Patient and Parent Perspectives of Adolescent Laparoscopic Adjustable Gastric Banding (LAGB)

Kim Willcox (BA, PGradDip Psych, MPsych (Clinical))[1], Narelle Warren (BA (Hons)/BSc, PhD)[2], Paul O'Brien (MD, FRACS) [3], Wendy Brown (MB.BS(Hons), PhD, FRACS, FACS)[3], Peter Nottle (MB.B.S)[4], Jason Winnett (MB.BS, FRACS)[5], Ahmad Aly (MB.BS, FRACS, M.S)[6] & Leah Brennan (BAppSc(Hons), MSc, PhD)[1,3]

kywill001@myacu.edu.au; **narelle.warren@monash.edu**; **paul.obrien@monash.edu.au**; **wendy.brown@monash.edu**; **nottle@ozemail.com.au**; **jason@winnettspecialistgroup.com.au**; **ahmad.aly@advanced-surgical.com.au**

[1]School of Psychology, Australian Catholic University, Locked Bag 4115, Melbourne, VIC 3065

[2]School of Social Sciences, Monash University, Wellington Road, Clayton, VIC 3168

[3]Centre for Obesity Research and Education, Monash University, Level 6, The Alfred Centre, 99 Commercial Road, Melbourne, VIC 3004

[4]Hobson's Bay Specialist Centre, 93 Ferguson Street, Williamstown, VIC 3106

[5]Winnett Specialist Group, 382 Victoria Parade, East Melbourne, VIC 3002

[6]Darebin Weightloss Surgery, 3/195 Thompsons Road, Bulleen VIC 3105

Correspondence: A/Prof Leah Brennan

School of Psychology, Australian Catholic University

Locked Bag 4115, Melbourne,VIC 3065

E: leah.brennan@acu.edu.au

T: +61 3 9953 3662

F: +61 3 9953 3205

E: leah.brennan@acu.edu.au

T: +61 3 9953 3662

F: +61 3 9953 3205

Abstract

Introduction Adolescent obesity is a significant global health challenge and severely obese adolescents commonly experience serious medical and psychosocial challenges. Consequently, severe adolescent obesity is increasingly being treated surgically. The limited available research examining the effectiveness of adolescent bariatric surgery focuses primarily on bio-medical outcomes. There is a need for a more comprehensive understanding of the behavioural, emotional and social factors which affect adolescents' and parents' experience of weight-loss surgery.

Materials/Methods Patient and parents' perspectives of adolescent LAGB were examined using a qualitative research methodology. Individual, semi-structured interviews were conducted with eight adolescent patients and five parents. Thematic analysis was used to identify key themes in the qualitative data.

Results Patients and parents generally considered adolescent LAGB to be a life-changing experience, resulting in physical and mental health benefits. Factors considered to facilitate weight-loss following surgery included parental support and adherence to treatment guidelines. Many adolescents reported experiencing surgical weight-loss stigma and challenging interpersonal outcomes after weight-loss for which they felt unprepared.

Conclusion Patients and parents perceived LAGB positively. There are opportunities to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

Adolescent obesity represents a significant public health challenge. Severely obese adolescents are likely to be obese adults [1], and are at risk of serious medical and psychological comorbidities [2-5]. Obese adolescents are exposed to weight-based stigma, which has been associated with poor educational, employment and socio-economic outcomes [6]. The psychosocial consequences of obesity are often of greater immediate concern to adolescents and parents than medical comorbidities [7], and are frequently the key reason for seeking obesity treatment [8].

Available research suggests that lifestyle and medication approaches can be effective in reducing overweight among children and adolescents. However, weight-loss is not always durable, meaning comorbidity improvements are not always sustained [9]. Severe adolescent obesity is increasingly being treated using bariatric surgery [10], which has been shown to produce significant, long-term weight-loss in adults [11]. Laparoscopic adjustable gastric banding (LAGB) and Roux-en Y gastric banding (RYGB) have most commonly been used to treat severe adolescent obesity [12]. Increasingly, sleeve gastrectomy is also being used [13]. Despite the growth in surgical treatment for severe obesity, there is currently little available research into its effectiveness for adolescents [10]. Several systematic reviews of common adolescent bariatric surgery procedures suggest surgery is effective for weight loss and resolution or improvement of medical comorbidities in the short- to medium- term [14-16]. In the only randomised control trial of adolescent LAGB, O'Brien et al. (2010) found adolescents who underwent gastric banding lost significantly more weight than adolescents who participated in an intensive lifestyle intervention. Resolution of the metabolic syndrome and improvements on quality of life measures were also significantly higher for the gastric banding group. However, the rates of post-surgical complications and re-operation reported in the study were higher than have been observed for adults [17].

Current adolescent bariatric surgery research has a predominant focus on bio-medical outcomes [18]. The lack of research addressing psychosocial aspects of adolescent bariatric surgery is of concern, given that psychosocial factors have been shown to affect both the severity and course of illness and treatment outcomes [19]. While successful weight-loss following bariatric surgery requires patients to adhere to

eating and exercise guidelines [20], research with adult bariatric surgery patients has found poor treatment adherence to be associated with psychosocial factors such as emotional eating [20]. Several studies of adolescent LAGB noted adolescents were less compliant with treatment protocols than adult patients [17] [21] [22]. However few studies described follow-up programs in detail, or examined the psychological and social factors influencing treatment outcomes [16]. The increasing use of bariatric surgery to treat adolescent obesity necessitates a more comprehensive understanding of the behavioural, emotional and social factors that influence adolescents' experience of the procedure. The aim of the present study was to develop an understanding of the psychosocial experiences of adolescent LAGB patients and their parents, which could inform improved treatment approaches.

Given the current adolescent bariatric surgery literature is limited in terms of both empirical evidence and theoretical discussion regarding behavioural, emotional and social factors affecting the adolescent's experience of LAGB, the present study employed a qualitative research design. Qualitative methods offer greatest utility when the subject of interest is under-researched or poorly-understood [23] and are recommended for use to help explain why outcomes of medical interventions vary among individuals [24]. Qualitative evidence is regarded as especially useful in explaining differential treatment outcomes for long-term health issues which require ongoing management by the patient [25]. Thus it is particularly suitable for the study of adolescent LAGB.

Method

Participants

Adolescents who underwent LAGB at one of three specialised bariatric surgery clinics in Melbourne, Australia between 2005 and 2012, and who were aged up to 18 years at the time of surgery, were invited to participate in this study. The parents of these patients were also invited to participate.

Eight adolescent LAGB patients (six female) and five parents (four female) agreed to take part in the study. Three parent participants were the mothers of adolescent participants, and two were parents of adolescent LAGB patients who did not take part in the study. Recruitment activity ceased after thirteen participant interviews, following achievement of informational redundancy, the point at which additional interviews yield few new thematic insights i.e., issues identified in new interviews have already been fully elucidated in previous interviews [26]. This coalesces with Guest et al.'s (2006) study which showed that sufficient themes for meta-analytic research can be identified after six interviews, with data saturation, a similar concept to informational redundancy, occurring after 12 interviews [27].

The mean age of adolescent participants at the time of LAGB surgery was 15.7 (range 14.2-17.4). Four of the eight adolescent participants had at least one parent or step-parent who had previously undergone LAGB.

Procedure

The research protocol was approved by Monash University and Australian Catholic University Human Research Ethics Committees. The data manager at each bariatric surgery centre identified eligible adolescent patients from their databases. Surgery staff mailed eligible patients a cover letter from the surgery with the explanatory statement, consent form and a reply paid envelope. Participants were asked to return the consent form to the researchers to register their interest in participating. On receipt of signed consent forms, researchers contacted participants to schedule one-on-one interviews.

Participants had the option to be interviewed in person or by telephone. Three adolescents and two parents were interviewed in person, with the remaining eight (five adolescents and three parents) participants completing telephone interviews. The mean interview length was 44 minutes (range 22-67 minutes) and interviews were informal in style. The researchers developed an interview guide which explored: the decision to have surgery, the experience of LAGB for patients and parents, barriers and facilitators of success, and patient aftercare and support. Participant responses were probed in depth

using follow-up questions. Interview progress was guided by participants' responses and, in line with standard qualitative research practices, the interview guide was updated after each interview to incorporate new topics introduced by participants [28]. All interviews were audiotaped, with participants' responses coded soon after interview completion [29].

Data analysis

In line with qualitative research recommendations outlined by Braun and Clarke (2013), the sample size of the current study is considered appropriate for a small- to medium-sized thematic analysis study.

Using the six-stage approach described by Braun and Clarke (2006), thematic analysis was undertaken to identify key themes in the data. This initially involved familiarisation with the data through repeated reviews of audiotaped interviews. Codes were then identified to represent salient aspects of the collected data, and to allow patterns within responses to be more easily identified. All data was then systematically collated according to the specified codes. Similar or related codes were grouped together and potential themes identified. Themes were then reviewed and refined, and a final thematic map of the analysis created. Data was managed and analysed using QSR NVivo 10 software.

