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ORIGINAL ARTICLE

Perceived barriers and facilitators to healthy eating and physical activity in endoscopic bariatric patients: a qualitative study

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Abstract

Purpose To explore the perceived barriers and facilitators to healthy eating and physical activity in individuals opting for endoscopic bariatric procedures.

Methods A total of 55 participants were recruited from a metropolitan bariatric clinic in Australia. Participants were interviewed at one of two stages of treatment: pre-procedure ($n = 34$) or 5–6 months post-procedure ($n = 18$). Interviews were transcribed and analyzed using content analysis.

Results Five themes emerged from analysis of participant responses in both groups including lifestyle, psychological, physiological, social, and eating behaviors. Each theme consisted of subthemes which were either perceived barriers, or facilitators, to healthy eating and physical activity. Perceived barriers consisted of factors such as time constraints, low motivation, unhealthy habits and portion control, low priority of personal health, emotional difficulties, and pain/mobility issues. Facilitators included subthemes such as planning/organization, high motivation, seeing results, improved self-esteem, increased energy, improved mobility, and changing mindset about portions.

Conclusion The results highlight the importance of delivering individualized and targeted treatment plans for individuals opting for bariatric procedures.

Level of evidence Level III: Evidence obtained from cohort or case–control analytic studies.

Keywords Bariatric procedures · Barriers · Eating behavior · Facilitators · Obesity · Physical activity

Introduction

Obesity is associated with numerous comorbid diseases such as hypertension, Type 2 diabetes, certain types of cancer, and stroke [1], and is linked to reduced life expectancy [2]. Further to these medical comorbidities, obesity has been associated with several mental health concerns including depression, negative body image issues [3], social stigma, and lowered quality of life [4].

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There are a number of treatment options recommended for overweight and obesity involving changes in diet, physical activity, and behavioral modification [5]. While lifestyle interventions contribute to short-term weight loss, follow-up studies have shown that initial weight loss is often regained within 3–5 years [6]. Several lifestyle and environmental factors have been proposed to explain this weight regain such as time constraints, sedentary occupations, and access to energy-dense foods [7]. In addition to external factors, the body's adaptive physiological responses counteract changes in calorie intake and energy expenditure by increasing appetite and reducing resting metabolism, favoring weight regain in the long term [8, 9].

Bariatric procedures including surgical and non-surgical procedures comprise the most efficacious treatment options for people with a BMI over 40 kg/m^2 (or 35 kg/m^2 if an obesity-related comorbidity is present) to achieve clinically significant weight loss [10] (5–10% of initial body weight). Endoscopic bariatric procedures such as endoscopic sleeve gastroplasty (ESG) and intragastric balloons have been

shown to result in greater initial weight loss, and to reduce cardiovascular and metabolic morbidities relative to non-surgical interventions [11]. In particular, endoscopic interventions have been shown to result in greater weight loss when combined with diet and lifestyle changes, compared to placebo groups and lifestyle interventions alone [12].

While bariatric procedures provide effective weight loss outcomes in the short term, research has consistently shown that the initial weight lost is regained at long-term follow-up in a subset of patients [13]. Further, research has not yet fully explored the role of lifestyle and psychological mechanisms associated with weight regain or weight loss maintenance in bariatric patients. It is therefore critical to gain insight into why weight loss maintenance or relapse occurs, and which factors are perceived by patients to enable or inhibit behaviours that promote a healthy lifestyle.

Currently, research on endoscopic bariatric procedures consists of safety and efficacy studies [12, 14]. Research is yet to explore the role of diet, habits, and psychological factors in achieving and maintaining weight loss in people who have undertaken endoscopic bariatric procedures. Hence, an exploratory, qualitative study is warranted. Qualitative investigations have the potential to capture the complexities in patients' weight loss experiences which cannot be described with weight loss outcomes alone [15]. Further, qualitative methods offer scope to understand the emotional, cognitive, behavioral, and environmental influences that are difficult to operationalize [16]. Given that endoscopic procedures are effective in the short term when combined with lifestyle changes, it is important to understand how individuals perceive the role of their broader lifestyle in the context of the barriers and facilitators impacting their ability to maintain weight loss long term [17]. The aim of the current study was to explore the barriers and facilitators to healthy eating and physical activity among individuals either before, or after their endoscopic procedure to provide insights that may inform clinical practice and future research.

Method

Participants and sampling

A purposive sample of 55 participants was recruited from a bariatric clinic in Australia. Patients who had given prior general consent upon admission to participate in research and those that met inclusion criteria were provided with further information about the study and asked for informed consent.

