Dietary Assessment and Patients Perspective Reasons for Diet and Exercise Adherence Post Bariatric Surgery

Bandar Saad Assakran (dr.bandar.22@gmail.com)
King Fahd Specialist Hospital Buraidah

Adel Mefleh Widyan
Qassim University

Najla Abdulaziz Alhumaidan
Qassim University College of Medicine

Fadiyah Abdullah Alharbi
Qassim University College of Medicine

Mohammed Abdullah Alhnaya
Qassim University College of Medicine

Abdullatif Abdullah Aljabali
Qassim University College of Medicine

Mohammed Abdulrahman Aleid
Qassim University College of Medicine

Research note

Keywords: Bariatric surgery, Dietary adherence, Physical activity, Adherence, Barriers

DOI: https://doi.org/10.21203/rs.3.rs-59427/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License
Abstract

Objective: Obesity prevalence is increasing and as an outcome; bariatric procedures are on the rise. Previous articles about bariatric surgery disclosed tremendous results. This study aims to estimate the rate and identify the reasons behind poor adherence to diet and exercise in post-bariatric patients.

Results: Majority (85.5%) of our patients scored “good”, 12% scored “fair”, and only 2% scored “excellent”. None scored “needs improvement”. Fruits had a mean of 1.51 ± 0.79 and vegetables 1.78 ± 0.76. The main reasons for patient non-adherence to healthy eating were: low self-discipline (48%), lack of motivation (28%), availability of healthy food, and being too busy to prepare healthy meals; both (25%). (55.9%) of the study subjects engaged in physical activity. Lack of time (47%), low self-discipline (38%), and weather (32%) were the primary reasons for not exercising regularly.

Introduction

A global epidemic has occurred; it has been yielded by poor dietary choices, high caloric diet, low physical activity, or systemic disease.\(^1\) “Obesity” is defined as body mass index (BMI) of more or equal to 30kg/m\(^2\). It is a major health disease that carries a high risk of many chronic diseases such as diabetes mellitus, hypertension, and cardiovascular diseases.\(^2\) In Saudi Arabia, the prevalence of obesity is increasing, and it is projected to reach 41% in men, and 78% in women by 2022.\(^3\)

Bariatric surgery has shown a rising success in the treatment of obesity.\(^4\) It has been the most effective solution to many who have found it ineffective to lose weight through exercise, diet, and other non-surgical means.\(^4\) Roughly 15,000 bariatric surgeries are performed annually in Saudi Arabia.\(^5\) Anti-obesity surgery promotes rapid, significant, and sustainable weight loss along with the remission of obesity-related comorbidities, and it reduces the overall mortality rate by 24.6%.\(^4,6\)

Good compliance to diet and exercise after bariatric surgery is essential to upsurge weight loss, prevent weight gain, avoid malnutrition, and improve quality of life.\(^7\) Sarwer et al. found that post bariatric patients with good dietary adherence were able to lose 28% of their body weight more than those who did not properly adhere.\(^8\) Yet, a multi-center study of young adults who underwent bariatric surgery revealed that dietary adherence has declined over the years.\(^9\) In one study conducted in sleeve gastrectomy patients the rate of poor adherence reached 74% by the end of the first year, mainly in low consumption of fruits, vegetables, legumes, and cereals.\(^10\) Similarly, in another study of post gastric bypass surgery patients poor dietary choices increased crucially from 11% to 37% in the second-year.\(^11\)

Bariatric surgery is the most effective treatment in morbidly obese patients, but it is not a panacea, and it should be incorporated with two large domains; “diet and exercise”.\(^12\) As the incidence of obesity is increasing, we aim in this study to estimate the rate and identify the reasons behind poor adherence to diet and exercise in patients who underwent bariatric surgery.
1. Methods

After acquiring the ethical approval from the hospital administration and local IRB no. H-04-Q-001, all patients who underwent bariatric surgery from the beginning of 2017 to August 2020 at King Fahd Specialist Hospital (KFSH), Qassim, Saudi Arabia, were selected and a total of three hundred ninety-nine individuals gave their consent to participate. Patients were interviewed via telephone, scheduled for 10-15 minutes per interview. Inclusion criteria were: patients aged above 18 years old who had bariatric surgery in a period not less than six months.