Results

Aspects of the adolescent LAGB experience, as raised by both adolescents and parents, are reported below. Common themes identified in participants' responses are discussed, with verbatim quotes provided to promote further understanding of participants' perspectives. Verbatim quotes are coded 'A' for adolescent or 'P' for parent, and numbers used to distinguish one adolescent or parent quote from another.

Perspectives on decision to undergo LAGB.

Adolescents overwhelmingly reflected on the decision to undergo LAGB in positive terms, however some parents found the decision to allow their children to have weight-loss surgery very difficult.

Life-changing decision for adolescents.

Adolescent participants characterised the decision to have LAGB as being 'life changing'. Regardless of the proportion of excess weight lost, adolescents reported being more active and confident, and capable of living a fuller and more enjoyable life following LAGB. Pleasure in shopping for and wearing nicer clothes was a common theme among female adolescents.

> It's one way to change your life. It's changed mine in a good way… I'm happier within myself …I can fit into clothes that I never used to think I could…. [A5]

> It's made my life better. I enjoy life now…It's improved my life, my health, my lifespan [A2]

Very difficult decision for some parents.

While parents' responses suggested they were also satisfied with the outcomes of LAGB for their children, those who had not undergone the procedure themselves found the initial decision to permit LAGB for their child very difficult. These parents generally knew no one else who had undergone bariatric surgery, and perceived it to be a 'drastic' measure for treating obesity. Those parents who had themselves undergone LAGB tended to report less difficulty with deciding to permit LAGB for their children.

> I was wrestling with myself…it's such a dreadful thing to do … just so drastic and dramatic. [P4]

> I was very scared and apprehensive about the surgery… petrified…I would've liked some support just because I was so anxious. [P5]

Focus on psychosocial factors.

Despite some parents' initial concerns, all parents interviewed believed LAGB had achieved positive outcomes for their adolescents. In describing their motivations for considering LAGB, and the benefits which resulted from surgery, parents and adolescents focused primarily on psychosocial factors, such as low self-esteem, social withdrawal or experiences of bullying, rather than weight-related medical concerns.

> I was worried more about emotional side of things than medical…[adolescent] was being bullied [P3]

> It's been the best thing I've done…I always felt like I was this person that I am now, but I couldn't be that person [before] because I was so unhappy with myself [A3]

> She's happier in herself, more confident, more active… [P1]

Perspectives on factors facilitating positive LAGB outcomes

Several factors were identified as being helpful to adolescent LAGB patients in achieving their weight-loss goals. These related to both clinical and social aspects of experience, as is described below.

Parental support.

The majority of adolescents nominated parental support as a key factor which facilitated their achievement of weight-loss. Parents tended to be adolescents' primary source of advice and guidance. Adolescents attributed this to the fact the parent had also experienced weight concerns, or already undergone LAGB. Parents supported adolescents by: managing their regular attendance at after-care

appointments, explaining clinical information, and providing weight-loss coaching and motivation.

> Mum was there and if I didn't understand anything [surgeon] said, I'd just wait 'til we were in the car and I'm like 'what the hell does that mean?' and she'd explain everything. [A4]

> My mum convinces me not to [eat] the bad things…And she convinces me that there are better options out there. [A5]

> [Adolescent] is fortunate because I've had one [gastric band]…I've also been obese [P1]

Peer support.

While adolescents acknowledged the possibility that peer support could help facilitate positive outcomes following LAGB, they appeared to consider it less important than parental support, and were unsure whether they would have accessed peer support had it been available at the time of their surgery.

> My mum is my greatest support and I can talk to her about anything. I don't know what would've happened if I'd had the option of speaking to [a peer], I don't know if I would've chosen to. [A5]

When describing the types of peer support that would be helpful, adolescents suggested it could be beneficial to talk to a peer who had experienced LAGB, both before surgery and at regular intervals afterwards. Face-to-face interaction was considered preferable to online peer contact. While one adolescent stated a preference for an informal peer support group, the general preference was for one-to-one 'buddy' or 'mentor/mentee' relationships.

While not necessarily seeing a need for peer support for themselves, many adolescents expressed enthusiasm for acting as a mentor and guide to other patients. This was typically conceptualised as being someone with whom new adolescent

patients could discuss their fears and expectations prior to surgery, and offering eating and weight-loss advice and coaching to new patients following surgery.

> I'd love to be a mentor. It'd be a good development opportunity for me. [A1]

Unprompted, several participants expressed a wish to promote bariatric surgery to obese adolescents.

> I see these girls all the time who are just like I used to be. I wish I could tell them to get a lap band! It can change your life! [A8]

Adherence to treatment guidelines.

Adolescents who were successful in achieving substantial weight-loss attributed their success to the fact they had consistently followed post-surgical eating and exercise recommendations.

> If I'm going to get the surgery, I'm going to make it work….as soon as I got the band I started exercising every day. [A3]

In contrast, adolescents who had experienced periods of minimal or slower than expected weight-loss blamed a failure to consistently adhere to diet and exercise guidelines. Common reasons cited included not exercising due to self-consciousness about body size, emotional eating and the desire to eat the same food as peers in social situations.

> The thing I could've done better is get straight into exercising, I'd probably be 20 kilos lighter than I am now… I put off exercising too long… It's hard to get started when you're really big. You don't want to stand out. [A2]

> There are things that go on in your life that you just need to eat that chocolate or you just need to pig out. [P2]

> When I'd go out with friends, I'd eat junk food. [A2]

After-care.

While most adolescents discussed parental support at length, they made few unprompted references to surgical after-care when discussing the factors they believed facilitated weight-loss. Participants' prompted responses suggested after-care was perceived as a medical appointment focused primarily on band adjustments. Several adolescents reported being very particular about which GPs they would see for after-care visits, and generally nominated a single, trusted GP. They tended not to want to see anyone else, even if their preferred GP was less conveniently located or booked-out. Preferred GPs tended to be favoured for their perceived listening skills and ability to adopt a partnership stance with the adolescent.

> [Preferred GP] listens to what I say. If I tell her…I've had the foods I'm not meant to have she says well that's the past, make better choices next time and here's how you could do it. [A5]

> There's certain clinicians you just don't click with …They're not really listening to [adolescent] and thinking what's behind her questions...They don't realise how you blow things out of proportion in your mind. [Preferred GP] is good, it's more of a partnership. [P1]

Challenges and adjustments following LAGB

Despite the general satisfaction of participants and their positive stories about LAGB, several encountered concerns following surgery, which related primarily to social aspects of their experiences.

Stigma associated with weight-loss surgery.

Despite regarding LAGB as a positive experience, resulting in numerous psychosocial benefits, many participant responses suggested the stigma and shame of obesity extends to bariatric surgery. Participants perceived society to disapprove of weight-loss surgery, viewing weight-loss as something that should be achieved through self-discipline.

> [People think] you're not trying hard enough, you can do it on your own…They say you don't need to take that drastic measure [P2]

> A few people thought [LAGB] was just laziness…a cheat's way out [A7]

Many believed society regards adolescent obesity to be a result of deficient parenting, and bariatric surgery to be too radical an option for minors.

> They would think my mum's a bad mother because she doesn't control me [A1]

> We didn't tell many people because I'd be judged - "fancy resorting to surgery when you should just be doing healthy eating and exercise." [P3]

> I saw that TV show 'Insight' where people were saying "why are they allowing teenagers to have this surgery?" [A1]

> A lot of people thought I was too young for the surgery [A7]

The fear of others' disapproval meant many adolescent participants and their parents were reluctant to disclose the adolescent's LAGB. To avoid potential criticism, many adolescents used lies of omission, such as attributing their weight-loss merely to "eating less", to explain their post-surgery eating behaviours and weight-loss to others.

> I didn't like lying [about having LAGB] but I felt I'd be criticised… I'd say I've cut down on portion size, or I'm eating less, or I have to eat slowly because I have a small stomach… [A1]

> I just say I've been eating less and exercising more [A2]

Interpersonal difficulties following weight-loss.

A number of female adolescents reported that following weight-loss, they experienced interpersonal changes they had not anticipated, and which created

concern. Some felt uncomfortable and ill-equipped to deal with attention from males after losing weight.

> I stand out more. There's, like, the sexual thing…People are more aware of me sexually… I was very scared of that initially [laughs nervously]. I was scared! [A1]

> I still have that issue now. You go from being so big where no one looks at you, to small, where men are looking at you. If I'm out with my partner I still feel uncomfortable…It's something that takes a while to get used to… [A7]

Several participants felt anger and resentment towards others they believed had rejected or victimized them when they were obese, but who later became friendly after the adolescents lost weight.

