

Eating Pathology and Body Image in Cultures in Transition: The Impact of Westernization in Saudi Arabia

**Munirah AlShebali**

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Abstract

**Background and Objectives:** Women in cultures in transition are vulnerable to eating and body image issues. Saudi Arabia is undergoing rapid cultural changes towards Westernization. However, the existing literature to date is inadequate to demonstrate the impact of those cultural changes. This dissertation addresses this gap in the literature.

**Methods:** A literature review identified a knowledge gap in eating and body image issues in women in Saudi Arabia (Chapter 2). Therefore, Chapters 3 and 4 examined levels of eating pathology, body image dissatisfaction and psychological comorbidity levels and the prevalence of eating disorders in Saudi women during cultural change. Based on the findings, a dissonance-based eating disorder prevention programme was tested for feasibility and acceptability (Chapter 6) and efficacy (Chapter 7).

**Results:** Saudi women suffered from comparable levels of eating pathology and related issues to women in Western cultures, though the pattern was more bulimic than anorexic. Dissonance-based eating disorders prevention created in a Western culture can help Saudi women, as it does women in other cultures.

**Conclusions:** This dissertation identifies the impact of ongoing cultural shift on eating and body image issues. It indicates that prevention developed in a Western culture can benefit women in non-Western cultures. Limitations and further directions for research are outlined, along with potential clinical implications. Local research might include national screening and cultural adaptation for interventions developed in a Western culture. The findings indicate the need to screen for eating disorders and body image dissatisfaction in Saudi and comparable locations.

**Dedication**

I dedicate this thesis to my father’s soul, “may he rest in peace”. He gave me a special spot in his heart and called me doctor Munirah since I first joined school.

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First, I would like to express my sincere gratitude to Princess Nourah Bint Abdulrahman University for the PhD scholarship. I will try my best to be a rewarding investment for my country.

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Declaration

I, Munirah Alshebali, confirm that the thesis titled “Eating Pathology and Body Image in Cultures in Transition: The Impact of Westernization in Saudi Arabia” is my own work. I am aware of the University’s Guidance on the Use of Unfair Means ([www.sheffield.ac.uk/ssid/unfair-means](http://www.sheffield.ac.uk/ssid/unfair-means)). This work has not been previously been presented for an award at this, or any other, university.

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Chapter 1. Eating Pathology and Body Image in Cultures in Transition: The Example of Saudi Arabia

This dissertation describes the pattern of eating pathology and body image dissatisfaction that is emerging in non-Western cultures, using the case of the cultural Westernization of Saudi Arabia. It will assess levels of disordered eating attitudes and behaviours, body image dissatisfaction and common psychological comorbidities among young undergraduate women, and links with the internalization of Westernization. It will also measure the prevalence of typical and atypical eating disorders. The dissertation will then investigate prevention methods that might limit the negative impact of Westernization on such young women’s body and eating pathology. The first part of this prevention research will assess the feasibility and acceptability of an evidence-based, well-researched Western designed intervention that has been adapted for Saudi women. The second part will undertake a randomized controlled trial to determine the effectiveness of prevention in Saudi Arabia.

# What are eating disorders, eating pathology, and body image disturbance?

The International Classification of Diseases, 11th version describes eating disorders as “Abnormal eating or feeding behaviours that are not explained by another health condition and are not developmentally appropriate or culturally sanctioned” (World Health Organization, 2021). The most common eating disorders are anorexia nervosa, bulimia nervosa, binge eating disorder, and atypical eating disorders. Anorexia nervosa is defined by very low body weight for developmental stage, height, and age, which is not caused by a scarcity of food or a health problem (World Health Organization, 2021). Bulimia nervosa is characterized by discrete periods when an individual loses control over the type or amount of food intake, followed by compensatory disordered eating behaviours to lose weight, such as extreme exercise (World Health Organization, 2021). Binge eating disorder is characterized by frequent episodes of binge eating, with emotional triggers and consequences such as feeling shame (World Health Organization, 2021).

The 10th version of the International Classification of Diseases defines atypical eating disorders as disorders that meet some of the eating disorders' symptoms but do not fully meet those criteria (World Health Organization, 2020). The reason might be the absence of one of the main symptoms (World Health Organization, 2021). For example, atypical anorexia nervosa is defined by characteristics that involve some of the symptoms of anorexia nervosa but the person’s weight might not be low enough to meet diagnostic criteria (World Health Organization, 2021). Atypical bulimia nervosa is defined as a disorder that includes some symptoms of bulimia nervosa like binge eating and compensatory behaviours but does not meet the diagnosis criteria, such as binging or purging less often than the full criteria (World Health Organization, 2021). Atypical binge eating disorder is identified by bingeing less often or for a shorter time than the full criteria (American Psychiatric Association, 2013).

﻿ Eating pathology is relatively common, especially among females. It involves disordered eating attitudes and behaviours that do not reach the criteria for a clinical diagnosis. Such attitudes involve body dissatisfaction, and disordered eating behaviours might include self-induced vomiting (Cooper & Fairburn, 1993). Body image is based on how one sees and feels about one’s body. People with eating disorders tend to overestimate their body size and consider themselves fat in response to sociocultural pressure for ideal thinness, and women without eating disorders tend to have the same experience (Slade, 1994).

# Prevalence and costs

The﻿ prevalence of eating disorders ﻿has been estimated at 4.6% in America, 2.2% in Europe, and 3.5% in Asia (Galmiche et al., 2019). Eating disorders are more﻿ prevalent in females than males (Galmiche et al., 2019). ﻿For example, ﻿the prevalence of anorexia nervosa, bulimia nervosa, and binge eating disorder in the United States has been estimated at 0.9%, 1.5%, and 3.5% among women, and 0.3%, 0 .5%, and 2.0% among men respectively (Hudson et al., 2007).

Globally, the prevalence is slightly higher in adults aged 18 years old and older than in adolescents aged under 18 years old (8.8% and 5.7% respectively) (Galmiche et al., 2019). The prevalence varies across ethnic groups (Franko, 2007). It appears that African American women and women from the Latina ethic group have higher rates of binge eating disorders than Asian women, accounting for 5.82%, 5.80% ﻿, and 4.71% respectively (Franko, 2007). The prevalence of anorexia nervosa and bulimia nervosa did not vary across ethnic groups (Franko, 2007). A recent study of young Arab women in Saudi Arabia (see Chapter 3 of this dissertation) shows more bulimic than anorexic pathology, with higher prevalence for bulimia nervosa (4.4%) than for binge eating disorder (1.6%), but with no cases of anorexia nervosa (AlShebali et al., 2020).

People with eating disorders suffer from comorbid psychological, social, physical, and cognitive impairments. These include personality disorders, less social engagement, impairments in everyday activities, and poor concentration (Bodell et al., 2014; Demmler et al., 2020; Mond et al., 2012). The burden of eating disorders can be stressful for patients, families, and mental health systems (The President and Fellows of Harvard College, 2021). Eating disorders can end lives. For example, 10,200 deaths each year are linked directly to eating disorders in the United States (The President and Fellows of Harvard College, 2021). The estimation of healthy life years that were lost worldwide to eating disorder-related disability in 2017 is over 3.3 million (Van Hoeken & Hoek, 2020). Eating disorders have an emotional impact on families and carers of patients. The painful experience of watching their loved ones suffering from eating disorders for long periods of illness can cause mental disorders such as depression or anxiety (Anastasiadou et al., 2014; Hillege et al., 2006). Moreover, families and carers might suffer from financial costs because they might take long unpaid leave from their jobs to look after patients specially with severe cases (Beat Eating Disorders, 2015).

The financial cost of eating disorders is also high. In the health system in the United States in 2019, such costs were estimated at 4.6 billion dollars (Deloitte Access Economics, 2020). Eating disorders patients usually use the services of primary care practitioners, mental health clinicians, and nutritionists (Deloitte Access Economics, 2020). Emergency departments or hospitalization can be needed in severe cases (Deloitte Access Economics, 2020). However, the method by which prevalence and cost are calculated varies across countries. Some countries use a relatively conservative method of analysing the prevalence and economic cost of eating disorders. For example, in the United Kingdom where the total population is 66.04 million, the economic cost is estimated as ﻿£16.8 billion, and the prevalence is estimated as 724,845 individuals with eating disorders (Beat, 2015). The cost calculation is based on a conservative calculation method of the real cost, health care cost, and social cost (Beat Eating Disorders, 2015). Beat Eating Disorders (2015) estimated prevalence based on the International Statistical Classification of Diseases and Related Health Problems-10th revision (World Health Organization, 2010).

On the other hand, Australia has used a more liberal approach to calculate cost and prevalence of eating disorders. Where the total population is 24.6 million, the ﻿total socioeconomic cost of eating disorders is estimated as $69.7 billion (The Butterfly Foundation, 2012), and the number of people diagnosed with eating disorders is estimated as 913,986 (The Butterfly Foundation, 2012). The calculation of eating disorders cost includes productivity costs and health systems costs (The Butterfly Foundation, 2012). The prevalence is based on the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994).

More liberal approaches to calculating cost and prevalence run the risk of mis-representing the need for provision. Therefore, it can be concluded that the conservative approach for cost and prevalence calculation used by Beat Eating Disorders (2015) is more suitable for research, intervention, and planning purposes than the more liberal approach.

# Causal and maintaining factors

Causal factors are variables that can predict an increase or decrease in symptoms if they were elevated or reduced among an asymptomatic population. In contrast, maintenance factors are variables that can explain the perseverance of symptoms over the course of time among a symptomatic population (Kraemer et al., 1997; Stice, 2002).

## Causal factors

There are many factors that are claimed to cause eating and body image issues. Culbert and colleagues suggest that biological and environmental factors can increase the risk of developing eating disorders or disordered eating attitudes and behaviours, as stated in behaviour genetic literature (Culbert et al., 2015).

Striegel-Moore and colleagues suggested sociological and cultural factors such as internalization of ideal thinness due to media exposure. This internalization of extreme thinness is found to be contributing to body image and eating pathology (Striegel-Moore et al., 2007). Teasing, peer pressure about ﻿appearance, perfectionism, and family disfunction are suggested causal factors that seem to be linked to disordered eating attitudes and behaviours (Culbert et al., 2015; Polivy & Herman, 2002; Sweetingham & Waller, 2008). Cultural factors like change towards the Western cultural idealization of thinness is a potential casual factor that deserves further research (Becker et al., 2005).

The complexity of eating disorder aetiology adds further difficulties to the analysis of causal factors (Polivy & Herman, 2002). The reason might be that eating disorders include several links and interaction between many factors (Polivy & Herman, 2002). Also, it can be hard to clearly identify causal factors because the onset of the disorder usually happens after years of the exposure to causal factors (Dakanalis et al., 2017). Additionally, research shows that several causal factors might explain symptoms of disordered eating but not eating disorders (Culbert et al., 2015). However, we know more about maintenance factors.

## Maintenance factors

Maintenance factors are mainly important for planning, policy making and intervention. Therefore, it is important to identify and target maintenance factors as they differ across cultures (Trottier et al., 2016). The causal and correlational literature has been able to identify several maintenance factors. These include internalization of ideal-thinness, extreme dieting, body image dissatisfaction, and negative affectivity such as shame, anxiety and sadness (Dakanalis et al., 2017).

# Treatment and prevention

﻿Treatment for eating disorders can be very long and expensive. For instance, it is recommended that psychotherapy should be provided in regular sessions at outpatient settings for up to one year for most cases, though longer periods might be needed for other cases such as anorexia nervosa (American Psychiatric Association, 2006; National Institute for Health and Clinical Excellence, 2004). ﻿The average length of stay at inpatient specialist settings ﻿for adults is estimated at 113.0 days (Morris, 2015). The expenses of medical and psychological treatments are substantial (Deloitte Access Economics, 2020). For example, the burden of medical and health-related costs for bulimia nervosa on a household economy in three months is estimated at ﻿AU$3175 per patient. Therefore, it is better to prevent eating disorders from occurring if possible (Stice et al., 2020)

## Treatment

There is a variety of treatment methods to treat eating disorders in different settings, ranging from generalist primary services to specialist services (Rose & Waller, 2017). The most common evidence-based therapies include dialectical-behaviour therapy, group behavioural therapy, group cognitive behavioural therapy specific for eating disorders, individual cognitive behavioural therapy specific for eating disorders, guided self-help cognitive behavioural therapy, and interpersonal psychotherapy (Chen et al., 2008, Slade et al., 2018). Of those therapies, cognitive behavioural therapy, guided self-help cognitive behavioural therapy and family-based treatment are the most effective (Hay, 2013; Slade et al., 2018). However, these are all relatively expensive options, and the case for exploring prevention methods is a strong one, in financial and personal terms.

## Prevention

Eating disorders prevention has a long history (e.g., Vandereycken & Meermann, 1984). It is important to address risk factors in order to prevent eating disorders, to reduce the widespread prevalence of disordered eating and body image dissatisfaction among young people (Austin, 2000). Prevention can be cost-efficient and effective (Stice et al., 2020). Early experiments show that prevention has limited the impact of risk factors and reduced the onset of eating disorders over extended follow-up periods (Stice & Shaw, 2004; Stice et al., 2006).

A variety of evidence-based prevention interventions have been examined (Watson et al., 2016). For example, media literacy is the most effective approach for universal prevention, targeting the whole population to reduce the negative impact of media on eating and body issues (McLean et al., 2016). A cognitive dissonance-based approach is the most recommended for selected populations at higher risk (Watson et al., 2016). This approach generates dissonant beliefs about eating and body-related issues so that people feel stresses when they act against their beliefs (Stice et al., 2006). The recommended approach for targeted prevention is cognitive behavioural therapy (Watson et al., 2016). Prevention targets people with symptoms of eating disorders but do not fulfil diagnosis criteria (Watson et al., 2016).

The key to all treatment and prevention is understanding causal and maintenance factors, but it is important to remember that such factors can be influenced by culture.

# Cultural influences

﻿Eckersley (2006) suggested that culture is a system of meaning that includes language, beliefs, assumption, accumulated knowledge, and values. In order to understand culture influence, it is important to understand that values vary between cultures in different dimensions, including individualism versus collectivism (Hofstede Insights, 2021).

In light of the above understanding it can be said that, including other values, Western culture is characterized by individualism and consumerism (Eckersley, 2006). These two values embrace individuals’ freedom and choices over collective beliefs, and consider money and power as a priority (Eckersley, 2006). On the other hand, many non-Western cultures are characterized by collectivism, whereby people do not behave independently from family and social norms. Rather, they act in the interest of the collective group (Eckersley, 2006).

The implementation of Western values varies across countries. This can be seen within Western countries as they vary in the extend at which values dimensions are indicated. For instance, countries differ in the way they adapt to individualism versus collectivism, masculinity versus femininity, and power distance index (how power is distributed between individuals) (Hofstede Insights, 2021). ﻿Thus, it seems to be useful to understand Westernization as a process in different dimensions of culture with different possible results, rather than as progress towards a particular end.

## Westernization

Heath (2004) defines Westernization as a process of cultural change through which non-Western cultures apply precise Western culture values. This process has its advantages and disadvantages to non-Western populations (Heath, 2004). Economic growth, civil rights, and the power of law are obvious advantages of obtaining Western values (Lal, 2000). However, some Western values might have a negative effect on our quality of life. It has been suggested that adopting some Western values might cause loneliness and emotional stress (Eckersley, 2006).

## Impacts of Westernization on eating disorders and body image in women in different cultures

Westernization can contribute to the rise of eating and body image issues among women in non-Western cultures. As an example, internalization of the thin-ideal in young women in non-Western cultures was found to be linked with exposure to Western thin-idealization media, and with adoption of Western norms and values (Becker, 2004).

Eating disorders and body image dissatisfaction are not limited to a specific culture. Rather, they are reactive to cultural transformation (Pike & Dunne, 2015). For example, Western media exposure and socioeconomic changes were associated with eating disorders and body dissatisfaction in women in Fiji, Curacao, and Japan (Becker et al., 2002; Hoek et al., 2005; Stark-Wroblewski et al., 2005). One of the most important cultures to think about at present is Saudi Arabia, because it is undergoing a process of rapid social and political changes towards Westernization.

## Saudi culture

Saudi Arabia is undergoing Westernization via a process of socio-political cultural and legal transformation. It aims to achieve the ambitious national 2030 vision, intended to diversify resources of the Saudi economy by improving the business environment to encourage international companies to invest in Saudi Arabia (Saudi Vision 2030, 2021). This vision includes adopting a Westernized lifestyle in diverse aspects of the population's life (Saudi Vision 2030, 2021).

This national transformation program has given women the same chances of education, scholarship, employment, entrepreneurship, and enterprise opportunities as men. It has empowered Saudi women with higher positions in the job market locally, and higher political representative positions globally. For example, in 2018 Saudi women were allowed to drive for the first time, in 2019 the government appointed the first female ambassador, and in 2020 the second female ambassador was appointed (Arab News, 2021; The British Broadcasting Corporation [BBC], 2018; BBC, 2019a).

Although these changes have clear positive outcomes, they could expose women to more eating and body image risk factors. Those factors include exposure to Western media, focus on the “thin ideal”, and issues of control. Therefore, the current changes in Saudi Arabia present a substantial opportunity to understand the development and prevention of eating and body image issues in a population where cultural changes are ongoing. Such understanding will have implications for work within Saudi Arabia, but will also be generalizable to other cultures that undergo Westernization in the future.

## Mental health in Saudi Arabia

The Saudi population is over 34 million (General Authority for Statistics, 2021). The prevalence of mental health disorders and the nature of mental health services before and during this time of culture transformation are not understood in a national scale. Although the lack of important data about mental health in Saudi Arabia was highlighted over thirty years ago, it is not solved yet (Al-Sabaie, 1989; Koenig et al., 2013).

In 2011 the country launched the Saudi National Mental Health Survey as part of the World Mental Health Survey initiative (Harvard Medical School, 2005). The survey aims to help planning and intervention by assessing prevalence, treatment challenges, risk factors, and protective factors (Shahab et al., 2017). However, this attempt has not yet met its objectives, because the survey results are not published (Shahab et al., 2017).

The limited set of prevalence studies of mental health issues in Saudi cannot be generalized to the whole population, because they assess prevalence in specific populations or at specific times (e.g., Al-Zaben et al., 2015; Alfakeh et al., 2021; Alharithy et al., 2019). Therefore, there is no national integrated perspective.

Similarly, the existing body of literature about mental health services in Saudi Arabia is limited. Therefore, mental health status remains unclear. The available data reveals many challenges - low number of mental health practitioners, limited existing services, and lack of competency in practicing new treatments and management. There are only three psychiatrists and two psychologists per 100,000 population. Community mental health care services do not provide services like ﻿vocational and psychosocial rehabilitation programs. Mental health clinicians are not competent deliver evidence-based therapies (Alhamidi et al., 2020; Qureshi et al., 2013). Given this lack of clarity, the impact of Westernization on the prevalence of eating disorders in Saudi Arabia merits further investigation. It will be particularly useful to find effective means to reduce the negative impacts of Westernization.

# Methodology and Epistemology

In this research, I adopted different methodologies for different studies, as appropriate to the question being asked. I used a systematic review (Chapter 2) to establish baseline levels of understanding in the field. After that, I used a simple cross-sectional survey design in Chapter 3 (Levels of pathology) and Chapter 4 (Prevalence), in order to address key gaps in knowledge about current levels of eating and body image issues in Saudi Arabia. That survey allowed me to overcome inconsistencies and limitations in the literature (e.g., the use of outdated measures). It also allowed me to assess whether westernization had a potential influence on the findings.

In Chapter 6 (Feasibility and acceptability), I conducted a feasibility and acceptability study that tested the viability of using an existing prevention intervention in Saudi Arabia. This within-subject study used a simple pre-post design to test the feasibility and acceptability of this intervention. After proving the feasibility and acceptability of the Body Project, extending this approach was a critical final step in the dissertation, determining the efficacy of this approach in the Saudi context. Therefore, I used a longitudinal repeated-measure randomized control trial in Chapter 7 (Efficacy), to demonstrate a clear impact of the Body Project on levels of eating, body and related pathology levels for the intervention group in comparison with the control group.

Thus, my choice of research designs was driven by the nature of the research questions that made up this whole dissertation. However, more explicit use of a widely accepted framework for such studies (e.g., the Medical Research Council’s framework for the development of complex interventions) would have ensured a more robust approach to key elements of the research – particularly the feasibility/acceptability and efficacy studies.

However, it is important to acknowledge that other research methods and designs could have contributed to my dissertation, and to consider how those might be employed in further research in this field. In particular, qualitative designs could have contributed to the research prior to Chapter 3 (Levels of pathology) and Chapter 4 (Prevalence). Such studies could have identified themes in the experience and context of eating and body image concerns that might have added to defining the experience of having such problems and diagnoses in Saudi Arabia during the current process of westernization. Such experiences might have included: the experiences of disclosure of an eating disorder (and to whom); particular concerns and behaviours that might be culturally-focused; and social and cultural perspectives on westernization’s effects. That could have informed the measures and questions used in Chapter 3 and the experience of diagnosis in Chapter 4, possibly given a less Western-informed perspective.

It is also important to consider my own role and perspective in this research and how they might have influenced my progress and the interpretation of the work - reflexivity.I am a female Saudi researcher, and hence have few direct role models for this work. That means that I felt that I had a lot to prove, and I had many reasons for wanting the research to succeed and to benefit mental health in my country. In order to ensure that my position did not affect my planning and decisions, I paid attention to the existing literature about eating pathology in Saudi Arabia and other non-Western cultures during the time of westernization. I worked closely with my supervisors to make sure that I utilized both reflexivity and my personal local social knowledge in designing, executing and interpreting my work, in order to ensure that I maintained a scientific perspective. I was able to use my supervisors’ lack of those cultural perspectives to ensure that I had to be able to explain my thinking and reasoning for outsiders, to ensure a less biased perspective. Furthermore, I shared my work with other scientists in the world through publication and presentation, in order to receive wide and useful feedback from a global and local perspective.

In studies of this sort, it is important to pay very close attention to ethical issues. In particular, complete confidentiality had to be ensured, so that the participants felt able to discuss topics that are not normally widely addressed in Saudi culture, and which could be seen as transgressing norms. The other critical issue was informed consent, which meant that the study had to be open to participants who might otherwise have felt compelled to take part, ensuring that they understood what they were committing to and that they had the option of not participating or continuing.

# Aims

In order to address this overall topic in the current period of cultural change, and given the methodological and epistemological considerations raised above, this dissertation will address the following aims:

Aim 1: To review the literature to date about eating pathology and body image in Saudi undergraduate females. (Chapter 2)

Aim 2: To investigate levels of eating pathology, body image dissatisfaction, psychological comorbidities, and internalization of Western values in Saudi undergraduate females. (Chapter 3)

Aim 3: To assess the diagnostic prevalence of typical and atypical eating disorders in Saudi undergraduate females. (Chapter 4)

Aim 4: To test the feasibility and acceptability of an evidence-based Western-developed eating disorders prevention programme among Saudi undergraduate females. (Chapter 6)

Aim 5: To undertake a randomized control trial to assess the effectiveness of an eating disorders prevention for Saudi undergraduate females. (Chapter 7)

**Chapter 2. Levels of Eating Pathology and Body Image Disturbance in Women in Saudi Arabia: A Systematic Review**

To help sufferers of eating pathology and body image disturbance with planning and intervention, we must know the level of the problem. Most of the research on the nature and prevalence of eating pathology and body image has been conducted in Western cultures. However, it should not be assumed that these issues relate only to Westernized countries. In particular, it has been suggested that they are likely to be relevant to countries that are undergoing Westernization (Anderson-Fye, 2004; Galfano & Swami, 2015). Less is understood about eating pathology during this transition period. This review aims to identify the levels of eating pathology and body image dissatisfaction in women in a country that is currently undergoing cultural transformation towards Western values - Saudi Arabia.

# What are eating disorders, eating pathology and body image disturbance?

The 11th version of the International Classification of Diseases describes eating disorders as “Abnormal eating or feeding behaviours that are not explained by another health condition and are not developmentally appropriate or culturally sanctioned” (World Health Organization, 2018). The most commonly considered eating disorders are anorexia nervosa, bulimia nervosa and binge eating disorder, though others exist (e.g., atypical and childhood eating disorders).

*Anorexia nervosa* is defined by a very low body weight for developmental stage, height and age, which is not caused by scarcity of food or a health problem. Anorexia nervosa also involves unhealthy eating behaviours, such as restricted diet to limit energy intake or the use of energy expenditure behaviours such as excessive workouts. (World Health Organization, 2018).

*Bulimia nervosa* is characterized by binge eating episodes accompanied by purging behaviours to avoid weight gain. A binge eating episode is a discrete period of time when an individual loses control over the type or amount of food intake. Purging behaviours are compensatory unhealthy eating behaviours to lose weight. such as self-induced vomiting (World Health Organization, 2018).

*Binge eating disorder* is characterized by frequent episodes of binge eating, with emotional triggers and consequences. For example, the individual might binge once a week or more for several months, feeling disgust and shame about their eating behaviours. Binge eating disorder is distinct from bulimia nervosa as it is not followed by purging behaviours (World Health Organization, 2018).

﻿ Non-clinical eating pathology involves disordered eating attitudes and behaviours, though not to the point of reaching a clinical diagnosis. Disordered eating attitudes involve body dissatisfaction and concerns about body shape and weight, to an extent where one’s self-esteem is based on body shape and weight (Cooper & Fairburn, 1993). Disordered eating behaviours include binge-eating and unhealthy methods used to control body weight and shape, such as restriction and purging.

﻿Body image is based on how one sees and feels about their body. It is influenced by a range of factors - historical, cultural, biological and individual (Slade, 1994). People with eating disorders have an unstable, uncertain and weak body image (Slade, 1994). They tend to overestimate their body size and consider themselves fat in response to sociocultural pressure for ideal thinness (Slade, 1994). Thus, body image disturbance has an important role in the development, maintenance and relapse of eating disorders. It is a diagnostic criterion for most eating disorders and a contributor to poor recovery (Bhatnagar et al., 2013).

# Prevalence and costs ﻿

As detailed in Chapter 1, the costs of eating disorders and their treatment are high. There are differences in the ways in which prevalence and costs of eating disorders are calculated. For example, in Australia where the population is 24.6 million, the estimation of the number of eating disorders cases is 913,986 and the total real economic cost is estimated as $69.7 billion (The Butterfly Foundation, 2012). In contrast, the United Kingdom has a population of 66.04 million, the estimated number of cases is lower at 724,845 people, and the total cost is estimated as a proportionally lower ﻿£16.8 billion (Beat Eating Disorders, 2015).

Methodological differences might explain these differences. The Butterfly Foundation’s prevalence estimate is based on the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994), while the Beat Eating Disorders estimate is based on the International Statistical Classification of Diseases and Related Health Problems-10th revision (World Health Organization, 2010). The two also make very different assumptions about the disease burden of eating disorders, with Beat Eating Disorders using a more conservative method of calculating real costs, health care costs, and social costs. For research, intervention and planning purposes, it is probably safer to consider the Beat Eating Disorders (2015) eating disorders method for prevalence and cost estimation.

However, there are costs that go beyond the financial. In severe cases, eating disorders can cause death. Anorexia nervosa has the highest mortality rate among other psychiatric illnesses (Arcelus et al., 2011). Eating disorders have negative psychological, physical, financial and social impact on sufferers. These impacts appear as sleep problems, poor heart functioning, lack of income due to poor career development, and poor social life (Beat Eating Disorders, 2015).

Families and carers supporting eating disorders patients struggle with various stressors. For instance, they undergo substantial financial and opportunity costs such as lack of income due to unpaid leave from work (Beat Eating Disorders, 2015). Furthermore, families and carers experience emotional problems such as anxiety and depression, especially with longer illness periods (Hillege et al., 2006; Anastasiadou et al., 2014).

# Treatment and prevention

There are a number of effective treatments for eating disorders (Hay, 2013; Slade et al., 2018), with cognitive behavioural therapy and Family Based Treatment being the most effective. Prevention programs show positive reduction in eating disorder onset through multi-year follow ups, and result in lower levels of body image distortion. For example, the Healthy Weight 2 prevention programme resulted in a 60% reduction in eating disorders onset and a significant increase in body satisfaction, despite the programme being of only four hours duration (Stice et al., 2013).

Key to all treatment and prevention efforts is our understanding of the factors that we need to target – the causal and maintenance factors that results in individuals experiencing eating disorders. Those factors need to be understood, so that we can understand the onset and maintenance of eating disorders and how to address them. However, these cannot be assumed to be culturally invariant, as the process of Westernization means that some of those factors become more prominent.

# Causal and maintaining factors

Causal factors precede and predict symptoms. An increase or decrease of the causal factor results in increased or decreased symptoms. In contrast, maintenance factors are factors that explain the persistence of symptoms over time among symptomatic population (Kraemer et al., 1997; Stice, 2002).

## Causal factors

Multiple factors are suggested to cause eating disorders, eating pathology and body image disturbance. For example, behaviour genetic research suggests that genetic and environmental factors contribute to the risk of developing eating disorders or eating pathology (Culbert et al., 2015). Furthermore, sociocultural data suggest that exposure to thin media images contributes to internalization of the thin-ideal, leading to body dissatisfaction and discrepancy between the current self and one’s ideal self. These factors are also suggested to cause eating pathology (Striegel-Moore et al., 2007). Other potential causal factors are peer pressure about body shape and teasing (Polivy & Herman, 2002; Sweetingham & Waller, 2008) and perfectionism, each of which appears to be related to over-evaluation of weight and drive for thinness (Culbert et al., 2015). A further potential causal factor is cultural transformation to more Western, thinness-oriented values (Becker et al., 2005), which merits investigation as cultures change.

We do not know enough about causal factors, because the aetiology of eating disorders is complex and involves interplay amongst many factors. The onset of the disorders is often not noted until some years after the causal factors were present, making them hard to identify accurately. In addition, longitudinal data suggests that some causal factors might explain disordered eating symptoms but not eating disorders (Culbert et al., 2015). However, more is known about maintenance factors.

## Maintenance factors

To improve strategic planning and intervention effectiveness, we need to address and investigate maintenance factors that are not universal across sufferers (Trottier et al., 2016). Many maintenance factors have been identified in correlational and causal research. These include: body-related behaviours (e.g., body checking); starvation symptoms; family misunderstanding of illness and expressed emotions; low self-esteem; depression; and social anxiety (Bhatnagar et al., 2013; Levinson & Rodebaugh, 2012; Raykos & Fursland, 2017; Stice, 2002; Treasure et al., 2007; Waller & Sheffield, 2008).

# The importance of understanding cultural issues behind eating and body issues

Almost all of the above information come from Western cultures. Therefore, our understanding of eating pathology and body image is lacking in generalizability. In particular:

* What is the prevalence of eating disorders in non-Western cultures?
* What are the levels of disordered eating attitudes and body image disturbance in non-Western cultures?
* Can prevention and treatment programmes that have been developed in Western cultures be assumed to be effective in non-Western cultures?
* What is the impact of the process of Westernization on eating and body image problems in non-Western cultures?

This literature review will consider the limited existing evidence that addresses these cultural issues, and how the literature needs to be developed in future.

## What is Western culture, and how does it differ from non-Western cultures?

Culture is defined as “the collective programming of the mind that distinguishes the members of one group or category of people from others” (Hofstede, 2019). To better understand Western culture, we should understand its values and beliefs. Consumerism and individualism are considered core values of Western culture (among other values). In contrast, collectivism is a non-Western culture value, whereby people tend to maintain family and social connections and live in extended families (Eckersley, 2006). However, Western culture differs in each country, based on the level of manifestation of culture dimensions. For example, countries vary in their balances of individualism versus collectivism, indulgence versus restraint, and masculinity versus femininity (Hofstede, 2019). Therefore, Westernization needs to be understood as a process with different potential outcomes, rather than as progress towards a fixed end-point.