First, demographic information including age, gender, occupation, marital status, living status, level of income, level of education, self-reported post-operative weight, number of obese members in the family, if they had any, and level of physical activity, were obtained. Other parameters, including the type of surgery, preoperative height, and weight, were retrieved from the patients' medical files.

The Healthy Eating Assessment, a “ten-question” questionnaire adapted from Paxton et al.\cite{13}, measures the overall health benefit score by identifying eating patterns over the past few weeks. Each question is scored out of 5, and the total score was computed by summing the score of each question, the highest being 50 and the lowest being 10. A higher score implies that a healthier lifestyle is being practiced. It categorized patients into four groups: needs improvement (score 10-19), fair (score 20-29), good (score 30-39), and excellent (score 40-50). A patient who categorizes into either the “needs improvement” or “fair” groups needs to seek help to make better health choices. Lastly, we investigated the reasons why they are not following a healthy diet or exercising regularly.

Statistical analysis

Data collected were analyzed using SPSS version 19.0. Quantitative variables presented as mean ± SD and qualitative variables as frequency and percentages. The Student’s t-test and ANOVA were used to compare normally distributed continuous variables, Chi-square test ($\chi^2$) used to test the association between the categorical variables. A p-value of less than 0.05 denoted a statistically significant value.

2. Results

A total of 399 patients, with an average age of 35.21 ± 10.45, underwent bariatric surgery with a recovery period of at least six months. 390 (98%) had sleeve gastrectomy, and 9 (2%) had a mini-gastric bypass. Mean preoperative BMI was 46.66 ± 12.74 kg/m2, and the post-operative BMI was 30.91 ± 6.54 kg/m2. Gender distribution was as follows, 178 (44.6%) were male, and 221 (55.4%) were female. 68% had at least one obese member in the family with a mean of 2.42 ± 1.64. The majority were educated, while only 12 (3%) were not. More than half of the study subjects engaged in physical activity. The majority, 341 (85.5%), of the study sample scored “good”, 50 (12%) scored “fair”, and only 8 (2%) scored “excellent”. None of the samples investigated scored “needs improvement”. Subscales of healthy eating assessment; the overall mean of healthy foods in eating habits was 3.38 ± 1.00. The mean value of fast/fried food and packed snacks high in fat/salt/or sugar was 4.83 ± 0.5, sweetened beverages 4.28 ± 1.02, chips or...
crackers 4.63 ± 0.69, desserts 4.59 ± 0.66, and added fats to food 3.97 ± 0.85. Furthermore, healthy food choices as fruits had a mean of 1.51 ± 0.79, vegetables 1.78 ± 0.76, dairy products 1.66 ± 0.80, and finally meat/fish/beans with a mean value of 2.8 ± 1.57. Participants characteristics and health dietary assessment are presented in Table 1
Table 1
Participant Characteristics and health dietary assessment (n = 399)