> Because now they [bullies] come to me and they're like, I want to be your friend and I'm like no! Some of them have tried adding me on Facebook, I'm like are you kidding me! Some of them 'like' my photos on Instagram! [A4]

> I used to go into these shops and they'd stare at me like "what are YOU doing in here, there's nothing here to fit you". Now they're all like "oh hi, I love your outfit!" To this day I won't shop in any of those places! [A8]

A number of participants felt ashamed or uneasy about the critical feelings they developed towards obese others after achieving their goal weight.

> I became, I know this is kind of a surprising thing… You become critical of people who are overweight…I become hyper-critical of them. [A1]

> It's really weird. I'm very judgmental of obese people. [A8]

Discussion

This study aimed to develop an understanding of the experiences of adolescent LAGB patients and their parents. Consistent with the adult bariatric surgery literature, the patient and parent perspectives reported in the study suggest the experience and outcomes of LAGB can be strongly influenced by psychological and social factors [30-32]. In line with previous research findings [33, 34], participants in the present study generally nominated psychosocial difficulties (e.g., low mood, social withdrawal) rather than medical concerns when describing the specific difficulties which led them to consider LAGB. While adolescents in the present study generally considered LAGB to have overwhelmingly changed their lives for the better, a minority reported difficulties in adhering to post-surgical treatment guidelines, consistent with findings in adult research [20, 35].

Parental support was cited by adolescents as a key influence on their ability to achieve weight-loss goals. Parents were considered best placed to provide guidance because most had experienced weight problems and many had previously undergone LAGB. The influence of parents' own experiences with weight-loss surgery on their children's surgery outcomes is an area for possible future investigation. Adolescents in the present study made few unprompted references to formal after-care as a source of support. Prompted participant responses suggested after-care was as medical appointments focused on band adjustment, consistent with previous research with adult LAGB patients [36]. Of note, while current treatment programs for adolescents managing chronic health conditions emphasise peer support [37, 38], often delivered online [39], adolescents in the present study regarded connections with peers as less

important than parental support, and expressed a clear preference for in-person rather than online interaction. Given the use of post-surgery peer support is well-established with adult bariatric patients [40], and has been associated with superior weight-loss outcomes [41-43], further research is recommended to establish the relevance and effectiveness of parent and peer support for adolescent patients. Further research is also required to determine preferred formats.

The findings of the present study have implications for improving the experience and outcomes for adolescents undergoing LAGB. While adolescents in the current study focused on the role of parental emotional support in facilitating adolescent weight-loss, research addressing non-surgical treatment of adolescent obesity suggests there are additional ways in which parents can influence adolescent weight outcomes. There is evidence that factors such as the mother's nutrition knowledge; parents' food selection; home eating patterns; and eating behaviours modelled by parents influence adolescent eating behaviour [28]. General parenting styles have also been shown to influence child and adolescent eating behaviour [44]. Research suggests parental involvement is associated with better outcomes for child and adolescent obesity interventions [9] and consideration should be given to targeting parents of adolescent LAGB patients for education and skills acquisition. Such education could focus on managing factors in the home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes.

The present study's findings also suggest post-operative care should anticipate psychosocial outcomes for which adolescents may be unprepared. A number of participants in this study reported stigma associated with weight-loss surgery, with many choosing not to disclose LAGB to others. Bariatric surgery is considered a 'lazy' option by many in society [45], and adolescent bariatric surgery patients may require support to develop effective strategies to deal with invasive questioning and potentially critical comments from others. Several adolescent participants in the study also reported experiencing unexpected, disquieting outcomes following weight-loss, including unease at increased attention from men, the development of critical attitudes towards obese individuals, and anger at friendship advances from peers previously responsible for

victimisation. Such psychosocial tensions arising from significant weight-loss following surgery are consistent with the adult bariatric surgery literature [46] [44], and adolescents may require support for issues related to sexuality, contraception, interpersonal changes, dealing with others' reactions, and conflicted feelings about stigmatising obese others [33]. Adolescents' ability to adjust new psychosocial challenges will vary according to their stage of development and maturation [47], and level of social support, thus requiring support to be individualised.

There is also an opportunity for the scope of after-care to expand beyond its current medical focus. In line with treatment programs for adolescents managing other chronic health conditions [37], the model of LAGB after-care could be adjusted to incorporate consideration of behavioural strategies to address common barriers to weight-loss such as failing to exercise, emotional eating, and social pressures to eat the same foods as peers. Dietary advice could also be provided to equip adolescent patients to incorporate 'treat' foods into their diets while remaining compliant with overall post-surgery eating guidelines. After-care appointments could also provide a forum for patients to discuss psychosocial dimensions of weight-loss which may be causing concern or discomfort.

To the authors' knowledge, this is the first qualitative study to address patient and parent perspectives of adolescent LAGB. The study's strengths include its use of established qualitative research methodology and the rich, detailed information it provides about patient and parent experiences, as well as the consistency of identified themes with the limited available previous research. The inclusion of patients from three different bariatric surgery centres was also a strength. The study is limited by a self-selected sample, and a larger-scale prospective study is recommended to validate the current study's findings.

In conclusion, the present study contributes to the existing adolescent bariatric surgery literature by providing a detailed examination of patient and parent perspectives of adolescent LAGB. The study's findings suggest that while adolescent patients and parents perceived LAGB to have resulted in significant, positive outcomes, important

opportunities exist to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

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Table 1 Opportunities to improve adolescent LAGB experience and outcomes

Role of parents	Educate parents about factors in home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes
Peer support	Explore potential for peer support and mentoring of adolescent patients
Extend aftercare	Extend beyond medical focus to incorporate strategies to address common barriers to weight-loss
Psychosocial support	Support patients to deal with surgical weight-loss stigma, and prepare them to manage interpersonal and psychosocial challenges following weight-loss

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Conflict of Interest

Wendy Brown received an Honorarium from Allergan to attend a Surgical Advisory Panel in London in 2009.

Paul O'Brien has written a patient information book entitled **"**The Lap-Band 391 Solution:A Partnership for Weight Loss**"** which is given to patients without charge, but some are sold to surgeons and others, for which he receives a royalty. He is employed as the National Medical Director for the American Institute of Gastric
Banding, a multicenter facility based in Dallas, Texas, that treats obesity predominantly by gastric banding.

Kim Willcox declares no conflict of interest.
Leah Brennan declares no conflict of interest
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Peter Nottle declares no conflict of interest
,Jason Winnett declares no conflict of interest
Ahmad Aly declares no conflict of interest..

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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Patient and Parent Perspectives of Adolescent Laparoscopic Adjustable Gastric Banding (LAGB)

Kim Willcox (BA, PGradDip Psych)[1], Narelle Warren (BA (Hons)/BSc, PhD)[2], Paul O'Brien (MD, FRACS) [3], Wendy Brown (MB.BS(Hons), PhD, FRACS, FACS)[3], Peter Nottle (MB.B.S)[4], Jason Winnett (MB.BS, FRACS)[5], Ahmad Aly (MB.BS, FRACS, M.S)[6] & Leah Brennan (BAppSc(Hons), MSc, PhD)[1,3]

kywill001@myacu.edu.au; narelle.warren@monash.edu; paul.obrien@monash.edu.au; wendy.brown@monash.edu; nottle@ozemail.com.au; jason@winnettspecialistgroup.com.au; ahmad.aly@advanced-surgical.com.au

[1]School of Psychology, Australian Catholic University, Locked Bag 4115, Melbourne, VIC 3065

[2]School of Social Sciences, Monash University, Wellington Road, Clayton, VIC 3168

[3]Centre for Obesity Research and Education, Monash University, Level 6, The Alfred Centre, 99 Commercial Road, Melbourne, VIC 3004

[4]Hobson's Bay Specialist Centre, 93 Ferguson Street, Williamstown, VIC 3106

[5]Winnett Specialist Group, 382 Victoria Parade, East Melbourne, VIC 3002

[6]Darebin Weightloss Surgery, 3/195 Thompsons Road, Bulleen VIC 3105

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Correspondence: A/Prof Leah Brennan

School of Psychology, Australian Catholic University

Locked Bag 4115, Melbourne,VIC 3065

E: leah.brennan@acu.edu.au

T: +61 3 9953 3662

F: +61 3 9953 3205

Abstract

Introduction Adolescent obesity is a significant global health challenge and severely obese adolescents commonly experience serious medical and psychosocial challenges. Consequently, severe adolescent obesity is increasingly being treated surgically. The limited available research examining the effectiveness of adolescent bariatric surgery focuses primarily on bio-medical outcomes. There is a need for a more comprehensive understanding of the behavioural, emotional and social factors which affect adolescents' and parents' experience of weight-loss surgery.

Materials/Methods Patient and parents' perspectives of adolescent LAGB were examined using a qualitative research methodology. Individual, semi-structured interviews were conducted with eight adolescent patients and five parents. Thematic analysis was used to identify key themes in the qualitative data.