## Westernization

Westernization can be defined as a process through which non-Western societies implement Western values (Heath, 2004). This adoption of Western culture can result in benefits such as modern economic development, respect for law and human rights (Lal, 2000). However, it is also possible that that some Western values like materialism and consumerism have a negative impact on health and well-being (Eckersley, 2006). There is evidence that Westernization increases eating pathology in women from non-Western cultures. For example, adopting Western social and economic values in addition to Western media exposure leads to the internalization of the thin-ideal, potentially resulting in increased eating pathology and body dissatisfaction, as found in Fijian, Japanese and Chinese women (Becker, 2004; Stark-Wroblewski et al., 2005).

## Impacts of Westernization in different cultures

It is important to understand that eating disorders react to culture changing rather than being culture-specific (Pike & Dunne, 2015). Therefore, the impact of Westernization on body image dissatisfaction and eating disorders among women could take different forms in different countries. We do not know whether people in non-Western culture share the same risks, concerns and behaviours with others from Western culture or not.

For example, Westernization in China was not found to have correlations with body image dissatisfaction but it was related to eating pathology (Getz, 2014). In Japan, anorexia nervosa and bulimia nervosa has increased four-fold between 2000 and 2010 in association with Westernization (Nakai, Nin, Teramukai, et al., 2014). Westernization has increased thin-ideal internalization, body image dissatisfaction, desire to lose weight, dieting and many disorders eating behaviours such as vomiting and binge-eating in women in Fiji (Mccabe et al., 2011).

## Studying cultures in transition

Studying cultures that are in the process of adopting Western values provide critical information about the way in which Westernization can enhance risk for eating disorders (e.g., Becker et al., 2004). For example, when people shift from collectivism to individualism, change gender roles and increase consumerism, there is the potential to experience confusion and restlessness, and a sense of lack of control. These factors are particularly important among women, as they are more vulnerable to eating disorders and body image disturbance than men undergoing this process (Nasser, 2009) and Westernization tends to involve more change in women’s roles than men’s. Understanding the changes due to Westernization could provide valuable information for the development of appropriate treatment and prevention programmes. This review will consider one specific example of a country’s ongoing Westernization – Saudi Arabia.

In recent years, Saudi Arabia has begun cultural transformation towards Westernization. This has resulted in more freedom and empowerment for women in terms of social, political and economic improvements. The changes have included the following:

* In 2013, 30 women were appointed to join the Shoura Council (the consultative assembly and the formal advisory body in the country)
* In 2013, female lawyers were allowed to practice in courts (United Nations Development Programme [UNDP], 2014).
* In 2018, Saudi women were allowed to drive for the first time to drive.
* In 2019, the Saudi government gave women the right to hold a passport if older than 21 years and to travel alone. Women can register for marriage, divorce and birth without the authorization of the father, brother or husband.
* In 2019, the government assigned its first female ambassador (The British Broadcasting Corporation [BBC] 2018; BBC, 2019a; BBC, 2019b).

The changes are undoubtedly positive for Saudi women in many ways, such as access to education and employment. However, it is also possible that these changes will have negative consequences, in terms of eating disorders and body image disturbance. In particular, exposure to risk factors such as Western beauty norms might lead them to internalize the thin ideal. This review aims to determine the current evidence regarding eating and body concerns, largely established before the pattern of Westernization in Saudi Arabia. That information will then be used to provide a baseline for understanding levels of eating and body concerns, against which the impact of the current pattern of Westernization can be understood in subsequent studies.

# Aims and hypotheses

The overall aim of this systematic review is to understand the evidence to date regarding levels of eating disorders, eating behaviours, eating attitudes, and body image concerns in Saudi Arabia. It will also consider the levels of common comorbid psychological disturbances/risk factors (depression; social anxiety and self-esteem), and whether there is evidence of Westernization playing a role up to that point in time. As this is an exploratory review, hypotheses are not specified. However, it is anticipated that levels of eating attitudes, eating disorders behaviours and negative body image will be lower in Saudi Arabia than in Western cultures.

# Method

An electronic search was conducted in five databases with specific search terms (detailed in Table 1) to collect eligible papers to answer the review questions. Databases searched were:

1. Psych-info
2. PubMed
3. Scopus
4. Saudi Digital Library
5. Saudi Medical Journal

In addition, reference checking was used to collect as many papers as possible. It added three papers (Khalaf, et al., 2015; Bano et al., 2013). Obtaining unpublished literature was difficult (see Appendix A). The databases were searched from 1932 to 2018 because the Kingdom of Saudi Arabia was founded in 1932. The inclusion criteria were: all study types and designs that addressed eating pathology levels in Saudi samples where N > 1; all ages; female participants; and studies in the Arabic or English language. Exclusion criteria were: case studies; non-local participants; males; cancer patients (where eating issues were often identified); and those with disabilities. Figure 1 shows the PRISMA diagram, detailing the numbers of papers at each stage in the process.

Table . Search terms

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Saudi Arabia | Women | Eating disorders | Body image | Weight | Westernization |
| Saudi | Female | Eating attitudes | Body dissatisfaction | Body mass index | Cultural transition |
| Arabian | Girls | Eating habits | Self-image | BMI | Western |
| Arabian Gulf | Ladies | Bulimia nervosa | Body shape |  | West |
| Gulf Cooperation  Council | Young girls | Anorexia nervosa |  |  | Modernization |
| Arab Countries |  | Binge eating |  |  | Globalization |
| Arabs |  | Eating restriction |  |  | Modern |
|  |  | Eating behaviours |  |  | Global |
|  |  | Eating pathology |  |  | Cultural changes |
|  |  |  |  |  | Cultures in transition |

Key: BMI, Body mass index.

**Figure 1. Identification of studies included in the analysis**

Psychinfo

N = 2517

## Screening

## Identification

Records after duplicates removed  
(N = 3459)

Records excluded  
(N = 3448)

3329 papers looking at medical conditions.

199 Not based in Saudi Arabia or did not recruit Saudi population

Records screened  
(N = 3459)

Full-text articles assessed for eligibility  
(N = 11)

Inclusion: All study types and designs, all ages, studies about females, Arabic and English language

Exclusion: case studies, non-local participants, males, cancer patients and disabilities

Pubmed

N = 2910

(n = )

Saudi Digital Library

N = 669

Scopus

N = 1406

(n = )

Saudi Medical Journal

N = 44

Reference checking

N = 14

## Included

## Eligibility

Full-text articles excluded, with reasons  
(N = 5)

Poor quality.

Studies included in quantitative synthesis   
(N = 6)

## Quality appraisal

CASP Critical Appraisal Skills Program Checklists were used to appraise the quality of each paper included. The cohort study check list was used (CASP, 2018). The checklist is divided into three main sections. The first section addresses the validation of results. The next addresses the nature of results. Finally, the third section addresses whether or not the results can be feasible locally. The list starts with two questions about the aim of the study and the recruitment methods. It contains twelve questions about major issues in the study. The first questions are about the accuracy of measures to minimize risk of bias. The following questions address the confounding factors and their consideration in the design and analysis. The next two questions address the length and completion of the follow up. The following two questions address the preciseness and reliability of results. The next two questions address the applicability of results to the local population and whether or not the results fit with other existing evidence. The final question addresses the practical implications of the study. Appendix B outlines issues with quality for each paper and Appendix C presents the CASP Checklist.

Table 2 lists the scores awarded on each CASP item for the 11 papers that were found. Each paper gets a percentage score based on the number of “Yes” divided by the total number of items. As shown in Table 3, five papers were of very poor quality (Aljaaly, 2012; Fallatah et al., 2015; Khalaf et al., 2015; Alwosaifer et al., 2018; Aljomaa, 2018), with scores below 40%. For example, Aljaaly (2012) included one question about body image in a self-reported questionnaire, and used it to conclude that three quarters of Saudi women have a positive body image. Therefore, those five were excluded from the review, leaving six papers. Those six papers will be the basis of the review.

Table 2. Quality appraisal

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Papers | Focus | Recruitment | Measures | Confounding factors | Follow up | Results | Local implications | Available evidence | Practice implications | Score |
| Al-Subaie (2000) | Yes | Yes | Yes | No | No | No | Yes | No | No | 44% |
| Aljaaly (2012) | No | Yes | No | No | No | No | No | No | No | 11% |
| Bano et al. (2013) | Yes | Yes | Yes | No | No | No | No | Yes | No | 44% |
| As-Sa’Edi et al. (2013) | Yes | Yes | Yes | No | No | Yes | Yes | Yes | Yes | 77% |
| Alanazi (2014) | Yes | Yes | Yes | No | No | Yes | Yes | Yes | Yes | 77% |
| Fallatah et al. (2015) | No | Yes | Yes | No | No | No | No | No | No | 22% |
| Khalaf et al. (2015) | Yes | Yes | Yes | No | No | No | No | No | No | 33% |
| Almoshadaq (2016) | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | 88% |
| ALAhmari et al. (2019) | Yes | Yes | Yes | No | No | Yes | Yes | Yes | Yes | 77% |
| Alwosaifer et al. (2018) | No | Yes | Yes | No | No | No | No | No | No | 22% |
| Aljomaa (2018) | Yes | Yes | No | No | No | No | No | No | No | 22% |

# Results

Table 3 shows the key details in each of the six remaining papers.

Table . Paper characteristics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Author (year)  Type | Title | Aim | Population | Recruitment | Measures |
| Al-Subaie (2000)  Cross-sectional | Some Correlates of Dieting Behaviour in Saudi Schoolgirls  Correlates of Dieting Behaviour in Saudi Schoolgirls | To examine the correlates of dieting behaviour among Saudi schoolgirls | N = 1,179 Female  School students  Age 12–21 years Riyadh | Stratified cluster sampling | EDI-DT (Garner, 1991) |
| Bano et al. (2013)  Cross-sectional | A Study on the Prevalence and Severity of Eating Disorders among the Young Population of Hail City in Saudi Arabia | To examine the prevalence and severity of eating disorders in a representative sample of Saudi adolescents and young adults. | N = 100  66 Female  34 Male  Age 18–25 years | Random sampling | EAT-26 (Garner et al., 1982) |
| As-Sa’Edi et al. (2013)  Cross-sectional | Body image dissatisfaction: Prevalence and relation to body mass index among female medical students in Taibah University | To estimate the prevalence of body image dissatisfaction, identify its underlying risk factors, and  explore the relation between actual, perceived and desired body mass index among female medical students in Taibah University, Saudi Arabia | N = 242  Female  Age 19–27 years  Medical students in Almadinah Almunawarah | Random sampling | FRS  (Stunkard, 1983) |
| Alanazi (2014)  Cross-cultural | A Cross-Cultural Comparison of Disordered Eating Behaviours, Social Appearance Anxiety, and Body Shape Dissatisfaction of Female College Students | To investigate the relationship between disordered eating, social appearance and body shape dissatisfaction in a cross-cultural sample of America and Saudi Arabian female college students | N = 142  Female  Age 18–25 years  College students  Saudi 81  American 62 | Random sampling | EDE-Q  (Mond et al., 2004)/  BSQ-16A (Evans & Dolan, 1993) |
| Almoshadaq (2016)  Cross-sectional | Body image, self-esteem and the mediating role of exercise among women in Saudi Arabia | To examine association between body satisfaction and self-esteem, and exercise among women in SA | N = 62  Female  Age 18–60 years  Attending Taibah University | Random sampling | BSQ-8C (Evans & Dolan, 1993) |
| ALAhmari et al. (2019  Cross-sectional | Associations of self-esteem with body mass index and body image among Saudi college-age females. | To examine the association of self-esteem with the body mass index, perceived body image, and desired body image of college-age Saudi females | N = 907  Female  College Age M = 21  University students | Stratified cluster sampling technique. | FRS (Stunkard, 1983) |

Key: EDI-DT, Eating Disorders Inventory Drive of Thinness subscale; EAT-26, Eating Attitude Test; FRS, The Stunkard Figure Rating Scale; EDE-Q, Eating Disorders Examination Questionnaire; BSQ-16A, Body Shape Questionnaire; BSQ-8C, Body Shape Questionnaire-8C.

## Frequency of papers addressing relevant topics

**Levels of eating behaviours, eating attitudes, body image dissatisfaction and prevalence of eating disorders.** Levels of eating attitudes were addressed in half of the papers and levels of body image dissatisfaction were more commonly addressed. The levels of eating behaviours and prevalence of eating disorders were not investigated across papers.

To understand if the levels of eating attitudes and body image dissatisfaction in Saudi women are high or low, they must be compared to the total population scores. Table 4 shows levels of eating attitudes, levels of body image dissatisfaction, measures and cut-off points of total population. As can be seen in Table 4, the levels of eating attitudes and body image dissatisfaction are lower than relevant norms for the clinical population.

Table . Levels of eating attitudes and body image dissatisfaction in Saudi Arabia

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Paper | Eating attitudes  M (SD) | Body image dissatisfaction  M (SD) | Cut-off score | Measure |
| Al-Subaie (2000) | Mean = 6.7 |  | 14 | ﻿EDI-DT |
| Bano et al. (2013) | 16.89 (10.52) |  | 20 | ﻿EAT-26 |
| As-Sa’Edi et al. (2013) |  | The prevalence of body image dissatisfaction is 73.6% |  | ﻿FRS |
| Alanazi (2014) | 1.73 (1.19) | 35.95 (16.10) | Cut-off point for eating attitudes = 2.76  Cut-off point for body image dissatisfaction = 66 | EDE-Q /  BSQ-16A |
| Almoshadaq (2016) |  | 22.1 (10.27) |  | BSQ-8C |
| ALAhmari et al. (2019) |  | Perceived body image  3.5 (1.4)  Desirable body image 2.7 (0.9) | 5 | FRS |

Notes: EDI-DT, Eating Disorders Inventory-Drive of Thinness subscale; EAT-26, The Eating Attitude Test; FRS, The Nine Figure Silhouette Rating Scale; EDE-Q, Eating Disorders Examination-Questionnaire; BSQ-16A, Body Shape Questionnaire-16A; BSQ-8C, Body Shape Questionnaire-8C; FRS, The Stunkard Figure Rating Scale.

**Risk factors and psychological correlates.** Half of the papers considered risk factors, while comorbidities were less commonly reported. Prevalence of eating disorders and the influence of Westernization were not investigated in any paper.

In order to determine whether levels of psychological correlates in Saudi women are high or low we need to compare them to the total population scores. Table 5 shows patterns of associations between suggested risk factors and eating pathology in the different studies. The findings suggest several potential risk factors, including parental education and influence of family and friends. Social appearance anxiety and low self-esteem were the most clearly identified comorbidities of eating pathology and body image dissatisfaction in women in Saudi Arabia.

Table . Suggested risk factors and correlates of eating pathology and body image dissatisfaction in women in Saudi Arabia

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Paper | Risk Factors | Psychological correlates | | Cut-off points | Measures |
| Mean | SD |
| Al-Subaie (2000) Cross-sectional | ﻿Suggested risk factor for eating disorders:  BMI (﻿χ2 = 97.59, df = 3, p = .0001)  Speaking a Western language (﻿χ2 = 8.9, df = 1, p = 0.002)  Lived in a Western country (﻿χ2 = 10.3, df = 1, p = .001)  Higher father’s education (﻿χ2 = 20.87, df = 4, p = .001)  Better father’s occupation ﻿(﻿χ2 = 12.32, df = 4, p = .015)  Higher mother’s education ﻿(﻿χ2 = 22.64, df = 3, p = .001)  Smaller family size ﻿(﻿χ2 = 10.47, df = 4, p = .03). | ﻿﻿ |  |  | ﻿ GDS |
| Bano et al. (2013)  Cross-sectional |  | ﻿ |  |  |  |
| As-Sa’Edi et al. (2013)  Cross-sectional | Suggested risk factors for body image dissatisfaction:  Family influence (χ2 =﻿ 8.66, p = .013)  Friends’ criticism (χ2 =﻿ ﻿18.88, p = .001)  Unreal self-perception (χ2 =﻿ ﻿78.22, p = .001)  Feeling of disproportional body parts (χ2 =﻿ ﻿﻿38.02﻿, p = .001) |  |  |  | ﻿Self-administered questionnaire to investigate suggested risk factors |
| Alanazi (2014) Cross-sectional |  | 26.42 | 12.00 | 40 | SAAS  (Hart et al., 2008) |
| Almoshadaq (2016)  Cross-sectional | Significant relationship between body satisfaction and self-esteem p ≤ 0.05 | 27.77 | 11.22 | 15 | RSES (Rosenberg, 1965) |
| ALAhmari et al. (2019)  Cross-sectional | Negative correlation between perceived body image and self-esteem p ≤ 0.01 | ﻿21.5 | 4.1 | 15 | RSES (Rosenberg, 1965) |

﻿ Notes: GDS, General Data Sheet; SAAS, Social Appearance Anxiety Scale; RSES, The Rosenberg Self-Esteem Scale.

**Levels of eating pathology and body image dissatisfaction in Saudi women in comparison to other cultures.** In order to understand whether the levels of eating pathology and body image disturbance in women in Saudi Arabia are high, low or normal, then need to be compared with norms from other cultures (e.g. Western cultures). Table 6 presents comparisons between Saudi scores and Western scores in eating pathology and body image dissatisfaction. Unfortunately, as shown in the table, the findings reported in the Saudi-based literature are very inconsistent, making it impossible to determine whether levels of eating attitudes and body image dissatisfaction in Saudi women are higher or lower than Western cultures.

Table . Levels of eating attitudes and body image disturbance in Saudi women and women from the United States (Alanazi, 2014; Forrest & Stuhldreher, 2007; Rosen, 1988), Greece (Costarelli & Patsai, 2012), Sweden (Welch et al., 2012) and Italy (Morotti et al., 2013)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Paper | Measure | Saudi sample | | Western Sample | | Western sample reference/country |
| Mean | SD | Mean | SD |
| Eating attitudes | | | | | | |
| Al-Subaie (2000) | EDI-DT | 6.7 |  | 5.6 | 5.9 | Rosen (1988)  United States |
| Bano et al. (2013) | EAT-26 | 16.89 | 10.52 | 12.17 | 6.87 | Costarelli and Patsai (2012)  Greece |
| Alanazi (2014) | EDEQ | 1.73 | 1.19 | 2.40 | 1.50 | Alanazi (2014)  United States |
| Body Image | | | | | | |
| As-Sa’Edi et al. (2013) | FRS | 73.6% | | 67% | | Forrest and Stuhldreher (2007)  United States |
| Alanazi (2014) | BSQ-16A | 35.95 | 16.10 | 50.42 | 20.90 | Alanazi (2014)  United States |
| Almoshadaq (2016) | BSQ-8C | 22.1 | 10.27 | 20 | 10 | Welch et al. (2012)  Sweden |
| AlAhmari et al. (2019) | FRS | Perceived body image 3.5 | 1.4 | Perceived  body image 3.5 | 1.0 | Morotti et al. (2013)  Italy |
| Desirable body image 2.7 | 0.9 | Desirable  body image 2.9 | 0.7 |

Notes: EDI-DT, Eating Disorders Inventory-Drive of Thinness subscale; EAT-26, The Eating Attitude Test; EDEQ, Eating Disorders Examination-Questionnaire; FRS, The Stunkard Figure Rating Scale; BSQ-16A, Body Shape Questionnaire-16A; BSQ-8C, Body Shape Questionnaire-8C.

## Synthesis of literature

In keeping with the aims, the findings were examined for their ability to address six questions, as detailed below.

**Q1. What are the levels of eating attitudes, eating disorders behaviours and body image dissatisfaction in Saudi Arabia?** This question cannot be answered, due to the very inconsistent use and reporting of measures across papers. Therefore, investigating levels of eating behaviours, eating attitudes and body image dissatisfaction in Saudi Arabia needs to be redone properly.

**Q2. What is the prevalence of eating disorders in Saudi Arabia?** This question cannot be answered, as no research used validated diagnostic measures. Where diagnoses were reported, they were based on the inappropriate use of dimensional measures that were not designed for this purpose. Again, this conclusion indicates a need for a validated approach to case identification in the Saudi Arabian population.

**Q3. What are the risk factors for eating pathology, body image dissatisfaction and eating disorders in Saudi Arabia?** Factors that emerge include higher parental education and occupation, smaller family size, living abroad and speaking a foreign language, low self-esteem, pressure from family and friends, and body mass index (BMI). However, the lack of information on the developmental sequence of these problems means that causality cannot be established. There is no evidence about the impact of genetic factors, personal traits and body-related behaviours were neglected.

**Q4. What are the psychological correlates of eating pathology and eating disorders in Saudi Arabia?** Low self-esteem and social appearance anxiety have been shown to be comorbidities, though the causal direction of any relationships has not been established.

**Q5. Are the levels of eating attitudes, eating behaviours and body image dissatisfaction in women in Saudi Arabia lower or higher than women from Western cultures?** There was no consistent pattern of differences that would have indicated higher or lower levels of problems in the Saudi Arabian population. There are no studies that address levels of eating behaviours.

**Q6. To what extent has Westernization influenced eating disorders, eating pathology and body image dissatisfaction in women in Saudi Arabia?** There is no evidence to address this point.

# Summary

Using a systematic approach to the literature review allows us to reach a relative negative conclusion. We do not yet know enough about the levels of eating attitudes and body image dissatisfaction in Saudi Arabia. Furthermore, nothing is known yet about levels of eating behaviours and prevalence of eating disorders in this culture, due to poor measurement methods. While some risk factors and correlates have been identified, there are many other potential ones that have not been considered, and the relationship of these to eating pathology is not yet clear. Finally, the influence of internalization of Western influences on eating pathology and body image in Saudi women has not yet been investigated.

# Discussion

To our knowledge, this is the first systematic review about the levels of eating pathology and body image dissatisfaction in women in Saudi Arabia. This review aimed to determine levels of eating attitudes, eating disorders behaviours, body image dissatisfaction and the prevalence of eating disorders, risk factors, psychological correlates and the influence of Westernization on these pathologies in women in Saudi Arabia. The first and most striking finding was that there is very little literature to draw on, with only six papers rated as yielding viable data.

Across six studies, the findings indicate that the levels of eating behaviours, eating attitudes, body image dissatisfaction and prevalence of eating disorders are not yet fully known. Little is known about suggested risk factors and psychological correlates. The effect of Westernization on eating pathology was not investigated across papers. Therefore, the review was not able to answer several of the review questions and where there were data available, they were not adequate.

## Limitations of this review

﻿The main limitation of this review is the limited published resources and the difficulty of finding unpublished studies (as explained in Appendix A). The current review focused on women in one country only. It looked at papers in Arabic language and English language only. The sample was limited to Saudi women with eating pathology and body image dissatisfaction with no medical issues. The review included papers that used outdated and non-diagnostic tools to measure eating behaviours, eating attitudes, body image and prevalence of eating disorders. Some papers lack major figures like standard deviations (Al-Subaie, 2000) and cut-off points (As-Sa’Edi et al., 2013).

## ﻿Links to wider literature

The limited findings about suggested risk factors are consistent with previous studies investigating the impact of family and friend pressure and media (Derenne & Beresin, 2018; Stice, 2002; Stice et al., 2010). The findings regarding psychological correlates of eating disorders in Saudi Arabia are consistent with Western studies suggesting low self-esteem and anxiety as potential correlates to dieting and eating disorders (Assari & De Freitas, 2018; Laessle et al., 1996). The mental health literature shows that the rates of other disorders in Saudi women are similar to those in the West. For example, the prevalence of depression among female medical Saudi students (Ibrahim et al., 2013) is comparable to the United States and Canada (Dyrbye et al., 2006). The prevalence of anxiety among pregnant women in Saudi Arabia (Alqahtani et al., 2018) is consistent with the United Kingdom (Amiel Castro et al., 2017).

## Research implications

**﻿**This review highlights a major gap in the literature about eating pathology and body image dissatisfaction in women in Saudi Arabia. There are several future research directions regarding investigating levels of eating pathology and body image dissatisfaction, eating disorders prevalence, risk factors and psychological correlates. Future research must use valid and reliable updates measures. It has to be conducted in a structured manner that provides methodological strength. This is important to enable comparison between Saudi figures against other cultures.

Several research directions are needed to understand the internalization of Western experiences for Saudi women and whether or not it has an impact on the levels of eating pathology, body image dissatisfaction and prevalence of eating disorders in the current time of cultural change. For example, it cannot be assumed that the population will internalize Western experience at the same level. Therefore, the level of internalization of Western experience must be assessed by measures that are sensitive to the nature of changes in the Westernization process. We need to know if the internalization of Western experience has an impact on eating pathology and body image or not. If an impact exists, we need to know whether it is direct or not, and what mediators might be involved and to what extent.

A critical gap in knowledge could be filled by reinvestigating the impact of internalization of Western experiences on the levels of eating pathology, body image dissatisfaction and prevalence of eating disorders after several years of cultural change to know if the impact has changed or not.

It would be beneficial to systematically review the levels of eating pathology, body image dissatisfaction and prevalence of eating disorders in women in Saudi Arabia after several years to know whether the literature has developed in this area or not.

# Conclusion

This systematic review aimed to determine levels of eating pathology, body image dissatisfaction, prevalence of eating disorders, potential risk factors, suggested psychological correlates and impact of internalization of Western experiences for women in Saudi. However, the review was not able to fulfil its aims, due to the limited and weak literature. Further research is needed to address those aims, using structured methods and better measures. Only then we can address those concerns. Therefore, the next chapter will investigate the levels of eating pathology, body image dissatisfaction, psychological comorbidities and the impact of Westernization on Saudi women.

Chapter 3. ﻿Eating Pathology and Westernization in Contemporary Saudi Arabia

# Introduction

## Eating pathology and body image

Eating pathology involves disordered eating attitudes and behaviours. Disordered eating attitudes include concerns about body weight and body shape dissatisfaction, to a degree where a person’s self-esteem is based on body shape and weight (Cooper & Fairburn, 1993). Disordered eating behaviours include binge-eating and compensatory behaviours such as vomiting to control body weight and shape.

Body image is associated with eating pathology. Its key elements are how one sees and feels about his/her body. It is affected by many factors, including culture and individual characteristics (Slade, 1994). Moreover, body-related behaviours and cognitions are associated with eating pathology and body image (Waller & Kyriacou Marcoulides, 2013). Such behaviours include body display (intentional presentation of parts of one’s body) and comparison with others’ bodies to judge one’s appearance (Meyer et al., 2011).

Eating pathology is an increasing problem for women around the world. Rates of identified cases have risen, mainly for younger women (Favaro et al., 2003; Hay et al., 2008; Hoek, 2006). The figures in non-Western countries have also increased. For example, the prevalence of binge eating rose from 12.7% to 33.4% and the prevalence of purging climbed from 3.8% to 11.8% in Japan between 1982 and 2002 (Nakai, Nin, & Noma, 2014).

To further comprehend eating pathology and body image across cultures, it is essential to understand related psychological, cognitive, and behavioural factors. These include psychological correlates, such as depression, anxiety and low self-esteem (Assari & DeFreitas, 2018; Forrest & Stuhldreher, 2007).

﻿﻿Eating pathology has a significant impact on sufferers, at multiple levels. It impacts their education and professional growth, family life, and quality of life (Beat, 2015). The mortality rate in anorexia nervosa patients is five times higher than the general population rate (Fichter & Quadflieg, 2016). The estimation of the financial cost of eating disorders in the United Kingdom is nearly ﻿£16.8 billion per annum (Beat, 2015).

The term ‘Western’ is used to define lifestyles, objects, individuals, and ideas that are linked to or imported from countries located in Western, Northern, and Southern Europe, Canada, and the United States (Collins, 2021). A large body of literature about eating and body image issues come from Western cultures. We cannot assume that the findings of Western studies are universal. They cannot explain the changes in non-Western cultures in eating and body image rates during cultural change towards Westernization. Such ‘Westernization’ is defined as a change in social values where individualism moves to replacing collectivism. In simplistic terms, people in individualistic societies identify themselves with success and independence rather than gender-roles and relationships (Tsai, 2000). This study will address the presence and nature of eating pathology in Saudi Arabia, a non-Western culture that is moving to Westernization.

## Eating pathology in Saudi women

Chapter 2 (Literature Review) has shown that the existing data on eating pathology and body image in Saudi Arabia are broadly inadequate. Therefore, to understand this problem in Saudi Arabia, we need to measure levels of eating behaviours, attitudes, body image, body-related behaviours and psychological comorbidities in Saudi women, using contemporary, valid and reliable measures. That will allow us to compare those levels to Western figures. It will also allow us to set valid cut-off points for Saudi samples. Such cut-offs will allow us to identify a high risk group (sensitivity) from others (specificity), giving measures clinical utility (Greve & Bianchini, 2004). These measures should also address comorbid features, to determine whether or not Westernization in Saudi Arabia is related to broader pathology (e.g., mood).

## Influence of Westernization on eating disordersThe prevalence of eating disorders in non-Western countries is lower than that of the Western countries but appears to be increasing.

* The prevalence of eating disorders in non-Western countries is lower than that of the Western countries but appears to be increasing.

Living in a Western country might lead to higher risks of eating disorders, potentially explaining why the prevalence of eating disorders in non-Western countries is lower than Western countries (Makino et al., 2004). However, that difference is not fixed. Westernization in non-Western countries can influence eating disorders. For instance, eating and body image issues have increased in Fiji due to Western media exposure (Becker et al., 2002). Similarly, Curacao's eating pathology levels increased due to socioeconomic changes (Hoek et al., 2005). Women in non-Western countries undergoing Westernization gain more rights, which is a positive development overall. However, we also need to consider the development of control issues, which can be linked to eating disorders (Garner, 1991; Slade et al., 1982).

The question arises of whether it is culture change that is associated with eating pathology and body image, or whether it is the internalization of that change that has the impact on the individual. If it is the cultural change itself that results in more cases of eating disorders, then the whole population should be expected to be affected equally. If it is internalization of that cultural change, then the people should be affected in proportion to their level of internalization. To distinguish these models, it will be important to know the levels of internalization of Western values, eating pathology and body image at present. Establishing such a baseline will also allow the impact of Westernization to be tracked over the coming years.

## Westernization in Saudi Arabia

Saudi Arabia has seen major cultural changes since the latter part of the decade from 2010-2020, resulting in considerable transformations, not only cultural, but also political and social. For local women, this cultural shift has occurred primarily as a result of women’s empowerment and not the influence of Western media. Thus, Westernization, as typically defined, does not account for the continuing cultural changes in the country (Tsai, 2000). The primary purpose of these changes is to move away from conservative, traditional views of the roles and rights of men and women to a more modern perspective. This involves embracing women’s empowerment rather than taking the position that it is a threat to men’s authority, both socially and politically (Arar & Oplatka, 2016; Lefdahl-Davis & Perrone-McGovern, 2015).

For many years, women’s opportunities in the social and organizational spheres have been limited, preventing them from participating in strategic planning, even when they would be capable of doing so (Abalkhail, 2017). Saudi women have not been permitted to travel independently to advance their skills and gain certificates that would enable them to make progress in their careers (Abalkhail, 2017). Old norms dictated that men alone should fill leadership positions and there were no ways for women to advance professionally (Kattan et al., 2016).