Potential participants were included if they were aged 19 or above with a BMI of ≥ 27 kg/m^2 and planned to or had already undergone an endoscopic gastric procedure, namely, Orbera Intragastric Balloon, Spatz3 Adjustable Intragastric Balloon, or Endoscopic Sleeve Gastroplasty, at the bariatric clinic. Additionally, participants needed to be English-speaking and were required to agree to at least 6 months of post-procedure follow-up. The Low and Negligible Risk panel at the University of Technology, Sydney approved the study, and written consent was obtained from all participants prior to data collection. Financial incentives were not offered for participation.

Design

The study consisted of two groups based on their stage of treatment: pre-procedure ($n = 34$) and 5–6 months post-procedure ($n = 18$). The study design was cross-sectional in nature, capturing participants' experiences at their present stage of treatment (either pre- or post-procedure).

Data collection. Participants were recruited between March and October 2018. They completed face-to-face (49 interviews) or telephone (3 interviews) interviews, administered by their treating dieticians and exercise physiologist.

Interview procedure. Each interview involved asking participants the following four questions in random order; *(1) what makes it easier to eat healthily?; (2) what makes it harder to eat healthily?; (3) what makes it easier to exercise?; and (4) what makes it difficult to exercise?* Participants in the post-procedure group were asked the same questions, however, the timeframe was specific to their experiences after treatment (each question stem was followed by "since the procedure"). Interviewers were asked to provide minimal prompting to ensure consistency and minimise the potential for influencing responses. The duration of interviews ranged from 1.5 to 7 min with a mean time of 2.5 min.

Data analysis

All interviews were audio recorded by interviewing allied health staff and transcribed verbatim by the first author. Three interviews were not transcribed or analyzed due to technological error. Transcripts were stored and organised using QSR Nvivo-12 software program [18]. Interviews were coded according to a conceptual content analysis framework.

Participant responses were analyzed using an inductive approach. The first author assigned initial codes to interview responses and organised these codes into potential themes and subthemes to make broader sense of the data. Next, the first author developed an initial coding manual based on the prospective themes and subthemes for review by the second author. The process of developing and applying the coding manual followed the recommendations outlined in Syed and Nelson [19]. The first and second author then met for 2 h to

code a small subset of the data and make initial revisions to the coding manual. To address the risk of unintentionally misrepresenting the data through coder biases [20], these two authors independently coded the entire dataset. For the pre-procedure data set, the inter-rater agreement was 90% and a Cohen's Kappa [21] coefficient of $k = 0.896$, $p < 0.001$, indicated *almost perfect* agreement between raters [22]. In the post-procedure data set, rater agreement was 94% with a kappa coefficient of $k = 0.938$, $p < 0.001$ again indicating *almost perfect* agreement. The first and third authors met again for 1 h to resolve discrepancies in the coding and obtain 100% agreement for the purpose of coding all data [22] to attain percentages of codes in each data set. Thus, the process of coding interview response data was iterative and involved moving back and forth between coders to review and define themes that best represented the data.

Results

Participant characteristics

Participants were 43 females and 9 males (mean age = 41.9 ± 11.5) with a BMI above 27 kg/m^2 (mean BMI = 35.1 ± 5.1). Separate demographic data for the two groups were unavailable due to the Clinic's privacy policy.

Themes

Five themes emerged from participant responses across the pre- and post-procedure groups: lifestyle, psychological, social, physiological, and eating behaviors. Each theme comprised barriers and facilitators to healthy eating and physical activity, identified from participant responses. The proportion of participants who endorsed each barrier and facilitator are represented in Table 1. The key themes and examples of participant responses are summarized below.

Lifestyle factors. Lifestyle factors represented a range of barriers and facilitators which captured the competing demands on participants' time and the relative priority placed on personal health behaviors. For example, being 'time-poor,' was the barrier referred to most frequently, and 'organization/planning/routine' was the most common facilitator in both groups.

"time poor…just not having the time to go shopping for the proper things"
"if you're prepped up it's easier to eat healthy…I do prep up meals for my husband and my kids"

Interestingly, 'low priority of own health' emerged as a barrier in the pre-procedure group, but this was not identified in the post-procedure group.

"I work at least maybe 16 h/day and I still have to sleep and hang out with my children…exercise comes after my children"

Psychological factors. Psychological factors represented a broader range of personal barriers and facilitators which appeared to be highly individualized. This factor comprised of concepts relating to cognitions and emotions. The most common barriers in both groups were 'low motivation/laziness,' and 'difficult emotions.'