Results Patients and parents generally considered adolescent LAGB to be a life-changing experience, resulting in physical and mental health benefits. Factors considered to facilitate weight-loss following surgery included parental support and adherence to treatment guidelines. Many adolescents reported experiencing surgical weight-loss stigma and challenging interpersonal outcomes after weight-loss for which they felt unprepared.

Conclusion Patients and parents perceived LAGB positively. There are opportunities to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

Adolescent obesity represents a significant public health challenge. Severely obese adolescents are likely to be obese adults [1], and are at risk of serious medical and psychological comorbidities [2-5]. Obese adolescents are exposed to weight-based stigma, which has been associated with poor educational, employment and socio-economic outcomes [6]. The psychosocial consequences of obesity are often of greater immediate concern to adolescents and parents than medical comorbidities [7], and are frequently the key reason for seeking obesity treatment [8].

Available research suggests that lifestyle and medication approaches can be effective in reducing overweight among children and adolescents. However, weight-loss is not always durable, meaning comorbidity improvements are not always sustained [9]. Severe adolescent obesity is increasingly being treated using bariatric surgery [10], which has been shown to produce significant, long-term weight-loss in adults [11]. Laparoscopic adjustable gastric banding (LAGB) and Roux-en Y gastric banding (RYGB) have most commonly been used to treat severe adolescent obesity [12]. Increasingly, sleeve gastrectomy is also being used [13]. Despite the growth in surgical treatment for severe obesity, there is currently little available research into its effectiveness for adolescents [10]. Several systematic reviews of common adolescent bariatric surgery procedures suggest surgery is effective for weight loss and resolution or improvement of medical comorbidities in the short- to medium- term [14-16]. In the only randomised control trial of adolescent LAGB, O'Brien et al. (2010) found adolescents who underwent gastric banding lost significantly more weight than adolescents who participated in an intensive lifestyle intervention. Resolution of the metabolic syndrome and improvements on quality of life measures were also significantly higher for the gastric banding group. However, the rates of post-surgical complications and re-operation reported in the study were higher than have been observed for adults [17].

Current adolescent bariatric surgery research has a predominant focus on bio-medical outcomes [18]. The lack of research addressing psychosocial aspects of adolescent bariatric surgery is of concern, given that psychosocial factors have been shown to affect both the severity and course of illness and treatment outcomes [19]. While successful weight-loss following bariatric surgery requires patients to adhere to

eating and exercise guidelines [20], research with adult bariatric surgery patients has found poor treatment adherence to be associated with psychosocial factors such as emotional eating [20]. Several studies of adolescent LAGB noted adolescents were less compliant with treatment protocols than adult patients [17] [21] [22]. However few studies described follow-up programs in detail, or examined the psychological and social factors influencing treatment outcomes [16]. The increasing use of bariatric surgery to treat adolescent obesity necessitates a more comprehensive understanding of the behavioural, emotional and social factors that influence adolescents' experience of the procedure. The aim of the present study was to develop an understanding of the psychosocial experiences of adolescent LAGB patients and their parents, which could inform improved treatment approaches.

Given the current adolescent bariatric surgery literature is limited in terms of both empirical evidence and theoretical discussion regarding behavioural, emotional and social factors affecting the adolescent's experience of LAGB, the present study employed a qualitative research design. Qualitative methods offer greatest utility when the subject of interest is under-researched or poorly-understood [23] and are recommended for use to help explain why outcomes of medical interventions vary among individuals [24]. Qualitative evidence is regarded as especially useful in explaining differential treatment outcomes for long-term health issues which require ongoing management by the patient [25]. Thus it is particularly suitable for the study of adolescent LAGB.

Method

Participants

A total of 99 adolescents who underwent LAGB at one of three specialised bariatric surgery clinics in Melbourne, Australia between 2005 and 2012, and who were aged up to 18 years at the time of surgery, were invited to participate in this study. The parents of these patients were also invited to participate.

Eight adolescent LAGB patients (six female) and five parents (four female) agreed to take part in the study. Three parent participants were the mothers of adolescent participants, and two were parents of adolescent LAGB patients who did not take part in the study.

The mean age of adolescent participants at the time of LAGB surgery was 15.7 (range 14.2-17.4). Four of the eight adolescent participants had at least one parent or step-parent who had previously undergone LAGB.

Procedure

The research protocol was approved by Monash University and Australian Catholic University Human Research Ethics Committees. The data manager at each bariatric surgery centre identified eligible adolescent patients from their databases. Surgery staff mailed eligible patients a cover letter from the surgery with the explanatory statement, consent form and a reply paid envelope. Participants were asked to return the consent form to the researchers to register their interest in participating. On receipt of signed consent forms, researchers contacted participants to schedule one-on-one interviews.

Participants had the option to be interviewed in person or by telephone. Three adolescents and two parents were interviewed in person, with the remaining eight (five adolescents and three parents) participants completing telephone interviews. The mean interview length was 44 minutes (range 22-67 minutes) and interviews were informal in style. The researchers developed an interview guide which explored: the decision to have surgery, the experience of LAGB for patients and parents, barriers and facilitators of success, and patient aftercare and support. Participant responses were probed in depth using follow-up questions. Interview progress was guided by participants' responses and, in line with standard qualitative research practices, the interview guide was updated after each interview to incorporate new topics introduced by participants [26]. All interviews were audiotaped, with participants' responses coded soon after interview completion [27].

Data analysis

In line with qualitative research recommendations outlined by Braun and Clarke (2013), the sample size of the current study is considered appropriate for a small- to medium-sized thematic analysis study.

Using the six-stage approach described by Braun and Clarke (2006), thematic analysis was undertaken to identify key themes in the data. This initially involved familiarisation with the data through repeated reviews of audiotaped interviews. Codes were then identified to represent salient aspects of the collected data, and to allow patterns within responses to be more easily identified. All data was then systematically collated according to the specified codes. Similar or related codes were grouped together and potential themes identified. Themes were then reviewed and refined, and a final thematic map of the analysis created. Data was managed and analysed using QSR NVivo 10 software.

Results

Aspects of the adolescent LAGB experience, as raised by both adolescents and parents, are reported below. Common themes identified in participants' responses are discussed, with verbatim quotes provided in accompanying tables to promote further understanding of participants' perspectives. Verbatim quotes are coded 'A' for adolescent or 'P' for parent.

Perspectives on decision to undergo LAGB.

Adolescents overwhelmingly reflected on the decision to undergo LAGB in positive terms, however some parents found the decision to allow their children to have weight-loss surgery very difficult. Table 1 provides participants' verbatim quotes for these findings.

Life-changing decision for adolescents.

Adolescent participants characterised the decision to have LAGB as being 'life changing'. Regardless of the proportion of excess weight lost, adolescents reported being

more active and confident, and capable of living a fuller and more enjoyable life following LAGB. Pleasure in shopping for and wearing nicer clothes was a common theme among female adolescents.

Very difficult decision for some parents.

While parents' responses suggested they were also satisfied with the outcomes of LAGB for their children, those who had not undergone the procedure themselves found the initial decision to permit LAGB for their child very difficult. These parents generally knew no one else who had undergone bariatric surgery, and perceived it to be a 'drastic' measure for treating obesity. Those parents who had themselves undergone LAGB tended to report less difficulty with deciding to permit LAGB for their children.

Focus on psychosocial factors.

Despite some parents' initial concerns, all parents interviewed believed LAGB had achieved positive outcomes for their adolescents. In describing their motivations for considering LAGB, parents and adolescents focused primarily on psychosocial factors, such as low self-esteem, social withdrawal or experiences of bullying, rather than weight-related medical concerns.

Perspectives on factors facilitating positive LAGB outcomes

Several factors were identified as being helpful to adolescent LAGB patients in achieving their weight-loss goals. These related to both clinical and social aspects of experience, as is described below. Table 2 provides participants' verbatim quotes for these findings.

Parental support.

The majority of adolescents nominated parental support as a key factor which facilitated their achievement of weight-loss. Parents tended to be adolescents' primary source of advice and guidance. Adolescents attributed this to the fact the parent had also experienced weight concerns, or already undergone LAGB. Parents supported adolescents by: managing their regular attendance at after-care

appointments, explaining clinical information, and providing weight-loss coaching and motivation.

Peer support.

While adolescents acknowledged the possibility that peer support could help facilitate positive outcomes following LAGB, they appeared to consider it less important than parental support, and were unsure whether they would have accessed peer support had it been available at the time of their surgery. When describing the types of peer support that would be helpful, adolescents suggested it could be beneficial to talk to a peer who had experienced LAGB, both before surgery and at regular intervals afterwards. Face-to-face interaction was considered preferable to online peer contact. While one adolescent stated a preference for an informal peer support group, the general preference was for one-to-one 'buddy' or 'mentor/mentee' relationships.