However, in 2016, Saudi Arabia launched a framework for national transformation, the Saudi Vision 2030 (Saudi Vision 2030, 2021). This supports cultural change and the role of women in a move towards Westernization, based on the belief that women can contribute to attaining most of the goals of the framework (Saudi Vision 2030, 2021). Therefore, the Vision 2030 could bring an end to the socio-political limitations on women in terms of their professional growth (Saudi Vision 2030, 2021). Today, Saudi Arabia has achieved gender equality in many areas, including education, entrepreneurship, and opportunities for innovation and employment in both the private and public (governmental) sectors (Saudi Vision 2030, 2021). An important milestone came in 2018, when women gained the right to drive. This was followed in 2019 by women being able to travel, register a marriage or birth, and divorce without the involvement of a male guardian. In addition, the first female diplomat was appointed in 2019. In terms of Westernization, the changes that have taken place in Saudi Arabia are greater and differ in fundamental ways from those in other non-Western cultures such as Fiji, where change has mainly been due to exposure to Western television (Becker et al., 2002).

Views of body size and preferences can change as a result of Westernization (Nasser, 1988), with people starting to favour very thin figures (Swami, 2015). This in turn can lead to the internalization of an “ideal” body shape, problems with body image, and eating disorders (Zhang et al., 2018). It is therefore crucial to explore these shifts in values and perceptions and how their internalization affects body issues and eating disorders as they have a critical impact on people’s lives. In addition, studies are needed over the long term, examining the relationship between the influence of Western values on perceptions and the levels of body image issues and disordered eating in the future. It should be noted that only an awareness of disordered eating and body image levels in Saudi Arabia will make this study possible.

There is a lack of literature on issues with eating and associated disorders in Saudi Arabia. In particular, existing research suffers from significant methodological limitations, as shown in the review of the literature in Chapter 2 (see, for example, Al‐Subaie, 2000; Alahmari et al., 2019; As-Sa’Edi et al., 2013; Bano et al., 2013). Therefore, when examining issues related to the potential internalization of Western values with regard to body image and disordered eating, it is important to ensure that studies have sufficient samples and use appropriate measures that have good psychometric properties.

According to Godart et al. (2000), there is an association between psychological disorders, dissatisfaction with body image and eating disorders. In Saudi Arabia, women are undergoing rapid changes that might put them at greater risk of a number of anxiety disorders (Hinrichsen et al., 2003). For example, research suggests that social anxiety is often found in non-Western cultures during culture change (Hsu et al., 2012) and therefore might equally be seen among Saudi women, potentially resulting in issues such as bulimic pathology (Swinbourne et al., 2012).

﻿Islamic teaching suggests that there should not be anorexic eating disorders since it prohibits hunger and harm to the human body: “Do not throw your selves into lethality by your own hand” (The Quran, 2016a); “Oh God, I seek refuge in You from hunger, for it is the misery of the lost” (Sunnah, 2020a). Moreover, beauty in Arabic society is traditionally associated with a fuller figure and not extreme slimness (Khaled et al., 2018). However, binge and bulimic eating pathology could be prevalent. The reason is the normalization of overeating due to serving large amounts of food in social gatherings, before the process of Westernization (Al-Khudairy et al., 2014; Sobh et al., 2013). Although there does not seem to be an association between Westernization and overeating, there is likely an impact on dissatisfaction with body image and related behaviours (Zhang et al., 2018).

Research has identified a link between affective state – mood – and body image and disordered eating in young women studying at undergraduate level (Celikel et al., 2008; ﻿Katsounari, 2009; Liao et al., 2010). This highlights the need to investigate factors influencing the mood state of Saudi women, such as sources of stress, which might in turn lead to problems with body image and eating disorders. Women’s lives are affected by specific stressors. For example, despite women and men being equal in the eyes of Islam (“And women have rights similar to their obligations”, The Quran, 2016b; “Act kind to women”, Sunnah, 2020b), women have by far the greater burden in the home since traditionally their role has been to take responsibility for the household (Tirnoveanu, 2015). Added to this, the Vision 2030 views women as playing a crucial part in the transformation of the nation (Saudi Vision 2030, 2021), with a particular emphasis on the role of the younger generation in fulfilling the goals. This could present additional stressors for female undergraduates as they take on additional roles, particularly as they may at the same time be adopting certain Western values incorporated in the Vision 2030 (Saudi Vision 2030, 2021), potentially increasing the risk of body image issues and disordered eating.

## Aims

* To investigate the levels of eating pathology among women in Saudi Arabia and compare them with those in Western cultures.
* To investigate the levels of body image dissatisfaction among women in Saudi Arabia, and compare them with those in Western cultures.
* To investigate the psychological correlates of eating pathology and body image dissatisfaction in women in Saudi Arabia and compare them with those in Western cultures.
* To examine the links between levels of eating pathology and body image with other measures of eating pathology, body image, and psychological comorbidities.
* To investigate the level of internalization of Western values in women in Saudi Arabia, and its’ relations with eating pathology, body image, and psychological comorbidities.
* To investigate the factors that might explain the associations between internalization of Western values and eating and body problems in Saudi women.

## Hypotheses

1. Eating pathology levels will be comparable with those in Western cultures, and the Saudi pattern will be more bulimic than anorexic (Aim 1).
2. Body image dissatisfaction and body-related behaviours rates will comparable with those in Western cultures (Aim 2).
3. Psychological comorbidity levels will be comparable with those in Western cultures (Aim 3).
4. Levels of eating pathology and body image dissatisfaction will be associated with other measures of eating pathology, body image dissatisfaction, and psychological comorbidity (Aim 4).
5. Internalization of Western values will be linked to eating pathology, body image, and psychological comorbidity (Aim 5).
6. Psychological comorbidities will mediate the impact of internalization of Western values on eating pathology and body image (Aim 6).

The first hypothesis (comparability of Saudi and Western populations in levels of eating pathology but a greater likelihood of bulimic presentations) requires particular consideration of the current rapid cultural changes in Saudi Arabia that might have an impact on eating and body image issues in women. While it is not possible to assume that eating pathology and body image levels in Saudi women would have been comparable to Western samples in the past, those cultural changes towards westernisation make it more likely that the two cultures’ prevalence levels will be similar now.

However, it is important to note that some aspects of the Saudi culture might be protective against eating and body image issues or might shape the presentation of those issues. For example, the Saudi population is predominantly culturally homogeneous in terms of religion (Islam) and ethnicity (Arab). Therefore, religious conflict and control issues are less likely, while the Arabic ethnicity is suggested to protect against eating pathology and body image dissatisfaction (Barakat et al., 2014; Worldatlas, 2020).

Explaining the prediction of lower levels of anorexia nervosa presentation and greater levels of bulimic patterns also requires consideration of Arabic culture. In particular, Arabic beauty norms have long favoured a fuller figure for women (Musaiger et al., 2000), so there might be less drive for restrictive eating patterns. Also, Islamic teachings consider starvation as a dangerous action that could damage human life (“Do not throw your selves into lethality by your own hand” - The Quran, 2016a; “Oh God, I seek refuge in You from hunger, for it is the misery of the lost” - Sunnah, 2020a). Thus starvation is less culturally valued in Saudi. It is also important to note that Saudi hospitality customs focus on the importance of offering and accepting food, making overeating more likely, but the interaction with body image concerns is likely to promote purging behaviours. Thus, against the background of high levels of unhealthy eating attitudes and body image, restrictive presentations are less likely, while bulimic behaviours are more likely to manifest.

To summarise, the westernization process includes political and economic empowerment to women in Saudi Arabia. While the introduction of western values to women’s lives can be a great empowerment, it should not be forgotten that the associated cultural changes can have negative impacts on mental health (Garner et al., 1980; Heinberg & Thompson 1992). It is argued that women in non-western countries might suffer from issues of control and body image focus, which can contribute to eating disorders (Garner, 1991; Slade et al., 1982). However, those cultural factors can manifest in different behavioural patterns.

# Methods

## Ethical approval

This project was approved by the University of Sheffield’s Ethics Review Procedure (Psychology Department) and by the Scientific Research Ethics Committee in Princess Noura bint Abdulrahman University (Basic Sciences Department). Participants were given an information sheet (see Appendix 3.1) and were asked to provide informed consent (see Appendix 3.2).

## Design

The study used a cross-sectional survey design, including correlational and comparative elements, and a mediational analysis.

## Participants

773,501 of 948,271 young Saudi women (age 20-24) are undergraduate students (Ministry of Education, 2020). They represent 81.6% of the total female population in this age group (General Authority of Statistics, 2020).

The sample was 504 female undergraduates from different community college departments in Princess Noura bint Abdulrahman University, a public university in Riyadh, Saudi Arabia. We sent an invitation email to all the departments, who circulated it to 1843 students. 27% of 1843 students responded to the email. Participation was voluntary, so therefore the participants self-selected. Of the 504 participants, one participant was excluded because her responses indicated impossible patterns of behaviour. Thus, 503 participants were included in the study ﻿(M age = 19.78 years, SD = 2.05), age range = 18-49. 99.2% were Saudis, and 0.8% were from other Arabic countries. Their reported weight and height gave them a mean body mass index (BMI) of 23.44 (SD = 5.51, minimum = 14.09, maximum = 55.78).

The necessary sample size was calculated for cross-sectional studies investigating prevalence (Pourhoseingholi et al., 2013). ﻿ Based on 10% expected eating disorders prevalence (Ward et al., 2019), 5% precision, 95% confidence level, and an estimated accuracy of 4%, 259 participants were needed. That target was increased by 20% to compensate for no response. Thus, the study was sufficiently powered, with N = 503.

## Measures

To address the aims, we measured: eating attitudes and behaviours; body image dissatisfaction; body-related behaviours; depression; social anxiety; self-esteem; and internalization of Western values. All measures were translated from English to Arabic, and back-translation was used to ensure this process's accuracy.

**Eating Disorder Examination-Questionnaire (EDE-Q, version 6.0).** The EDE-Q is a widely used self-report measure of disordered eating attitudes and behaviours (Fairburn & Beglin, 2008). See Appendix 3.3. It contains 28 items examining disordered eating in the past 28 days. It includes four subscales: dietary restraint EDE-Q-R (5 items); eating concerns EDE-Q-EC (5 items); weight concerns EDE-Q-WC (5 items); and shape concerns EDE-Q-SC (8 items). All attitudinal items are rated on a seven-point Likert scale (range = 0-6). Behavioural items (e.g., bingeing, vomiting) are rated for frequency. The Global EDE-Q score (mean of the four attitudinal scores) was used in this study. Higher scores indicate greater eating pathology. The EDE-Q can be used with clinical and non-clinical populations, and it is validated with both populations (Carter et al., 2001; Mond et al., 2004). ﻿ ﻿It has good psychometric properties. The Global EDE-Q score internal consistency in this study was (α = 0.80), compared to Peterson and colleagues (2007) (α = 0.90), and a recent study with a Saudi sample by Melisse and colleagues (2021) (α = 0.93).

In this study, the internal consistency values achieved for EDE-Q-R, EDE-Q-WC, EDE-Q-EC, and EDE-Q-SC were (α = 0.81, 0.70, 0.71, and 0.83 respectively), compared to (α = 0.80, 0.89, 0.86, and 0.95 respectively) in Isomaa et al.’s (2016) study and (α = 0.81, 0.83, 0.69, and 0.84 respectively) in Melisse et al.’s (2021) study. EDE-Q has high test-retest reliability, with significant correlations for EDE-Q-R, EDE-Q-SC, EDE-Q-WC and EDE-Q-EC ﻿(r = .81, .87, .92, .94, p < .001) (Luce & Crowther, 1999), and strong validity in clinical and non-clinical populations (﻿Fairburn & Beglin, 1994; Mond et al., 2004). The mean global EDE-Q score in this study was 1.92 (SD = 1.28), consistent with ﻿the value for Western non-clinical populations of 1.59 (SD = 1.32) (Mond et al., 2006). The EDE-Q was validated by comparing the scores of people who scored above or below the cut-off score on the rest of the study measures.

**Body Shape Questionnaire (BSQ-8C).** The BSQ-8C is a short version of the full Body Shape Questionnaire (Evans & Dolan, 1993) to assess body image dissatisfaction. It is an eight-item self-report survey, targeting body satisfaction during the past four weeks. It shows a high internal consistency ( .93), which is comparable to (α = .91) in Pook et al. (2008). The BSQ-8C has high test-retest reliability (r = .95), and high convergent validity (r = .90, p < .001). The questionnaire is suitable for clinical and non-clinical samples (Welch et al., 2012). The validation of the BSC-8C was done by comparing the scores of those who scored above or below the cut-off point (25) on the other research measures. (See Appendix 3.4.)

**Body-Related Behaviours Scale (BRBS).**The 38-item BRBS (Amin et al., 2014) assesses behaviours and related cognitions relating to four body-related behaviours: Body Checking (e.g., “ I believe that checking my appearance ensures that I kept control of my weight”); Body Avoidance (e.g., “I tend to look away if I catch sight of my reflection or if I see a photograph of myself”); Body Comparison (e.g., “If I see someone who looks slim, then I tend to see myself as fat”); and Body Display (e.g., “I like to feel that others have a good idea of how well I can control my body”). It can be used with clinical and non-clinical samples because it is validated with both populations (Amin et al., 2014; Meyer et al., 2011). It had a high internal consistency in this study (α = .86, .89, .90, .80) for Checking, Avoidance, Comparison and Display respectively. The study sample's reliability is similar to Meyer et al.’s (2011) ( = .84, .88, .84, .76) for Checking, Avoidance, Comparison and Display respectively. Higher scores indicate greater levels of body-related behaviours and cognitions. See Appendix 3.5.

**Brief Version of the Fear of Negative Evaluation Scale (BFNE).** The BFNE (Leary, 1983) measures anxiety related to perceived negative evaluation. It contains 12 items assessing anxiety cognitions. ﻿Each item is rated on a 5-point Likert scale, ranging from 0 (Not at all characteristic of me) to 4 (Extremely characteristic of me). It is divided into two subscales - subscale 1 contains eight items describing the presence of fear or worrying; subscale 2 contains four items relating to the absence of fear or worrying. The scores of these two subscales are highly correlated with the total score, which results in a higher order factor ﻿(r = .91 for Subscale 1 and r = .72 for Subscale 2) (Weeks et al., 2005). It is a valid scale suitable for the community and clinical populations (Leary, 1983; Weeks et al., 2005). The BFNE shows a significant difference between clinical and control populations (p < .001) and a significant correlation with social anxiety measures (p < .001) (Weeks et al., 2005). ﻿It has high internal consistency, the Cronbach’s alpha of the overall scale in this study was α = .872 compared with Weeks and colleagues (2005) α = .81, and it has good test-retest reliability (*r* = .75) (Leary, 1983). We used a version that was already translated into Arabic (Alkhawaja, 2019). (See Appendix 3.6.)

**Patient Health Questionnaire (PHQ-9).** ﻿ The PHQ-9 (Löwe et al., 2004) was used to assess depression during the past two weeks. ﻿It has nine items, where answers are given on a Likert-type scale ranging from 0 (not at all) to 3 (nearly every day). The items correspond with each of the nine depression criteria in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). The items investigate the frequency of depressive symptoms such as poor appetite or overeating, thoughts of death or hurting oneself. Higher scores indicate greater levels of depression. ﻿The PHQ-9 has strong psychometric properties. The overall scale's internal consistency in this study was α = .888, which is equal to Zuithoff et al.’s (2010) α = .88. It has a high test-retest reliability (r = 0.94) (Zuithoff et al., 2010). We used a version that was already translated into Arabic (Sawaya et al., 2016). (See Appendix 3.7.)

**Rosenberg Self-Esteem Scale (RSES).** The RSES is a 10-item self-report scale that assesses positive and negative feelings about the self (Rosenberg, 1965). All items are answered using a four-point Likert scale format, ranging from strongly agree to strongly disagree. The RSES can be used with clinical and community populations. The internal consistency in this study was α = .761 compared to Sinclair et al.’s (2010) α = .91. The total score is the total of all items scores (range = 10-40). A higher score indicates lower self-esteem. We used a version that was already translated into Arabic (Zayed et al., 2019). (See Appendix 3.8.)

**Internalization of Western Values Scale (IWVS).** The IWVS is a self-reported scale that we created for this study. It contains 11 items that measure the internalization of Western values relevant to women in Saudi Arabia during the present cultural changes. It contains three subscales: Political (items 1, 10 and 11 - α = .580); Economic (items 6, 7, 8 and 9 - α = .716); and Media (items 2, 3, 4 and 5 - α = .507). The IWVS has an acceptable internal consistency for the overall scale in this sample α = .711. The omission of items did not alter the scale’s reliability. The mean overall score for this study was 6.13 (SD = 2.56).

The items were created to assess the internalization of the social and political changes that have been mentioned above (e.g., women can travel by themselves, drive vehicles, and have a political voice). The items contain statements reflecting behaviours that participants either can or cannot do. Thus, the responses are categorical.

The responses are scored 1 for “yes” and 0 for “no”. The total score is the total of scores on all the items (range = 0-11). A higher score indicates higher internalization of Western values. Appendix 3.9 presents the scale items and participants’ responses in this study.

## Procedure

Following initial email contact, participants accessed the survey (using Qualtrics software). ﻿At the start of the study, participants gave informed consent (see Appendices 3.1 and 3.2). They then answered demographic questions and completed the study measures in one session. Data collection took place in March 2019. The studies used for comparison purposes were chosen because they used the same measures as those used in this study, with a comparable sample in terms of gender and age group.

## Data analysis

﻿ SPSS (v.24) was used for all descriptive and inferential data analyses. There were no missing data because all items had to be completed. BMI was calculated in SPSS using the formula (BMI = kg/m2) where kg is the reported weight in kilograms and m2 is the reported height in metres squared. The following analyses were carried out to address our aims and test our hypotheses:

**Hypothesis 1.** Descriptive and comparative analysis were used to compare levels and distribution of eating pathology by comparing means, standard deviations, and percentiles for the Saudi sample against Western norms from a British sample (Tatham et al., 2015) and a Finnish sample (Isomaa et al., 2016). Inferential analysis was used to validate the EDE-Q using independent sample t-tests to compare those who scored above or below the Global EDE-Q cut-off point.

**Hypothesis 2.** Descriptive and comparative analysis were used to compare levels and distribution of body image dissatisfaction by comparing means, standard deviations, and percentiles for the Saudi sample against samples from Sweden (Welch et al., 2012) and the United Kingdom (Meyer et al., 2011). Inferential data was used to validate the BSQ-8C using independent sample t-tests to compare those who scored above or below the BSQ-8C cut-off point.

**Hypothesis 3.** Descriptive and comparative analysis were used to compare levels of comorbidities by comparing means and standard deviations of the Saudi sample against samples from the United States (Keum & Inkelas, 2018; Leary, 1983; Sinclair et al., 2010).

**Hypothesis 4.** Inferential analysis was used to assess the correlation between eating pathology and body image levels with other measures using Pearson's *r.*

**Hypothesis 5.** Inferential analysis was used to assess the correlation between internalization of Western values with other measures using Pearson's *r*.

**Hypothesis 6.** Mediation analysis was used to examine the influence of internalization of Western values on eating pathology and body as mediated by depression and social anxiety by Hayes’s (2017) mediational method.

# Results

## Levels of eating pathology among women in Saudi Arabia (Hypothesis 1)

Comparison of means and standard deviations of EDE-Q for Saudi women against Western cultures (Hypothesis 1). Table 1 shows the Saudi sample scores relative to the comparable Western samples on EDE-Q Global score, EDE-Q subscales, bingeing and compensatory behaviours. The two samples had similar EDE-Q Global scores, but the Saudi group tended to have higher levels of bingeing and compensatory behaviours.

Table 1. Levels of eating pathology for Saudi sample against a British sample (Tatham et al., 2015) and a Finnish sample ﻿(Isomaa et al., 2016).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Measures | Saudi Sample | | Other Samples | | Source |
| M | (SD) | M | (SD) |
| EDE-Q Global | 1.92 | (1.28) | 1.61 | (1.32) | (Tatham et al., 2015) |
| EDEQR | 1.37 | (1.54) | 1.59 | (1.44) | (Tatham et al., 2015) |
| EDEQWC | 2.35 | (1.44) | 1.99 | (1.62) | (Tatham et al., 2015) |
| EDEQEC | 1.07 | (1.15) | 1.07 | (1.31) | (Tatham et al., 2015) |
| EDEQSC | 2.49 | (1.54) | 1.79 | (1.47) | (Tatham et al., 2015) |
| Binge frequency | 3.47 | (6.12) | 2.57 | (1.96) | (Tatham et al., 2015) |
| Vomit | 0.64 | (3.19) | 0.01 | (0.12) | ﻿(Isomaa et al., 2016) |
| Laxatives | 0.58 | (3.15) | 0.19 | (1.25) | ﻿(Isomaa et al., 2016) |
| Exercise | 5.17 | (12.55) | 0.42 | (2.48) | ﻿(Isomaa et al., 2016) |

Notes: EDE-Q Global, Eating Disorders Examination Questionnaire Global score. Behaviours are per 28 days.

Comparison of the distribution of eating pathology among Saudi and Western women (Hypothesis 1).Table 2 shows the percentile EDE-Q Global scores for this Saudi sample and the United Kingdom sample (Tatham et al., 2015). At the lower end, the Saudi women score higher than the United Kingdom sample. In contrast, their scores were more similar at and above the 90th centile.

The hypothesis that eating pathology levels will be comparable with those in Western cultures, and the Saudi pattern will be more bulimic than anorexic (Hypothesis 1) was supported by the findings in Table 1 and Table 2.

Table . Centile EDE-Q Global scores for the Saudi and UK samples

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Percentile | 25th | 50th | 75th | 90th | 95th | 99th |
| Saudi Arabia | 0.81 | 1.66 | 2.90 | 3.72 | 4.21 | 5.04 |
| UK | 0.49 | 1.27 | 2.47 | 3.62 | 4.30 | 5.20 |

Validation of EDE-Q cut-off point for Saudi women (Hypothesis 1). It can be useful to understand if there is a cut-off point that determines whether some people are at high risk of developing eating pathology, body image dissatisfaction, and potential psychological correlates. To determine if the score of 2.9 (75th centile) is a useful cut-off point for the EDE-Q Global score in the Saudi sample, the next analysis (Table 3) considers whether people who score above vs below that point differ significantly in their levels of eating, body image, and comorbid problems. The table shows that a score of 2.9 or above on the EDE-Q Global can have clinical meaning for women in Saudi Arabia. It is associated with higher levels of pathology on all the other indices.

Table . Scores on eating pathology, body image, and psychological correlates scores for Saudi women who score above or below a cut-off EDE-Q Global score of 2.9.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Measures | Low EDE-Q  (N = 377) | | High EDE-Q  (N = 126) | | t-value | p-value |
|  | Mean | (SD) | Mean | (SD) |
| Eating variables | | | | | | |
| EDEQR | .82 | (1.04) | 3.39 | (1.45) | 18.29 | .001 |
| EDEQWC | 1.85 | (1.14) | 4.17 | (.84) | 24.14 | .001 |
| EDEQEC | .65 | (.73) | 2.75 | (1.11) | 19.82 | .001 |
| EDEQSC | 1.93 | (1.17) | 4.56 | (.80) | 27.98 | .001 |
| Binge frequency | 2.86 | (5.86) | 5.30 | (6.51) | 3.92 | .001 |
| Binge days | 2.41 | (4.85) | 5.03 | (6.68) | 4.06 | .001 |
| Vomit | .29 | (2.19) | 1.67 | (4.99) | 2.98 | .0015 |
| laxatives | .16 | (1.69) | 1.81 | (5.40) | 3.36 | .0015 |
| Exercise | 2.91 | (6.49) | 11.96 | (21.07) | 4.74 | .001 |
| BMI | 22.40 | (4.75) | 26.56 | (6.40) | 6.68 | .001 |
| Body image | | | | | | |
| Body image dissatisfaction | 14.35 | (7.16) | 29.98 | (7.83) | 19.7 | .001 |
| Checking | .95 | (.69) | 2.10 | (.83) | 13.88 | .001 |
| Avoidance | .55 | (.63) | 1.64 | (1.04) | 11.05 | .001 |
| Comparison | .78 | (.82) | 2.08 | (1.12) | 11.97 | .001 |
| Display | 1.35 | (.78) | 1.81 | (.86) | 5.53 | .001 |
| Psychological correlates | | | | | | |
| Social anxiety | 25.06 | (9.25) | 32.26 | (10.9) | 6.63 | .001 |
| Depression | 8.26 | (5.82) | 14.48 | (6.16) | 10.22 | .001 |
| Self-esteem | 18.86 | (4.47) | 22.50 | (5.40) | 7.47 | .001 |

Note: BMI, Body Mass Index.

## Levels of body image dissatisfaction among women in Saudi Arabia (Hypothesis 2)

BSQ-8C and BRBS scores for the Saudi women relative to the Western sample (Hypothesis 2). Table 4 shows the comparison between Saudi sample and comparable Western samples on body image dissatisfaction levels and body-related behaviours. Saudi women scored similarly to Western women on body dissatisfaction and body-related behaviours (except for display, where Saudi women scored higher).

Table . BSQ-8C and BRBS scores of Saudi sample against a comparable sample from Sweden and the United Kingdom

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Measures | Saudi Sample | | Other Samples | | Resource |
| M | (SD) | M | (SD) |
| BSQ-8C | 18.26 | (9.98) | 20.00 | (10.00) | (Welch et al., 2012) |
| Checking | 1.24 | (0.88) | 1.00 | (0.69) | (Meyer et al.,2011) |
| Avoidance | 0.82 | (0.89) | 0.65 | (0.62) | (Meyer et al.,2011) |
| Comparison | 1.11 | (1.06) | 1.22 | (0.87) | (Meyer et al.,2011) |
| Display | 1.46 | (0.82) | 0.87 | (0.50) | (Meyer et al.,2011) |

Note: BSQ-8C, Body Shape Questionnaire.

Distribution of body image dissatisfaction among women in Saudi Arabia against Western women (Hypothesis 2). Table 5 compares the body image scores at different centile points for women in Saudi Arabia and women in Sweden (Welch et al., 2012) at the same percentile. (Welch et al. did not provide the 25th percentile scores). As seen above, Saudi women had similar eating pathology and body image dissatisfaction levels with Western norms in the exception of eating behaviours and display where they score higher. The hypothesis that Saudi and Western women will have comparable levels of body image dissatisfaction and body-related behaviours (Hypothesis 2) was supported by the findings in Table 4 and Table 5.

Table . BSQ-8C centile scores for Saudi women and Swedish women

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Percentile | 5th | 10th | 15th | 50th | 75th | 90th | 95th |
| Saudi Arabia | 7 | 7.4 | 8 | 15 | 25 | 35 | 39 |
| Sweden | 8 | 9 | 12 | 18 | 26 | 36 | 40 |

Validation of BSQ-8C cut-off point for Saudi women (Hypothesis 2). To test the potential utility of the 75th centile BSQ-8C score (score = 25) in the Saudi population, those scoring 25+ were compared with the lower scorers on measures of eating, body-related behaviours and other psychological measures. Table 6 shows that those at or above the 75th centile in terms of body dissatisfaction were also distinguished by greater pathology levels on all the other indices.

Table . Comorbid pathologies for those with a higher score (≥ 25) on the BSC-8C.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Measures | Low  (N = 368) | | High  (N = 135) | | t-value | p-value |
|  | Mean | (SD) | Mean | (SD) |
| Eating variables | | | | | | |
| EDE-Q Global | 1.40 | (.96) | 3.34 | (.94) | 20.07 | .001 |
| EDEQR | 1.00 | (1.33) | 2.74 | (1.59) | 11.28 | .001 |
| EDEQWC | 1.91 | (1.23) | 3.87 | (1.07) | 17.33 | .001 |
| EDEQEC | .70 | (.83) | 2.47 | (1.26) | 15.07 | .001 |
| EDEQSC | 1.97 | (1.24) | 4.27 | (1.08) | 20.22 | .001 |
| Binge frequency | 2.51 | (5.2) | 6.09 | (7.49) | 5.10 | .001 |
| Binge days | 2.28 | (4.63) | 5.20 | (6.90) | 4.55 | .001 |
| Vomit | .32 | (2.20) | 1.50 | (4.88) | 2.713 | .0035 |
| Laxatives | .04 | (.32) | 2.04 | (5.82) | 3.97 | .001 |
| Exercise | 3.58 | (8.56) | 9.53 | (19.06) | 3.50 | .001 |
| BMI | 22.11 | (4.67) | 27.11 | (5.98) | 8.71 | .001 |
| Body related behaviours | | | | | | |
| Checking | .97 | (.73) | 1.97 | (.86) | 11.93 | .001 |
| Avoidance | .50 | (.57) | 1.70 | (1.01) | 12.98 | .001 |
| Comparison | .76 | (.82) | 2.05 | (1.08) | 12.52 | .001 |
| Display | 1.37 | (.79) | 1.71 | (.87) | 4.08 | .001 |
| Psychological correlates | | | | | | |
| Social anxiety | 24.79 | (9.15) | 32.53 | (10.72) | 7.45 | .001 |
| Depression | 8.25 | (5.75) | 14.10 | (6.46) | 9.25 | .001 |
| Self-esteem | 18.60 | (4.29) | 22.97 | (5.30) | 8.60 | .001 |

Notes: EDE-Q Global, Eating Disorders Examination Questionnaire Global score. Behaviours are per 28 days; BMI, Body Mass Index.

## Psychological correlates of eating pathology and body image in Saudi women (Hypothesis 3)

Scores on BFNE, PHQ-9 and RSES for Saudi women and Western women (Hypothesis 3).Table 7 shows the comparison between Saudi sample and comparable samples from Western culture on levels of social anxiety, depression and self-esteem. Saudi women scored slightly lower in psychological comorbidities than women from Western culture. The hypothesis that Saudi and Western women will have comparable levels of psychological comorbidities (Hypothesis 3) was supported by the findings in Table 7.

Table 7. Levels of BFNE, PHQ-9 and RSES for the Saudi and a comparable sample from Western culture

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Measures | Saudi Sample | | Other Samples | | Resource |
| M | (SD) | M | (SD) |
| Social anxiety | 26.8 | (10.18) | 35.7 | (8.10) | (Leary, 1983) |
| Depression | 9.82 | (6.49) | 15.62 | (5.53) | (Keum & Inkelas, 2018) |
| Self-esteem | 19.77 | (4.97) | 22.79 | (5.41) | (Sinclair et al., 2010) |

## Correlations between levels of eating pathology and body image with other measures of eating pathology, body image, and psychological comorbidities (Hypothesis 4)

Correlation analysis (Pearson’s r) between the EDE-Q Global and BSQ-8C scores and the study scales were used to determine whether levels of eating pathology and body image have links with disordered eating, body image, and emotional comorbidities (Hypothesis 4). Table 8 shows the associations between levels of eating pathology (EDE-Q Global score) and body dissatisfaction (BSQ-8C score) with psychological correlates in Saudi women. Eating pathology and body image dissatisfaction were related to eating variables, body image measures, and potential psychological correlates. The hypothesis that levels of eating pathology and body image dissatisfaction will be associated with other measures of eating, body image, and comorbidities (Hypothesis 4) was supported by the findings in Table 8.

Table . Correlations (Pearson’s r) of the EDE-Q Global and BSQ-8C scores with other indices of eating, body image, and comorbidity

|  |  |  |
| --- | --- | --- |
| Measures | EDE-Q Global | BSQ-8C |
| Eating variables | | |
| EDE-Q Global | - | .807\*\* |
| EDEQR | .825\*\* | .568\*\* |
| EDEQWC | .902\*\* | .744\*\* |
| EDEQEC | .843\*\* | .714\*\* |
| EDEQSC | .918\*\* | .798\*\* |
| Binge frequency | .235\*\* | .268\*\* |
| Binge days | .217\*\* | .242\*\* |
| Vomit | .203\*\* | .189\*\* |
| Laxatives | .274\*\* | .262\*\* |
| Exercise | .327\*\* | .247\*\* |
| BMI | .442\*\* | .480\*\* |
| Body image | | |
| Checking | .635\*\* | .581\*\* |
| Avoidance | .607\*\* | .682\*\* |
| Comparison | .629\*\* | .632\*\* |
| Display | .300\*\* | .202\*\* |
| Psychological correlates | | |
| Social anxiety | .391\*\* | .411\*\* |
| Depression | .446\*\* | .463\*\* |
| Self-esteem | .375\*\* | .426\*\* |

\*\* Correlation is significant at the 0.01 level.