"my own limitations internally. I've got a gym membership for example and I don't utilise it, it's all internal"
"there's been a lot of stress in my life…when there's too much stress and alcohol comes in and blows up my diet"

Participants in both groups noted 'high motivation' as a common facilitating factor. In addition, facilitators in the post-procedure group appeared to relate to initial weight-loss and its subsequent impact on motivation and beliefs about the self, with 'seeing results,' and 'improved self-esteem,' reported in this group.

"when I see results I feel more happy, I feel more motivated to exercise cos I always like toning up and looking good"
"I can fit into clothes I haven't been able to, I feel so much better about myself"

Social factors. The next commonly reported factor related to social responsibilities and support. 'Parental responsibilities' was the most frequently reported barrier and 'professional support' the most frequently identified facilitator among participants pre-and-post procedure.

"both the children have special needs so lots and lots of activities around them…leaves no time for me"
"I've got a really a good personal trainer"

Physiological factors. These factors encapsulated barriers and facilitators relating to the impacts of illness, energy levels, mobility, and the endoscopic procedure itself. For participants in both groups, 'pain or mobility issues' and 'tiredness/fatigue' were the most common barriers.

"The weight, obviously. It's harder to you know move around easy"
"I get tired easily, being bigger. After work I get tired"

Participants in the post-procedure group also reported 'recovery from procedure' as a barrier.

Table 1 Percentage of participants who endorsed each category

Theme	Subtheme	Percentage of participants endorsing each subtheme |	
		Pre-Procedure $n=34$	Post-Procedure $n=18$
Lifestyle	*Barriers*		
	Time Poor	62%	50%
	Convenience	12%	6%
	Low priority of own health	9%	0%
	Lack of organization/planning/routine	26%	11%
	Facilitators		
	Organization/planning/routine	29%	28%
	Incidental Exercise	9%	11%
	Access to health information	12%	0%
Psychological	*Barriers*		
	Low motivation/laziness	26%	6%
	Difficult emotions	12%	17%
	Cravings	6%	11%
	Negative associations with exercise	12%	0%
	Low self-esteem	3%	6%
	Unsuccessful attempts at weight loss	6%	0%
	Facilitators		
	Seeing results	18%	44%
	Positive associations with exercise	21%	17%
	Feeling good	18%	17%
	Financial incentive	6%	11%
	High motivation	35%	33%
	Improved self-esteem	0%	28%
Social	*Barriers*		
	Parental responsibilities	21%	11%
	Family environment	9%	6%
	Social environment	6%	6%
	Facilitators		
	Family support	9%	0%
	Professional support	12%	28%
	Having a workout partner	6%	6%
Physiological	*Barriers*		
	Illness or injury	6%	6%
	Pain or mobility issues	24%	11%
	Tiredness/fatigue	12%	17%
	Recovery from procedure	N/A	11%
	Facilitators		
	More energy	3%	6%
	Physically unable to eat as much post-procedure	N/A	28%
	Improved mobility	0%	28%
Eating Behaviors	*Barriers*		
	Not cooking	3%	0%
	Portion control	6%	22%
	Unhealthy habits	24%	11%
	Facilitators		
	Changing eating routine	15%	17%
	Changing mindset about portions	0%	22%

"Initially I found the very first time it was put in I found it took me a couple of weeks to get my strength back I couldn't really do a full gym session for at least a couple of weeks"

Participants in the pre-procedure group only identified one facilitator: 'more energy.' As expected, those in the post-procedure group frequently indicated facilitators which related to improvement in functioning resulting from the procedure and subsequent weight loss such as 'physically unable to eat as much post-procedure' and 'improved mobility.'

"the fullness of main meals…definitely a lot easier to regulate portion size and you really do feel unwell if you do eat beyond…"
"it makes it easier now that I've lost the 20 kg so it's much easier to move and do the incidental exercise, so my walking daily is much easier since the weight's off"

Eating behavior factors. Eating behavior factors referred to eating habits and routines. For participants in the post-procedure group, the identified barriers and facilitators were likely influenced by post-procedure instructions. Participants in the pre-procedure group noted 'unhealthy habits' as the most common barrier whereas 'portion control' was the most common barrier in the post-procedure group.

"if I get home after work I'll generally reach for something sweet…even if I don't feel like it, sometimes"
"I was probably eating too small amounts and that wasn't sustaining me enough so that probably allowed for snacking or grazing"

For the pre-procedure group, 'changing eating routine' was the only facilitator, while the post-procedure group reported 'changing mindset about portions' and 'changing eating routines' as enabling healthy eating.

