentioned diminishing family support. For example, the initial postsurgery weight loss support from spouses and other family members was described as slowly disappearing over time, especially when the body weight of the post-WLS individual stabilized and/or gradual weight gain appeared. Other study participants responded by stating that their spouses had regained lost weight by no longer following healthy eating behaviors and reverting back to grocery shopping behaviors high in convenience foods, baked goods, candies, and high caloric beverages. Nonverbal messages by some family members of the WLS participants were also perceived as nonsupportive cues. Specific examples included spouses who ignored weight loss accomplishments by not acknowledging positive changes in body size and personal appearance. Additionally, other family members responded in nonsupportive behavior as “saboteurs” by “baking brownies” and demanding large amounts of food and unhealthy food choices served at family meals. Co-workers and social friends were also mentioned as not being particularly supportive of long-term weight loss efforts. Comments regarding the working environment showed limited if any support to WLS subjects in sustaining a significant weight loss and preventing weight regain (Table 3).

Exceptions to these findings were reported by a couple of individuals who highly valued the personal support that they had received from their spouse and/or other family members. Study participants who received consistent family support overtime reported positive weight loss comments and other supportive actions such as jointly engaging in physical activity and eating healthy.

Dealing with emotional stress

One of the strengths in this study was identifying the positive activities that some post-WLS patients used to cope with emotional stress. For example, walking, swimming, and playing the piano were discussed in the focus groups. One individual mentioned reading cookbooks as a stress reducer. Other individuals expressed a challenge in preventing eating episodes associated with personal stress. In general, comments from the focus group members identified stress as a trigger to overeating, and those individuals who were not dealing with personal stress in a positive manner resorted to overeating and alcohol consumption. As a consequence, most group members endorsed the concept of having an action plan to deal with stressful situations.

Perceived needs for group support

There was wide variation in the perceived needs for group support. Several study participants commented on the barriers preventing them from attending a WLS support group.

Specifically, driving distance, inconvenient meeting times, and lack of childcare to attend a support group meeting were discussed. Other individuals commented that they did not have access to a WLS support group locally. And still, a few individuals stated that they personally were not interested in attending any support group meetings.

Discussion

The focus group discussions in this study revealed that post-WLS patients share similar experiences with weight maintenance and/or preventing further weight gain. The 7-day food records documenting the study participants' food choices supported several of the focus group comments about “eating the wrong things,” drinking “Coke,” and “what I’m eating is the problem.” The comment “not able to go to the gym” in conjunction with the food records supports the concern of falling back into “old habits” of poor food choices and lack of exercise that may trigger weight regain. These findings are consistent with other WLS studies that report, in most cases of recidivism, weight loss failure is due to dietary non-compliance or an inability to change eating and exercise behaviors.¹⁷⁻²² Findings from the Swedish Obesity Subjects study reported that baseline caloric intake was 2,800 calories.³⁵ At 6 months postsurgery, the study reported caloric intake at approximately 1,500 calories, and by 10 years postsurgery, the caloric intake had increased to an average of 1,800–2,000 calories per day.³⁵ As time lapsed, energy intake increased and weight gained occurred, which was a consistent message repeated in this study. Clearly, the focus group participants had associated weight regain with lack of exercise and marginal eating behaviors that they had documented in their food logs.

The food records also documented days where the study participants had lost control of their eating behaviors with excessive alcohol and/or food intake. The food logs showed less than 20% of the individuals consumed three or more alcoholic beverages during the 7-day study period. According to a study conducted by Suzuki *et al.*,³⁶ WLS is not associated with an increased risk of alcohol use disorder (AUD). However, individuals with a prior history of AUD may be at increased risk for slipping back into alcohol use after surgery. Although this study did not screen for AUD, the additional calories consumed from alcoholic beverages is of concern. A recent study by Mozaffarian *et al.*³⁷ confirms an association between alcohol consumption and unintentional weight gain in women. The same is true for additional calories consumed in other beverages. Based on the food log estimates, a majority of the subjects recorded consuming 100 calories or more from beverages on a daily basis. The beverage calories were predominately from specialty coffee drinks, soda, sports drinks, and alcohol, accounting for approximately 163 calories per day or 11% of the total daily caloric intake. When beverage calories were discussed during the focus group sessions, only Coke, wine, and beer were identified as beverages with calories. From the food logs, however, coffee drinks were the most commonly recorded source of beverages with calories. The focus group members commented that coffee with the added flavored creams and sweeteners was a “non-negotiable” item and considered a daily “treat” in their diet. In a study conducted in 2004, with 68 GB patients at 30±8 months postsurgery, intake of sugar-sweetened beverages was recorded at 129±158 calories or 7.0±7.0% of the total calories

during the 24-hour period.³⁸ Compared to the food logs of this study, it appears that the current sample of postsurgery patients consumes more calories from beverages in total caloric intake (11%) than the findings reported by Wader-Kamar *et al.*³⁸ According to the Mayo Clinic dietary recommendations,⁸ one strategy in preventing weight regain among post-WLS patients is to avoid regularly sweetened beverages in the diet.