Notes: EDE-Q Global, Eating Disorders Examination Questionnaire Global score. Behaviours are per 28 days; BMI, Body Mass Index.

## Internalization of Western values among Saudi women: Association with eating, body image and psychological pathologies (Hypothesis 5)

Correlation analysis (Pearson’s r) was used between IWVS score and the study scales to determine if Westernization has links with disordered eating, body image, and emotional comorbidities (Hypothesis5). The analysis shows that internalization of Western values is associated with eating concerns (EDE-Q Global score) and compensatory behaviours (except for binge-eating), but not with BMI, as shown in Table 9. IWVS score is linked with body image and most body-related behaviours but not with display. Lastly, internalization of Western values was related to depression and social anxiety, but not with self-esteem. In brief, the more Saudi women internalize Western values, the more likely they have eating and related problems.

For the most part, the impact of internalization of Western political, economic and media values on eating pathology, body image dissatisfaction and psychological comorbidities is relatively weak, as seen in Table 9. The most significant influence is for the internalization of Western media and economic values, whilst internalization of Western political values seems to have a lower impact. The hypothesis that levels of internalization of Western values will be associated with eating pathology, body image and comorbidities (Hypothesis 5) was supported (Table 9).

Table . Correlations between Internalization of Western Values scale and subscales scores with measures of eating pathology, body image, and associated states

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | IWVS Global score  r | Political-  subscale  r | Economic-  subscale  r | Media-  subscale  r |
| **Eating variables** | | | | |
| EDE-Q Global | .167\*\* | .053 | .161\*\* | .138\*\* |
| EDEQR | .160\*\* | .084 | .117\*\* | .144\*\* |
| EDEQWC | .135\*\* | .032 | .157\*\* | .090\* |
| EDEQEC | .148\*\* | .054 | .128\*\* | .133\*\* |
| EDEQSC | .139\*\* | .015 | .159\*\* | .114\* |
| Binge frequency | .087 | .103\* | .082 | .004 |
| Binge days | .077 | .005 | .088\* | .065 |
| Vomiting | .127\*\* | .074 | .083 | .119\*\* |
| Laxatives | .122\*\* | .072 | .069 | .126\*\* |
| Exercise | .151\*\* | .115\*\* | .074 | .146\*\* |
| BMI | .070 | .045 | .069 | .034 |
| **Body image** | | | | |
| Body dissatisfaction | .184\*\* | .091\* | .139\*\* | .166\*\* |
| Checking | .192\*\* | .132\*\* | .135\*\* | .151\*\* |
| Avoidance | .127\*\* | .004 | .150\*\* | .106\* |
| Comparison | .131\*\* | .018 | .156\*\* | .097\* |
| Display | .079 | .056 | .047 | .072 |
| **Psychological correlates** | | | | |
| Social anxiety | .205\*\* | .094\* | .187\*\* | .155\*\* |
| Depression | .178\*\* | .065 | .177\*\* | .134\*\* |
| Self-esteem | .069 | -.043 | .065 | .119\*\* |

\*\* Correlation is significant at the 0.01 level.

Notes: EDE-Q Global, Eating Disorders Examination Questionnaire Global score. Behaviours are per 28 days; BMI, Body Mass Index.

## 

## Mediators of the associations between internalization of Western values and eating pathology and body image (Hypothesis 6)

Mediational analysis was used to test the relationship between internalization of Western values and eating pathology and body image dissatisfaction, as mediated by depression and social anxiety (Hypothesis6). Table 9 shows that internalization of Western values (IWVS) is significantly associated with eating pathology (EDEQ Global) and body image (BSQ-8C). To understand those associations, it was hypothesized that these relationships would be explained by mediating roles of mood states (depression and social anxiety). Hayes’s (2017) mediational method was used to test each of these two models.

Considering the impact of IWVS scores on EDE-Q Global scores, Figure 1 shows that the relationship between the two was mediated by significant effects of both social anxiety and depression. However, there was still a significant role of IWVS scores, indicating partial rather than perfect mediation. The same applied to BSQ-8C scores (Figure 2), though the residual effect of the IWVS scores narrowly failed to reach significance. To summarize, social anxiety and depression appear to partially mediate the impact of internalization of Western values on eating and body image pathology.

Therefore, the hypothesis that psychological comorbidities will mediate the influence of internalization of Western values on eating pathology and body image (Hypothesis 6) was supported by the findings in Figure 1 and Figure 2.

Depression (PHQ-9)

Internalization of Western values (IWVS)

Beta = .065, p < .0001

Eating pathology (EDE-Q Global)

Beta = .031, p = .019

Beta = .273, p < .0001

Social anxiety (BFNE)

Figure . Mediational analysis for the relationship between internalization of Western values and eating pathology, as mediated by depression and social anxiety.

Notes: PHQ-9, Patient Health Questionnaire; EDE-Q Global, Eating Disorders Examination Questionnaire Global score; BFNE, Brief Version of the Fear of Negative Evaluation Scale; IWVS, Internalization of Western values Scale.

Depression (PHQ-9)

Internalization of Western values (IWVS)

Body dissatisfaction (BSQ-8C)

Beta = .290, p = .051

Beta= .516, p < .0001

Beta = .225, p < .0001

Social anxiety

(BFNE)

Figure . Mediational analysis for the relationship between Internalization of Western values and body image dissatisfaction as mediated by depression and social anxiety

Notes: PHQ-9, Patient Health Questionnaire; BSQ-8C, Body Shape Questionnaire; BFNE, Brief Version of the Fear of Negative Evaluation Scale; IWVS, Internalization of Western values Scale.

# Summary

1. Women in Saudi Arabia have similar eating pathology, body image, and psychological comorbidities levels as those from Western societies, though the pathology is more bulimic than anorexic (Hypotheses 1, 2, and 3).
2. Eating and body image issues are linked to related comorbidities (Hypothesis 4).
3. Internalization of Western values is associated with more pathological eating, body image and psychological comorbidities (Hypothesis 5).
4. The impact of internalization of Western values on eating and body image pathology appears to be partially mediated by social anxiety and depression (Hypothesis 6).

# Discussion

To the best of the authors’ knowledge, this is the first study of levels of eating pathology, body image dissatisfaction and psychological correlates among undergraduate women in Saudi Arabia in comparison to Western norms. It is also novel because it assessed the level of internalization of Western values in Saudi women and whether or not that internalization was related to eating pathology and body image. We also examined whether or not psychological comorbidities mediate the impact of internalization of Western values on eating pathology and body image, although it must be acknowledged that the data are cross-sectional rather than longitudinal, thus limiting that conclusion.

The results show similarities in levels of eating pathology, dissatisfaction with body image and comorbidity among Saudi and Western women. However, as assumed, it appears that there is greater over-eating and compensatory behaviour among Saudi women, which can be attributed to the known tendency to over-eat in Saudi Arabia (Al-Khudairy et al., 2014; Sobh et al., 2013). Although it is important to show a guideline of how the pathology levels look like in other Western samples, it is too early to infer anything regarding similarities or differences between Saudi and Western eating pathology levels, particularly as the data were collected under very different circumstances and as the data for the Saudi sample might be argued to be subject to further change during the Westernisation process. Therefore, we did not conduct a comparative analysis (t-test) to compare means for the two groups. The psychological comorbidities with body image issues and disordered eating are the same in Saudi and Western samples (Assari & Defreitas, 2018; Hinrichsen et al., 2004; Slade, 1994). Finally, the results show relationships between the internalization of Western values and issues with body image, disordered eating, and comorbidities, but not binge eating or low self-esteem.

The comparison of levels of eating and related issues and the associations with westernization (Becker, 2004; Jackson et al., 2006) show that during this period of cultural change, Saudi women are experiencing a rather Western form of eating and body image issues more than women in other non-Western countries, especially when those women are internalizing Western values. We could not compare with Saudi data due to the lack of similar studies to date.

The proposed cut-off points for eating pathology and body image measures among Saudi women were validated by their clinical utility. As assumed, internalization of Western values was linked to eating pathology and body image, with depression and social anxiety appearing to be mediators of that impact. Most importantly, the more Saudi women internalize Western values, the higher their level of disordered eating attitudes and behaviours, body dissatisfaction, depression and social anxiety. However, it is noteworthy that Saudi women with higher levels of internalization of Western values were more likely to restrict and purge but not to overeat.

The effect of Westernization on body image issues and disordered eating differs depending on the Western values internalized, with media and economic values being related, but not political values. This might suggest less interest in political aspects among Saudi women, as has been shown in a qualitative study about the interest in the political arena among Saudi women working for postgraduate institutes (Alghofaily, 2019).

## Links to wider literature

Similar levels of eating pathology and body dissatisfaction between Saudi and Western women are consistent with a previous study about non-Western and Western women (Jennings et al., 2006). The comparability with Western women in eating pathology was also found by Melisse and colleagues (2021). It challenges the culture-bound notion that eating pathology will always be experienced at higher levels in Western cultures (Jung & Forbes, 2007). The cut-off point of EDE-Q (2.9) is consistent with (Melisse et al., 2021), who suggested that this cut-off point yielded high specificity (80%) and sensitivity (82%). The results have demonstrated differences between Saudi and Western women in psychological correlates of eating pathology. This links to differences in perfectionism levels between Asian and Australian women suffering from disordered eating patterns (Jennings et al., 2006).

Our findings are consistent with research from various areas of psychology, emphasizing the relationships between eating behaviours, eating attitudes and body image (Farrell et al., 2006; Gan & Zalilah, 2012). The associations of eating pathology and body image with psychological comorbidities (mainly depression and anxiety) are consistent with the existing comorbidity literature (Blinder et al., 2006; Cash et al., 2003; Katsounari, 2009; Kaye et al., 2004; Noles et al., 1985). The relationships between eating pathology and the level of internalization of Western values are consistent with existing evidence in Fiji, Hong Kong, Taiwan, Singapore, Pakistan and China (Becker, 2004; Chang et al., 2013; Hidaka, 2012; Lee et al., 1996; Mumford et al., 1992; Soh et al., 2008; Ung, 2003; Zhang et al., 2018).The results of this study, showing relationships between BMI and body image issues and eating pathology, are in line with existing international and Saudi research (Abdel-Fattah et al., 2008; Grilo et al., 2015). As in this study, Wirtz and Madanat (2013) reported a lack of association between Westernization and BMI in Jordan, a country that is culturally similar to Saudi Arabia in many respects.

## Theoretical links

Consistent with acculturation theory, which argues that the change associated with Westernization poses a higher risk of eating disorders (Smolak & Striegel-Moore, 2001), this study identified a relationship between the internalization of Western values and dissatisfaction with body image and disordered eating. Moreover, the association found in this study between disordered eating and psychological comorbidities is in line with the proposition that there are commonalities in biological factors in disorders such as depression, anxiety and eating disorders, specifically that serotonin can result in concurrent comorbidities and eating disorders (Blundell, 1992; Charney et al., 1987).

There is a theorized relation between body display and objectification theory (Fredrickson & Roberts, 1997). ﻿The theory postulate that women are looked at as an object valued by it’s appearance and use. Women internalize this view in varying degrees and start to self-objectify by dealing with their body as an object to be displayed and evaluated based on it’s look, leading to mental health problems like eating disorders and related issues (Fredrickson & Roberts, 1997). Thus, display was not related to Westernization.

Clinical presentation of psychological disorders differs across cultures. As a result of cultural transformation, complaints of depression and anxiety shifted from somatic to a form that is closer to Western (Kirmayer, 2001).

## Limitations, strengths and future research

Despite the high numbers of young Saudi women enrolled in undergraduate programmes and in higher education more broadly, clearly the findings of this study cannot be generalized to the Saudi female population as a whole. Future studies should expand this approach and incorporate other samples, for example children, adolescents, men, and women from different backgrounds. Moreover, to explore the causal links between dissatisfaction with body image, disordered eating and related issues in Saudi Arabia, it will be necessary to conduct longitudinal research. Qualitative research and interview data can improve our understanding of how Saudi women experience eating and related issues during cultural change.

What is more, there are likely to be geographical differences in the effects of Westernization, with some areas of Saudi Arabia (most likely urban) experiencing greater and more rapid change than others (rural). Also, there will be geographical differences in terms of the country context: this research was conducted solely in Saudi Arabia and other countries and non-Western cultures will potentially experience a range of effects of Westernization that may differ greatly. Indeed, Westernization is not a uniform process that occurs at the same pace or has the same impact across other non-Western cultures; rather, it differs from one context to another.

A further limitation is that it was not possible to use the original versions of the Eating Disorder Examination-Questionnaire (EDE-Q, version 6.0), Body Shape Questionnaire (BSQ-8C), or other study scales as the study participants were not fluent in English. As a result, we translated the instruments into Arabic. Although we undertook validation of the cut-off scores for the EDE-Q and BSQ-8 scales, this work is not enough to assess the reliability and validity of the measures in the Saudi context. The scales need additional research to be fully validated in their translated form for this culture (and for others). In particular, further development and validation are required for the Internalization of Western Values Scale (IWVS). Moreover, we undertook a comparison of the study results with research that had employed the same scales over the same period and with similar samples, but this meant that the studies used for comparison had been conducted in Western contexts. For instance, when examining issues and behaviours related to bulimia, we took Isomaa et al.’s (2016) study for comparison rather than that of Tatham et al. (2015), which was conducted using different parameters.

## Research implications

The association of internalization of Western values with eating pathology, body image and psychological comorbidities highlights the need for such internalizations to be taken into account in future research.

In future, it will be essential to understand the broader impact of these symptoms (e.g., on family, social, work and leisure life), which is not yet fully understood, as well as their long-term implications (e.g., relationship with the development of eating disorders). Longitudinal comparative research will be needed to determine whether this pattern of eating and related characteristics are consistent over time or whether there is a change that maps onto cultural developments. Longitudinal studies should determine whether Westernization and internalization of Western values are associated with women empowerment as well as eating pathology. The pattern of internalization of Western values should be followed in future years to determine the pattern of internalization and its link to eating and related issues.

Reassessing levels of eating pathology and body image after years will enhance understanding of the impact of cultural change. Re-examining levels of internalization of Western values will add to our understanding of Westernization's impact in Saudi Arabia and beyond.

Moreover, it would perhaps be beneficial to explore ways of adapting eating disorders prevention (Le et al., 2017; Stice & Presnell, 2007) to reduce the risks of eating disorders in the Saudi context. In particular, it is proposed that dissonance-based prevention and psychoeducation could be used to target the internalization of Western values.

## Clinical implications

Although further research is needed, policymakers and clinicians can use these findings to plan national screening for targeted cohorts. These findings could help with planning population-level prevention programmes, helping young women at high risk of eating disorders, and potentially limiting the negative impact of cultural change. Education programmes might be established in high schools and universities. Similarly, parental and family education might increase awareness of the harm of factors such as teasing, bullying, and family pressures to be thin.

**Conclusion**

To conclude, this study aimed to measure levels of eating pathology and related issues in women in Saudi Arabia. It assessed levels of internalization of Western values at the current period and its affairs with eating pathology. It demonstrated that Saudi levels are comparable to Western and that the more Western values are internalized among women, the higher their pathological levels. It can provide a base for future research to investigate changes in the levels of eating pathology and related issues after years of Westernization, and to investigate the changes in the impact of Westernization further. The findings cannot be generalized considering several limitations, mainly that it is about one country where Westernization has a special patter. Notably, the prevalence of eating disorders and the mediators of the effect of internalization of Western values on eating pathology and body image dissatisfaction needs to be established.

Chapter 4. Prevalence of Eating Disorders in Undergraduate Women in Saudi Arabia During the Current Cultural Change

We know from Chapter 3 (Levels of Pathology) that eating pathology levels in undergraduate Saudi women are comparable to Western levels. It was also shown that eating pathology is associated with body image dissatisfaction, psychological comorbidities and internalization of Western values. These findings are compatible with evidence that the majority of people with eating disorders suffer from comorbid issues, such as body image dissatisfaction, depression, social anxiety, and low self-esteem (Blinder et al., 2006; Gila et al., 2005; Kerr-Gaffney et al., 2018).

Chapter 3 showed that eating attitudes and behaviours in Saudi undergraduate women are more bulimic than anorexic. This pattern was suggested to be due both to the social normality of overeating at Saudi social events and to Arabic beauty norms (Al-Khudairy et al., 2014; Musaiger et al., 2000; Sobh et al., 2013). However, we do not know yet whether that difference manifests at the diagnostic level - is anorexia nervosa less prevalent in Saudi Arabia than bulimia nervosa or binge eating disorder, and are those prevalence rates different to those in Western countries?

Chapter 2 (Literature review) identified a need to assess prevalence with standardized diagnostic measures. The literature shows that there are inadequate data about eating disorder prevalence in the Saudi population, with methodological limitations related to small sample sizes, outdated measures, and invalid assumptions regarding diagnostic validity (Al‐Subaie, 2000; Alahmari et al., 2019; As-Sa’Edi et al., 2013; Bano et al., 2013). Therefore, we need to understand the prevalence of typical and atypical eating disorders among undergraduate Saudi women, given that this is a population at high risk for developing eating disorders (Stice et al., 2013). Using validated and contemporary diagnostic measures will allow for comparison with other populations.

# The importance of understanding prevalence

It is important to assess prevalence in order to develop and implement policy, health care provision, and diagnostic and treatment decision-making (Davis et al., 2012; Ward, 2013). Prevalence is a key element in descriptive epidemiology data, as it enhances the chance of a policy being approved and useful (Davis et al., 2012; Ward, 2013). Policy makers consider prevalence as one of the major factors in policy selection, implementation and evaluation (Cohen, 2000).

Understanding true prevalence is also important in order to avoid stereotyping. Historically, non-Western countries have been stereotyped as not having eating disorders (Bruch, 1973; Keel & Klump, 2003). Much of the Western research has emphasized or assumed that eating disorders are Western, culture-bound syndromes, which means that they might not exist in other cultures or might exist at much lower rates (Lee, 1996). Starting a line of research aimed at understanding prevalence of eating disorders in non-Western cultures requires that we should explore native factors related to the nature and impact of eating disorders. While it is often assumed that the prevalence of eating disorders in non-Western countries is increasing due to Westernization, the evidence for this is limited (Makino et al., 2004; Tsai, 2000).

Of course, it should not be assumed that prevalence varies only between Western and non-Western cultures. It also appears to differ from one country to another within Western cultures. The prevalence levels of any eating disorder in Switzerland, Finland and the United States are 3.5%, 6% and ﻿19.7%, respectively (Lähteenmäki et al., 2014; Mohler-Kuo et al., 2016; Ward et al., 2019), though these extensive differences are possibly due to different methodologies, measure and definitions. Similarly, there is variance between non-Western countries’ prevalence rates. For example, Makino et al. (2004) found that the prevalence of bulimia nervosa among females in non-Western countries varied from 0.46% to 3.2% for bulimia nervosa. Therefore, individual cultures need to be understood, both within and between “Western” and “non-Western” groupings. It is also important to consider how local culture can shape the pattern of eating disorders. Therefore, we need to understand the prevalence of eating disorders in the context of different cultures in different countries.

## Prevalence in non-Western cultures

There is some evidence that the prevalence of eating disorders in non-Western cultures has increased due to Westernization. Sociocultural models of eating disorders suggest that internalization of Western appearance norms is linked to elevated eating disorders rates in non-Western cultures (Stark-Wroblewski et al., 2005). For example, prevalence in Fiji, Taiwan, Hong Kong, Singapore and Pakistan has increased due to this element of Westernization (Becker, 2004; Chang et al., 2013; Lee et al., 1996; Soh et al., 2008; Suhail & Zaib-u-Nisa, 2002).

However, prevalence varies between non-Western countries (Tsai, 2000). For example, twice as many Japanese people as Chinese suffer from eating disorders, with rates of 12.74% and ﻿6.3% respectively (Nakai, Nin, & Noma, 2014; Watson et al., 2015). The reason for this variation could be differences in religions, ethnicity and beauty norms. An example of religion-based factors is Islamic fasting, which includes reversed cycles of eating and sleeping norms, which could promote binge eating specifically (Ajabnoor et al., 2014; Chia et al., 2018; Erol et al., 2008). In contrast, other religions link starvation with self-control and willpower, thus promoting restriction and more anorexic behaviours (Castillo, 1997; ﻿Littlewood, 1995). With regard to ethnicity-based factors, Asians differ from Africans by reporting vomiting to be more stressful than bingeing, and using fewer laxatives (Franko, Becker et al., 2007; Franko, Wonderlich et al., 2007). Similarly, Asians appear to be at higher risk of developing eating disorders than Blacks and Hispanics, because they are not as protected by positive ethnic identity as the latter ethnic groups (Burnett-Zeigler et al., 2013; Rakhkovskaya & Warren, 2014). In respect of beauty norms, a fuller body figure is more preferred in Fiji (Becker et al., 2005). In contrast, a small body size is desirable in Southeast Asia (Swami et al., 2011).

Because of the above diversity, we cannot assume that Westernization has the same impact in all non-Western countries. Saudi Arabia is one example of a country where we do not know the prevalence rate, and where we do not know the impact of Westernization on eating disorders and body image dissatisfaction. However, it is a country that might be particularly valuable to investigate because it is undergoing Westernization in a specific way.

## The example of Westernization in Saudi Arabia

We do not know yet the number of people in Saudi Arabia who suffer from eating disorders because previous studies have had a range of methodological limitations – particularly in the lack of use of validated diagnostic measures. In Chapter 3, it was explained that there are reasons to assume that such eating disorder prevalence in Saudi Arabia might differ from that in other cultures due to the nature of Westernization, religious reasons and beauty standards.

It is important to consider the key features of Saudi Arabia that could be related to eating disorder development and prevalence. First, it is a country of one religion (Islam), so that there is likely to be limited religious diversity or conflict. Second, 90% of Saudis are of Arab ethnicity, which is claimed to be a positive ethnic identity that gives higher protection from eating disorders (Barakat et al., 2014; Worldatlas, 2020). Third, Arabic beauty norms do not favour extreme thinness (Musaiger et al., 2000), so we might expect to see fewer restrictive people. Fourth, Muslims’ eating and sleeping patterns during Ramadan could shape eating towards bingeing and bulimic presentations. Finally, there are religious issues about starvation, treating it as a negative behaviour because it could be harmful to the person (“Do not throw your selves into lethality by your own hand” - The Quran, 2016a; “Oh God, I seek refuge in You from hunger, for it is the misery of the lost” - Sunnah, 2020a).

Therefore, it can be hypothesized that Saudi culture has a specific pattern of protective and risk factors, as well as factors that might shape the pattern of eating disorders to be more bulimic than anorexic. Indeed, it is more likely that young Saudi women who are dissatisfied with their weight or body image will overeat and then purge, since overeating is common practice in Arabic and Saudi culture. This is due to the importance of offering hospitality in Islam, based on which food will typically be served at social events (Al-Khudairy et al., 2014; Sobh et al., 2013).

Therefore, this study will use a well-validated diagnostic measure to determine whether young adult women in Saudi Arabia suffer from eating disorders, and to identify the nature of those disorders. While the measure used is a self-report one, its clinical validation to date means that it should give a reliable and valid estimate of prevalence rates of the different disorders in this large group of individuals.

# Aims

1. To assess the prevalence of typical and atypical eating disorders in undergraduate women in Saudi Arabia, and to compare that prevalence rate with those in other countries.
2. To compare levels of eating pathology and related problems for people with and without diagnosable cases of eating disorders, in order to validate the diagnostic groupings clinically.

# Hypotheses

1. There will be fewer cases of anorexia nervosa in young Saudi women than in other countries.
2. There will be proportionally more cases of bulimia nervosa and binge eating disorder than anorexia nervosa in undergraduate Saudi women.
3. Young women in Saudi Arabia with identified eating disorders will have higher levels of eating pathologies and related problems.

# Methods

To address the aims, we used the same data set, ethical approval, design, participants and procedure as in the previous study. To determine prevalence, the Eating Disorders Diagnostic Scale (EDDS) was used with the same cohort. The measure was translated from English to Arabic, and back-translation was used to ensure accuracy of this process. See Appendix 3.1 for Information sheet and Appendix 3.2 for consent form.

## Participants and sample size calculation

The participants were the same 503 women who completed measures in Chapter 3. The sample size calculation was based on ﻿the principles of sample size calculations for cross-sectional prevalence studies in medicine (Pourhoseingholi et al., 2013). We used the assumption of Wared and Colleges (2019) of 10% prevalence of eating disorders in females aged 21 years old, with 5% precision, a confidence interval of 95%, and an estimated accuracy of 4%. We assumed that 20% would not respond. The minimum target sample size was 259. Therefore, the study was sufficiently powered.

## Eating Disorders Diagnostic Scale (EDDS) - DSM-5 version (Stice et al., 2000)

The EDDS contains 23 items, which assess the DSM-5 criteria of eating disorder symptoms and produce a diagnostic category for each individual (Stice et al., 2000) EDDS scores were used to group participants into six diagnostic categories: anorexia nervosa, atypical anorexia nervosa, bulimia nervosa, atypical bulimia nervosa, binge-eating disorder, or atypical binge-eating disorder. The internal consistency of the overall scale in this study was α = .666, compared to Stice and colleagues’ (Stice et al., 2000) Cronbach's α = .759. The reason for this lower internal consistency might be that the EDDS is culturally specific to Western cultures, or that the translation was not fully adequate. Validation of the EDDS was demonstrated by comparing the resultant ‘clinical’ and ‘non-clinical’ groups on the rest of the study measures. The DSM-5 scoring system was used (<https://www.phenxtoolkit.org/protocols/view/120602>) (see Appendix 4.1). Appendix 4.2 shows the coding equation used for each disorder, and Appendix 4.3 shows the definitions used to create the coding equations.

## Data analysis

SPSS (v.26) was used for all descriptive and inferential data analyses. Descriptive and comparative analysis were used to calculate prevalence and confidence intervals (95%), and to compare clinical and non-clinical groups. There were no missing data, because all items had to be completed.

# Results

## Prevalence of typical and atypical eating disorder diagnoses among Saudi undergraduate women

The prevalence of anorexia nervosa, atypical anorexia nervosa, bulimia nervosa, atypical bulimia nervosa, binge eating disorders, and atypical binge-eating disorder were calculated, based on EDDS responses (Aim 1a). The prevalence of all eating disorders across this sample of 503 young women was 6.96% (N = 35). Bulimia nervosa was the most common diagnosis (N = 22; 4.4%; 95% CI = 2.61-6.19%), followed by binge-eating disorder (N = 8; 1.6%; 95% CI = 0.5-2.70%), atypical bulimia nervosa (N = 4; 0.8%; 95% CI = 0.02-1.68%), and atypical binge-eating disorder (N = 1; 0.2%; 95% CI = -0.02-0.6%). No cases of anorexia nervosa or atypical anorexia nervosa were identified.

## Prevalence of eating disorders compared to other countries

To compare the prevalence of typical and atypical eating disorders for Saudi women against that in other countries (Aim 1b), we compared the sample rates against Western and non-Western countries. Table 1 shows that the overall prevalence of eating disorders is comparable to that among women from Western countries. However, considering different specific diagnoses, this Saudi sample leaned more towards bulimic than anorexic diagnoses compared to Western rates, and binge eating disorder was lower in this Saudi sample compared to Western countries.

Table 2 compares Saudi rates to those of other non-Western countries. It can be seen that the overall prevalence of eating disorders is close to other non-Western cultures, although it differs when broken down by diagnosis. Bulimia nervosa has a higher rate among Saudi sample than other non-Western countries, whereas anorexia nervosa and binge-eating disorder are at lower rates than other non-Western cultures.

To summarize, the overall prevalence of eating disorders in Saudi undergraduate women is comparable to that in other countries. However, bulimic disorders are more prevalent in Saudi women than in other Western and non-Western cultures, while anorexic disorders and binge-eating disorder are less common in Saudi Arabia.

Table . Saudi prevalence of typical and atypical eating disorders against Western prevalence

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Saudi Arabia | Striegel-Moore et al. (2003), USA | Favaro et al. (2003), Italy | Mohler-Kuo et al. (2016), Switzerland | Smink et al. (2014), Netherlands | Stice et al. (2013), USA |
| All eating disorders | 7% (95% CI = 4.9, 9.5%) | 6.5% | 11% (95% CI = ﻿9.0, 13.0%) | 5.3% (95% CI = 4.8, 6.0%) | 5.7% (95% CI = ﻿4.2, 7.5%) | 13.1% |
| Anorexia nervosa | 0% | 1.5% | 2% (95% CI = ﻿1.1, 2.9%) | 1.9% (95% CI = 1.6, 2.3%) | 1.7%  ﻿(95 % CI =﻿ 1.0, 2.9%) | 0.8% (95% CI = 0.6, 0.8%) |
| Bulimia nervosa | 4.4% (95% CI = 2.61, 6.19%) | 2.3% (95% CI =﻿ 2.2, 18.2%) | 4.6% (95% CI = ﻿3.3–, .9%) | 2.4% (95% CI = 2.0, 2.8%) | 0.8%  ﻿(95 % CI = ﻿﻿0.3, 1.7%) | 2.6% (95% CI = ﻿1.4, .6%) |
| Binge eating disorder | 1.6% (95% CI = 0.5, 2.70%) | 2.7% (95% CI = ﻿1.0–, .8%) | 0.6% (95% CI = ﻿0.1, .2%) | 2.4% (95% CI = 2.0, 2.8%) | 2.3% ﻿﻿(95 % CI = 1.4, 3.6%) | 3% (95% CI = ﻿1.3, 3.0%) |
| Atypical anorexia nervosa | 0% |  | 2.6% (95% CI = ﻿1.6, 3.6 %) |  |  | 2.8% (95% CI = 1.5, 2.8%) |
| Atypical bulimia nervosa | 0.8% (95% CI = 0.02, 1.68%) |  | 3.1% (95% CI = ﻿2.0, 4.2%) |  |  |  |
| Atypical binge eating disorder | 0.2% (95% CI = ‑0.02, 0.6%) |  |  |  |  |  |

Table . Saudi prevalence of typical and atypical eating disorders against non-Western prevalence

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Saudi Arabia | Tong et al. (2014), China | Tseng et al. (2007), Taiwan | obakht and Dezhkam (2000), Iran | Nakamura et al. (2000), Japan | Nakai, Nin, & Noma, (2014), Japan |
| All eating disorders | 7% (95% CI = 4.9, 9.5%) | 7.56% | ﻿2.0% (95% CI = 1.2, 2.9%) |  |  | ﻿12.74% (95% CI = 11.55, 14.31%) |
| Anorexia nervosa | 0% | ﻿1.05 % ﻿(95 % CI = 0.02, 2.08%) | ﻿0.1% (95% CI = 0.0, 0.4%) | ﻿0.9% | 4.79% (95% CI = 3.96, 5.83%) | ﻿0.43% (95% CI = 0.20, 0.67%) |
| Bulimia nervosa | 4.4% (95% CI = 2.61, 6.19%) | ﻿2.98 % ﻿(95 % CI = 1.21, 4.74%) | 1.0% (95% CI = 0.5, 1.8%) | ﻿3.23% | 1.02% (95% CI = 0.80, 1.29%) | ﻿2.32% (95% CI = 1.79, 2.86%) |
| Binge eating disorder | 1.6% (95% CI = 0.5, 2.70%) | ﻿3.53 % ﻿(95 % CI = 1.75, 5.30%) |  |  |  |  |
| Atypical anorexia nervosa | 0% |  |  |  |  |  |
| Atypical bulimia nervosa | 0.8% (95% CI = 0.02, 1.68%) |  |  |  |  |  |
| Atypical binge eating disorder | 0.2% (95% CI =  -0.02, 0.6%) |  |  |  |  |  |

## Levels of eating pathology and related problems for people with and without diagnosable eating disorders (Aim 2)

Those with and without eating disorders were compared on their levels of eating pathology, body image dissatisfaction, BMI and comorbid problems (Table 3). Th study used *t*-tests to determine whether the differences in scores were significant. As would be expected, those with any eating disorder diagnosis reported higher levels of eating attitudes and behaviours and a higher BMI. They also had more pathological levels of body image dissatisfaction, depression, social anxiety, and lower self-esteem.