"trying to find ways to incorporate vegetables into my meals and salads"
"just smaller portions and making sure I'm eating what are in the requirements"

Discussion

The aim of the present study was to explore barriers and facilitators to healthy eating and physical activity in participants either before, or after, their scheduled endoscopic bariatric procedure. Five key themes emerged from analysis of participant responses across both groups, including lifestyle, psychological, social, physiological, and eating behaviors. There were several barriers and facilitators identified as subthemes within each theme, with participants in the post-procedure group reporting fewer barriers, and more facilitators, compared to those in the pre-procedure group.

Participants in both groups identified being 'time-poor' as a lifestyle barrier to preparing healthy meals and engaging in regular exercise. This barrier is consistent with other studies in which time constraints have been identified as inhibiting healthy behaviors [23]. Related to time management, participants reported that a 'lack of planning/ organization/ routine' inhibited their ability to eat healthily and find time for exercise, however, engaging in planning and organizing facilitated healthy behaviors. This finding suggests that as part of preparing for, undergoing, and following post-op protocols, people may go through an important process of examining the competing demands on their time and re-prioritizing their health.

Consistent with prior research, participant responses in the pre-procedure group identified 'high motivation' as a facilitator to exercise [24]. People who are highly motivated, particularly for intrinsic reasons, such as improving personal health and social engagement, are more likely to maintain exercise relative to those exercising for weight loss or aesthetic reasons [25]. Contrary to this finding, participants in the post-procedure group in the current study commonly reported 'seeing results,' an extrinsic motivational factor, as a facilitator of healthy eating and increased physical activity. Other studies have also reported post-procedure weight loss as a motivator for healthy behavior change [26]. A potential explanation for this discrepancy in intrinsic and extrinsic motivators may be the stage of treatment at which participants were interviewed. Although participants in the current study were interviewed post-procedure, they were still in the 'treatment' phase (i.e., the balloon/staples were still in place). It is possible that during the early stages of treatment, extrinsic factors such as reduction in weight are important for initiating behavior and lifestyle changes. However, intrinsic motivation may be more important for sustaining the behavioral and lifestyle changes necessary for maintaining weight loss long term, especially once the devices (e.g., balloon) are removed.

Another commonly reported psychological barrier to healthy eating in the present study was 'emotional difficulties.' Participants who endorsed this barrier referenced factors such as stress or other negative emotions as perceived challenges to eating healthily. This subtheme may relate to emotional eating, which denotes eating to avoid or cope with negative emotions [27]. Several studies have identified emotional eating as a contributing factor to weight regain [28, 29]. For example, an online survey of European adults found that people who regained lost weight reported eating unhealthily to avoid or manage stress, feeling low, emotionally drained, or for comfort [30]. Similarly, in a retrospective analysis of data from bariatric surgery patients, results revealed that patients who engaged in more emotional eating

had higher weight regain compared to those who reported less emotional eating [31]. The frequency with which emotional regulation is identified as a barrier in previous research, and the present study, suggests that weight loss alone may not be sufficient to initiate and sustain healthy eating habits. An important clinical implication of this research is that patients may require targeted psychological therapies to build emotion regulation skills as part of their weight management plans.

Participants cited 'parental responsibilities' as a barrier in the current study. This finding is somewhat in line with previous research, which has indicated factors like lack of family support [32], social support [33], and family members who preferred eating unhealthy food [34], as challenges to healthy eating. An important contribution of the results from the current study is to delineate parental responsibilities from general lack of family/social support as its own challenge. Clinically, this may allow the treating team to engage in specific problem-solving and account for parental obligations when developing treatment plans.

Unsurprisingly, a higher proportion of participants in the pre-procedure group identified 'pain and mobility issues' as a physiological barrier to physical activity compared to the post-procedure group. Conversely, participant responses from the post-procedure group noted 'improved mobility' as enabling exercise. While improved mobility means that participants are likely to be able to exercise more comfortably after their endoscopic procedure, it will be equally important to concurrently address the other non-weight-related barriers, as past studies have shown that increased mobility does not lead to increased exercise in the long term [35].