While not necessarily seeing a need for peer support for themselves, many adolescents expressed enthusiasm for acting as a mentor and guide to other patients. This was typically conceptualised as being someone with whom new adolescent patients could discuss their fears and expectations prior to surgery, and offering eating and weight-loss advice and coaching to new patients following surgery. Unprompted, several participants expressed a wish to promote bariatric surgery to obese adolescents.

Adherence to treatment guidelines.

Adolescents who were successful in achieving substantial weight-loss attributed their success to the fact they had consistently followed post-surgical eating and exercise recommendations. In contrast, adolescents who had experienced periods of minimal or slower than expected weight-loss blamed a failure to consistently adhere to diet and exercise guidelines. Common reasons cited included not exercising due to self-consciousness about body size, emotional eating and the desire to eat the same food as peers in social situations.

After-care.

While most adolescents discussed parental support at length, they made few unprompted references to surgical after-care when discussing the factors they believed facilitated weight-loss. Participants' prompted responses suggested after-care was perceived as a medical appointment focused primarily on band adjustments. Several adolescents reported being very particular about which GPs they would see for after-care visits, and generally nominated a single, trusted GP. They tended not to want to see anyone else, even if their preferred GP was less conveniently located or booked-out. Preferred GPs tended to be favoured for their perceived listening skills and ability to adopt a partnership stance with the adolescent.

Challenges and adjustments following LAGB

Despite the general satisfaction of participants and their positive stories about LAGB, several encountered concerns following surgery, which related primarily to social aspects of their experiences. Table 3 provides participants' verbatim quotes for these findings.

Stigma associated with weight-loss surgery.

Despite regarding LAGB as a positive experience, resulting in numerous psychosocial benefits, many participant responses suggested the stigma and shame of obesity extends to bariatric surgery. Participants perceived society to disapprove of weight-loss surgery, viewing weight-loss as something that should be achieved through self-discipline. Many believed society regards adolescent obesity to be a result of deficient parenting, and bariatric surgery to be too radical an option for minors.

The fear of others' disapproval meant many adolescent participants and their parents were reluctant to disclose the adolescent's LAGB. To avoid potential criticism, many adolescents used lies of omission, such as attributing their weight-

loss merely to “eating less”, to explain their post-surgery eating behaviours and weight-loss to others.

Interpersonal difficulties following weight-loss.

A number of female adolescents reported that following weight-loss, they experienced interpersonal changes they had not anticipated, and which created concern. Some felt uncomfortable and ill-equipped to deal with attention from males after losing weight. Several felt anger and resentment towards others they believed had rejected or victimized them when they were obese, but who later became friendly after the adolescents lost weight. A number felt ashamed or uneasy about the critical feelings they developed towards obese others after achieving their goal weight.

Discussion

This study aimed to develop an understanding of the experiences of adolescent LAGB patients and their parents. Consistent with the adult bariatric surgery literature, the patient and parent perspectives reported in the study suggest the experience and outcomes of LAGB can be strongly influenced by psychological and social factors [28-30]. In line with previous research findings [31, 32], participants in the present study generally nominated psychosocial difficulties (e.g., low mood, social withdrawal) rather than medical concerns when describing the specific difficulties which led them to consider LAGB. While adolescents in the present study generally considered LAGB to have overwhelmingly changed their lives for the better, a minority reported difficulties in adhering to post-surgical treatment guidelines, consistent with findings in adult research [20, 33].

Parental support was cited by adolescents as a key influence on their ability to achieve weight-loss goals. Parents were considered best placed to provide guidance because most had experienced weight problems and many had previously undergone LAGB. The influence of parents' own experiences with weight-loss surgery on their children's surgery outcomes is an area for possible future investigation. Adolescents in the present study made few unprompted references to formal after-care as a source of support. Prompted participant responses suggested after-care was as medical appointments focused on band adjustment, consistent with previous research with adult LAGB patients [34]. Of note, while current treatment programs for adolescents managing chronic health conditions emphasise peer support [35, 36], often delivered online [37], adolescents in the present study regarded connections with peers as less important than parental support, and expressed a clear preference for in-person rather than online interaction. Given the use of post-surgery peer support is well-established with adult bariatric patients [38], and has been associated with superior weight-loss outcomes [39-41], further research is recommended to establish the relevance and effectiveness of parent and peer support for adolescent patients. Further research is also required to determine preferred formats.

The findings of the present study have implications for improving the experience and outcomes for adolescents undergoing LAGB. While adolescents in the current study focused on the role of parental emotional support in facilitating adolescent weight-loss, research addressing non-surgical treatment of adolescent obesity suggests there are additional ways in which parents can influence adolescent weight outcomes. There is evidence that factors such as the mother's nutrition knowledge; parents' food selection; home eating patterns; and eating behaviours modelled by parents influence adolescent eating behaviour [26]. General parenting styles have also been shown to influence child and adolescent eating behaviour [42]. Research suggests parental involvement is associated with better outcomes for child and adolescent obesity interventions [9] and consideration should be given to targeting parents of adolescent LAGB patients for education and skills acquisition. Such education could focus on managing factors in the home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes.

The present study's findings also suggest post-operative care should anticipate psychosocial outcomes for which adolescents may be unprepared. A number of participants in this study reported stigma associated with weight-loss surgery, with many choosing not to disclose LAGB to others. Bariatric surgery is considered a 'lazy' option by many in society [43], and adolescent bariatric surgery patients may require support to develop effective strategies to deal with invasive questioning and potentially critical comments from others. Several adolescent participants in the study also reported experiencing unexpected, disquieting outcomes following weight-loss, including unease at increased attention from men, the development of critical attitudes towards obese individuals, and anger at friendship advances from peers previously responsible for victimisation. Such psychosocial tensions arising from significant weight-loss following surgery are consistent with the adult bariatric surgery literature [44] [42], and adolescents may require support for issues related to sexuality, contraception, interpersonal changes, dealing with others' reactions, and conflicted feelings about stigmatising obese others [31]. Adolescents' ability to adjust new psychosocial challenges will vary according to their stage of development and maturation [45], and level of social support, thus requiring support to be individualised.

There is also an opportunity for the scope of after-care to expand beyond its current medical focus. In line with treatment programs for adolescents managing other chronic health conditions [35], the model of LAGB after-care could be adjusted to incorporate consideration of behavioural strategies to address common barriers to weight-loss such as failing to exercise, emotional eating, and social pressures to eat the same foods as peers. Dietary advice could also be provided to equip adolescent patients to incorporate 'treat' foods into their diets while remaining compliant with overall post-surgery eating guidelines. After-care appointments could also provide a forum for patients to discuss psychosocial dimensions of weight-loss which may be causing concern or discomfort.

To the authors' knowledge, this is the first qualitative study to address patient and parent perspectives of adolescent LAGB. The study's strengths include its use of established qualitative research methodology and the rich, detailed information it

provides about patient and parent experiences, as well as the consistency of identified themes with the limited available previous research. The inclusion of patients from three different bariatric surgery centres was also a strength. The study is limited by a self-selected sample, and a larger-scale prospective study is recommended to validate the current study's findings.

In conclusion, the present study contributes to the existing adolescent bariatric surgery literature by providing a detailed examination of patient and parent perspectives of adolescent LAGB. The study's findings suggest that while adolescent patients and parents perceived LAGB to have resulted in significant, positive outcomes, important opportunities exist to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

Table 1 Perspectives on the decision to undergo LAGB

Life-changing decision for adolescents	It's one way to change your life. It's changed mine in a good way… I'm happier within myself …I can fit into clothes that I never used to think I could…. [A5]
	It's made my life better. I enjoy life now…It's improved my life, my health, my lifespan [A2]
Very difficult decision for some parents	I was wrestling with myself…it's such a dreadful thing to do … just so drastic and dramatic. [P4]
	I was very scared and apprehensive about the surgery… petrified…I would've liked some support just because I was so anxious. [P5]
Focus on psychosocial factors	*Motivations for LAGB primarily psychosocial*
	I was worried more about emotional side of things than medical…[adolescent] was being bullied [P3]
	Benefits of LAGB described in psychosocial terms It's been the best thing I've done…I always felt like I was this person that I am now, but I couldn't be that person [before] because I was so unhappy with myself [A3]
	She's happier in herself, more confident, more active… [P1]

Table 2 Perspectives on factors facilitating positive LAGB outcomes

Parental support.	Mum was there and if I didn't understand anything [surgeon] said, I'd just wait 'til we were in the car and I'm like 'what the hell does that mean?' and she'd explain everything. [A4] My mum convinces me not to [eat] the bad things…And she convinces me that there are better options out there. [A5] [Adolescent] is fortunate because I've had one [gastric band]…I've also been obese [P1]
Peer support	*Peer support less important than parental support* My mum is my greatest support and I can talk to her about anything. I don't know what would've happened if I'd had the option of speaking to [a peer], I don't know if I would've chosen to. [A5] *Willingness to support adolescents considering LAGB* I'd love to be a mentor. It'd be a good development opportunity for me. [A1] I see these girls all the time who are just like I used to be. I wish I could tell them to get a lap band! It can change your life! [A8]