Table . Differences in women with or without a clinical diagnosis (based on Eating Disorders Diagnostic Scale classification) on eating pathology, body image dissatisfaction, and comorbidity measures

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Measure | Non-clinical group  (N = 468) | | Clinical group  (N = 35) | | t | P | d |
| M | (SD) | M | (SD) |
| EDEQR | 1.37 | (1.54) | 2.82 | (1.88) | 5.31 | .001 | 0.92 |
| EDEQWC | 2.35 | (1.44) | 3.90 | (1.15) | 6.33 | .001 | 1.09 |
| EDEQEC | 1.07 | (1.15) | 2.69 | (1.37) | 7.92 | .001 | 1.38 |
| EDEQSC | 2.49 | (1.54) | 4.09 | (1.26) | 6.02 | .001 | 1.05 |
| EDEQ Global | 1.82 | (1.23) | 3.38 | (1.15) | 7.30 | .001 | 1.27 |
| Binge frequency | 3.12 | (5.80) | 8.31 | (7.71) | 4.96 | .001 | 0.87 |
| Binge days | 2.63 | (4.86) | 9.06 | (8.93) | 7.01 | .001 | 1.22 |
| Vomit | 0.48 | (2.57) | 2.74 | (7.32) | 4.10 | .001 | 0.72 |
| Laxative use | 0.38 | (2.32) | 3.20 | (7.99) | 5.24 | .001 | 0.92 |
| Exercise | 4.27 | (7.74) | 17.3 | (36.5) | 6.16 | .001 | 1.07 |
| Body dissatisfaction | 17.4 | (9.47) | 31.1 | (8.69) | 8.44 | .001 | 1.45 |
| BMI | 23.1 | (5.40) | 26.9 | (5.90) | 3.93 | .001 | 0.69 |
| Social anxiety | 26.4 | (9.98) | 32.5 | (11.8) | 3.45 | .001 | 0.60 |
| Depression | 9.57 | (6.43) | 14.1 | (6.62) | 4.14 | .001 | 0.70 |
| Self-esteem | 19.52 | (4.79) | 23.11 | (6.13) | 4.18 | .001 | 0.73 |

Notes: EDEQR, Eating Disorders Examination Questionnaire Restraint subscale; EDEQWC, Eating Disorders Examination Questionnaire Weight Concerns subscale; EDEQEC, Eating Disorders Examination Questionnaire Eating Concerns subscale; EDEQSC, Eating Disorders Examination Questionnaire Shape Concerns subscale; EDEQ Global, Eating Disorders Examination Questionnaire Global score; BMI, Body Mass Index. All behaviours are per 28 days

# 

# Discussion

This study aimed to investigate the prevalence of eating disorders in undergraduate Saudi women - a population at a high risk for eating disorders. As hypothesized, the prevalences of bulimia nervosa and binge eating disorder were higher than anorexia nervosa. The overall prevalence was comparable to other cultures. When the rate was broken down, the Saudi group had more bulimic individuals and fewer anorexia nervosa sufferers than other cultures (Western and non-Western). As expected, those with eating disorders had more disordered eating attitudes and behaviours and comorbid psychopathology than those who did not.

## Links to wider literature

The similarity between Saudi, Western and non-Western prevalence levels is inconsistent with the assumption that eating disorders are culture-bound syndromes overall (Keel & Klump, 2003; Makino et al., 2004; Qian et al., 2013). Comparison with other studies (Tables 1 and 2) shows generally similar prevalence rates overall (Smink et al., 2014; Striegel-Moore et al., 2003; Tong et al., 2014), though the levels of anorexic and bulimic diagnoses differed. Finally, the associations of eating disorders and body image dissatisfaction, social anxiety, depression, self-esteem are consistent with other studies (Barth & Starkman, 2016; Hinrichsen et al., 2003; Mischoulon et al., 2011; Polivy & McFarlane, 1994; Raykos et al., 2017; Wonderlich-Tierney, & Vander Wal, 2010).

## Links to theory

The lack of prevalence of anorexia nervosa during the current cultural change in Saudi Arabia suggests that the effects of Westernization are not as strong as the impact of core social values (Berry et al., 2002). In this case, Islam considers starvation as a harmful behaviour to the human body, which might explain why anorexia nervosa is not common in the Saudi population. Similarly, Arabic beauty norms (which do not encourage extreme thinness) might have a role in reducing the likelihood of restrictive eating.

Acculturation can have positive and negative effects. Positive ethnic identity can provide some protection from psychopathology (Burnett-Zeigler et al., 2013). A strong ethnic identity is suggested to enhance psychological adaptation, providing a sense of belonging and attachment to members of the same ethnic group (Burnett-Zeigler et al., 2013). The example of Saudi Arabia is consistent with this suggestion, indicating that the strength of Arab ethnic identity (Barakat et al., 2014) can protect individuals against anorexic behaviours.

## Limitations and strengths

This study had a number of limitations. The sample was limited to undergraduate women living in an urban area. It did not cover women from other age groups, males, or those living in rural areas. Therefore, the prevalence cannot be generalized to the whole population of Saudi Arabia. Nor does it guarantee similar prevalence rates in other non-Western countries. While the measures used here were self-report, the sample size and the validity of the tools used supports these conclusions. The translation and cultural specificity of the Eating Disorders Diagnostic Scale (EDDS) needs further testing.

It is important to note the limitations caused by relying on a self-report assessment to measure diagnostic criteria in this study. While the number of participants needed meant that full diagnostic interviews were not possible in this study, it must be acknowledged that self-report measures might increase the identified rate of eating disorders (Keel et al., 2002). An alternative approach might have been to confirm the diagnosis of eating disorders from self-reported measures through clinical interviews (Freitas et al., 2006), although this approach still runs the risk of false negatives, if the screening questionnaire does not pick up a case. This risk is that participants might not be able to assess themselves accurately, and that self-report measures carry the possibility of response bias (e.g., participants responding in a socially acceptable way the questions). Therefore, the prevalence data here should be treated cautiously until more robust diagnostic measures have been employed in future research.

## Research implications

Further research is needed to demonstrate the generalizability of these findings to other populations and different areas. In particular, rural areas might be less exposed to this pattern of Westernization than urban areas, which could influence prevalence. Prevalence should be considered over the course of the Westernization process, in order to determine the impact of time and changes in local policies and practices. Potential mediators and moderators of these effects should also be considered. Interviews and qualitative data might also help to explain the associations with body image and related negative affect. Local culture must be taken into consideration to understand risk, protective and other underpinning factors that shape the experience of eating disorders in each culture.

**Clinical** implications

When working with Saudi young women with eating disorders, it is worth paying attention to comorbidities (e.g., social anxiety, depression and low self-esteem) as well as eating pathology itself. Considering local culture when treating people from non-Western cultures might improve understanding of sufferers’ experiences, which might enhance outcomes.

As well as considering interventions for those with eating disorders, it will be important to consider using evidence-based psychoeducation and prevention programmes, such as dissonance-based interventions (e.g., Le et al., 2017; Stice & Presnell, 2007). Given that eating disorders in Saudi young women lean towards bulimic more than anorexic behaviours, such prevention programmes should be focused more around bulimia nervosa than anorexia nervosa or binge eating disorder. Such interventions need to adapted to be suitable for local women, targeting eating pathology and body dissatisfaction, but also addressing associated issues such as acculturation and psychological comorbidities.

**Conclusion**

Prevalence rates of eating disorders in young Saudi women are comparable to rates to Western countries, and eating disorders in young Saudi women are associated with psychological comorbidities. However, Saudi women appear to have more bulimic than anorexic eating disorders. These findings indicate a potential role for prevention programmes to reduce eating disorder rates in young Saudi women, but show that such prevention work needs to be adapted for local implementation.

Chapter 5. The Case for Translating Our Understanding of Saudi Eating Disorder Patterns into a Culture-Specific Prevention Program

Chapter 3 (Levels of Pathology) has shown that eating pathology, body image dissatisfaction and psychological comorbidities levels among young women in Saudi Arabia are comparable to those in Western cultures, and that they are related to internalization of Western values (AlShebali et al., 2020). That impact of internalization of Western values is partially mediated by social anxiety and depression (Chapter 3). Considering the same issue from a diagnostic perspective, Chapter 4 (Prevalence) has shown that the prevalence of eating disorders in young Saudi women is comparable to Western rates, although the pattern was one of bulimic disorders rather than restrictive disorders (AlShebali et al., 2020).

Therefore, it is clear that addressing eating and related problems in Saudi Arabia needs to consider the nature of eating and related pathology, in a Saudi context. In this chapter, a potential approach to addressing such pathology will be considered, beginning with the level of intervention that makes the most sense in this context. The case will be made for the development of a prevention programme that could reduce the risk of the development of eating pathology among young Saudi women. That will lead to the testing and implementation of such a programme in the following chapter.

# Prevention or treatment of eating disorders?

The question behind prevention approaches is: “What interventions or experiences can be provided for persons who are or might be at risk that can avert the onset or severity of some condition?” (Kazdin & Blase, 2011, p. 28). Thus, a prevention programme for eating disorders focuses on addressing problems either in a wide population or in a specific, high-risk group. Its effectiveness is measured either in the long term by lower rates of development of full eating disorders or by short-term reduction in risk factors such as unhealthy eating attitudes and negative body image. In contrast, treatment programmes depend on the disorder having developed, by which time the eating pathology is likely to be entrenched and hard to treat. Given this difficulty in treating eating disorders once they are established, there is a clear value to developing prevention programmes to reduce the risk of such disorders developing in the first place.

Prevention is an important goal to consider because psychotherapy cannot address the world’s burden of eating disorders, as therapy is lengthy, expensive, hard to access, and limited in its effectiveness (Kazdin & Blase, 2011). Eighty per cent of people with eating disorders do not receive therapy (Swanson et al., 2011). Even among those who do, fewer than half of treated people experience remission by the end of treatment, and more than half of those relapse (Hay, 2013).

Therefore, it is important to examine ways in which eating pathology can be prevented. However, that work needs to be culturally-specific. Chapters 3 and 4 have shown the targets that need to be addressed by prevention work in a Saudi culture - bulimic behaviours, body image dissatisfaction and comorbidities.

## Does a prevention approach work for eating pathology?

Prevention research in this field shows positive results. These include short term reduction in body image dissatisfaction, eating pathology, negative affect, internalization of thin-idealization, and eating disorder symptoms (Stice et al., 2013; Watson et al., 2016). Just as importantly, prevention programmes have reduced the onset of eating disorders significantly through three years of follow-up (Stice et al., 2008; Watson et al., 2016). Prevention is cost-efficient, and can be implemented widely to reduce prevalence and mental illness burden (Becker & Stice, 2017; Kazdin & Blase, 2011; Le et al., 2017).

## What prevention programmes are available?

Initial studies of eating disorders prevention were based on psychoeducation, which provides information about eating disorders. However, they delivered limited results (Franko et al., 1998; Shaw et al., 2009). ﻿Vella-Zarb and colleagues (2015) ﻿found that psychoeducation was ineffective in improving self-efficacy and ﻿readiness to change in people with eating disorders. Therefore, other approaches have been developed more recently.

**Levels of prevention for mental disorders.** World Health Organization policy frameworks suggest that prevention for mental health is categorized based on the classifications of physical disease prevention as well as the typical public health categorizations (World Health Organization, 2004). The categories are primary, secondary and tertiary prevention interventions. Primary prevention helps those who do not fulfil the criteria for a mental illness diagnosis. Secondary prevention aims to reduce the prevalence of mental health disorders through screening, early detection and treatment. Tertiary prevention aims to reduce the negative impact of psychological disorders in sufferers’ daily lives by improving their functioning, and trying to delay or prevent potential complications. Primary prevention has been recognized by policy-makers, commissions and practitioners in the world as an intervention that provides vital strategies and outcomes when it fits the level of risk (World Health Organization, 2004).

**Eating disorders prevention.** Eating disorders prevention falls under mental health prevention. It is divided into three levels (World Health Organization, 2004). The first level is universal, targeting the whole population (Le et al., 2017). The second level is selective, targeting specific high-risk populations which will be implemented in this research (Le et al., 2017). Finally, the third level is indicated prevention which targets people with eating disorder symptoms but not yet at diagnostic level (Le et al., 2017).

Media literacy is the most effective universal intervention (Watson et al., 2016). It works for male and female adolescents with mean ages 11 to 14 years old (Le et al., 2017). It targets media impact on body image dissatisfaction and showed small to medium effect size for weight and shape concerns and media internalization (Le et al., 2017; Wade et al., 2003).

The cognitive dissonance-based approach is the most supported selective prevention approach. It works for females with a mean age = 17.6 years old (Le et al., 2017). It targets thin-idealization and shows moderate to large effects on several risk factors and pathology outcomes mainly bulimic behaviours, body image dissatisfaction, thin-ideal internalization and comorbidities (Le et al., 2017; Watson et al., 2016).

Cognitive behavioural therapy interventions are the most studied indicated prevention (Le et al., 2017).

**Which prevention programme meets our criteria?**

As Westernization is a key risk factor in eating pathology, body image dissatisfaction and comorbidities in Saudi Arabia (AlShebali et al., 2020), we need a prevention program that helps people to cope with Westernization while protecting themselves from eating pathology problems. Given that Westernization is a process that is taking place currently and will continue, we need a programme that helps individuals to counter the thin-idealization that leads to eating pathology problems.

Based on the above, it can be hypothesised that the most effective eating disorders prevention for women at high risk in this context is the selective prevention approach – particularly dissonance-based interventions (Watson et al., 2016). This approach targets Western cultural influences around thin-idealization and eating pathology.

**What is dissonance-based prevention?**

Dissonance-based prevention is based on cognitive dissonance theory, which states that the disharmony between people’s behaviours and their attitudes causes psychological discomfort (Festinger, 1957). To minimize or avoid this discomfort, people modify their attitudes or behaviours to be more closely aligned with each other (Festinger, 1957). Therefore, in order to change people’s attitudes, it is possible to change their behaviour, and vice versa. There is evidence of the effectiveness of cognitive dissonance prevention approaches on ﻿non-clinical health behaviour in non-clinical populations. These include sexual risks (Aronson et al., 1991; Stone et al., 1994), condom use (Thompson et al., 2002), smoking ﻿(Hafstad et al., 1997), and exercise ﻿(Bator & Bryan, 2007).

Dissonance-based prevention influences eating pathology by shifting people’s behaviour around food and related issues (Stice et al., 2000). It has shown positive and ﻿reproducible outcomes in many eating disorders prevention studies ﻿(Becker et al., 2008). Several dissonance-based eating disorders prevention approaches have been used with young women but not manualized (McMillan et al., 2011; Stice et al., 2008). The only manualized dissonance-based prevention programme that has been developed with university and similar populations in mind is The Body Project, making it appropriate to the current research.

# The Body Project

The Body Project is a selective dissonance-based prevention program that targets women with body image concerns. It has resulted in significant and meaningful reductions in body image dissatisfaction, eating disorder symptoms, and future onset of eating disorders over a three-year follow-up (Stice et al., 2008). Psychobiological research shows a reduction in the attention given to thin-ideal stimuli from programme completers (Stice, Becker & Yokum, 2013).

The Body Projectis based on a protocol. It aims to create cognitive dissonance that encourages participants to reduce pursuit of the thin-ideal (Stice et al., 2013). It involves the use of a scripted manual, covering four interactive weekly sessions. These involve role play, behavioural, verbal and written exercises. It can be delivered in schools and universities by a range of facilitators, including clinicians, counsellors, research staff, nutritionists, and undergraduate peer leaders (Stice, Marti & Cheng, 2014; Stice et al., 2013). It has a face-to-face version and internet-based version (Shaw et al., 2016; Stice et al., 2014; Stice et al., 2012). Fidelity and competence have been evaluated in effectiveness trials through reviewing randomly selected audio and video records of sessions (Stice et al., 2013; Stice et al., 2006).

## The role of facilitators

Facilitators work from a scripted manual and familiarize themselves with key trials that evidence this dissonance-based eating disorder prevention program (Stice et al., 2006; 2008). Facilitators can be trained in one of two ways. They can attend a four-hour training, covering the theoretical based of the intervention, key components of the program, and practical issues such as homework compliance and confidentiality (Stice et al., 2006; 2008). Alternatively, they can watch training videos and mock practice videos (ORI body acceptance project, 2020).

## Roll-out of the Body Project to date

Since 2008, the Body Project has been delivered in 138 universities in the United States, and in ten other countries (Becker & Stice, 2017; Butryn et al., 2014). It shows consistent outcomes in different countries and for different ethnic groups (Stice, Marti & Cheng, 2014). However, its effectiveness in non-Western cultures is not yet known, as there are no published studies regarding the Body Project or any dissonance-based prevention in non-Western countries (Witcomb et al., 2013).

# Conclusion: Adapting the Body Project for Saudi Arabia

The previous chapters have demonstrated that there is an issue with eating pathology and body image among young women in Saudi Arabia. They have also shown that cultural issues need to be considered in order to understand such problems in that setting. Therefore, a culturally-adjusted approach to prevention merits consideration. The Body Project’s wide utilization and evidence base make it particularly worthy of consideration for this purpose, if it is feasible to deliver it in the Saudi cultural context.

The coming chapters will consider whether the Body Project is viable and effective in reducing risky eating attitudes and body image disturbance among young adult women in Saudi Arabia. Chapter 6 will examine the feasibility and acceptability of the Body Project for Saudi women. If the programme is feasible then Chapter 7 will determine whether it is an effective approach to reducing risk of eating disorders among young adult women in Saudi Arabia.

Chapter 6. Adapting the Body Project to a non-Western culture: A dissonance-based eating disorders prevention programme for Saudi women

# Introduction

It was suggested in Chapter 3 (Levels of Pathology) that prevention programmes for young Saudi women should target eating pathology, body image dissatisfaction and potential mediators such as depression and social anxiety. Several eating disorders prevention interventions were presented in Chapter 5. It appears that The Body Project (Stice, Rohde, & Shaw, 2013) is the best prevention programme for young women with eating and body image issues. However, its viability and effectiveness remain to be proven across cultural settings.

The Body Project is an eating disorders prevention program that contains four group sessions in four consecutive weeks. Each session lasts for one hour. The facilitator must remind participants about sessions and home exercises (Stice, Rohde, & Shaw, 2013). Table 1 describes the session schedule. Home exercises are given at the end of each session and are reviewed at the beginning of the next session.

Table 1. Content of The Body Project sessions

|  |  |
| --- | --- |
| Sessions | The Body Project Content |
| Session 1 | Voluntary commitment and overview  Definition and origin of the appearance ideal  Costs associated with pursuing the appearance ideal  Home Exercises:  A letter to an adolescent girl: write a letter to a teenager girl who is struggling with her body image about the costs associated with trying to look like the appearance ideal.  Mirror exercise: stand in front of the mirror with as little clothing as possible and write ten positive qualities in yourself (could be physical, emotional, intellectual, or social qualities).  Appearance ideal perpetuation behaviour checklist. |
| Session 2 | Reinforcing voluntary commitment Debriefing last session’s home exercises Role play to discourage pursuit of the appearance ideal  Home Exercises:  Write a letter to a person who pressured you to pursue the appearance ideal and tell him/her how you were affected. Explain the way you will respond using the new skills you learned in the sessions.  Top-10-list: write a list of ten things a woman can do to resist the appearance ideal in a societal level. |
| Session 3 | Reinforcing voluntary commitment Debriefing last session’s home exercises  Role play: quick comebacks to appearance ideal statements  Reasons for signing up  Behavioural challenge  Home Exercises:  Behavioural exercise form: do two things that you do not do because of body image dissatisfaction.  Body activism form: write ten behaviours that women could do to resist the appearance ideal, choose two behaviours to do during the next week. |
| Session 4 | Reinforcing voluntary commitment  Debriefing of last session’s home exercises  Future pressure to be thin  Benefits of the group  Closure discussion  Self-affirmation exercise  Closure  Home Exercises:  Self-affirmation exercise.  Letter to a younger self.  Group body activism: do a body activism behaviour as a group to resist the thin-ideal. |

## Identifying and addressing logistical issues in applying the Body Project in Saudi culture

The Body Project has never been applied in Saudi Arabia or in any non-Western country before. There are potential challenges that need to be addressed before application, which are mainly related to culture and logistics. For example, the programme has a behavioural exercise that includes revealing dress (e.g., wearing shorts or swimming suits in public), which would not be allowed in the Saudi culture (Visitsaudi, 2020). Another exercise includes filming a video of what people say about their bodies at the university campus and posting it on Youtube - an action that can cause penalties in Saudi Arabia (Deanship of Students’ Affairs, 2020). Video filming the sessions is suggested to increase the session’s effect because it expands the questioning of appearance idealization (ORI Body Acceptance Project, 2020). The challenge is that Saudi women will not accept being video filmed because they belong to a conservative culture (Al-bakr et al., 2017). Therefore, audio recording might be more acceptable, but the issue of potential errors in the audio recording process needs to be considered. Other logistic challenges include providing a suitable venue in a convenient location for participants, to ensure accessibility, comfort and privacy. Although it is suggested that applying sessions at the university will be more convenient (Stice, Rohde, & Shaw, 2013), that requires being able to access space.

In short, there are a number of potential challenges in applying the Body Project in Saudi culture. Each of them might influence the viability of the approach. Therefore, a feasibility and acceptability study will be conducted here, to determine whether the issues can be addressed by adapting the Body Project to suit Saudi culture. This adaptation was done in collaboration with a co-director of The Body Project, to ensure conceptual fidelity of the adapted version. Table 2 details those potential challenges, and how they will be addressed in this feasibility and acceptability study.

Table 2. The Body Project: Potential problems and means to address these problems

|  |  |  |
| --- | --- | --- |
| **Element of The Body Project** | **Potential problem in the Saudi context** | **Means to address problems** |
| The Body Project is a prevention programme. | Saudi undergraduates are not familiar with prevention programmes and might not be willing to take part. | The facilitator will explain the idea of a prevention programme. The intervention will be advertised as a workshop (Stice, Rohde, & Shaw, 2013) |
| The Body Project targets eating disorders and body image problems. | The assumption that eating and body problems are Western problems might not encourage enrolment. | The facilitator will provide information about the increasing numbers of eating disorders and body image dissatisfaction in young women in non-Western cultures undergoing cultural change. |
| Health related issues such as compensatory behaviours harm are discussed. | Participants might think that The Body Project is a nutritional health-based programme. | The facilitator will explain that The Body Project is not a nutrition health-based programme. |
| The Body Project includes therapeutic techniques such as: group discussion; role play; mirror challenge to name physical, emotional, intellectual, and social qualities; writing letter to self and others and self-affirmation. | Undergraduates might assume that The Body Project is a psychotherapy programme due to lack of familiarity with prevention programmes. This assumption could discourage enrolment as they may wish to avoid stigma. | The facilitator will clarify the difference between a prevention programme and a therapy programme to avoid misunderstanding. |
| No certificates of attendance. | Undergraduates are used to collecting certificates from non-academic activities. Therefore, they might not sign up or complete the programmes. Locally, activities that do not provide attendance certificates have lower rates of enrolment and completion. | The facilitator will explain the benefits of the programme when advertising. |
| Video filming of the sessions for supervision. | Filming sessions is not acceptable among Saudi females. | Video filming will be replaced with audio recording and there will be monitoring for any technical errors. |
| Attendance at four sessions, each session lasting one hour. | The number of sessions might not accommodate participants’ academic schedules. | No changes will be made to the number or duration of sessions. |
| Home exercises are in English. | The material might be difficult to understand because the majority of participants do not speak fluent English. | The home exercises will be translated into Arabic. |
| One behavioural challenge exercise is based on Western culture. It includes wearing shorts to school and going to the public pool in a swimsuit. | If a woman wears shorts or a swimsuit in public in Saudi Arabia, she will be held accountable for violation of public decency and could be penalized (Visitsaudi, 2020). | This exercise will be changed to one that reflects culturally sensitive behaviours. |
| One exercise asks participants to act as social activists to resist the thin-ideal. | The problem is that the notion of social activism does not exist in Saudi Arabia. | Rather than using the term “social activism”, reference will be made to spreading awareness about the cost of the thin-ideal. |
| One suggested social activism action is making a video about what people say about their bodies and posting it on YouTube. | Videorecording interviews and posting them on YouTube or any other social media platform would expose the participants to being held accountable and penalized. | Instead of video, a written text will be posted on social media. |
| Participants must be assessed (complete The Body Project assessments) at two time points. | Participants might find the assessments overwhelming. | The facilitator will explain the importance of the pre-test and post-test assessments for measuring change. |
| The Body Project has its own pre and post assessment measures in English that have never been used for non-Western cultures (Bodyproject Support, 2020). | The assessments will need to be translated into Arabic and validated for use with Saudi women before being applied in the feasibility and acceptability study. | The pre-tests and post-tests will employ measures in Arabic previously used with young Saudi women. |
| Sharing eating and body image concerns with group members. | It is claimed that Saudi undergraduates lack adequate social skills and confidence (Taha et al., 2017). Therefore, participants might not feel comfortable sharing their concerns. | Participants’ (lack of) willingness to share concerns will be addressed. |
| There are 10 home exercises that include a lot of writing. | Undergraduates are not familiar with home exercises in the form of writing for non-academic programmes. The nature of local non-academic programmes is usually recreational (e.g. sport) and does not include any home exercises. | Participants’ experience of doing the home exercises will be explored to determine whether it is feasible to use them with the Saudi cohort. |
| There will be four sessions in four consecutive weeks, each lasting one hour, to discuss disordered eating and body image issues. | It will be difficult to run the sessions during exam periods because they could conflict with schedules.  It will also be difficult to run them in the Holy month of Ramadan when eating patterns change. The participants and facilitators will not drink and eat from sunrise to sunset (Erol et al., 2008), which might not allow for adherence to attendance and home exercises. | The sessions will not be scheduled during exam periods or Ramadan. |
| The sessions are designed to be interactive. | A private room is needed to ensure privacy and comfort for participants. | A quiet room must be booked for the four sessions. |

To summarize, participants might not find The Body Project useful or enjoyable, might not understand it, or might drop out because they think it is Western-based. Therefore, before the Body Project can be fully evaluated (see Chapter 5), a feasibility and acceptability study is needed to assess the applicability of The Body Project for young Saudi women in terms of enrolment, attendance, attrition, understandability, acceptability, whether or not participants think it is useful and enjoyable, and potential reasons for non-completer. The preliminary outcomes of the intervention will also be assessed, to provide preliminary evidence of whether effect sizes are comparable to those achieved in Western cultures and what number of participants would be needed for a full efficacy study.

# Aims

1. To measure the feasibility and acceptability of The Body Project in Saudi Arabia in terms of enrolment, attendance, attrition, understandability and acceptability, and to investigate pre-intervention differences between completers and non-completers.
2. To assess the likely efficacy of the intervention, as shown by these pilot data.

To fulfil the aims, this study will address the following questions:

1. Is The Body Project feasible for young Saudi women in terms of enrolment, attendance, attrition, understandability and acceptability? **(Aim 1a)**
2. Are there any differences between completers and non-completers in their pathology levels? **(Aim 1b)**
3. What is the efficacy of The Body project on eating pathology, body image dissatisfaction, depression and social anxiety in young women in Saudi Arabia? **(Aim 2a)**
4. Does the efficacy of The Body Project differ between people of higher and lower levels of eating pathology? **(Aim 2b)**

# Method

## Ethical approval

This study received ethical approval from the Institutional Review Board (IRB) at King Abdulaziz City for Science and Technology and the Scientific Research Ethics Committee at Princess Noura bint Abdulrahman University. See Appendix 6.1.

## Design and setting

The study used a cross-sectional pre-test/post-test design, including correlational and comparative elements. It was also used to determine effect sizes.

## Adaptation

Adaptation was agreed in collaboration with Dr. Carolyn Becker - the co-director of the Body Project Collaborative. The material was back translated by the English Department in the Community College at Princess Noura bint Abdulrahman University. Table 3 shows the specific adaptations made for The Body Project to be suitable for Saudi culture.

Table . Potential specific adaptations of The Body Project for this study

|  |  |
| --- | --- |
| The Body Project element | Adaptation |
| One behavioural challenge exercise includes wearing shorts to school and going to the public pool in a swimsuit. | The challenge was changed to “wearing a belt to show your waist, wearing heavy makeup, walking in heels, and letting your hair down”. |
| Social activism exercise. | Spreading awareness exercise. |
| Posting a video on Youtube about what people say about their bodies. | Posting a written text on social media about what people say about their bodies. |
| Video filming | Audio recording |
| The Body Project has pre and post assessment measures (Bodyproject Support, 2020) in English that are not valid for use with the local population. | Apply pre- and post-test measures in Arabic previously used with Saudi populations. |
| Home exercises are in English. | Use home exercises translated into Arabic. |

There were some potential practical problems that needed to be addressed before running the feasibility and acceptability study. Table 4 illustrates the ways in which potential problems were addressed.

Table . Potential general problems of the feasibility and acceptability study and how they were addressed

|  |  |
| --- | --- |
| **Potential problem** | **The way they were addressed** |
| The meaning and aim of prevention interventions might not be understood | The facilitator explained the meaning and aim of prevention programs during class visits for advertisement and recruitment. |
| Eating and body images issues might be assumed to be a Western problem | The facilitator explained during class visits that eating and body image problems are growing among young women in non-Western cultures specially at the time of cultural change. |
| The Body Project could be understood as a psychotherapy programme. | The facilitator explained during class visits that The Body Project is not a psychotherapy programme and that it is not designed for clinical clients. |
| Sharing eating and body image concerns with group members | The facilitator will encourage participants to share their concerns and ensure a safe environment for this purpose. |
| The sessions need to be held in a quiet room to ensure comfort and privacy. | A session room was booked for the four sessions. |

There were other potential adaptations for the Saudi culture, but these could not be conducted here as they would have risked the viability of the intervention (i.e., The Body Project attendee will not get an attendance certificate; participants need to attend four sessions in four consecutive weeks where every session lasts for one hour; and participation includes pre- and post-assessment measures and home exercises).

## Participants

﻿For within-subject studies the sample size was calculated using the parameters of: a medium effect size (d = 0.5) (Stice, Butryn et al., 2013; Stice et al., 2017); an alpha level of p = 0.05; and power = 0.8. This calculation indicated a sample of 27 participants was needed to undertake a t-test comparing pre- and post-EDE-Q scores in a single intervention condition. Given an attrition rate of 25%, 34 participants would be required at minimum, but as a precaution, the target sample was set at 48 participants. No control group was required as the aim was to test feasibility and acceptability.