Research has shown that making behavioral changes to dietary habits and lifestyle practices is central to long-term weight management [36]. A recent follow-up study of surgical patients found that those who had maintained weight loss 18 months post-surgery, changed their eating routines by chewing sufficiently, taking pauses between bites, and taking 20–30 min to consume a meal [36]. In line with these findings, participants in the post-procedure group of the current study endorsed 'changing mindset about portions' and 'changing eating routine' as facilitators to eating healthily. However, in somewhat contradiction with this result, post-procedure participants also identified 'portion control' as a challenge to healthy eating. It is possible that although participants in this group were trying to reduce portion sizes, and they physically could not eat as much food in one sitting as they could before their procedure, they may have equally found the behavioral aspects of preparing smaller meals and sticking to the dietary restrictions challenging. Taken together, these findings highlight the need to encourage changes in eating practices and engage in creative problem-solving, when necessary, as part of follow-up care to better enable maintenance of positive eating behavior changes.

In conclusion, five key themes emerged from participant responses across the pre-and-post-procedure groups including lifestyle, psychological, social, physiological, and eating behaviors. Several perceived barriers and facilitators to healthy eating and exercise were observed within these themes. There are significant clinical implications from the findings of this study; including the importance of conducting comprehensive pre-procedure assessments to capture the perceived barriers, and facilitators, of individuals to enable enhanced and targeted multidisciplinary interventions that are individualized for each patient.

Strengths, limits and future research

A key strength of the present paper is its analysis of original clinical data which provides ecologically valid findings directly relevant to clinical service delivery in a newly emerging endoscopic bariatric treatment modality. Another important benefit of the study is that it provides a deeper and more nuanced understanding of the attitudinal, behavioral, and psychological influences on a patient's decision to eat healthily or exercise. This can be used to explore predictors of sustained weight loss among post-procedure patients. Put simply, it offers an illustration of the interplay between psychological and physiological factors which has the potential to improve post-op care in a predominantly medical field.

It is important to consider some methodological limitations when interpreting the findings of this study. Firstly, data regarding certain participant characteristics and demographics were unavailable to protect participants' privacy according to the treating clinic's service delivery policy. It was therefore not possible to obtain weight between groups nor to track weight loss among participants in the post-procedure group. We were also unable to statistically determine whether the sample was homogenous or if there were quantitative differences between groups on these characteristics. In the present study, we treated the data as if they were homogeneous. We believe this information is important and suggest future studies could use a mixed methods approach to correlate weight loss with individualized treatment plans.

Secondly, the current study followed a cross-sectional design and did not allow for post-procedure follow-up with participants who were in the pre-procedure group. Future research could use a longitudinal design to explore how the perceived barriers and facilitators change among the same group of participants from pre-procedure to 1–2 years after procedure. Thirdly, it is important to note sample limitations and possible sampling bias issues. While we used a purposive sample of participants to ensure the research question was relevant and meaningful, all participants were recruited from the same clinic. Additionally, the majority of participants were female. Therefore, the experiences of

male bariatric patients, and endoscopic bariatric patients in general, from other clinics throughout Australia may be underrepresented in the present study. It will be important for future research to ensure more equal representation of gender and source participants from a broader range of geographic locations.

What is already known on this subject

Obesity is a risk factor for numerous medical comorbidities, and is also associated with mental health concerns, such as depression and lowered health-related quality of life. Bariatric procedures are the most efficacious treatment for weight loss among people with severe and complex obesity. Endoscopic procedures are a non-surgical alternative which addresses concerns associated with surgery. While these procedures result in effective weight-loss initially, studies on surgical patients show this weight is often regained within 3–5 years. Maintenance of weight loss requires change in diet and physical activity; however, research demonstrates that there are inhibiting and facilitating factors which determine whether one engages in healthy behaviors before and after procedure.

What this study adds

This study is the first to examine the perceived barriers and facilitators to healthy eating and physical activity among patients opting for endoscopic bariatric procedures in a clinical setting. This study contributes to the literature by highlighting the key factors which play a role in patients adhering to post-procedure guidelines and recommendations. The ecological validity of this study has the potential to directly inform treatment planning and delivery.

Author contributions JR conceived the original idea, obtained ethics committee approval, supervised the data collection and overall project. JR, AS, and ZS devised the project details. SC wrote the manuscript. SC and FC contributed to the interpretations of the results. JR, SC and FC provided critical feedback and all authors approved the final version of the manuscript.

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Code availability The coding manual used to analyse the raw deidentified data will be made available by the authors, without undue reservation, to any qualified researcher.

Declarations

Conflicts of interest The corresponding author states that there is no conflict of interest on behalf of all authors.

Ethics approval This study was reviewed and approved by the University of Technology, Sydney's Human Research Ethics Expedited Review Committee within the Discipline of Clinical Psychology. All participants provided written informed consent.

Consent to participate Written informed consent was obtained from all individual participants included in the study.

Consent to publish Participants provided informed consent regarding publishing their unidentified data.

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