| Variables                        | Mean ± SD / n (%) |
|----------------------------------|-------------------|
| Mean age (years) ± SD            | 35.21 ± 10.45     |
| Gender n (%)                     |                   |
| Male                             | 178 (44.6%)       |
| Female                           | 221 (55.4%)       |
| Occupation n (%)                 |                   |
| Employed                         | 192 (48.1%)       |
| Student                          | 33 (8.3%)         |
| Housewife                        | 83 (20.8%)        |
| Retired                          | 9 (2.3%)          |
| Unemployed                       | 82 (20.6%)        |
| Marital status n (%)             |                   |
| Single                           | 145 (36.3%)       |
| Married                          | 254 (63.7%)       |
| Living status n (%)              |                   |
| Living alone                     | 33 (8.3%)         |
| Living with family/other         | 366 (91.7%)       |
| Income n (%)                     |                   |
| Low                              | 35 (8.8%)         |
| Medium                           | 286 (71.7%)       |
| High                             | 78 (19.5%)        |
| Education level n (%)            |                   |
| Non educated                     | 12 (3.0%)         |
| Less than high school            | 71 (17.8%)        |
| High school and higher education | 316 (79.2%)       |
| Variables                                           | Mean ± SD / n (%) |
|-----------------------------------------------------|-------------------|
| Mean BMI (kg/m²) ± SD                               | 46.66 ± 12.74     |
| Preoperative                                        | 30.91 ± 6.54      |
| Current BMI                                         |                   |
| Obese member in the family n (%)                    | 272 (68.2%)       |
| Yes                                                 | 127 (31.8%)       |
| No                                                  |                   |
| Mean number of obese members in the family          | 2.42 ± 1.64       |
| Type of surgery n (%)                               | 390 (97.7%)       |
| Sleeve gastrectomy                                  | 9 (2.3%)          |
| Mini gastric bypass                                 |                   |
| Health dietary assessment total score n (%)         | 8 (2%)            |
| Excellent                                           | 341 (85.5%)       |
| Good                                                | 50 (12.5)         |
| Fair                                                | 0 (0%)            |
| Needs Improvement                                   |                   |
| Subscales of healthy eating assessment              | 3.38 ± 1.005      |
| Overall mean of healthy foods in eating habits      | 4.83 ± 0.490      |
| Fast/fried food or packaged snacks high in fat/salt/ or sugar | 1.51 ± 0.786  |
| Fruits                                              | 1.78 ± 0.759      |
| Vegetables                                          | 4.28 ± 1.025      |
| Sweetened beverages                                 | 4.63 ± 0.689      |
| Chips or crackers                                   | 4.59 ± 0.663      |
| Sweet food or desserts                              | 3.97 ± 0.850      |
| Amount of added fat to food                         | 1.66 ± 0.801      |
| Dairy products                                       | 2.80 ± 1.572      |
| Meat/fish/beans                                     |                   |
| Variables | Mean ± SD / n (%) |
|-----------|------------------|
| Obtain ≥ 30 minutes per day in physical activity n (%) | 223 (55.9%) |
| Yes | 176 (44.1%) |
| No | |

Table 1 Participant characteristics and health dietary assessment (n = 399)

Regarding the variables that were associated with the health benefit score, only three had a significant association; gender, occupation, and marital status with p-values of 0.027, 0.027, and 0.006, respectively. The mean age of patients was not statistically significant between health benefit score categories (33.10 ± 11.85 vs. 35.36 ± 10.27 vs. 40.38 ± 8.80, p-value = 0.172). [See additional file 1]

The main reasons for patient non-adherence to healthy eating were: low self-discipline (48%), lack of motivation (28%), availability of healthy food, and being too busy to prepare healthy meals; both had the same percentage (25%) (Fig. 1). On the other hand, lack of time, low self-discipline, and weather were the primary reasons for not exercising regularly, (47%), (38%), and (32%), respectively (Fig. 2).

3. Discussion

By means of structured interviews via the phone, we ran a retrospective study on 399 bariatric patients to assess their dietary eating habits and reasons for poor compliance. Majority of the patients 98% had sleeve gastrectomy and only 2% received mini gastric bypass. The mean age was 35.21 ± 10.45, in which 178 (44.6%) were male, and 221 (55.4%) were female. Bariatric surgery is already known to be very effective. The “forced behavioral changes” in the first few months post-surgery leads to a rapid weight loss. But what about the long run? Gastric and intestinal adaptation are expected to occur two years following the surgery.⁴ Freire et al. revealed some weight gain in the second year, second to the fifth year, and over five years to be 14.7%, 69.7%, and 84.8%, respectively.⁵ It might be influenced by the reduction in the frequency of dumping symptoms, resolution of food intolerances, and return to preoperative eating and other lifestyle patterns that initially contributed to weight gain.⁶

In the present study, the final score of healthy eating assessment was relatively acceptable, as the majority 341 (85.5%) scored “good”, 50 (12%) scored “fair”, and none had scored “needs improvement”. General nutritional guidelines post-surgery prioritize protein intake, minimizing high carbohydrate and high fat foods, eliminating caloric beverages, and increasing the consumption of fruits and vegetables.⁷ Fruits and vegetables provide the body with a wide range of nutrients.⁸ In our study, the average intake of fruits and vegetables were “once daily” 1.51 ± 0.79, and 1.78 ± 0.76, respectively. These averages are lower than the recommended. Low consumption of fruits and vegetables has been reported in other
extended follow up studies.\textsuperscript{[18,19]} Inadequate nutritive intakes may lead to haematological, metabolic, and neurological disorders.\textsuperscript{[20–22]}

A high percentage of patients in our study had an obese family member 272 (68.2\%) with an average of 2.42 ± 1.64 per family. Frequency of drinking sweetened beverages is “once daily” 4.28 ± 1.02. However, we did not measure the quantity of food/drink assumed thus, once daily can either be in high quantity affecting patients' weight loss or in minimum to satisfy the appetite. Out of this large sample size eight patients scored “excellent” which represents 2\% only. A comprehensive nutritional education should be delivered for all, both obese and non-obese, supporting those who need to make healthier dietary choices and to improve body health reaching maximum bariatric treatment’s efficacy.