﻿The recruitment process is illustrated in Figure 1. Participation was voluntary and informed consent was obtained (see Appendix 6.2). In total, 114 Saudi female undergraduate students were recruited from various community college departments at Princess Nourah bint Abdulrahman University in ﻿January 2020. The facilitator attended classes to invite student participation in person, explaining the purpose of the programme, which was described as a workshop to promote body acceptance, as suggested in the manual developed by Stice, Rohde, and Shaw (2013).

The exclusion criteria included meeting the DSM-5 diagnostic criteria for anorexia nervosa, bulimia nervosa, binge eating disorder, atypical anorexia nervosa, atypical bulimia nervosa, or atypical binge-eating disorder, based on evaluation using the Eating Disorders Diagnostic Scale (EDDS)–DSM-5 version (Stice et al., 2000, 2017). As shown in Figure 1, this resulted in the exclusion of four participants for an eating disorder (two for binge-eating disorder and two for bulimia nervosa) and they were encouraged to seek treatment. A further 28 students were unable to participate due to scheduling conflicts. Not all 82 remaining participants were needed, so another 34 were released from participation to bring the sample size within requirements (N = 48).

Prior to the intervention, a further 10 students were lost to the study. One, despite not being determined to have an eating disorder in the EDDS evaluation, had to be excluded as an outlier due to reporting vomiting 100 times over 28 days on the EDE-Q. As shown in Figure 1, the remaining sample comprised 38 participants, still above the minimum sample size of 34. The mean age of the participants was 19.16 years (SD = 1.23) and the baseline body mass index (BMI) was (M = 24.42, SD = 5.46). All participants were of Arabic ethnicity. Eating pathology, body image, and comorbidities were assessed pre and post the intervention with adapted self-report measures.

114 received the invitation and responded to Eating Disorder Diagnosis Scale survey

82 agreed to participate in the feasibility and acceptability study

48 participants were enrolled and allocated to one of four groups (each of 12 participants)

4 were excluded (2 with binge eating disorder, 2 with bulimia nervosa).

28 did not want to participate in the feasibility and acceptability study

34 were not recruited because the feasibility and acceptability study was designed for fewer participants

Research (N = 38)

38 did the pre-test assessment before the 1st session

Of the 38, 33 did the post-test assessment after the 4th session

Of the 33, 30 were included in analysis. 3 were excluded because 2 did not do the pre-test, and 1 was an outlier

Intervention (N = 48)

(N = 10) attended 0 sessions

(N = 3) attended 1 session

(N = 4) attended 2 sessions

(N = 9) attended 3 sessions

(N = 22) attended 4 sessions

(N = 35) attended 2 or more sessions

(N = 13) attended 1 or fewer sessions

Figure 1. Flowchart of participant recruitment, assessment, and attendance.

## 

## Measures

**Indicators of feasibility and acceptability.** Participants’ experiences of The Body Project and recommendations for future implementation were explored through a survey. Following Bowen et al.’s (2009) proposal when undertaking a feasibility and acceptability study, we examined the following indices: enrolment; attendance; attrition; understandability; acceptability. The indices were defined as follows:

* **Enrolment** was the number of people recruited to participate in the programme.
* **Attendance** was the number of participants who attended at least two or more sessions.
* **Attrition from the group** comprised the number of people who did not attend at least half of the programme.
* **Attrition from the research** comprised the number of people who did not complete the pre- and post-test measures.
* **Understandability** was measured at the end of the programme through a question in the reflection survey about whether the intervention was understandable or not, to what extent, and why.
* **Acceptability** was assessed at the end of the programme through questions in the reflection survey about whether or not the intervention was useful and enjoyable, whether the techniques were useful, whether the home exercises were enjoyable, and whether the number and duration of sessions were appropriate, and why. The participants were asked what they considered to be the most useful part of the programme and whether or not they would recommend The Body Project to other women. They were also asked about the best way to advertise the programme.

The reflection survey is described in further detail below.

**Reflection survey.** A self-report survey of 10 questions was designed to assess participants’ experience of The Body Project. The survey was completed by 29 participants. Appendix 6.3 shows the reflection survey questions, which related to the following areas:

1. Understandability (see above).
2. Acceptability (see above).
3. Suggestions for improvement.

**Indicators of efficacy.** To measure efficacy, we used some of the measures in Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence). BMI was assessed by asking participants to report their weight and height. The formula (BMI = kg/m2) was calculated in SPSS.

**Eating Disorders Diagnostic Scale (EDDS)–DSM-5 version (Stice et al., 2000).** The EDDS is a self-report measure of eating pathology. It contains 23 items, which assess the DSM-5 criteria of eating disorder symptoms and produce a diagnostic category for each individual (Stice et al., 2000). EDDS was applied as a screen before inviting participants. The scores were used to exclude those with eating disorders. The DSM-5 scoring system was used (https://www.phenxtoolkit.org/ protocols/view/120602). See Appendix 4.1.

**Eating Disorder Examination-Questionnaire (EDE-Q, version 6.0).** The EDE-Q is a widely used self-report measure of eating disorder psychopathology (Fairburn & Beglin, 2008). It contains 28 items investigating eating disorder behaviours and attitudes during the past 28 days. It includes four subscales: dietary restraint; eating concerns; weight concerns; and shape concerns. The Global EDE-Q score (mean of the four attitudinal scores) and the scores on each subscale were used in this study. Higher scores indicate greater eating pathology. The scale was applied before and after the programme to assess outcomes. See Appendix 3.3.

**Body Shape Questionnaire (BSQ-8C).** Body image dissatisfactions was measured using the BSQ-8C, which is a short version of the full Body Shape Questionnaire (Evans & Dolan, 1993). A higher score indicates higher levels of body image dissatisfaction. The scale was applied before and after the programme to assess outcomes. See Appendix 3.4.

**Brief Version of the Fear of Negative Evaluation Scale (BFNE).** The BFNE (Leary, 1983) measures anxiety related to perceived negative evaluation. A high score shows higher levels of social anxiety. The scale was applied before and after the programme to assess outcomes. See Appendix 3.6.

**Patient Health Questionnaire (PHQ-9).** Depression was assessed with the ﻿ PHQ-9 (Löwe et al., 2004), which measures the severity of depression over the past two weeks. Higher scores indicate greater levels of depression. The scale was applied before and after the programme to assess outcomes. ﻿If participants had endorsed suicidal thoughts during the sessions, they would have been referred to the psychiatry unit in the university hospital for assessment and treatment, but no patients expressed any. See Appendix 3.7.

## Data analysis

Descriptive and inferential analyses were undertaken in SPSS (v.26). For the completers’ and non-completers’ scores, which were not normally distributed, comparison was undertaken using the non-parametric Mann–Whitney U test. Pre- and post-test scores were compared using paired t-tests. Cohen’s d was used to calculate effect sizes for the outcomes. As all items had to be completed, there were no missing data values.

# Results

## Is The Body Project feasible for young Saudi women? (Aim 1a)

**Enrolment*.*** As seen in Figure 1, the number of people who were interested to enrol in The Body Project (N =82) was greater than the number of people recruited (N = 48). Participants were allocated in four groups of twelve members each. It appears that young Saudi women are willing to enrol in this new intervention once they receive a clear explanation about the intervention’s nature and aims.

**Analysis of attendance.** Of 48 participants, 35 attended at least 50% of the programme and 22 attended all four sessions. The attendance rate here (73% attending at least two sessions) is comparable to clinical trials of The Body Project (Stice et al., 2014; Stice et al., 2012; Stice et al., 2020). Therefore, while only 46% attended all four sessions, approximately three-quarters (73%) attended at least half of the programme, making attendance levels acceptable in the Saudi culture.

**Analysis of attrition*.*** Considering attrition from the intervention, 13 of the 48 participants did not attend at least half of the program. Therefore, the loss to intervention rate was 27%.

As regards attrition from the research, 10 participants did not complete the pre-test. Two of the 10 did not complete the pre-test measures but completed the programme, and one further participant was excluded from the analysis as her scores were not possible. Fifteen participants did not complete the post-test, and 18 did not complete pre-test and post-test. Therefore, the loss to research rate was 37.5%.

**Understandability and acceptability.** Twenty-nine participants responded to the reflection survey. Table 5 shows that participants found The Body Project understandable, enjoyable and acceptable. The reasons included that they found it easy, it taught them new knowledge about the cost of pursuing the ideal appearance, and it provided a safe environment to shared their eating and body concerns. They suggest reducing the homework exercises.

Table . Reflection survey responses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Did you find the workshop useful? | | | |
| Very useful 17 | Useful 11 | Sometimes useful 1 | Not useful |
| Why? Because it enabled participants to choose better eating attitudes and behaviours based on new knowledge and skills. | | | |
| How can we improve it? Discuss more related topics. | | | |
|  | Did you find the workshop enjoyable? | | | |
| Very enjoyable 21 | Enjoyable 8 | Sometimes enjoyable | Not enjoyable |
| Why? Because it is new; it gives the chance to share eating and appearance concerns; meet new people; work in teams and engage in group discussions. | | | |
| How can we improve it? Longer and more sessions. | | | |
|  | What do you think about the session techniques (displaying pictures of models; role play; debriefing home exercise) | | | |
| Very Helpful 22 | Helpful 5 | Sometimes helpful 2 | Not helpful |
| Why? Because they teach new skills to resist social pressure to be thin. | | | |
| How can we improve it? Add more techniques. | | | |
|  | Did you find the intervention understandable? | | | |
| Very understandable 11 | Understandable 9 | Sometimes understandable 9 | Not understandable |
| Why? Clear; relevant; practical and the wording were easy. | | | |
| How can we improve it? Present more visual media material about eating disorders. | | | |
|  | Did you find home exercises enjoyable? | | | |
| Very enjoyable 16 | Enjoyable 8 | Sometimes enjoyable 4 | Not enjoyable 1 |
| Why? They encouraged thinking about important issues. | | | |
| How can we improve it? Reduce home exercises. | | | |
|  | What do you think about the number of sessions? | | | |
| Adequate 18 | A lot 1 | Few 10 | |
| Why? Suitable for students’ schedule. | | | |
| How can we improve it? Increase the sessions for those who need. | | | |
|  | What do you think about the length of sessions (1 hour)? | | | |
| Adequate 22 | Long 0 | Short 7 | |
| Why? Suitable to academic schedule. | | | |
| How can we improve it? Longer duration for those who need. | | | |
|  | Which part of the workshop worked for you? Why? Role play and group discussion because they include useful skills and knowledge needed for resisting appearance ideal. | | | |
|  | Would you recommend this workshop to other students? Yes. | | | |
|  | What are your suggestions for advertising for the workshop (e.g. via emails, class visit to explain the idea of the workshop)? Class visit to explain the idea of the workshop) | | | |

## Differences between completers and non-completers in pre-test pathology (Aim 1b)

﻿As can be seen in Table 6, there were no significant differences between completers and non-completers in terms of initial levels of eating pathology, body image dissatisfaction, comorbidities, BMI, or age. Therefore, there was no systematic attrition.

Table . Scores of completers and non-completers on measures of eating pathology, body image dissatisfaction, comorbidities, and BMI

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Completers**  **(N = 30)** | | **Non-completers**  **(N = 7)** | | **Mann-Whitney U** | **p** |
| **M** | **(SD)** | **M** | **(SD)** |
| EDEQR | 1.34 | (1.37) | 2.28 | (1.91) | 69.5 | .167 |
| EDEQWC | 2.44 | (1.65) | 3.05 | (1.24) | 83.0 | .393 |
| EDEQEC | 1.44 | (1.54) | 1.62 | (1.71) | 99.5 | .830 |
| EDEQSC | 2.46 | (1.67) | 2.55 | (1.80) | 101.0 | .877 |
| EDEQ Global | 1.93 | (1.36) | 2.38 | (1.45) | 81.0 | .352 |
| Binge frequency | 2.63 | (4.97) | 4.42 | (6.63) | 93.0 | .633 |
| Binge days | 3.03 | (5.53) | 2.57 | (3.45) | 101.0 | .873 |
| Vomit | 0.33 | (1.29) | 0.00 | (0.00) | 98.0 | .489 |
| Laxatives | 0.10 | (.40) | 0.00 | (0.00) | 94.5 | .390 |
| Exercise | 2.93 | (6.19) | 3.00 | (2.70) | 75.5 | .218 |
| Body image | 20.83 | (13.18) | 19.14 | (10.86) | 98.0 | .600 |
| Depression | 10.10 | (6.47) | 11.57 | (4.35) | 87.5 | .496 |
| Social anxiety | 27.63 | (10.62) | 26.57 | (12.28) | 91.5 | .786 |
| BMI | 24.29 | (5.54) | 24.98 | (5.50) | 93.500 | .656 |
| Age (years) | 19.16 | (1.34) | 19.14 | (0.69) | 88.5 | .535 |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; EDEQR, Eating Disorders Examination Questionnaire Restrain subscale; EDEQWC, Eating Disorders Examination Questionnaire Weight Concerns subscale; EDEQEC, Eating Disorders Examination Questionnaire Eating Concerns subscale; EDEQSC, Eating Disorders Examination Questionnaire Shape Concerns subscale; BMI, Body Mass Index. All behaviours are per 28 days.

**Summary of feasibility and acceptability indices**

It can be concluded The Body Project is feasible for use with young Saudi women. The rates of enrolment, attendance, attrition and completion shows that Saudi women were willing to enrol and complete the intervention, despite being unfamiliar with prevention programs. They understood and accepted The Body Project. Pre-intervention levels of eating and other pathologies did not influence engagement levels.

## Efficacy of The Body Project (Aim 2a)

To understand the provisional efficacy of the intervention, we compared pre- and post-intervention scores for all who completed them both (*N* = 30). Table 7 shows these scores and the result of paired t-tests, along with effect sizes (Cohen’s d).

The intervention resulted in significant changes on all measures apart from BMI. The EDE-Q Global score showed a reduction in ﻿eating attitudes (with large effect sizes for most scales) but not in behaviours. There were also reductions in body dissatisfaction and comorbidities, with medium effect sizes.

Table . Changes in eating pathology, body image, comorbidities and BMI during prevention intervention for completers (N = 30)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Pre-test** | | **Post-test** | | **t** | **p** | **d** |
| **M** | **(SD)** | **M** | **(SD)** |
| EDEQR | 1.34 | (1.37) | 0.63 | (.87) | 3.02 | .005 | 0.552 |
| EDEQWC | 2.44 | (1.65) | 1.30 | (1.52) | 4.92 | .001 | 0.899 |
| EDEQEC | 1.44 | (1.54) | 0.42 | (.82) | 4.46 | .001 | 0.815 |
| EDEQSC | 2.46 | (1.67) | 1.32 | (1.43) | 4.43 | .001 | 0.809 |
| EDEQ Global | 1.93 | (1.36) | 0.92 | (1.05) | 5.78 | .001 | 1.056 |
| Binge frequency | 2.63 | (4.97) | 1.90 | (5.22) | .534 | .597 | 0.097 |
| Binge days | 3.03 | (5.53) | 1.36 | (3.07) | 1.44 | .160 | 0.263 |
| Vomiting | 0.33 | (1.29) | 0.00 | (.00) | 1.40 | .169 | 0.255 |
| Laxatives | 0.10 | (.40) | 0.70 | (2.42) | -1.32 | .196 | -0.241 |
| Exercise | 2.93 | (6.19) | 1.46 | (5.17) | 0.94 | .352 | 0.171 |
| Body image | 20.83 | (13.18) | 14.56 | (8.14) | 3.14 | .004 | 0.574 |
| Depression | 10.10 | (6.47) | 6.43 | (4.14) | 3.58 | .001 | 0.654 |
| Social anxiety | 27.63 | (10.62) | 23.06 | (7.82) | 2.34 | .026 | 0.428 |
| BMI | 24.29 | (5.54) | 24.26 | (5.41) | 0.17 | .859 | 0.032 |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; EDEQR, Eating Disorders Examination Questionnaire Restrain subscale; EDEQWC, Eating Disorders Examination Questionnaire Weight Concerns subscale; EDEQEC, Eating Disorders Examination Questionnaire Eating Concerns subscale; EDEQSC, Eating Disorders Examination Questionnaire Shape Concerns subscale; BMI, Body Mass Index. All behaviours are per 28 days.

The effect sizes for these outcomes (Table 7) are in the range found in other research. The effect size on the key measure of eating pathology - the EDEQ Global - was d = 1.05, which is higher than the d = 0.72 reported by Stice, Rohde et al. (2013) using the EDEQ Global, the d = 0.78 reported by Rohde et al. (2014) using the EDDS, and the effects found by Stice, Butryn et al. (2013; d = 0.54) and Stice et al. (2017; d = 0.52) when using the EDDI. Thus, the adaptation of the Body Project for the Saudi culture has not resulted in any evidence of loss of benefits ﻿in this key outcome variable.

﻿The effect size for body image dissatisfaction was d = 0.57, which is higher than the d = 0.35 reported elsewhere (Leary, 1983), and lower than the d = 0.64–0.94 reported in other papers (Stice, Butryn et al. 2013; Stice et al., 2017; Stice, Rohde et al., 2013). The effect sizes for depression and social anxiety were d = 0.65 and d = 0.42 respectively, which are in the range for changes in mood (d = 0.38–0.72) reported elsewhere (Rohde et al., 2014; Stice et al., 2017; Stice, Butryn et al. 2013; Stice, Rohde et al., 2013). Therefore, it appears that there was no loss of efficacy when using The Body Project in Saudi Arabia.

## Association of initial eating pathology with the efficacy of The Body Project (Aim 2b)

To determine whether the Body Project is better suited to those with higher or lower eating pathology, we compared the pre- and post-intervention scores on all measures separately for those with higher and lower levels of initial eating pathology. We used a cut-off of 2.9 on the EDEQ Global score, because Chapter 3 (Levels of Pathology) shows that 2.9 is an appropriate cut-off point for Saudi young women.

Table 8 shows that there were differences between pre- and post-test scores on all measures among people with lower EDE-Q scores, except for social anxiety and BMI. There were no vomiting behaviours in this group at post-test, meaning that no effect size could be calculated.

Table . Differences between pre- and post-scores on eating pathology, body image, psychological correlates and BMI for completers who score below a cut-off EDE-Q Global score of 2.9 and effect size.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Lower EDE-Q (N = 24)** | | | | **r** | **t** | **p** | **d** | **95% CI** |
| **Pre** | | **Post** | |
| **M** | **(SD)** | **M** | **(SD)** |
| EDEQR | .78 | (.76) | .39 | (.52) | .24 | 2.35 | .028 | 0.480 | (.06, 1.12) |
| EDEQWC | 1.94 | (1.39) | .76 | (.78) | .39 | 4.39 | .000 | 0.897 | (.48, 1.59) |
| EDEQEC | .87 | (.95) | .21 | (.34) | .38 | 3.67 | .001 | 0.750 | (.35, 1.43) |
| EDEQSC | 1.93 | (1.40) | .86 | (.71) | .29 | 3.80 | .001 | 0.776 | (.38, 1.52) |
| EDEQ Global | 1.40 | (.89) | .56 | (.46) | .41 | 5.04 | .000 | 1.030 | (.60, 1.75) |
| Binge frequency | 2.54 | (5.53) | 1.08 | (1.86) | -.097 | 1.18 | .246 | .243 | (-.24, .94) |
| Binge days | 2.87 | (5.84) | .70 | (1.36) | -.157 | 1.70 | .101 | .350 | (-.09, 1.10) |
| Vomiting | .41 | (1.44) | .00 | (.00) |  | 1.41 | .170 |  |  |
| Laxatives | .12 | (.44) | .45 | (1.86) | .74 | -.83 | .411 | .211 | (-.70, .22) |
| Exercise | 3.50 | (6.81) | .45 | (1.21) | -.20 | 2.08 | .049 | .427 | (.00, 1.22) |
| Body image dissatisfaction | 16.91 | (10.97) | 11.79 | (3.41) | .27 | 2.37 | .026 | 0.484 | (.07, 1.17) |
| Depression | 8.33 | (5.74) | 5.70 | (3.86) | .38 | 2.30 | .030 | 0.471 | (.05, 1.01) |
| Social anxiety | 24.91 | (8.76) | 21.70 | (6.62) | -.009 | 1.42 | .168 | 0.291 | (-0.17, .98) |
| BMI | 23.25 | (5.21) | 23.30 | (5.13) | .992 | -.351 | .728 | 0.073 | (-.06, .04) |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; EDEQR, Eating Disorders Examination Questionnaire Restrain subscale; EDEQWC, Eating Disorders Examination Questionnaire Weight Concerns subscale; EDEQEC, Eating Disorders Examination Questionnaire Eating Concerns subscale; EDEQSC, Eating Disorders Examination Questionnaire Shape Concerns subscale; BMI, Body Mass Index. All behaviours are per 28 days.

Table 9 shows that there were similar differences between pre-test and post-test scores among people with higher EDEQ Global score. The overlap in effect size confidence intervals indicates that there were no reliable differences in level of change between those who started with high or low EDEQ Global scores. Therefore, it can be concluded that the Body Project was equally effective, regardless of initial eating pathology, making it applicable to all non-eating disordered young adult women.

Table . Differences between scores on eating pathology, body image, psychological correlates and BMI for completers who score above a cut-off EDE-Q Global score of 2.9 and effect size

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Higher EDE-Q**  **(N = 6)** | | | | **r** | **t** | **p** | **d** | **95% CI** |
| **Pre-test** | | **Post-test** | |
| **M** | **(SD)** | **M** | **(SD)** |
| EDEQR | 3.56 | (.89) | 1.60 | (1.34) | -.60 | 2.38 | .063 | 0.975 | (-.07, 3.42) |
| EDEQWC | 4.43 | (.95) | 3.46 | (1.90) | .89 | 2.08 | .091 | 0.852 | (-.09, 1.34) |
| EDEQEC | 3.73 | (1.36) | 1.26 | (1.53) | .43 | 3.90 | .011 | 1.593 | (.34, 3.01) |
| EDEQSC | 4.56 | (.74) | 3.16 | (2.11) | .78 | 2.14 | .085 | 0.875 | (-.11, 1.82) |
| EDEQ Global | 4.03 | (.73) | 2.37 | (1.50) | .55 | 3.25 | .023 | 1.327 | (.17, 2.57) |
| Binge frequency | 3.00 | (1.54) | 5.16 | (11.25) | -.57 | -.43 | .682 | .177 | (-1.48, .96) |
| Binge days | 3.66 | (4.41) | 4.00 | (6.00) | .12 | -.11 | .912 | .049 | (-1.12, 1.00) |
| Vomiting | .00 | (.00) | .00 | (.00) |  |  |  |  |  |
| Laxatives | .00 | (.00) | 1.66 | (4.08) |  | -1.00 | .363 |  |  |
| Exercise | .66 | (1.21) | 5.50 | (11.13) | .08 | -1.06 | .334 | .436 | (-1.76,.59) |
| Body image dissatisfaction | 36.50 | (9.26) | 25.66 | (12.09) | .37 | 2.18 | .081 | 0.888 | (-.11,2.06) |
| Depression | 17.16 | (4.07) | 9.33 | (4.27) | .60 | 5.17 | .004 | 2.113 | (.52,3.19) |
| Social anxiety | 38.50 | (11.13) | 28.50 | (10.44) | .76 | 3.30 | .021 | 1.350 | (.11,1.69) |
| BMI | 28.44 | (5.22) | 28.12 | (5.17) | .98 | .79 | .462 | 0.325 | (-.10,.22) |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; EDEQR, Eating Disorders Examination Questionnaire Restrain subscale; EDEQWC, Eating Disorders Examination Questionnaire Weight Concerns subscale; EDEQEC, Eating Disorders Examination Questionnaire Eating Concerns subscale; EDEQSC, Eating Disorders Examination Questionnaire Shape Concerns subscale; BMI, Body Mass Index. All behaviours are per 28 days.

# 

# Discussion

The objective of this study was to investigate the feasibility and acceptability of The Body Project for young women in Saudi Arabia, and to assess its potential efficacy. Adaptations were made in collaboration with a co-director of The Body Project. This effort is important because Chapter 3 (Levels of Pathology) shows that there are eating, body image and related problems among young Saudi women, and Chapter 5 shows that The Body Project is an eating disorders prevention programme that targets these issues in similar populations. However, the feasibility and acceptability of this programme for non-Western cultures has not previously been established.

## Evidence of feasibility, acceptability and efficacy

The results show that The Body Project is feasible for young women in Saudi Arabia. This is because people were willing to enrol and complete the programme, they found it understandable, enjoyable and useful, and they were willing to do unfamiliar things. The preliminary data also show that The Body Project was potentially effective in this group, as in previous studies. The effect sizes here were large for eating pathology, body image dissatisfaction and comorbidities, but there was no impact on BMI.

## Links to the wider literature

What was done in this study is in keeping with Nasser and Katzman’s (1999) suggestion that we should look at sociocultural adaptations when implementing eating disorders prevention programmes. Similarly, in a study of different ethnicities within the United States, Serdar et al. (2014) suggested that we need to make adaptations to dissonance-based prevention interventions for people from diverse ethnicities and cultures. The evidence of feasibility, acceptability and efficacy in this study is consistent with Witcomb et al.’s (2013) view that it should be possible to make dissonance-based interventions work in non-Western cultures.

There were no differences between completers and non-completers in levels of pathology and age. This is consistent with the results of Stice et al. (2006, 2009). Finally, people with higher and lower levels of eating pathology had similar effect sizes, as found in other studies (Becker et al., 2005; Butryn et al., 2014).

## Limitations

The main limitation to note in this feasibility and acceptability study is that there was no control group. Therefore, it cannot be concluded that improvements observed were due to the intervention. Furthermore, although our preliminary results are encouraging, they should be interpreted with caution because the study might not have been adequately powered. Finally, two participants continued attending the sessions without fully taking part in the research, showing that the linkage between research and intervention needs to be tightened.

## Strengths

Tailored adjustments of The Body Project for an intended group are recommended because they allow for wider application of the programme (Becker & Stice, 2017). We have presented an appropriate use of The Body Project in an adapted form, with consultation with the originating team, as recommended. We have demonstrated that it is possible to make the adaptations needed for local culture. It was possible to develop an adapted version of The Body Project for Saudi young women by adapting language and content to increase cultural ﻿relevance and acceptance. It was not possible to use the original Body Project measures (Bodyproject support, 2020) because they are not adapted to the local culture. However, we showed that we could use appropriate measures adapted for local purposes to assess outcomes.

## Implications for the main study

During the course of the feasibility and acceptability study and using participant feedback, further factors emerged that are likely to be important to consider when planning a full randomized controlled trial of The Body Project for young women in Saudi Arabia. These are detailed in Table 10. The main adaptation is the need to build role play statements around bulimic behaviours and attitudes, because eating pathology in Saudi young women is more bulimic than anorexic (as shown in Chapter 3).

Table . Further adaptations suggested after running the feasibility and acceptability study

|  |  |  |
| --- | --- | --- |
| The Body Project | Changes suggested | Why |
| Presenting images of international models that promote for thin-ideal and have thin bodies. | Present images of Arabic models, social media influencers, singes and actresses that promote for thin-ideal and have thin bodies. | Participants will engage more with images of people who look like them. They will understand that eating and body image issues exist in non-Western cultures. |
| Role play sample statements include anorexic statements only. | Add bulimic statements like “I will eat as much as I like now, then vomit later”. | Disordered eating behaviours and attitudes are more bulimic than anorexic in Saudi undergraduate women. This change will make role play more relevant to participants. |
| Role play include cultural insensitive statements. For example, “No guy is ever going to ask me to the prom unless I drop some of this weight”. | Change this statement to “No man is ever going to marry me unless I drop some of this weight”. | Men are not allowed to attend events with women unless with wives or first-degree relatives. |
| Role play sample statements include fear from gaining the Freshman 15 which is a common expression among undergraduates in the United States that refers to gaining 10 to 15 pounds during the first year at college. | Fear of gaining weight before Eid break where undergraduates gather with the bigger extended family circle. | Freshman 15 is not a common term in local culture. |

# Conclusion

This study has confirmed the feasibility and acceptability of The Body Project for Saudi young women. This pilot version of the programme showed promising effect sizes for eating pathology, body image dissatisfaction and comorbidities. Therefore, it will be important to reproduce this work in the context of a larger sample and a randomized controlled trial to test efficacy.

Chapter 7. Efficacy of the Body Project in a non-Western culture: A randomized controlled trial of a dissonance-based eating disorders prevention for Saudi women

# Introduction

Eating pathology includes moderate but non-clinical levels of disturbed eating attitudes and behaviours (Cooper & Fairburn, 1993). Disordered eating attitudes involve preoccupation with ﻿a desire to be thinner, body shape and weight, and dissatisfaction about body shape and weight, to a degree where self-worth is built on perceived body weight and shape (Cooper & Fairburn, 1993). Maladaptive eating behaviours include caloric restriction, excessive workouts, and vomiting (Dakanalis et al., 2017). These maladaptive eating cognitions and behaviours can be major risk factors for developing eating disorders if not accurately addressed (Dakanalis et al., 2017).

﻿ Body image is based on what an individual believes about his/her body and how he/she feels about it (Slade, 1994). Among other factors, cultural, biological, emotional and perceptual factors can lead to either satisfaction or dissatisfaction about body image (Slade, 1994; Túry et al., 2010). Those with eating disorders have body image dissatisfaction, and they internalize sociocultural pressure to fulfil unrealistic thinness idealization (Slade, 1994). Therefore, body image issues can contribute to eating disorder development and maintenance (Bhatnagar et al., 2013).

Eating pathology and body image dissatisfaction have been associated with mental health comorbidities, ﻿emotional stress, and maladaptive psychosocial functioning ﻿in the work, family, and personal relationships spheres (Steinhausen & Winkler Metzke, 2005). It is evident that depression and social anxiety, among other emotional disorders, are common psychological comorbidities of eating and body image issues (Assari & DeFreitas, 2018; Swinbourne et al., 2012). The impact of eating pathology on depression is higher for younger females (Puccio et al., 2016). Young women with eating pathology and body image dissatisfaction usually suffer from fear of being negatively evaluated on their appearance, which can make them vulnerable to social anxiety (Hart et al., 2008).

Women are particularly vulnerable to eating pathology and body image dissatisfaction (Rowling, 2006). One of the main reasons is their internalization of the Western thinness ideal, regardless of their cultural and ethnic background (Rakhkovskaya et al., 2014). Young women in non-Western cultures are especially vulnerable to eating and body issues during periods of cultural change towards Westernization (Swami, 2015).

Chapter 1 (General Introduction) showed that Saudi Arabia is undergoing a rapid Westernization process. Although Westernization empowers women in non-Western cultures, it increases internalization of the thinness ideal, which might increase eating and body issues (AlShebali et al., 2020; Rakhkovskaya & Warren, 2014; Rodgers et al., 2018; Stark-Wroblewski et al., 2005). Eating pathology, body image dissatisfaction, and comorbidities in young Saudi women are linked to internalization of Western values (AlShebali et al., 2020). Chapter 3 (Levels of Pathology) explains that the impact of internalization of Western values on eating and body issues is partially related to depression and social anxiety.

Levels of eating pathology, body image dissatisfaction, and comorbidities among Saudi young women are comparable with women from Western culture (AlShebali et al., 2020). Thus, eating disorders prevention can be suggested as a way to limit the impact of Westernization on young women during this time of inevitable culture transformation (AlShebali et al., 2020).

Eating disorders prevention is a practical, cost-effective intervention, which can be provided by non-clinical facilitators (e.g., Becker & Stice, 2017; Diedrichs et al., 2015; Stice et al., 2021). Selective dissonance-based prevention targets eating pathology and body image dissatisfaction (Stice et al., 2008). The Body Project is a selective dissonance-based prevention programme that challenges the thinness ideal (Stice, Rohde, & Shaw, 2013). It contains written, verbal, and behavioural tasks during four sessions in four sequential weeks (Stice, Rohde, & Shaw, 2013). It is a manualized, evidence-based and effective programme (Becker & Stice., 2017; Stice et al., 2008).