Adherence to treatment guidelines.	*Perspectives on adherence to guidelines* If I'm going to get the surgery, I'm going to make it work….as soon as I got the band I started exercising every day. [A3] *Perspectives on non-adherence* The thing I could've done better is get straight into exercising, I'd probably be 20 kilos lighter than I am now… I put off exercising too long… It's hard to get started when you're really big. You don't want to stand out. [A2] There are things that go on in your life that you just need to eat that chocolate or you just need to pig out. [P2] When I'd go out with friends, I'd eat junk food. [A2]
After-care	*Preferred clinicians.* [Preferred GP] listens to what I say. If I tell her…I've had the foods I'm not meant to have she says well that's the past, make better choices next time and here's how you could do it. [A5]

There's certain clinicians you just don't click with …They're not really listening to [adolescent] and thinking what's behind her questions...They don't realise how you blow things out of proportion in your mind. [Preferred GP] is good, it's more of a partnership. [P1]

Table 3 Challenges and adjustments following LAGB

Theme	Participant quotes
Stigma associated with weight-loss surgery.	*Society's disapproval of weight-loss surgery.* [People think] you're not trying hard enough, you can do it on your own…They say you don't need to take that drastic measure [P2] A few people thought [LAGB] was just laziness…a cheat's way out [A7] *Associated with deficient parenting* They would think my mum's a bad mother because she doesn't control me [A1] We didn't tell many people because I'd be judged - "fancy resorting to surgery when you should just be doing healthy eating and exercise." [P3] *Surgery not appropriate for minors* I saw that TV show 'Insight' where people were saying "why are they allowing teenagers to have this surgery?" [A1] A lot of people thought I was too young for the surgery [A7] *Using lies of omission to avoid criticism.* I didn't like lying [about having LAGB] but I felt I'd be criticised… I'd say I've cut down on portion size, or I'm eating less, or I have to eat slowly because I have a small stomach… [A1]

	I just say I've been eating less and exercising more [A2]

Table 3 Challenges and adjustments following LAGB (cont.)

Theme	Participant quotes
Interpersonal difficulties following weight-loss.	*Discomfort with increased male attention.* I stand out more. There's, like, the sexual thing…People are more aware of me sexually… I was very scared of that initially [laughs nervously]. I was scared! [A1] I still have that issue now. You go from being so big where no one looks at you, to small, where men are looking at you. If I'm out with my partner I still feel uncomfortable…It's something that takes a while to get used to… [A7] *Anger at others' reactions.* Because now they [bullies] come to me and they're like, I want to be your friend and I'm like no! Some of them have tried adding me on Facebook, I'm like are you kidding me! Some of them 'like' my photos on Instagram! [A4] I used to go into these shops and they'd stare at me like "what are YOU doing in here, there's nothing here to fit you". Now they're all like "oh hi, I love your outfit!" To this day I won't shop in any of those places! [A8] *Stigmatising obese others.* I became, I know this is kind of a surprising thing… You become critical of people who are overweight…I become hyper-critical of them. [A1] It's really weird. I'm very judgmental of obese people. [A8]

Table 4 Opportunities to improve adolescent LAGB experience and outcomes

Role of parents	Educate parents about factors in home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes
Peer support	Explore potential for peer support and mentoring of adolescent patients
Extend aftercare	Extend beyond medical focus to incorporate strategies to address common barriers to weight-loss
Psychosocial support	Support patients to deal with surgical weight-loss stigma, and prepare them to manage interpersonal and psychosocial challenges following weight-loss

Declarations

Wendy Brown received an Honorarium from Allergan to attend a Surgical Advisory Panel in London in 2009. Paul O'Brien has written a patient information book entitled "The Lap-Band 391 Solution:A Partnership for Weight Loss" which is given to patients without charge, but some are sold to surgeons and others, for which he receives a royalty. He is employed as the National Medical Director for the American Institute of Gastric Banding, a multicenter facility based in Dallas, Texas, that treats obesity predominantly by gastric banding.

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Conflict of Interest

Kim Willcox, Leah Brennan, Narelle Warren, Peter Nottle, Jason Winnett and Ahmad Aly have no conflict of interest declaration.

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Patient and Parent Perspectives of Adolescent Laparoscopic Adjustable Gastric Banding (LAGB)

Abstract

Introduction Adolescent obesity is a significant global health challenge and severely obese adolescents commonly experience serious medical and psychosocial challenges. Consequently, severe adolescent obesity is increasingly being treated surgically. The limited available research examining the effectiveness of adolescent bariatric surgery focuses primarily on bio-medical outcomes. There is a need for a more comprehensive understanding of the behavioural, emotional and social factors which affect adolescents' and parents' experience of weight-loss surgery.

Materials/Methods Patient and parents' perspectives of adolescent LAGB were examined using a qualitative research methodology. Individual, semi-structured interviews were conducted with eight adolescent patients and five parents. Thematic analysis was used to identify key themes in the qualitative data.

Results Patients and parents generally considered adolescent LAGB to be a life-changing experience, resulting in physical and mental health benefits. Factors considered to facilitate weight-loss following surgery included parental support and adherence to treatment guidelines. Many adolescents reported experiencing surgical weight-loss stigma and challenging interpersonal outcomes after weight-loss for which they felt unprepared.

Conclusion Patients and parents perceived LAGB positively. There are opportunities to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

Adolescent obesity represents a significant public health challenge. Severely obese adolescents are likely to be obese adults [1], and are at risk of serious medical and psychological comorbidities [2-5]. Obese adolescents are exposed to weight-based stigma, which has been associated with poor educational, employment and socio-economic outcomes [6]. The psychosocial consequences of obesity are often of greater immediate concern to adolescents and parents than medical comorbidities [7], and are frequently the key reason for seeking obesity treatment [8].

Available research suggests that lifestyle and medication approaches can be effective in reducing overweight among children and adolescents. However, weight-loss is not always durable, meaning comorbidity improvements are not always sustained [9]. Severe adolescent obesity is increasingly being treated using bariatric surgery [10], which has been shown to produce significant, long-term weight-loss in adults [11]. Laparoscopic adjustable gastric banding (LAGB) and Roux-en Y gastric banding (RYGB) have most commonly been used to treat severe adolescent obesity [12]. Increasingly, sleeve gastrectomy is also being used [13]. Despite the growth in surgical treatment for severe obesity, there is currently little available research into its effectiveness for adolescents [10]. Several systematic reviews of common adolescent bariatric surgery procedures suggest surgery is effective for weight loss and resolution or improvement of medical comorbidities in the short- to medium- term [14-16]. In the only randomised control trial of adolescent LAGB, O'Brien et al. (2010) found adolescents who underwent gastric banding lost significantly more weight than adolescents who participated in an intensive lifestyle intervention. Resolution of the metabolic syndrome and improvements on quality of life measures were also significantly higher for the gastric banding group. However, the rates of post-surgical complications and re-operation reported in the study were higher than have been observed for adults [17].

Current adolescent bariatric surgery research has a predominant focus on bio-medical outcomes [18]. The lack of research addressing psychosocial aspects of adolescent bariatric surgery is of concern, given that psychosocial factors have been shown to affect both the severity and course of illness and treatment outcomes [19]. While successful weight-loss following bariatric surgery requires patients to adhere to

eating and exercise guidelines [20], research with adult bariatric surgery patients has found poor treatment adherence to be associated with psychosocial factors such as emotional eating [20]. Several studies of adolescent LAGB noted adolescents were less compliant with treatment protocols than adult patients [17] [21] [22]. However few studies described follow-up programs in detail, or examined the psychological and social factors influencing treatment outcomes [16]. The increasing use of bariatric surgery to treat adolescent obesity necessitates a more comprehensive understanding of the behavioural, emotional and social factors that influence adolescents' experience of the procedure. The aim of the present study was to develop an understanding of the psychosocial experiences of adolescent LAGB patients and their parents, which could inform improved treatment approaches.

Given the current adolescent bariatric surgery literature is limited in terms of both empirical evidence and theoretical discussion regarding behavioural, emotional and social factors affecting the adolescent's experience of LAGB, the present study employed a qualitative research design. Qualitative methods offer greatest utility when the subject of interest is under-researched or poorly-understood [23] and are recommended for use to help explain why outcomes of medical interventions vary among individuals [24]. Qualitative evidence is regarded as especially useful in explaining differential treatment outcomes for long-term health issues which require ongoing management by the patient [25]. Thus it is particularly suitable for the study of adolescent LAGB.

Method

Participants

Adolescents who underwent LAGB at one of three specialised bariatric surgery clinics in Melbourne, Australia between 2005 and 2012, and who were aged up to 18 years at the time of surgery, were invited to participate in this study. The parents of these patients were also invited to participate.