“What keeps you away from eating healthier?” Well, 48.4\% reported poor self-discipline as their main barrier. Loss of control over eating is a proxy for binge eating, as post-bariatric patients cannot consume large quantities of food in one sitting.\textsuperscript{[17]} Saunders observed that many patients report feelings of loss of control over eating after bariatric surgery and, in some cases, weight gain after several years.\textsuperscript{[23]} Changing the mindset over binge eating is quite tough and challenging. It necessitates big support from a dietitian, a psychologist, and a family member. Nevertheless, patient’s motivation and willingness to lose weight are important for the surgery to be effective.\textsuperscript{[24, 25]} Diet adherence showed to be successful when patients are highly motivated.\textsuperscript{[26]} Unfortunately, around thirty percent of our patients report a lack of motivation. More interestingly, a minority of patients, all were female, stated that they stopped being strict over their lifestyle not to lose more weight for their own perspective of body image, and preventing having excess skin.

An increase in physical activity after bariatric surgery is beneficial and effective for weight loss, maintaining lost weight, and improving body composition.\textsuperscript{[27, 28]} It is highly recommended to start physical activity before and after the surgery to preserve lean body mass, boost cardiometabolic risk factors, and increase cardiovascular capacity as well as aerobic performance.\textsuperscript{[29, 30]} It is advised to exercise at least 150 minutes per week.\textsuperscript{[31]} Patients who exercise can lose on average 3.6 kg higher than the 1.5 kg of parallel meta-analysis study of non-surgical weight loss.\textsuperscript{[27, 32]} In our study, only 55.9\% obtained ≥ 30 minutes per day of physical activity, which is similar to what has been reported in other studies.\textsuperscript{[9, 15, 18]} On the other hand, 47\% of patients stated lack of time as their primary reason for not exercising regularly, followed by low self-discipline and weather, which counted for 38\%, and 32\%, respectively. In another study, the most commonly endorsed external barriers were time and weather.\textsuperscript{[33]}

To conclude, 399 patients were assessed post bariatric surgery for dietary habits and reason of poor compliance. Majority scored “good” on the healthy eating assessment and while none had scored “needs improvement”, only 2\% scored “excellent”. Poor dietary habits were found to be associated with fruits and vegetables. The main reasons for patient non-adherence were most commonly: low self-discipline, followed by a lack of motivation. When it comes to physical activity, a little more than half of the patients obtained ≥ 30 minutes per day of physical activity. Lack of time, low self-discipline, and weather were the
primary reasons for not exercising regularly. As the surgical population is growing, a global drive should be taken to reduce the prevalence of obesity worldwide. We call for more randomized control trials headed to correct addressed reasons for poor adherence. We recommend the use of new technology to support and motivate patients through video appointments, group therapy, and smartphone applications. Hand in hand, toward outstanding results, future with fewer diseases, more self-satisfaction, and better quality of life.

Limitations

A limitation is a single-center and patient-report based study. Patients may have reported adherence in a socially desirable manner, and it may also involve recall bias. Yet, the large number of patients being interviewed and the patient-perspective reasons for difficulty adhering gives valuable information improving the long-term results of bariatric surgery.

Declarations

Ethics approval and consent to participate:

This study received ethical approval from Qassim Regional Research Ethics Committee, SA, ref. no.: 1441-895024. Approval was obtained from the hospital administration to access bariatric clinics’ database at KFSH and verbal and written consent was taken. All potentially identifying data were anonymised.

Consent for publication:

Not applicable.

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

Funding:

Not applicable.

Authors’ contributions:
BSA guided, advised, and supervised the research group. BSA, NAA, FAA, MAA, AAA, MAA contributed to the conception of the study and formulated the proposal. NAA, FAA, MAA, AAA, MAA were responsible for data acquisition and entry. AMW was responsible for analysing the data. All authors contributed towards writing, reading, and approving the final manuscript.