Although the Body Project shows desirable change with comparable samples in several effectiveness trials (Stice, Butryn et al., 2013; Stice, Rohde et al., 2013), its feasibility and acceptability for women in non-Western cultures has not yet been tested. Therefore, in Chapter 6, we assessed the feasibility and acceptability of the Body Project when adapted for the Saudi culture, changing some elements of the programme and examining its viability in a sample of Saudi undergraduate females. The results showed that the adapted version is useful, understandable, and potentially effective (Alshebali et al., 2021). However, although the preliminary data show promising changes in eating pathology, body image, and comorbidity measures, the efficacy needs to be confirmed using an experimental study to determine accurate effect sizes (AlShebali et al., 2021).

Therefore, this study will undertake a randomized controlled trial to assess the efficacy of the Body Project for Saudi undergraduate women. We will compare outcomes between an active group (where the prevention programme will be delivered), and an active control group (where participants will receive health education material related to healthy eating and body weight).

# Aims

1. To confirm the efficacy of the Body Project for eating pathology, body image, and comorbidities, immediately after the intervention and at three-months follow-up.
2. To determine whether compliance (attendance, homework) influences outcome in the active group.

# Hypotheses

1. The active group will experience greater positive changes in eating pathology and body image than the control group, from pre- to post-intervention and at follow-up.
2. Compliance (attendance at the intervention sessions; homework completion) will influence outcome in the active group.

# Method

## Ethical approval

This study was approved by the Institutional Review Board (IRB) of King Abdulaziz City for Science and Technology, and the Scientific Research Ethics Committee of Princess Nourah bint Abdulrahman University. See Appendix 6.1.The trial is registered at www.clinicaltrials.gov as NCT05071521. See appendix 7.1.

## Design and setting

﻿The study is a randomized controlled trial. It compares the outcomes of those who received the adapted version of the Body Project (see Chapter 6) (N = 47) to those who received a control health education intervention (N = 45). Both conditions ﻿were four weeks in duration. The study used a longitudinal design, where measures were taken at pre-test, post-test, and three-months follow-up. It included correlational and comparative elements. Within-group effect sizes were calculated at pretest to posttest, pretest to follow-up, and posttest to follow-up. We choose to measure follow-up after three months because it is comparable with similar prevention studies for eating and body image (e.g., Sharpe et al., 2013).

## Sample size

The sample size was calculated based on a repeated measures design (Yue & Roach, 1998), addressing the primary outcome variable of the EDE-Q. The calculation used the effect size from the finding of Chapter 6 (Feasibility and Acceptability) d = 1.05, where the mean EDE-Q Global score at pre-test was 1.93 (SD = 1.36) and at post-test was 0.92 (SD = 1.05). With an alpha level of *p* = .05 and power = 90%, and assuming an attrition rate of 37.5% (as in Chapter 6), the minimum target sample size was 64 (32 per group). However, in case of a larger attrition rate, we aimed to recruit more than 64 participants.

## Participants and procedure

Participants were 92 female undergraduates recruited from different departments in Princes Nourah bint Abdulrahman University in Riyadh, Saudi Arabia. Therefore, the sample size was adequate for this study. The mean age of the participants was 20.48 years (SD = 2.28), and their mean baseline body mass index was 24.48 (SD = 6.35). All participants were of Arabic ethnicity.

﻿ Figure 1 shows a CONSORT diagram, outlining the recruitment, assessment process of participants, attendance, and homework completion. Participation in this study was on a voluntary basis. Recruitment took place between 1.10.2020 and 15.11.2020 (i.e., under COVID-19 restrictions). An invitation email was sent to 32166 undergraduates, with a link to an online survey containing an information sheet, consent form (See Appendix 6.1), and the Eating Disorders Diagnostic Scale (EDDS) - DSM-5 version (Stice et al., 2000). As a result, 137 undergraduate Saudi females agreed to participate.

137 responded to the EDDS

22 were excluded (12 with bulimia nervosa, 2 with binge eating disorder, and 8 from other universities).

92 were randomized to two groups

32166 undergraduates received an invitation email

23 were lost (2 wrong contacts, 1 no contact, 15 left, 2 no response, and 3 had schedule conflicts).

Active group (N =47)

Control group (N =45)

45 did pre-test

42 did post-test

42 did pre-test and post-test

36 did pre-test, post-test and follow up

1 left

Active group (N =46)

Research (N =46)

46 completed pre-test

44 completed post-test

44 completed pre-test and post-test

36 did pre-test, post-test and follow up

Homework completion (N =46)

|  |  |
| --- | --- |
| Homeworks | Number of homeworks completed |
| 0 | 13 |
| 1 | 5 |
| 2 | 1 |
| 3 | 9 |
| 4 | 14 |
| 5 | 1 |
| 6 | 3 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |

Intervention (N =46)

41 attended session 1

35 attended session 2

31 attended session 3

30 attended session 4

[40 attended 2 or more sessions]

[6 attended 1 or fewer sessions]

115 agreed to participate

Figure . Flowchart of participant recruitment, assessment, attendance, and homework completion.

Participants were excluded if they met DSM-5 diagnostic criteria for anorexia nervosa, bulimia nervosa, binge eating disorder, atypical anorexia nervosa, atypical bulimia nervosa or atypical binge-eating disorder, determined via the EDDS (Stice et al., 2000). As shown in Figure 1, 22 participants were excluded. This was because they met the criteria for bulimia nervosa (N = 12) or binge-eating disorder (N = 2), or because they were from other universities (N = 8). Those with eating disorders were advised to seek treatment. Of the remaining 115 participants, 23 were lost to the study for the following reasons - wrong contact information (N =2); no contact information (N =1); left the study without expressing any reason (N =15); did not respond (N =2); or had scheduling conflicts (N =3).

Simple randomization using electronic random generation (Random.org, 2021) was used to randomly divide the remaining 92 volunteers into two groups - the active group (N = 47) and the control group (N = 45). One participant left the active group after randomization. A co-director of The Body Project advised that the maximum number participants in each meeting should not exceed twelve participants. Therefore, participants in the active group (N = 46) were allocated to four subgroups with 12 or 11 participants each. There was no blinding of the researcher, who also delivered the prevention work.

Outcome measures were applied before the first meeting, after the last meeting, and after the three-month follow-up. These self-report measures were delivered via an electronic survey.

## Interventions

﻿**Online delivery.** The World Health Organisation announced a coronavirus disease pandemic in March 11, 2020 ﻿(COVID-19) (World Health Organization, 2021). Therefore, the Saudi Arabia government implemented several protective measures to decrease the spread of COVID-19, including social distancing. Social distancing means maintaining at least two-metre distance between individuals. Consequently, Princess Nourah Bint Abdulrahman University shifted to online learning, and gave permission for non-academic workshops to be delivered online. Therefore, the Body Project was delivered online (Princess Nourah bint Abdulrahman University, 2021a).

**The Body Project**. The active group received the adapted version of the Body Project for Saudi culture, based on the feasibility/pilot study in Chapter 6 (Feasibility and Acceptability) (AlShebali et al., 2021). The adaptation process kept the rationale for the intervention but changed some items to be feasible for Saudi culture (AlShebali et al., 2021; Stice, Rohde, & Shaw, 2013). The changes include applying different outcome measures rather than the original measures in the manual (due to their lack of validation in the Saudi population).

Participants attended four meetings, each lasting one hour, in consecutive weeks from 15.11.2020 to 16.12.2020, via a video meeting platform (Zoom Video Communications, 2021). In session 1, participants cooperatively defined the appearance ideal, discussed costs of pursuing an unrealistic appearance, ﻿and were assigned home exercises (e.g., write a letter to an adolescent girl who is not satisfied with her body image about the costs of pursuing appearance ideals). In session 2, participants dissuaded each other from pursuing the appearance ideal in role-plays, and were assigned more exercises (e.g., create a list of 10 things women can do to challenge the appearance ideal in the society). In session 3, participants challenged appearance ideal statements through role-plays, discussed reasons for signing up for the programme, and were assigned home exercises (e.g., engage in a behaviour that challenges their body image concerns). In session 4, participants discussed plans for potential pressure to be thin, considered benefits of the programme, and were assigned home exercises (e.g., do a body acceptance awareness activity as a group to resist the thinness ideal).

The author was the therapist and was supervised by GW and with support from CB. Supervision addressed issues of recruitment and delivery. Issues such as randomization, engagement, and attrition were addressed throughout.

**Health education material.** The control group were asked to read educational material in Arabic about healthy nutrition and active lifestyle from the Saudi branch of the World Obesity Federation (Kayl Association for Combatting Obesity, 2021). The material includes: information about body mass index; easy ways to measure food units without a scale; benefits of working out; means to adopt healthier daily habits; and healthier food alternatives. The material was chosen because it was designed to be easy to understand by any individual. Reading the material took approximately one hour.

## Measures

To address the aims, we used the translated measures that were used and detailed in Chapter 6.

**Eating Disorders Diagnostic Scale (EDDS) - DSM-5 version (Stice et al., 2000).** The EDDS is a self-report scale of DSM-5 criteria of eating disorder symptoms that contains 23 items. The EDDS yields a diagnostic category of typical or atypical eating disorder (Stice et al., 2000). It was applied as a screening tool, in order to exclude anybody with an eating disorder before randomizing participants to the study groups. The DSM-5 scoring system was used (https://www.phenxtoolkit.org/protocols/view/120602). See Appendix 4.1.

**Eating Disorder Examination-Questionnaire (EDE-Q, version 6.0).** The EDE-Q is a self-report scale of eating disorder attitudes and behaviours (Fairburn & Beglin, 2008). It contains 28 items that assess eating disorder pathology during the past 28 days. It has four subscales: restraint; eating concerns; weight concerns; and shape concerns. The Global EDE-Q score (mean of the four attitudinal scores) and the scores of each subscale were used in this study. Higher scores indicate greater eating pathology. The completers’ mean EDE-Q Global score in this study at pre-test was 2.00 (SD = 1.20), consistent with Saudi (AlShebali et al., 2020; 2021) and Western non-clinical norms (Mond et al., 2006). The EDE-Q was used before and after the interventions, and after the three-month follow-up to assess outcomes. See Appendix 3.3.

**Body Shape Questionnaire (BSQ-8C).** The eight-itemBSQ-8C is a self-report scale that assesses body image. It is a short version of the full Body Shape Questionnaire (Evans & Dolan, 1993). A higher score reveals a higher level of body dissatisfaction. Internal consistency in a Saudi population (AlShebali et al., 2020; α = .927) is similar to Western norms (e.g., Peterson et al., 2007). It has excellent test–retest reliability and high convergent validity (Pook et al., 2008). The BSQ-8C can be used in clinical and non-clinical populations (Welch et al., 2012). The scale was used before and after the interventions, and at the three-month follow-up to assess outcomes. See Appendix 3.4.

**Brief Version of the Fear of Negative Evaluation Scale (BFNE).** The12-item BFNE (Leary, 1983) is a self-report scale that assesses anxiety associated with perceived negative evaluation. A higher score indicates a higher level of social anxiety. The BFNE has strong psychometric properties in a Saudi group (AlShebali et al., 2020; α = .872), which is similar to Western levels (Weeks et al., 2005) It has strong test-retest reliability (r = .75) (Leary, 1983). The scale was used before and after the intervention, and at the three-month follow-up to assess outcomes. See Appendix 3.6.

**Patient Health Questionnaire (PHQ-9).** The nine-itemPHQ-9 (Löwe et al., 2004) is a self-report scale that assesses the severity of depression over the past two weeks. A higher score shows a higher level of depression. The scale items correspond with the major depressive episode criteria described in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). Its internal consistency in a Saudi population (AlShebali et al., 2020; α = .888) is comparable to Western norms (Zuithoff et al., 2010). It also has strong test-retest reliability Zuithoff et al. (2010). If participants had expressed suicidal thoughts during the meetings in the active group, they would have been referred to the psychiatry clinic in the university hospital for assessment and treatment. The scale was used before and after the intervention, and at the three-month follow-up to assess outcomes. See Appendix 3.7.

**Data analysis**

General Linear Mixed Models (GLMM; SPSS 26.0) were used to analyse the data relating to the first aim. This approach addresses the problems of missing data from those who did not complete the measures at all time points, and overcomes any issue of correlations between repeated measures. Thus, all data were used. There were four dependent measures - eating pathology [EDE-Q Global], body satisfaction [BSQ], social anxiety [Brief FNE], and depression [PHQ-9] - all measured dimensionally. The first of these (EDE-Q Global) was treated as the primary outcome variable, and the others were treated as secondary outcomes. The GLMMs were used to analyse for main and interaction effects, with the interaction terms indicating reliable differences between the trajectory of the two groups (Body Project vs educational control).

For each individual dependent variable, initial modelling of the repeated variable (Time) was conducted using linear, quadratic, cubic and logarithmic (logn) transformation to determine which provided the best fit to the data (Information criteria, identified by the lowest -2 Log Likelihood score). Thereafter, the models (maximum iterations = 100) were built using: the Random Intercept (to identify differences between the groups at the outset); the Intervention effect (to identify the overall difference between the Body Project and Educational interventions); the most effective Time measure (to show the overall change in scores over time); and the interaction of the relevant Time variable x Intervention (to determine whether the intervention conditions yielded different outcomes). For the interactions, estimated means were presented graphically, to enable interpretation.

For the second aim, correlations were used to assess associations between adherence and outcomes (change scores in the outcome measures) in the Body Project condition only. Change scores were calculated as the difference between the posttest score and the pretest score for all treatment completers. A negative change score is a positive outcome. Spearman’s rho was used to ensure that non-normal distribution of scales was accounted for.

# Results

Table 1 shows the demographic characteristics for the control group and the intervention group, showing that the two groups were well-matched at baseline. Mean pre-intervention scores (Table 2) were comparable with those of other non-clinical groups (Luce et al., 2008; Pitarch, 2010; Rogowska et al., 2020; Welch et al., 2012). Binary logistic regressions showed no difference between the drop-outs and completers in the Body Project condition (chi-squared = 7.676, df = 24, P = .905) or the control condition (chi-squared = 11.09, df = 24, P = .679). Therefore, there were no predictors of attrition in either group.

# Table 1. Demographic characteristics of the control group and active group.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Groups** | **Age (years)** | | **Body mass index** | | **Arab Ethnic group** | | **Saudi Nationality** | |
| M | (SD) | M | (SD) | N | % | N | % |
| Control | 20.91 | (2.52) | 23.94 | (6.13) | 45 | 100 | 45 | 100 |
| Active | 20.06 | (1.97) | 25.01 | (6.58) | 46 | 100 | 46 | 100 |

**Differences between the control group and the intervention group at baseline in eating pathology, body image dissatisfaction, and psychological comorbidities**

Independent sample t-tests were used to compare the pretest scores of the control group and the intervention group. Table 2 shows that the intervention group had higher levels of body image dissatisfaction and depression at baseline, despite the randomization.

**Table 2**

Scores on eating pathology, body image, and psychological correlates for the control group and the Body Project group at baseline.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measures** | **Control group**  (N = 45) | | **Body Project group**  (N = 46) | | **t** | **P** |
| **Mean** | **(SD)** | **Mean** | **(SD)** |
| EDE-Q Global | 1.89 | (1.21) | 2.42 | (1.37) | 1.96 | .053 |
| BSQ-8C | 20.26 | (10.61) | 24.86 | (11.33) | 1.99 | .049 |
| PHQ-9 | 8.24 | (5.47) | 11.91 | (6.68) | 2.86 | .005 |
| BFNE | 28.11 | (8.72) | 30.65 | (8.89) | 1.37 | .172 |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; BSQ-8C, Body Shape Questionnaire; PHQ-9, Patient Health Questionnaire; BFNE, Brief Version of the Fear of Negative Evaluation Scale.

**Outcome of the Body Project intervention**

Generalised Linear Mixed Models (GLMM) were used to determine whether there were any significant differences in outcome between the young adult women receiving the Body Project intervention and those in the control condition. These were conducted separately for the primary outcome variable (EDE-Q Global score) and for each of the secondary outcome variables (BSQ, FNE, and PHQ-9 scores).

***Eating pathology scores***

The EDE-Q Global score was initially tested for the most appropriate model assumption. As is commonly the case with psychopathological measures, the logn distribution had the lowest -2 Log Likelihood score (677.878), compared with the simple linear (682.031), quadratic (690.288), or cubic (681.568) distributions. Therefore, the logn transformation was used in the modelling for this outcome variable.

The final model consisted of the random intercept, the intervention, the logarithmic transformation of the Time variable (the three time points of pre, post and follow-up), and the interaction of logn Time by Intervention. It had a -2 Log Likelihood value of 674.185. Table 3 shows the fixed coefficients from the model. There was a non-significant difference between the scores on the Intercept variable, indicating that the Body Project group tended to start with higher EDE-Q Global scores. There were no significant main effects of Intervention or Time. However, there was a significant interaction of logn Time x Intervention. The negative sign of the coefficient indicates that the Body Project group had a significantly greater reduction in EDE-Q Global scores than the Educational intervention control group (whose scores remained relatively static over time). This pattern is detailed in Figure 2.

**Table 3**

Generalised Linear Mixed Model, demonstrating impact of time (pre, post, follow-up) on EDE-Q Global scores for the active (Body Project) and control (Educational) groups.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model term** | **Coefficient** | **Standard Error** | **t** | **P** | **Lower 95% Confidence interval** | **Upper 95% Confidence interval** |
| Intercept | 1.777 | 0.917 | 1.94 | .054 | -0.030 | 3.583 |
| Intervention | -0.206 | 0.189 | 1.09 | .277 | -0.580 | 0.167 |
| Logn time | -0.257 | 0.168 | 1.53 | .128 | -0.589 | 0.075 |
| Logn time x Intervention | -0.569 | 0.238 | 2.39 | .018 | -1.039 | -0.100 |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; BSQ-8C, Body Shape Questionnaire; PHQ-9, Patient Health Questionnaire; BFNE, Brief Version of the Fear of Negative Evaluation Scale.

**Figure 2**

Estimated EDE-Q Global scores across time (1 = Pre-intervention; 2 = Post-intervention; 3 = Follow-up) for the Body Project group (red) and the Educational Control group (blue)

Chart, line chart

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***Secondary outcomes***

The GLMMs for the secondary outcomes are detailed in Table 4 and in Figures 3- 5. Again, these demonstrate the main and interaction effects of Time (pre, post and follow-up) and Condition (Body Project vs Educational control).

**Table 4**

Generalised Linear Mixed Model, demonstrating impact of time (pre, post, follow-up) on secondary outcome variables (BSQ, Anxiety, PHQ-9) for the active (Body Project) and control (Educational) groups.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measure & Model term** | **Coefficient** | **Standard**  **Error** | **t** | **P** | **Lower 95% Confidence interval** | **Upper 95% Confidence interval** |
| ***BSQ*** | | | | | | |
| Intercept | 16.450 | 7.457 | 2.21 | .028 | 1.762 | 31.137 |
| Intervention | 5.254 | 1.547 | 3.40 | .001 | 2.206 | 8.301 |
| Logn time | -0.607 | 1.417 | 0.43 | .669 | -3.399 | 2.185 |
| Logn time x Intervention | -5.510 | 1.983 | 2.77 | .006 | -9.428 | -1.591 |
| ***BFNE*** | | | | | | |
| Intercept | 26.423 | 6.318 | 4.18 | .001 | 13.979 | 38.868 |
| Intervention | 2.992 | 1.282 | 2.33 | .020 | 0.466 | 5.518 |
| Logn time | -3.045 | 1.097 | 2.78 | .006 | -5.206 | -0.884 |
| Logn time x Intervention | 0.369 | 1.552 | 0.24 | .812 | -2.687 | 3.425 |
| ***PHQ-9*** | | | | | | |
| Intercept | 8.452 | 4.152 | 1.87 | .063 | -0.445 | 17.349 |
| Intervention | 3.524 | 0.963 | 3.66 | .001 | 1.627 | 5.421 |
| Logn time | 0.503 | 0.866 | 0.58 | .562 | -1.203 | 2.209 |
| Logn time x Intervention | -2.916 | 1.220 | 2.39 | .018 | -5.319 | -0.513 |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; BSQ-8C, Body Shape Questionnaire; PHQ-9, Patient Health Questionnaire; BFNE, Brief Version of the Fear of Negative Evaluation Scale.

**Body satisfaction** was assessed using the BSQ. The logn distribution for time had the lowest -2 Log Likelihood score (1640.294), compared with the simple linear (1721.138), quadratic (1728.025) or cubic distributions (1730.715). Therefore, the logn transformation was used in the modelling for this outcome variable of BSQ (final model -2 Log Likelihood value = 1706.163). Table 4 shows that the Body Project group had a higher BSQ score at the outset (Intercept), despite randomisation to groups. There was also a main effect of Intervention, which was subsumed into the Intervention x Time interaction, showing that the effect of the index intervention (Body Project) was more effective than the Education control condition in enhancing body satisfaction, as those in the Body Project saw an improvement in BSQ scores compared to the stable scores of those Education control group (see Figure 3).

**Figure 3**

Estimated Body Satisfaction Questionnaire (BSQ) scores across time (1 = Pre-intervention; 2 = Post-intervention; 3 = Follow-up) for the Body Project group (red) and the Educational Control group (blue)

Chart, line chart

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**Social anxiety** was assessed using the Brief FNE. Again, the logn distribution for time had the lowest -2 Log Likelihood score (1647.155), compared with the simple linear (1649.501), quadratic (1964.880) or cubic distributions (1657.152). Therefore, the logn transformation for time was used to model the outcome variable of FNE (final model -2 Log Likelihood value = 1637.778). Table 4 shows that the Body Project group had a higher FNE score at the outset (Intercept), despite randomisation. There was also a main effect of Intervention and another of Time, showing reduction in social anxiety over time and different overall levels of social anxiety for the two groups. However, there was no significant Intervention x Time interaction, showing that the index intervention (Body Project) and the control condition did not differ in their impact on social anxiety, which stayed relatively stable in each group (see Figure 4).

**Figure 4**

Estimated Fear of Negative Evaluation (Brief FNE) scores across time (1 = Pre-intervention; 2 = Post-intervention; 3 = Follow-up) for the Body Project group (red) and the Educational Control group (blue)

Chart, line chart

Description automatically generated

Finally, **Depression** was assessed using the PHQ-9. Again, the logn distribution for Time had the lowest -2 Log Likelihood score (1530.948), compared with the simple linear (1532.305), quadratic (1534.288) or cubic distributions (1536.047). Therefore, the logn transformation of Time was used to model the outcome variable of PHQ-9 (final model -2 Log Likelihood value = 1519.270). Table 4 shows that the two groups did not differ in PHQ-9 score at the outset (Intercept). There was a main effect of Intervention, which was subsumed into the Intervention x logn Time interaction. This showed that the index intervention (Body Project) led to a reduction in depression, while there was no change in the Educational control group’s depression levels (see Figure 5).

**Figure 5**

Estimated depression (PHQ-9) scores across time (1 = Pre-intervention; 2 = Post-intervention; 3 = Follow-up) for the Body Project group (red) and the Educational Control group (blue)

Chart, line chart

Description automatically generated

**Association of compliance and outcomes in the active group**

**Levels of compliance.** Of the 46 participants, 40 attended at least 50% of the programme (two or three sessions), and 25 attended all four sessions. In total, 87% of participants attended at least two sessions. This percentage is higher than a recent virtual delivery trial of the Body Project (Ghaderi et al., 2020), and similar to other clinical trials of the Body Project (Stice, Butryn et al., 2013; Stice et al., 2014; Stice et al., 2012; Stice et al., 2020). In contrast, of the 460 total home exercises expected from participants, only 113 were carried out. This homework completion rate (25%) is considerably lower than in a similar trial, where participants completed 87% of the home exercises (Stice, Butryn, et al., 2013).

**Association of compliance with outcomes.** Table 5 shows the associations (Spearman’s rho) between changes in the core measures of pathology (EDE-Q; BSQ-8C; PHQ-9; BNFE) and the levels of attendance and homework completion. None of these associations were significant, indicating that the level of compliance was not linked directly to level of change in the measures.

Table 5

Correlations between attendance of sessions and homework completion with eating pathology, body image dissatisfaction, depression and social anxiety in completers of the active group (N = 36).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Spearman’s correlation** | **Homework** | | | **Attendance** | |
| **rho** | **p** | **rho** | | **p** |
| Change in EDEQ Global | .130 | NS | .317 | | NS |
| Change in BSQ-8C | .131 | NS | .256 | | NS |
| Change in PHQ-9 | -.146 | NS | .074 | | NS |
| Change in BFNE | -.134 | NS | .007 | | NS |

Key: EDEQ Global, Eating Disorders Examination Questionnaire Global score; BSQ-8C, Body Shape Questionnaire; PHQ-9, Patient Health Questionnaire; BFNE, Brief Version of the Fear of Negative Evaluation Scale; BMI, Body mass index.

**Summary**

The GLMM models demonstrated that the young women who received the Body Project benefitted more than those in the active control condition on the majority of the outcomes – specifically eating concerns, body satisfaction and depression. However, this was not the case for social anxiety. This finding supports the core hypothesis in three out of the four outcome variables, supporting the efficacy of the Body Project across a range of outcome variables. These conclusions hold, despite the fact that the randomisation resulted in the Body Project group having slightly greater levels of initial pathology at the outset. Compliance (level of session attendance and homework completion) were not related to outcomes.

# Discussion

The main aim of this randomized control trial was to determine the efficacy of the Body Project for Saudi women. We also aimed to determine whether or not compliance has an influence on outcomes. As hypothesized, participation in the Body Project resulted in greater changes than the control intervention in eating pathology, body satisfaction and depression, and this pattern was maintained to follow-up. Considering the second hypothesis, there were no links between compliance and outcomes, even though the homework compliance was low.

Homework completion was low compared to that in other cultures. This could be due to the online nature of the programme, or the tendency towards passive learning in young Saudi women (El-Naggar, 2012). It might be that homework completion was not linked to outcomes because the Body Project sessions themselves include enough activities to make the homework redundant, even though homework completion in other interventions is suggested to improve outcomes (LeBeau et al., 2013).

Comparison of our findings and those of other studies (Becker & Stice, 2017; Stice, Butryn et al., 2013) indicates similar benefits from the Body Project for women across cultures, even when using online presentation (e.g., Hamatani et al., 2019), as long as the protocol is used appropriately ﻿(e.g., Stice, Rohde, & Shaw, 2013). These findings suggest that the underlying psychological processes are transcultural. It might be that homework completion was not linked to outcomes because the Body Project sessions themselves include enough activities to make the homework redundant, even though homework completion in other interventions is suggested to improve outcomes (LeBeau et al., 2013). The findings are consistent with the predictions of cognitive dissonance theory (Festinger, 1957), suggesting that this intervention influences eating attitudes, body image and depression by inducing changes in behaviour (via group discussions and challenging societal norms).

## Limitations

Our sample was limited to undergraduate women who shared one ethnicity, country, city, and university. We did not examine men, children, adolescents, women in rural areas, undergraduates in other universities, and other age groups, meaning that the findings cannot be generalised. It is also important to note that there was no ﻿longer-term follow-up, which is a limitation that is common in eating disorder prevention trials (Stice et al., 2007). Longer-term follow-up would test whether the prevention programme offered protection against later life factors. Finally, the use of self-report data creates a risk of socially desirability in the participants’ responses, as well as issues of limited self-reflective ability (Devaux & Sassi, 2016). The differences in outcomes between groups could be due to differences in the lengths of the two interventions.

## Strengths

This is the first full test of the efficacy of eating disorders prevention in Saudi Arabia. The use of a randomized control trial strengthened the findings, along with the use of a follow-up assessment and the use of a clear protocol and measures that were culturally appropriate. The use of a rigorous methodology and well validated measures enhances confidence in these findings for a non-Western population. We also demonstrated that videoconference delivery was effective for the Body Project in a non-Western setting.

## Future research

The Body Project should now be tested on larger populations in a range of non-Western settings, to demonstrate its generalizable efficacy. A larger sample over an extended period with a longer follow-up would also allow researchers to test for reductions in future eating disorders onset, and to provide more precise calculations of effect sizes and costs (Stice et al., 2008). Such studies should also include consideration of a wider range of outcome measures, including possible biological changes, such as heart risk indicators and brain responses to thinness images (Green et al., 2016; Stice et al., 2015). Any such work should consider cultural adaptations at the pilot stage, as here.

It will be useful to compare the effects of the Body Project and other evidence-based prevention interventions, in order to determine what adjustments each needs and whether different prevention programmes suit different cultures. These might include approaches such as school-based body image interventions, media literacy, and cognitive behavioural ﻿therapy-based interventions (Diedrichs et al., 2015; Le et al., 2017; Watson et al., 2016). Such work should consider cultural adaptations at the pilot stage, as in the Feasibility and Acceptability study (Chapter 6). Qualitative approaches might inform the outcomes of such research, by enhancing our understanding of what approach works best in different cultures. This might particularly include consideration of whether virtual and face-to-face delivery have comparable outcomes.

## Implications for practice

Although further research is needed, policymakers and clinicians might use these findings as the basis for local and national planning of eating disorders prevention in Saudi Arabia, to reduce the personal, social, health and economic costs of eating and body disturbance. Such an approach would mean scaling up the availability of the prevention work, through large-scale training of facilitators, as per existing approaches to rolling out the Body Project (e.g., ORI Body Acceptance Project, 2021; Stice, Rohde, & Shaw, 2013). Given that online approaches are viable, they could be with larger numbers, in order to enhance access to psychological support for those who live in rural areas or who cannot attend in person (Matheson et al., 2020), thus ensuring effective psychological help for a larger number of people.

# Conclusion

In this final study of the dissertation, I have examined the efficacy of the Body Project for Saudi women, using a randomized controlled trial. The delivery had to be online, but still showed medium-strong effect sizes for eating attitudes and body image. The participants attended well. While they were poor at homework completion, such compliance did not predict change. The efficacy of the Body Project for Saudi women indicates that its underlying psychological processes are relevant across cultures and delivery methods. These findings show that the large number of people in Saudi Arabia with pathological eating and body concerns (Chapter 3) can be helped through the appropriate adaptation of a prevention programme that was developed in a Western culture, as shown in the Feasibility and Acceptability study (Chapter 6). In addition, Western programmes have implications for the potential utility of these approaches in other cultures and using other prevention methods.

Chapter 8. General Discussion

This dissertation aimed to demonstrate the pattern of eating pathology and body image in young Saudi women in the current time of Westernization, and to use that understanding to develop a prevention strategy for this group. We hypothesized that we would find comparable levels of pathology to Western cultures, at this point in the ongoing cultural shift towards Westernization. We hypothesized that internalization of Western values would influence eating pathology and body image dissatisfaction. Finally, we hypothesized that a dissonance-based eating disorders prevention programme would be effective, particularly where there was good compliance (attendance; homework completion).

The first step was to review existing studies Chapter 2 (Literature Review). This review showed that the literature covering eating and body image issues to date was limited in range and poor in quality. Although eating and body image are women-oriented issues, which are related to culture, such research in Saudi Arabia was led by men and foreign women. There were few studies by Saudi female researchers, and those studies were not published. These findings indicated a clear need for good data on prevalence and levels of eating and related problems in this population, including an understanding of the experience of Saudi women.

In response to that gap in the literature, Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence) outlined an evaluation of eating disorder diagnoses, eating pathology and body image in this group, using valid, reliable and locally adapted measures. We found comparable levels of eating pathology, body image dissatisfaction, and psychological comorbidities to those found in Western culture, though the Saudi eating pathology pattern was more bulimic than anorexic. Pathology levels were related to internalization of Western culture, and were linked to psychological comorbidities.