Eight adolescent LAGB patients (six female) and five parents (four female) agreed to take part in the study. Three parent participants were the mothers of adolescent participants, and two were parents of adolescent LAGB patients who did not take part in the study. Recruitment activity ceased after thirteen participant interviews, following achievement of informational redundancy, the point at which additional interviews yield few new thematic insights i.e., issues identified in new interviews have already been fully elucidated in previous interviews [26]. This coalesces with Guest et al.'s (2006) study which showed that sufficient themes for meta-analytic research can be identified after six interviews, with data saturation, a similar concept to informational redundancy, occurring after 12 interviews [27].

The mean age of adolescent participants at the time of LAGB surgery was 15.7 (range 14.2-17.4). Four of the eight adolescent participants had at least one parent or step-parent who had previously undergone LAGB. Additional participant information is provided in Table 1.

Procedure

The research protocol was approved by Monash University and Australian Catholic University Human Research Ethics Committees. The data manager at each bariatric surgery centre identified eligible adolescent patients from their databases. Surgery staff mailed eligible patients a cover letter from the surgery with the explanatory statement, consent form and a reply paid envelope. Participants were asked to return the consent form to the researchers to register their interest in participating. On receipt of signed consent forms, researchers contacted participants to schedule one-on-one interviews.

Participants had the option to be interviewed in person or by telephone. Three adolescents and two parents were interviewed in person, with the remaining eight (five adolescents and three parents) participants completing telephone interviews. The mean interview length was 44 minutes (range 22-67 minutes) and interviews were informal in style. The researchers developed an interview guide which explored: the decision to have surgery, the experience of LAGB for patients and parents, barriers and facilitators of

success, and patient aftercare and support. Participant responses were probed in depth using follow-up questions. Interview progress was guided by participants' responses and, in line with standard qualitative research practices, the interview guide was updated after each interview to incorporate new topics introduced by participants [28]. All interviews were audiotaped, with participants' responses coded soon after interview completion [29].

Data analysis

In line with qualitative research recommendations outlined by Braun and Clarke (2013), the sample size of the current study is considered appropriate for a small- to medium-sized thematic analysis study.

Using the six-stage approach described by Braun and Clarke (2006), thematic analysis was undertaken to identify key themes in the data. This initially involved familiarisation with the data through repeated reviews of audiotaped interviews. Codes were then identified to represent salient aspects of the collected data, and to allow patterns within responses to be more easily identified. All data was then systematically collated according to the specified codes. Similar or related codes were grouped together and potential themes identified. Themes were then reviewed and refined, and a final thematic map of the analysis created. Data was managed and analysed using QSR NVivo 10 software.

Results

Aspects of the adolescent LAGB experience, as raised by both adolescents and parents, are reported below. Common themes identified in participants' responses are discussed, with verbatim quotes provided to promote further understanding of participants' perspectives. Verbatim quotes are coded 'A' for adolescent or 'P' for parent, and numbers used to distinguish one adolescent or parent quote from another.

Perspectives on decision to undergo LAGB.

Adolescents overwhelmingly reflected on the decision to undergo LAGB in positive terms, however some parents found the decision to allow their children to have weight-loss surgery very difficult.

Life-changing decision for adolescents.

Adolescent participants characterised the decision to have LAGB as being 'life changing'. Regardless of the proportion of excess weight lost, adolescents reported being more active and confident, and capable of living a fuller and more enjoyable life following LAGB. Pleasure in shopping for and wearing nicer clothes was a common theme among female adolescents.

> It's one way to change your life. It's changed mine in a good way… I'm happier within myself …I can fit into clothes that I never used to think I could…. [A5]

> It's made my life better. I enjoy life now…It's improved my life, my health, my lifespan [A2]

Very difficult decision for some parents.

While parents' responses suggested they were also satisfied with the outcomes of LAGB for their children, those who had not undergone the procedure themselves found the initial decision to permit LAGB for their child very difficult. These parents generally knew no one else who had undergone bariatric surgery, and perceived it to be a 'drastic' measure for treating obesity. Those parents who had themselves undergone LAGB tended to report less difficulty with deciding to permit LAGB for their children.

> I was wrestling with myself…it's such a dreadful thing to do … just so drastic and dramatic. [P4]

> I was very scared and apprehensive about the surgery… petrified…I would've liked some support just because I was so anxious. [P5]

Focus on psychosocial factors.

Despite some parents' initial concerns, all parents interviewed believed LAGB had achieved positive outcomes for their adolescents. In describing their motivations for considering LAGB, and the benefits which resulted from surgery, parents and adolescents focused primarily on psychosocial factors, such as low self-esteem, social withdrawal or experiences of bullying, rather than weight-related medical concerns.

> I was worried more about emotional side of things than medical…[adolescent] was being bullied [P3]

> It's been the best thing I've done…I always felt like I was this person that I am now, but I couldn't be that person [before] because I was so unhappy with myself [A3]

> She's happier in herself, more confident, more active… [P1]

Perspectives on factors facilitating positive LAGB outcomes

Several factors were identified as being helpful to adolescent LAGB patients in achieving their weight-loss goals. These related to both clinical and social aspects of experience, as is described below.

Parental support.

The majority of adolescents nominated parental support as a key factor which facilitated their achievement of weight-loss. Parents tended to be adolescents' primary source of advice and guidance. Adolescents attributed this to the fact the parent had also experienced weight concerns, or already undergone LAGB. Parents supported adolescents by: managing their regular attendance at after-care

appointments, explaining clinical information, and providing weight-loss coaching and motivation.

> Mum was there and if I didn't understand anything [surgeon] said, I'd just wait 'til we were in the car and I'm like 'what the hell does that mean?' and she'd explain everything. [A4]

> My mum convinces me not to [eat] the bad things…And she convinces me that there are better options out there. [A5]

> [Adolescent] is fortunate because I've had one [gastric band]…I've also been obese [P1]

Peer support.

While adolescents acknowledged the possibility that peer support could help facilitate positive outcomes following LAGB, they appeared to consider it less important than parental support, and were unsure whether they would have accessed peer support had it been available at the time of their surgery.

> My mum is my greatest support and I can talk to her about anything. I don't know what would've happened if I'd had the option of speaking to [a peer], I don't know if I would've chosen to. [A5]

When describing the types of peer support that would be helpful, adolescents suggested it could be beneficial to talk to a peer who had experienced LAGB, both before surgery and at regular intervals afterwards. Face-to-face interaction was considered preferable to online peer contact. While one adolescent stated a preference for an informal peer support group, the general preference was for one-to-one 'buddy' or 'mentor/mentee' relationships.

While not necessarily seeing a need for peer support for themselves, many adolescents expressed enthusiasm for acting as a mentor and guide to other patients. This was typically conceptualised as being someone with whom new adolescent

patients could discuss their fears and expectations prior to surgery, and offering eating and weight-loss advice and coaching to new patients following surgery.

> I'd love to be a mentor. It'd be a good development opportunity for me. [A1]

Unprompted, several participants expressed a wish to promote bariatric surgery to obese adolescents.

> I see these girls all the time who are just like I used to be. I wish I could tell them to get a lap band! It can change your life! [A8]

Adherence to treatment guidelines.

Adolescents who were successful in achieving substantial weight-loss attributed their success to the fact they had consistently followed post-surgical eating and exercise recommendations.

> If I'm going to get the surgery, I'm going to make it work….as soon as I got the band I started exercising every day. [A3]

In contrast, adolescents who had experienced periods of minimal or slower than expected weight-loss blamed a failure to consistently adhere to diet and exercise guidelines. Common reasons cited included not exercising due to self-consciousness about body size, emotional eating and the desire to eat the same food as peers in social situations.

> The thing I could've done better is get straight into exercising, I'd probably be 20 kilos lighter than I am now… I put off exercising too long… It's hard to get started when you're really big. You don't want to stand out. [A2]

> There are things that go on in your life that you just need to eat that chocolate or you just need to pig out. [P2]

> When I'd go out with friends, I'd eat junk food. [A2]

After-care.

While most adolescents discussed parental support at length, they made few unprompted references to surgical after-care when discussing the factors they believed facilitated weight-loss. Participants' prompted responses suggested after-care was perceived as a medical appointment focused primarily on band adjustments. Several adolescents reported being very particular about which GPs they would see for after-care visits, and generally nominated a single, trusted GP. They tended not to want to see anyone else, even if their preferred GP was less conveniently located or booked-out. Preferred GPs tended to be favoured for their perceived listening skills and ability to adopt a partnership stance with the adolescent.

> [Preferred GP] listens to what I say. If I tell her…I've had the foods I'm not meant to have she says well that's the past, make better choices next time and here's how you could do it. [A5]

> There's certain clinicians you just don't click with …They're not really listening to [adolescent] and thinking what's behind her questions...They don't realise how you blow things out of proportion in your mind. [Preferred GP] is good, it's more of a partnership. [P1]

Challenges and adjustments following LAGB

Despite the general satisfaction of participants and their positive stories about LAGB, several encountered concerns following surgery, which related primarily to social aspects of their experiences.