Fast food consumption was another observation noted in the food logs and reported in the focus group discussions. Frequency of fast food consumption defined as three or more meals per week was recorded in almost half of food logs. According to Garcia *et al.*,³⁹ an increased consumption of fast foods is associated with weight gain. Statistically significant behavioral factors including fast food consumption and frequency of eating out were found to exert the most influence on weight gain in obese subjects according to the Garcia *et al.*³⁹ study. Therefore, a second commonly cited recommendation to prevent weight regain in the post-WLS is to limit restaurant, fast food, and take-out meals to fewer than two per week.^{39,40}

Variation between individual food records and within one's own 7-day collection of food records exposed many feelings about environmental factors that influenced and shaped the eating and exercise behaviors of the sampled population. This portion of the focus group discussions stimulated extensive dialogue about family dynamics and work environments and the impact of long-term eating behaviors in relation to weight maintenance issues. Several statements by the study participants reported the lack of family and co-worker support in two specific areas identified as long-term eating behaviors and lack of positive feedback on weight maintenance efforts. These themes have also been noted in other nonsurgical qualitative studies conducted on weight loss maintenance.^{41,42} Thus, there appear to be repeated themes in nonsupportive family and work environments that affect the long-term sustainability of healthy behaviors and weight maintenance. According to Barnes *et al.*⁴² who conducted seven focus groups ($N=37$) of individuals who had lost and maintained a significant amount of weight by nonsurgical methods, family and work environments made it difficult for weight loss maintainers to sustain healthy behaviors. For example, Barnes *et al.*⁴² reported "food-laden environments with family and co-workers" citing high calorie foods and large quantities of food as obstacles to weight loss and weight maintenance. These findings are surprisingly similar to the reports from the focus group discussions of this study.

The focus groups summarized their feelings about the food records, emotional stress, and weight gain by exploring their perceived needs for support systems to help them cope with environmental factors associated with successful long-term weight maintenance. Several barriers to attending local WLS support groups were discussed, while others expressed no need for a monthly group support meeting. Nonetheless, having access to a WLS support group was valued by the majority of the focus group members. According to Elakkary *et al.*,⁴³ psychosocial factors discussed in support groups can influence the degree of weight loss and weight maintenance. For example, WLS support groups can help identify compulsive and disordered eating behaviors (binges, grazing, night eating), environmental factors attributing to weight gain, and social/emotional eating behaviors.⁴³⁻⁴⁵ Sarwer *et al.*⁹ identified two factors related to food regulation intake that potentially increase the risk of weight regain in post-WLS

patients. The first is the loss of "cognitive restraint" defined as an "intentional effort to limit food intake" to lose or maintain weight.⁹ This second is "disinhibition," which is commonly referred to as a "tendency to lose control over food intake" and is often associated with excessive eating or binge behaviors.⁹ Although only a few studies have reported on WLS support groups, the findings suggest that individuals who attend regular monthly meetings gain emotional support to embrace new eating behaviors and dietary compliance.^{9,46} In addition, Orth *et al.*⁴⁶ observed that regular support group participation was associated with greater weight loss than those who did not attend a support group.

Finally, one of the most interesting aspects of the focus group discussions was connecting post-WLS individuals who had a GB procedure several years ago with other rural community members who had a similar WLS experiences. Personal strategies to cope with stress, emotional eating, family environments, co-workers, and the need for more emotional support were clearly communicated. Professional services to support long-term eating behaviors and to establish routine medical care specific to WLS were also suggested as mechanisms to support long-term weight maintenance and prevent further weight gain.

Limitations

There are several limitations to this study, including self-reported data and the small sample size, which is a common characteristic of qualitative studies.^{27,30} The data analysis, however, indicated that all of the themes reached saturation, meaning additional participants would likely not have added to the depth or breadth of the participant responses. This study also included a homogeneous sample of rural western South Dakota individuals who may not be representative of other RYGB populations across the country. The quantitative and qualitative data only represented females, which does not make the study findings generalizable to the greater WLS population. Selection bias must also be noted, as only those individuals who had e-mail and phone capabilities were screened for the study, and therefore the inclusion criteria may have omitted potential study participants who did not have technology accessibility or knowledge in working with technology devices. Finally, although qualitative studies in general have some limitations, focus groups were well suited to address the objective of this study in learning about long-term eating and exercise behaviors and weight maintenance.

Implications

This study suggests that rural GB patients share many of the same concerns with long-term eating and exercise behaviors and weight maintenance as found in the science literature.^{17-20,41,42} The study participants expressed in great detail their personal struggles with healthy food choices, managing stress, family and work environment support, and their overall perception of WLS outcomes. More education on food choices and more emotional support from family members, co-workers, support groups, and the medical community were identified as perceived needs to maintain weight and to prevent further weight gain. Additional research using both quantitative and qualitative methods should focus on *what* is needed to support long-term behaviors in WLS patients and *how* to sustain a significant weight loss over time.

Disclosure Statement

No competing financial interests exist.

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