**Acknowledgements:**

We would like to extend our gratitude to all the participants for their patience, high spirit, and cooperation.

**Abbreviations**

BMI: Body mass index; KFSH: King Fahd Specialist Hospital.

**References**

1. DeNicola E, Aburizaiza O, Siddique A, Khwaja H, Carpenter D. Obesity and public health in the Kingdom of Saudi Arabia. Reviews on Environmental Health. 2015;30(3).

2. Djalalinia S, Qorbani M, Peykari N, Kelishadi R. Health impacts of obesity. Pak J Med Sci. 2015;31(1):239–42.

3. Al-Quwaidhi AJ, Pearce MS, Critchley JA, Sobngwi E, O’Flaherty M. Trends and future projections of the prevalence of adult obesity in Saudi Arabia, 1992–2022. Eastern Mediterranean Health Journal. 2014 Oct 1;20(10).

4. Colquitt J, Pickett K, Loveman E, Frampton G. Surgery for weight loss in adults. Cochrane Database of Systematic Reviews. 2014.

5. Maghrabi AA, Abumunaser A, Dakhakhni B, Babatain N, Ghabra L, Naghi S, Jamal W, Altaf A, Abulfaraj M, Aljiffry MM, Alkhaldy A. Nutritional Education for Patients Undergoing Bariatric Surgery Improves Knowledge of Post-Bariatric Dietary Recommendations. Health Sciences. 2019;8(9):82–8.

6. Sjöström L. Soft and hard endpoints over 5–18 years in the intervention trial Swedish obese subjects: IS0112. Obesity Reviews. 2006 Sep;7.

7. Tabesh MR, Maleklou F, Ejtehadi F, Alizadeh Z, Nutrition. Physical Activity, and Prescription of Supplements in Pre-and Post-bariatric Surgery Patients: a Practical Guideline. Obesity surgery. Jul. 2019;31:1–6.

8. Sarwer DB, Wadden TA, Moore RH, Baker AW, Gibbons LM, Raper SE, Williams NN. Preoperative eating behavior, postoperative dietary adherence, and weight loss after gastric bypass surgery. Surgery for Obesity and Related Diseases. 2008 Sep 1;4(5):640-6.

9. de Jong MM, Hinnen C. Bariatric surgery in young adults: a multicenter study into weight loss, dietary adherence, and quality of life. Surgery for Obesity and Related Diseases. 2017 Jul 1;13(7):1204-10.

10. Schiavo L, Scalera G, Pilone V, De Sena G, Ciorra FR, Barbarisi A. Patient adherence in following a prescribed diet and micronutrient supplements after laparoscopic sleeve gastrectomy: our experience
during 1 year of follow-up. Journal of human nutrition dietetics. 2017 Feb;30(1):98–104.

11. Toussi R, Fujioka K, Coleman KJ. Pre-and postsurgery behavioral compliance, patient health, and postbariatric surgical weight loss. Obesity. 2009 May;17(5):996–1002.

12. Hood MM, Kelly MC, Feig EH, Webb V, Bradley LE, Corsica J. Measurement of adherence in bariatric surgery: a systematic review. Surgery for Obesity and Related Diseases. 2018 Aug 1;14(8):1192 – 201.

13. Paxton AE, Strycker LA, Toobert DJ, Ammerman AS, Glasgow RE. Starting the conversation: performance of a brief dietary assessment and intervention tool for health professionals. American journal of preventive medicine. 2011 Jan;40(1):67–71.

14. Longshore SW, Wakeman D, McMellen M, Warner BW. Bowel resection induced intestinal adaptation: progress from bench to bedside. Minerva pediatrica. 2009 Jun;61(3):239–51.

15. Freire RH, Borges MC, Alvarez-Leite JJ, Correia MI. Food quality, physical activity, and nutritional follow-up as determinant of weight regain after Roux-en-Y gastric bypass. Nutrition. 2012 Jan 1;28(1):53 – 8.

16. Mechanick J, Kushner R, Sugerman H, Gonzalez-Campoy J, Collazo-Clavell M, Guven S, Spitz A, Apovian C, Livingston E, Brolin R, Sarwer D. American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery Medical Guidelines for Clinical Practice for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient. Endocrine Practice. 2008 Jul 1;14(Supplement 1):1–83.