Stigma associated with weight-loss surgery.

Despite regarding LAGB as a positive experience, resulting in numerous psychosocial benefits, many participant responses suggested the stigma and shame of obesity extends to bariatric surgery. Participants perceived society to disapprove of weight-loss surgery, viewing weight-loss as something that should be achieved through self-discipline.

> [People think] you're not trying hard enough, you can do it on your own…They say you don't need to take that drastic measure [P2]

> A few people thought [LAGB] was just laziness…a cheat's way out [A7]

Many believed society regards adolescent obesity to be a result of deficient parenting, and bariatric surgery to be too radical an option for minors.

> They would think my mum's a bad mother because she doesn't control me [A1]

> We didn't tell many people because I'd be judged - "fancy resorting to surgery when you should just be doing healthy eating and exercise." [P3]

> I saw that TV show 'Insight' where people were saying "why are they allowing teenagers to have this surgery?" [A1]

> A lot of people thought I was too young for the surgery [A7]

The fear of others' disapproval meant many adolescent participants and their parents were reluctant to disclose the adolescent's LAGB. To avoid potential criticism, many adolescents used lies of omission, such as attributing their weight-loss merely to "eating less", to explain their post-surgery eating behaviours and weight-loss to others.

> I didn't like lying [about having LAGB] but I felt I'd be criticised… I'd say I've cut down on portion size, or I'm eating less, or I have to eat slowly because I have a small stomach… [A1]

> I just say I've been eating less and exercising more [A2]

Interpersonal difficulties following weight-loss.

A number of female adolescents reported that following weight-loss, they experienced interpersonal changes they had not anticipated, and which created

concern. Some felt uncomfortable and ill-equipped to deal with attention from males after losing weight.

> I stand out more. There's, like, the sexual thing…People are more aware of me sexually… I was very scared of that initially [laughs nervously]. I was scared! [A1]

> I still have that issue now. You go from being so big where no one looks at you, to small, where men are looking at you. If I'm out with my partner I still feel uncomfortable…It's something that takes a while to get used to… [A7]

Several participants felt anger and resentment towards others they believed had rejected or victimized them when they were obese, but who later became friendly after the adolescents lost weight.

> Because now they [bullies] come to me and they're like, I want to be your friend and I'm like no! Some of them have tried adding me on Facebook, I'm like are you kidding me! Some of them 'like' my photos on Instagram! [A4]

> I used to go into these shops and they'd stare at me like "what are YOU doing in here, there's nothing here to fit you". Now they're all like "oh hi, I love your outfit!" To this day I won't shop in any of those places! [A8]

A number of participants felt ashamed or uneasy about the critical feelings they developed towards obese others after achieving their goal weight.

> I became, I know this is kind of a surprising thing… You become critical of people who are overweight…I become hyper-critical of them. [A1]

> It's really weird. I'm very judgmental of obese people. [A8]

Discussion

This study aimed to develop an understanding of the experiences of adolescent LAGB patients and their parents. Consistent with the adult bariatric surgery literature, the patient and parent perspectives reported in the study suggest the experience and outcomes of LAGB can be strongly influenced by psychological and social factors [30-32]. In line with previous research findings [33, 34], participants in the present study generally nominated psychosocial difficulties (e.g., low mood, social withdrawal) rather than medical concerns when describing the specific difficulties which led them to consider LAGB. While adolescents in the present study generally considered LAGB to have overwhelmingly changed their lives for the better, a minority reported difficulties in adhering to post-surgical treatment guidelines, consistent with findings in adult research [20, 35].

Parental support was cited by adolescents as a key influence on their ability to achieve weight-loss goals. Parents were considered best placed to provide guidance because most had experienced weight problems and many had previously undergone LAGB. The influence of parents' own experiences with weight-loss surgery on their children's surgery outcomes is an area for possible future investigation. Adolescents in the present study made few unprompted references to formal after-care as a source of support. Prompted participant responses suggested after-care was as medical appointments focused on band adjustment, consistent with previous research with adult LAGB patients [36]. Of note, while current treatment programs for adolescents managing chronic health conditions emphasise peer support [37, 38], often delivered online [39], adolescents in the present study regarded connections with peers as less

important than parental support, and expressed a clear preference for in-person rather than online interaction. Given the use of post-surgery peer support is well-established with adult bariatric patients [40], and has been associated with superior weight-loss outcomes [41-43], further research is recommended to establish the relevance and effectiveness of parent and peer support for adolescent patients. Further research is also required to determine preferred formats.

The findings of the present study have implications for improving the experience and outcomes for adolescents undergoing LAGB. While adolescents in the current study focused on the role of parental emotional support in facilitating adolescent weight-loss, research addressing non-surgical treatment of adolescent obesity suggests there are additional ways in which parents can influence adolescent weight outcomes. There is evidence that factors such as the mother's nutrition knowledge; parents' food selection; home eating patterns; and eating behaviours modelled by parents influence adolescent eating behaviour [28]. General parenting styles have also been shown to influence child and adolescent eating behaviour [44]. Research suggests parental involvement is associated with better outcomes for child and adolescent obesity interventions [9] and consideration should be given to targeting parents of adolescent LAGB patients for education and skills acquisition. Such education could focus on managing factors in the home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes.

The present study's findings also suggest post-operative care should anticipate psychosocial outcomes for which adolescents may be unprepared. A number of participants in this study reported stigma associated with weight-loss surgery, with many choosing not to disclose LAGB to others. Bariatric surgery is considered a 'lazy' option by many in society [45], and adolescent bariatric surgery patients may require support to develop effective strategies to deal with invasive questioning and potentially critical comments from others. Several adolescent participants in the study also reported experiencing unexpected, disquieting outcomes following weight-loss, including unease at increased attention from men, the development of critical attitudes towards obese individuals, and anger at friendship advances from peers previously responsible for

victimisation. Such psychosocial tensions arising from significant weight-loss following surgery are consistent with the adult bariatric surgery literature [46] [44], and adolescents may require support for issues related to sexuality, contraception, interpersonal changes, dealing with others' reactions, and conflicted feelings about stigmatising obese others [33]. Adolescents' ability to adjust new psychosocial challenges will vary according to their stage of development and maturation [47], and level of social support, thus requiring support to be individualised.

There is also an opportunity for the scope of after-care to expand beyond its current medical focus. In line with treatment programs for adolescents managing other chronic health conditions [37], the model of LAGB after-care could be adjusted to incorporate consideration of behavioural strategies to address common barriers to weight-loss such as failing to exercise, emotional eating, and social pressures to eat the same foods as peers. Dietary advice could also be provided to equip adolescent patients to incorporate 'treat' foods into their diets while remaining compliant with overall post-surgery eating guidelines. After-care appointments could also provide a forum for patients to discuss psychosocial dimensions of weight-loss which may be causing concern or discomfort.

To the authors' knowledge, this is the first qualitative study to address patient and parent perspectives of adolescent LAGB. The study's strengths include its use of established qualitative research methodology and the rich, detailed information it provides about patient and parent experiences, as well as the consistency of identified themes with the limited available previous research. The inclusion of patients from three different bariatric surgery centres was also a strength. The study is limited by a self-selected sample, and a larger-scale prospective study is recommended to validate the current study's findings.

In conclusion, the present study contributes to the existing adolescent bariatric surgery literature by providing a detailed examination of patient and parent perspectives of adolescent LAGB. The study's findings suggest that while adolescent patients and parents perceived LAGB to have resulted in significant, positive outcomes, important

opportunities exist to improve both the experience and outcomes of adolescent LAGB through parental education and enhancements to surgical aftercare programs.

Table 1 LAGB outcomes of adolescent study participants

Participant	BMI at surgery (kg/m^2)	BMI at most recent follow-up (kg/m^2)	Change in BMI (kg/m^2)	Length of follow-up (weeks)	Reoperations/ Revisions
A1	33.1	23.8	9.3	143	Nil
A2	62.7	44.5	18.2	186	Nil
A3	32.4	21.0	11.4	114	Port change
A4	36.2	23.8	12.4	83	Nil
A5	58.1	43.0	15.1	143	Nil
A6	41.0	29.8	11.2	431	Revision Tubing repair
A7	44.1	28.0	16.1	258	Nil
A8	36.1	28.9	7.2	513	Revision

Table 2 Opportunities to improve adolescent LAGB experience and outcomes

Role of parents	Educate parents about factors in home eating environment which influence adolescent weight, and parenting styles associated with positive weight outcomes
Peer support	Explore potential for peer support and mentoring of adolescent patients
Extend aftercare	Extend beyond medical focus to incorporate strategies to address common barriers to weight-loss
Psychosocial support	Support patients to deal with surgical weight-loss stigma, and prepare them to manage interpersonal and psychosocial challenges following weight-loss

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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