17. Hood MM, Corsica J, Bradley L, Wilson R, Chirinos DA, Vivo A. Managing severe obesity: understanding and improving treatment adherence in bariatric surgery. Journal of behavioral medicine. 2016 Dec 1;39(6):1092 – 103.

18. Soares FL, De Sousa LB, Corradi-Perini C, Da Cruz MR, Nunes MG, Branco-Filho AJ. Food quality in the late postoperative period of bariatric surgery: an evaluation using the bariatric food pyramid. Obesity surgery. 2014 Sep 1;24(9):1481-6.

19. Thomas JG, Bond DS, Ryder BA, Leahey TM, Vithiananthan S, Roye GD, Wing RR. Ecological momentary assessment of recommended postoperative eating and activity behaviors. Surgery for Obesity and Related Diseases. 2011 Mar 1;7(2):206 – 12.

20. Aarts EO, Janssen IM, Berends FJ. The gastric sleeve: losing weight as fast as micronutrients?. Obesity surgery. 2011 Feb 1;21(2):207 – 11.

21. Malinowski SS. Nutritional and metabolic complications of bariatric surgery. The American journal of the medical sciences. 2006 Apr 1;331(4):219 – 25.

22. Berger JR. The neurological complications of bariatric surgery. Archives of Neurology. 2004 Aug 1;61(8):1185-9.

23. Saunders R. "Grazing": a high-risk behavior. Obesity surgery. 2004 Jan 1;14(1):98–102.

24. Wadden TA, Neiberg RH, Wing RR, Clark JM, Delahanty LM, Hill JO, Krakoff J, Otto A, Ryan DH, Vitolins MZ, Look AHEAD Research Group. Four-year weight losses in the Look AHEAD study: factors associated with long-term success. Obesity. 2011 Oct;19(10):1987–98.
25. Look AHEAD, Research Group. Eight-year weight losses with an intensive lifestyle intervention: the look AHEAD study. Obesity. 2014 Jan;22(1):5–13.

26. Moreira EA, Most M, Howard J, Ravussin E. Dietary adherence to long-term controlled feeding in a calorie-restriction study in overweight men and women. Nutrition in Clinical Practice. 2011 Jun;26(3):309–15.

27. Egberts K, Brown WA, Brennan L, O’Brien PE. Does exercise improve weight loss after bariatric surgery? A systematic review. Obesity surgery. 2012 Feb 1;22(2):335 – 41.

28. Jacobi D, Ciangura C, Couet C, Oppert JM. Physical activity and weight loss following bariatric surgery. Obesity reviews. 2011 May;12(5):366–77.

29. Daniels P, Burns RD, Brusseau TA, Hall MS, Davidson L, Adams TD, Eisenman P. Effect of a randomised 12-week resistance training programme on muscular strength, cross-sectional area and muscle quality in women having undergone Roux-en-Y gastric bypass. Journal of sports sciences. 2018 Mar;36(5)(4):529–35.

30. Hassannejad A, Khalaj A, Mansournia MA, Tabesh MR, Alizadeh Z. The effect of aerobic or aerobic-strength exercise on body composition and functional capacity in patients with BMI ≥ 35 after bariatric surgery: A randomized control trial. Obesity surgery. 2017 Nov 1;27(11):2792 – 801.

31. Jakicic JM, Clark K, Coleman E, Donnelly JE, Foreyt J, Melanson E, Volek J, Volpe SL. Appropriate intervention strategies for weight loss and prevention of weight regain for adults. Medicine & Science in Sports & Exercise. 2001 Dec 1;33(12):2145-56.

32. Shaw K, Gennat H, Rourke P, Del Mar C. Exercise for overweight or obesity. Cochrane Database Syst Rev 2006; CD003817.

33. Peacock JC, Sloan SS, Cripps B. A qualitative analysis of bariatric patients’ post-surgical barriers to exercise. Obesity surgery. 2014 Feb 1;24(2):292-8.

Figures
Figure 1
Reasons for not following a healthy diet

Figure 2
Reasons for not exercising regularly
Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile4.pdf
- Additionalfile3.pdf
- Additionalfile2.xlsx
- Additionalfile1.xlsx