Having determined the links between internalization of Western values and eating pathology and body image, the remaining studies Chapter 6 (Feasibility and Acceptability) and Chapter 7 (Efficacy) tested an evidence-based eating disorders prevention among young adult female Saudi University students. The method used was developed in a Western culture and needed cultural adaptation to be feasible for Saudi women. Having shown feasibility and acceptability, we then demonstrated in an RCT that the prevention programme was effective, with positive changes in eating and body image issues. The strength of the recruitment and retention shown in Chapter 7 (Efficacy) might be due to Covid-19 social isolation, which might have made the intervention a chance for participants to interact with others. An alternative possibility was that the topic is one that would have been of interest to potential participants, but which they had not previously had the opportunity to explore or to seek help for, due to the lack of recognition of eating and body image concerns in Saudi culture.

Participants were engaged and found the prevention useful and enjoyable. However, they were not compliant with homework tasks. It seems that active learning of this sort is difficult to enact in the Saudi culture. However, compliance did not influence efficacy. The findings support the hypothesis that adaptation of an existing prevention programme was suitable and effective in a non-Western setting.

In summary, Saudi women are like women in other cultures in terms of the impact of cultural changes on their eating and body image issues, and in their response to prevention. When the impact of the current ongoing changes towards Westernization was taken into consideration, the pattern of pathology was similar to that found in Western cultures, with the exception of a more bulimic than anorexic manifestation. Saudi women benefited from a Western developed prevention approach just like women in other cultures, suggesting that the underlying psychological processes of the programme are not culture-specific.

# Links to wider literature

It can be seen in Chapter 2 (Literature review) that eating and body image issues are not yet fully understood in Saudi Arabia. This problem is also found in other mental health disorders. Saudi research in human psychopathology consisted of just 670 studies from 1975 to 2017 (Abumadini, 2019). Furthermore, the existing research has been led by men and non-Saudi women. It has been suggested that the problem of eating pathology is not adequately studied in Saudi Arabia because men cannot ask the right questions, and foreign women cannot understand local culture (Leichtman, 2015; Nasser, 2009). This pattern indicates challenges in the research infrastructure and mental health care in Saudi Arabia (which is likely to be replicated in many other cultures). This gap encouraged us to undertake this dissertation during the ongoing cultural changes.

The comparable levels of pathology with Western samples in Chapter 3 (Levels of Pathology) are consistent with what has been found in other non-Western countries like ﻿China, Iran, Singapore, Japan, and Taiwan (Kim & Thomas, 2021). This indicates that eating and body image issues are not culture-specific. The links between internalization of Western appearance ideal and eating pathology and body image dissatisfaction in Chapter 3 (Levels of Pathology) are also found in Western countries, including Australia, France, and the United States (Rodgers et al., 2011; Shroff et al., 2006). The same links are found in non-Western cultures, including Israel, Sudan, and Korea (Latzer et al., 2019; Lau & Ambrosino, 2017; You et al 2020). The links in Western and non-Western cultures between internalization of Western appearance ideal and eating pathology and body image dissatisfaction indicate that women across cultures develop eating and body image issues as they internalize the Western appearance-ideal (Zittoun, & Gillespie, 2015).

The Saudi pattern tends towards bulimic pathology in Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence). This pathology pattern differs from other non-Western cultures, including China where bulimic pathology is less prevalent (Yao et al., 2021). This difference in pattern of pathology could be due to Saudi hospitality traditions, where large amounts of food are served in regular social gatherings (Sobh et al., 2013). The hospitality traditions exist in Saudi Arabia, but not in China, which might explain the more bulimic pathology in Saudi Arabia. Overeating then purging seems to be normalized among Saudi women (Altwaijri et al., 2020).

Chapter 5 concluded that there is limited research in eating disorders prevention worldwide, which is consistent with gaps in other research areas (Austin, 2012). More attention is needed to prevention science as a public health approach (Austin, 2012). It is important to understand ﻿the theoretical underpinnings of prevention and whether or not the theory is applicable across cultures (Stice et al., 2021). ﻿The limited prevention research in other cultures highlights the danger of conducting Western-based prevention in another culture without appropriate adaptation and cultural awareness (Chisuwa & O’Dea 2010). ﻿The consistency between Chapter 5 and Austin (2012) indicates a need for more research to understand prevention theories and to expand prevention practice and influence (Austin, 2016). Community-focused prevention might reduce the public health burden (Austin, 2016).

Chapter 6 (Feasibility and Acceptability) shows the feasibility and acceptability of an adaptation of the Body Project, and shows its effects. These outcomes are in line with the adaptation and effectiveness of a school-based prevention ﻿“Me, You and Us” in Korea (Lee et al., 2018). Similarly, the changes in the intervention group in Chapter 7 (Efficacy) are consistent with the outcomes of an online implementation of the Body Project for young women in China (Luo et al., 2021). This consistency shows that Western-developed prevention methods are applicable to different cultures. However, the participants here suggested reducing the prevention homework in Chapter 6 (Feasibility and Acceptability), which is in contrast with another study (Simpson et al., 2020). The homework completion rate (25%) in Chapter 7 (Efficacy) was notably lower than Stice, Butryn, et al. (2013; 87%). These differences in compliance to homework between Saudi participants and others in different cultures indicate a greater tendency towards passive learning in young Saudi women.

Comparison of our findings in Chapter7 (Efficacy) and those of other studies (Becker & Stice, 2017; Stice, Butryn et al., 2013) indicates similar benefits from the Body Project for women across cultures. This similarity suggests that the underlying psychological processes are effective regardless of culture.

# Theoretical links

The similarities in levels of eating attitudes and behaviours, body image dissatisfaction, and psychological comorbidities between Saudi young women and women from Western cultures in Chapter 3 (Levels of Pathology) can be explained by cultural dimensions theory (Hofstede, 1980, 2001, 2021a), social learning theory (Bandura, 1971), feminist theory (Bordo, 1993), and objectification theory (Fredrickson & Roberts, 1997). The effectiveness of the Body Project in reducing disordered eating attitudes and behaviours and body image dissatisfaction in Chapter 6 (Feasibility and Acceptability) and Chapter 7 (Efficacy) can be explained by cognitive dissonance theory (Festinger, 1957).

## Cultural theories

There are two cultural theories that explain comparable levels of eating attitudes and behaviours, body image dissatisfaction, and psychological comorbidities between Saudi young women and Western women in Chapter 3 (Levels of Pathology). Those are cultural dimensions theory (Hofstede, 1980, 2001, 2021a) and social learning theory (Bandura, 1971).

**Cultural Dimensions Theory (Hofstede, 1980, 2001).** ﻿Hofstede (1980) defines culture as “The programming of the human mind by which one group of people distinguishes itself from another group”. Hofstede proposes that culture is a shared phenomenon that is learned from people’s local environment (Hofstede Insights, 2021). Understanding culture as a collective shared phenomenon allows for understanding attitudes and actions of groups (Hofstede Insights, 2021). In other words, if we can understand the collective values of a group of people, we can predict the way they will choose to behave (Hofstede Insights, 2021). Therefore, it can be assumed that one individual behaviour does not represent the whole culture (Hofstede Insights, 2021). However, people are likely to behave in an appropriate manner for that culture in a group of individuals from the same culture (Hofstede Insights, 2021).

Hofstede (1980, 2001) argues that culture contains three layers and a core. The first layer consists of symbols. Symbols are items that are associated with emotions. When symbols are changed the emotional impact does not last for a long time. Symbols include eating habits, local foods, beverages, monuments, colours, and flags (Hofstede, 1980, 2001). ﻿The next layer consists of heroes. Heroes are those who have shown role model examples or show behaviours of the national spirit. Those include founders of the country, politicians, and artists. The third layer consists of rituals. Rituals are regular events that shape the collective mind unconsciously. These include celebrations, gatherings, and spending habits (Hofstede, 1980, 2001).

The core of culture is values (Hofstede, 1980, 2001). Values are a wide range of preferences for a special kind of affairs such as preferring equality over hierarchy. Values are transferred in the upbringing environment. They are shaped in the collective mind at a young age by the behaviours of parents, teachers, and leaders, who show individuals what behaviour is appropriate for the local culture and what is not (Hofstede, 1980, 2001). Hofstede specified six dimensions of human values that can be considered to categorize countries based on cultural concepts (Hofstede Insights, 2021). These dimensions are individualism, power distance, uncertainty avoidance, masculinity, long-term orientation, and indulgence (Hofstede Insights, 2021).

There are two dimensions in the cultural dimensions theory that can explain the comparable levels of eating pathology and body image dissatisfaction in young Saudi women at the current time of ongoing cultural changes and women in Western cultures, as seen in Chapter 3 (Levels of Pathology). Those are the individualism dimension, and the power distance dimension (Hofstede Insights, 2021).

**Individualism Dimension (Hofstede Insights, 2021).**The main issue targeted by the individualism dimension is the extent to which people in a culture are joined into groups (Hofstede Insights, 2021). The dimension reflects the interrelationship a society emphasizes between individuals. These ties between society and its members determines whether an individual regards her/his self as “I” or “We”.

Individualistic societies have untied relationships with extended families. Individualists look after themselves and their immediate family. In collectivist societies, people are tightly related to their extended families. Loyalty to groups is unquestionable because the group looks after individuals’ interests and safety at difficult times (Hofstede Insights, 2021).

﻿Traditionally, Saudis used to live in extended families, which nurture collectivism, kinship, and loyalty between family members (Jiang et al. 2010/2011). Children do not leave the family even when they grow up and get married (Jiang et al. 2010/2011). Loyalty to familial rules and regulations in terms of responsibility towards other family members is paramount. Men look after women and elderly relatives, and are also responsible for the family expenses (Jiang et al. 2010/2011). If an individual rejects the family rules, he/she will be shamed with a bad reputation, and labelled ungrateful to the family or the tribe. Collectivism used to affect every aspect of Saudis lives, such as money spending habits, personal networks, professional environment, and decision making (Jiang et al. 2010/2011).

At present, in a time of continuous cultural transformation, young Saudis are shifting from collectivism to individualism (Al-Khraif et al., 2020; Jiang et al. 2010/2011). They are shifting from living in extended families to living in a basic social unit - nuclear families (Al-Khraif et al., 2020). A nuclear family ﻿involves parents and their children (Al-Khraif et al., 2020). This shift from extended to nuclear families is a result of many changes, including developments in women’s education and career growth (Al-Khraif et al., 2020). Women’s education and careers increased the age of first marriage, which affects reproduction and leads to a reduction in household size (Al-Khraif et al., 2020). Living in nuclear families has loosened social relations to the extended family members (Al-Khraif et al., 2020). However, the cultural changes are ongoing, so family structure might change further.

Cultural transition is associated with vulnerability to eating and body image issues (Humphry & Ricciardelli, 2004; Miller & Pumariega, 2001). The change in family structure in Saudi Arabia is consistent with the cultural transition from collectivism to individualism in Hofstede’s cultural dimensions theory (Hofstede, 1980, 2001). The shift caused exposure to two different eating and body image models associated with individualism and collectivism at the same time (Sassaroli et al., 2015). For example, women are encouraged to eat large amounts of food in family gatherings associated with collectivism values, while women’s social rights developments associated with individualism values favour Western thinness standards (Sobh et al., 2013; Thomas et al., 2018). The dissonance between the two models led to eating and body image problems as seen in Chapter 3 (Levels of Pathology) (Sassaroli et al., 2015).

Concisely, the cultural shift from collectivism to individualism in the Saudi society includes two different forms of eating and body image, as explained earlier. The gap between normalizing eating large portions of food regularly and fulfilling thinness standards results in eating and body image problems in Saudi women as seen in Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence).

**Power Distance Dimension (Hofstede Insights, 2021).** The power distance dimension measures public tolerance of inequality between individuals. A higher degree of this dimension means that the culture supports centralized authority and inequality between genders (Hofstede Insights, 2021). In such a culture, the majority of people are not participating in decision-making - instead they comply with authority (Hofstede Insights, 2021). In contrast, a lower degree of this dimension means that the culture supports decentralized authority and equality among individuals, in terms of responsibilities, power distribution, and participation in decision-making (Hofstede Insights, 2021). Regardless of equality between men and women in Islamic teachings (“And women have rights similar to their obligations”, The Quran, 2016a; “Act kind to women”, Sunnah, 2020a), the Saudi culture has emphasized a male dominance hierarchy (Al-bakr et al., 2017). Saudi Arabia used to have a high power distance between men and women (Alghofaily, 2019).

Male domination resulted in several social problems for women including gender segregation, child marriage, domestic violence, and lack of mobility freedom (Afifi et al., 2011; Al-Hakami & McLaughlin, 2016; Alghofaily, 2019). These social issues resulted from a tradition that the main role for women is that of a caring mother and wife (Baki, 2004). Hence, women were allowed to interact with males only if they were family members (AlMunajjed, 1997). While the age of puberty used to define marriage age for girls, boys were encouraged to finish school and find a job before getting married (Al-Hakami & McLaughlin, 2016). Child marriage led to domestic violence (Afifi et al., 2011). As a result of the above, women were not allowed to go out without a male family member (Alghofaily, 2019).

The social hierarchies in favour of men impacted women’s education and career (El-Sherbeeny, 2014). Formal education was provided for men in 1930, whereas women’s education was not provided until 1960 (Hamdan, 2005; Ochsenwald, 2020). It was normal for women to quit education and comply to domestic obligations and men’s domination (Hamdan, 2005). Women’s education lacked field training due to mobility restrictions (El-Sherbeeny, 2014; Hamdan, 2005). Women’s careers were limited to the educational and medical sectors (El-Sherbeeny, 2014). Women were never given a voice in strategic planning or appointed in high-ranking positions (Alghofaily, 2019). Instead, women were burdened with basic administrative work and implementing plans made by men who were isolated from the practical field (El‐Sanabary, 1994). Thus, women’s contributions to Saudi and global economy were extremely limited (Baki, 2004). These problems have impacted women’s mental health (Al‐Subaie et al., 2020).

The government applied rapid social and political changes to lessen the power distance between men and women in the current time of cultural transformation (Saudi Vision 2030, 2021). In 2017, reforms were made to protect women against violence (Wulfhorst, 2020). In 2018, women were given the right to drive. In 2019, they were permitted to independently travel, and register a divorce, marriage or birth without a permission from a male guardian. The government put an end to child marriage under the age of 18 years in 2019 (The National News, 2021).

Women’s education and career growth developed significantly according to women empowerment reforms too (Saudi Vision 2030, 2021). Education has developed significantly to prepare women for new sectors such as tourism, hospitality, sport education, communications engineering, industrial engineering, and electronic engineering (Princess Nourah bint Abdulrahman Universty, 2021b ; 2021c; 2021f). Women are given the chance to involved in strategic framework creation (Ministry of Education, 2021b). Since 2017, women’s participation in the economy developed rapidly (Alasgah & Rizk, 2021). In 2019, the government appointed the first female diplomat.

Therefore, Saudi Arabia was ranked as a top reformer in women’s rights according to the World Bank report in 2020 (Wulfhorst, 2020). The reforms related to women’s empowerment might change in the future, as the cultural change continues. It is not known if the change will keep going towards more empowerment or new reforms will be applied to revert to original traditional norms.

The above shift in the power distance dimension from ﻿traditional male domination to women’s empowerment is demanding two different roles from Saudi women at the same time (Tirnoveanu, 2015). For example, Saudi women are challenging the remaining conservative ﻿male domination associated with higher power distance between genders, while fulfilling modern career requirements associated with women’s empowerment during the current ongoing cultural transition (Arar & Oplatka, 2016; Hammad & Shah, 2018; Tirnoveanu, 2015). The findings in Chapter 3 (Levels of Pathology) are in accordance with the power distance shift. It was suggested that women develop eating and body image issues when they play two different roles linked to two different cultures simultaneously at the time of cultural change (Sassaroli et al., 2015).

**Social Learning Theory (Bandura, 1971).** Modelling is a major component of the social learning theory by Bandura (1971). The theory suggests that new behaviours can be learned from observing and modelling others (Bandura,1971). Nowadays, Western thinness-ideal and appearance standards are advertised in social media and marketing campaigns (Marks et al., 2020). Eighty per cent of the Saudi population are active social media users (Global Media Insight, 2021). Therefore, women are exposed and engaged with images of Western-thinness and beauty idealization more than ever before (Marks et al., 2020). These images promote adopting unrealistic thinness and beauty standers which contributes to eating and body image issues. However, the impact of ideal appearance images might differ after years of continuous cultural change and media exposure.

The findings in Chapter 3 (Levels of Pathology) are consistent with the social learning theory (Bandura,1971). Saudi women are learning about Western ideal-thinness from social media and advertisements as part of the current cultural change. Social media influencers are promoting disordered eating in order to pursue unrealistic Western appearance standards.

## Feminist theories

There are two feminist theories that can explain the Western levels of eating attitudes and behaviours, body image dissatisfaction, and psychological comorbidities in young Saudi women in Chapter 3 (Levels of Pathology). Those are the feminist theory (Bordo, 1993) and the objectification theory (Fredrickson & Roberts, 1997).

**Feminist Theory (Bordo, 1993)**. Bordo (1993) argues that when a patriarchal culture shifts into gender equality, women are pressured to fulfil unrealistic slimness and beauty standards. Therefore, the more women’s roles change when a patriarchal culture is challenged, the more women will encounter extreme appearance standards (Bordo, 1993). This emphasis on slimness and appearance ideal results in symptoms of eating disorders and body image dissatisfaction.

The findings in Chapter 3 (Levels of Pathology) are consistent with the predictions of the feminist theory of Bordo (1993). We do not know whether eating and body image issues existed before the shift to gender equality in Saudi Arabia or not (Saudi Vision 2030, 2021). However, we know now that eating and body image problems exist during the current cultural shift, where Saudi women are empowered to have a major role in the economy (Saudi Vision 2030, 2021). It must be noted that the cultural shift is continuing, which might change the impact on women’s eating pathology and body image dissatisfaction after the current period of continuous change.

**Objectification Theory (Fredrickson & Roberts, 1997).** This theory suggests that Western culture separates women’s bodies and minds, motions, and identities (Fredrickson & Roberts, 1997). The theory proposes that the Western culture is treating women as objects to satisfy men’s sexual pleasure, which values women by their bodies (Fredrickson & Roberts, 1997). The cultural objectification of women’s bodies is emphasized through several ways including via the media, which results in self-objectification (Fredrickson & Roberts, 1997). That is, women adopt disordered eating behaviours and attitudes to meet thinness and beauty standards because they are not satisfied with their body image (Fredrickson & Roberts, 1997). Fredrickson and Roberts (1997) focus on the mental and behaviour processes in response to women’s own desire to meet extreme appearance standards. Women’s desire to fulfil appearance standards might change after time of continues cultural transformations.

The findings in Chapter 3 (Levels of Pathology) are in line with the objectification theory (Fredrickson & Roberts, 1997). The Westernization process in Saudi Arabia includes a shift to Western values in different aspects in life (Saudi Vision 2030, 2021). Western views about women’s bodies are part of the culture shift, which leads to self-objectification among young Saudi women. Saudi women are adopting disordered eating and body image dissatisfaction in their pursue of unrealistic appearance standards.

**Cognitive Dissonance Theory (Festinger, 1957).** The Body Project is a dissonance-based prevention program (Stice et al., 2008). Therefore, cognitive dissonance theory (Festinger, 1957) can explain the effectiveness of the prevention programme in disordered eating attitudes and behaviours, and body image dissatisfaction in Chapter 6 (Feasibility and Acceptability) and Chapter 7 (Efficacy). Cognitive dissonance theory proposes that people experience emotional distress when they have inconsistency between their attitudes and behaviours. This discomfort will make them want to reduce the gap between their attitude or behaviours to reach emotional stability. Thus, they try to change either their behaviours or attitudes (Festinger, 1957).

The prevention programme includes role play, group discussion, written homework, and behavioural tasks. These elements are designed to encourages participants to challenge the pursuit of ideal thinness (Stice et al., 2013). Participants’ engagement in the prevention will teach them new skills and knowledge that contradict appearance idealization, leading to emotional discomfort. Therefore, participants change their attitudes or behaviours to be consistent with their new knowledge in order to be emotionally comfortable. This process results in reduction in disordered eating attitudes and behaviours and body image dissatisfaction in the post-assessment. These changes were retained to follow up.

The effect sizes were comparable to clinical trials in other cultures as seen in Chapter 6 (Feasibility and Acceptability) and Chapter 7 (Efficacy). Therefore, it can be said that Saudi women benefit from the Body Project like other women in other cultures. This is because the underpinning prevention theory is not culturally specific (Festinger, 1957; Stice et al., 2013). The prevention shows efficacy even when some elements were culturally adapted. The Body Project might not have the same changes in Saudi women after years of continues cultural shifts.

The findings in Chapter 6 (Feasibility and Acceptability) and Chapter 7 (Efficacy) are consistent with the suggestions of cognitive dissonance theory (Festinger, 1957). The prevention shows significant change in eating attitudes and body image by challenging appearance idealization. Desirable eating attitudes and body image satisfaction were developed through behavioural change via group discussions, role play, and written and behavioural tasks.

# Strengths

This research has used robust methods, including statistical models, procedures and updated and translated tools. The sample sizes were adequate across studies. The international collaboration in the feasibility and acceptability study maintained the psychological effects of the prevention. The study was done at an important period at the beginning of the ongoing cultural change towards Westernization. The study demonstrated proper online delivery, and proved efficacy of the prevention programme under exceptional pandemic conditions (World Health Organization, 2021).

In addition, this is the first research to show reliable prevalence and pathology patterns of eating pathology and body image dissatisfaction in Saudi young women at the current cultural shift. It is also the first study to adapt an eating disorders prevention approach for Saudi women, and to examine efficacy in a structured manner through a feasibility and acceptability study and a randomized control trial.

# Limitations

The samples in Chapter 3 (Levels of Pathology), Chapter 4 (Prevalence), Chapter 6 (Feasibility and Acceptability), and Chapter 7 (Efficacy) were limited to young undergraduate women in one city and one university. Although female undergraduates account for 81.6% of the total young female population in Saudi Arabia (General Authority of Statistics, 2020), they do not represent the whole Saudi female population. We did not investigate women from other age groups, other universities, other cities, and young women who do not study at universities. Also, we did not investigate males, children, adolescents, older adults, and those from rural areas.

We only used self-report assessments. Self-report data might lead to less self-reflection, and a desire to respond in a socially acceptable manner (Devaux & Sassi, 2016). Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence) lacks longitudinal data, which is needed to examine changes in prevalence over time as the cultural changes are ongoing. A further limitation is that we did not measure internalization of the thin ideal in Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence), although this would have linked to the theoretical underpinnings of the Body Project intervention. The reason for this omission is that the decision to investigate the Body Project’s potential came only after Chapter 3 (Levels of Pathology) and Chapter 4 (Prevalence) yielded alarming eating pathology and body image dissatisfaction levels. It is recommended that future researchers should employ such a measure of the internalisation the thin ideal as a matter of course when undertaking comparable research in different cultures.

Chapter 7 (Efficacy) lacked longer-term follow-up, which would have determined whether changes are maintained. Finally, we were only able to use an online intervention in Chapter 7 (Efficacy), due to the coronavirus pandemic (World Health Organization, 2021).

# Research implications

Cultural norms should be considered when investigating eating disorders and body image issues. Each culture has its own eating patterns and appearance standards that are normalized in each culture (AlShebali et al, 2020). Therefore, local social and eating norms can shape the pattern of eating and body image pathology (AlShebali et al, 2020). This is especially important when cultures undergo major cultural shifts (AlShebali et al, 2020).

Longitudinal research in eating pathology and body image in young women should be considered in the future. It will be beneficial to know future pathology levels, and whether or not internalization of Western values will have the same impact. This is because the cultural change process in ongoing. Therefore, it is also useful to reassess the cultural context to as it goes forward or even reverses.

The influence of cultural change in eating pathology and body image issues in other populations should be considered in future studies. It is important to know if Westernization is influencing older women, men, children, adolescent, and people in rural areas in the same manner it does with young women. For example, it might be assumed that the effects of cultural change on older women might be less than young women (Acerbi et al., 2012). This is because young individuals are more social learners than older people, they keep less traditional cultural qualities, and they are less considered as cultural representatives (Acerbi et al., 2012).

Furthermore, the impact of cultural change is suggested to be greater on children and adolescents than others (Portes & Rumbaut, 2001), because children and adolescents can internalize new cultural norms faster than adults (Portes & Rumbaut, 2001). Children and adolescents can adopt new languages and new values and behaviours related to cultural shift (Portes & Rumbaut, 2001). However, men might be less influenced by Westernization because men are likely to want to keep traditional domination privileges (Edelstein, 2013). Finally, cultural shift towards Westernization might have a faster and greater influence on people in the main cities than those in rural areas, because urban areas are where the new social, economic, and political reforms usually take place (Machado et al., 2014). Therefore, it would be useful to assess people in rural areas now and compare the rates with our findings. Overall, future research is needed to determine the pattern of pathology in each of the above groups in response to Westernization over these continued cultural shifts.

It will be valuable to further investigate prevention theories and practices. Research should include social adaptations for other cultures, wider application methods, and means to improve compliance to therapeutic tasks. Active learning is an important skill to consider to improve compliance (Tompkins, 2002). Participants’ views about the tasks might expand our understanding about prevention feasibility, acceptability and effectiveness (Tompkins, 2002). If participants find the tasks relevant to the therapy goal and doable in the current sociocultural circumstances they are more likely to engage and to comply in terms of attendance and tasks (Tompkins, 2002). It could also be useful to examine the right time in the treatment process to ask participants to undertake specific therapeutic tasks.

The same issues are likely to apply in other non-Western cultures undergoing Westernization. Future research should consider the differences between those non-Western cultures in relation to the current findings. Those cultures differ in many aspects, such as women’s organizational and social rights, mental health, education, and career growth. Therefore, the impact of each cultural context should be fully understood in future research.

The adaptability and effectiveness of the Body Project should be tried in different settings via various delivery methods, and for different populations in Saudi Arabia and other non-Western cultures. These include student dormitories, schools, primary care units, clinics and hospitals. The feasibility, acceptability and effectiveness for males, athletics, older people, and adolescents in Saudi Arabia and other non-Western cultures is not yet known. Similarly, the findings open doors for other Western-based interventions targeting other disorders and other populations to be examined in non-Western cultures.

# Clinical implications

Policymakers, clinicians, parents, and teachers should watch out for eating disorders and body image dissatisfaction in Saudi and comparable locations. The focus should be on detecting bulimic rather than anorexic symptoms. For example, teachers can learn ﻿behavioural and emotional signs specific to the school setting (National Eating Disorders Association, 2021). Eating and body image problems should be looked out for mainly in more Westernized individuals, schools, and other groups and institutes. This is because people in such conditions are vulnerable to internalization of Western values, resulting in eating and body image issues (Zittoun, & Gillespie, 2015).

Clinicians can use the adapted tools for screening purposes. The measures can be used also to assess interventions’ outcomes. If screening shows a national eating and body image problems at the time of Westernization, then a national scale programme of eating pathology and body dissatisfaction prevention is worth considering. Clinicians and policymakers can apply prevention locally and broadly, via face-to-face or internet-based methods. Video conference delivery is viable and cost-efficient for scalable prevention (Ghaderi et al., 2020).

The above implementations are helpful because mental health in Saudi Arabia suffer from challenges in research and care. Psychiatry and clinical psychology education started relatively late in Saudi Arabia, in 1997 and 2012 respectively (El-Naggar, 2012; Princess Nourah bint Abdulrahman Universty, 2021e). Research infrastructure lacks funding, libraries, laboratories, research skills, prevalence data, and international publication standards (Abumadini, 2019). Although mental health care started in1959, people often prefer to approach faith healers (Dubovsky, 1983; Koenig et al., 2014). Challenges in care provision include underrepresentation of women, inadequate institutions and specialists, and lack of training and treatment standards (Aldosari, 2017; Al‐Subaie et al., 2020; Koenig et al., 2014).

# Conclusion

Eating disorders and body image dissatisfaction are still understudied in Saudi Arabia, as is the impact of the ongoing Westernization process. The current eating and body image pathology levels appear high, and suggest more bulimic than anorexic pathology. However, it is too early to compare local figures with Western samples, especially as Westernization is ongoing in Saudi Arabia. The outcomes should be treated with caution, due to the study’s limitations detailed earlier – particularly the use of Western measures without full validation and adaptation for local culture, and the lack of longitudinal and qualitative data. Prevention outcomes appear promising for Saudi women, but further longitudinal research with other populations is needed. The University Agency for Academic Support and Student Services in Princess Nourah bint Abdulrahman University is considering to widley apply the Body Project in other colleges . To summarise, more research and clinical development is needed to build on the research in this dissertation.

As a Saudi researcher, I have learned that Saudi scholars have to investigate psychological issues in the Saudi context with international research standards. I have also learned that local issues can benefit from international collaborations, with international publications to catch international scientists’ attention and hence their contribution to local issues. However, if Saudi scholars can combine their deeper understanding of local culture with international research standards, they too can become national and international researchers. This development can enhance research in Saudi Arabia in the future, and contribute to international research. Now is an excellent time for Saudi researchers to benefit from financial and organizational reforms to improve research in the country, particularly focusing on the impact of the current cultural changes, especially for women’s mental health.

Eating pathology and body image dissatisfaction in young women might have been present before this process of cultural change, but went unexplored and unrecognized. Alternatively, maybe those problems have emerged in the current fast-changing social context. In either case, we are able to study the problem now because current Saudi developments in research and care are allowing more women to contribute (Saudi Vision 2030, 2021), with more money invested and a stronger infrastructure (Ministry of Education, 2021a; 2021b; National Center for Mental Health Promotion, 2019; Princess Nourah bint Abdulrahman Universty, 2021d). This dissertation is a result of that recent research infrastructure support (Saudi Vision 2030, 2021), which would have been impossible to conduct or publish in this way in the past.

Other non-Western countries might not currently have the level of reforms to mental health and research that Saudi Arabia has developed recently. Thus, eating and body image problems and other women’s mental health issues are not studied or treated adequately. The ongoing Saudi cultural transformation processes are giving us a better understanding of Saudi, but also a model for enhancing understanding, prevention and treatment of mental health issues in other parts of the non-Western world.

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# Appendices

# Appendix A

Why obtaining unpublished papers was difficult

Obtaining unpublished papers was difficult because the majority are master’s thesis or doctoral thesis of Saudi scholars. This literature is allowed to be published in the Saudi Digital Library (SDL) for reading only, saving and printing material is not allowed. Although we have contacted the directors of SDL to explain that this condition is not helpful for the reviewer, no exception was done. We tried to contact the authors but failed to find their contacts in the internet. We then tried to find any information about them in Saudi professional and social networks in social media but we failed to get their contacts. Unlike other countries, scholars and scientists in Saudi Arabia do not have official platforms nor data basis, which could have been helpful in such matters.

We contacted people of the same majors and cities of targeted authors to help. For example, we have contacted dietitians in Jeddah and Makkah to help connecting to Amnah Alsabbah, a dietitian at a local hospital in Makkah. Her thesis is titled “A survey of health care professionals treating patients with eating disorders and obesity in Saudi Arabia and the availability of specialized eating disorders and obesity resources” (Alsabbah, 2017). We were not interested in the thesis itself, we needed information about some unpublished references in the thesis.

We failed to get in contact with targeted authors so we tried to contact their thesis supervisors. Our trials have failed for many reasons. For example, Dr. Paul Robinson at The University College London was contacted via email to provide a copy of Alsabbah’s thesis but he did not reply nor did the Department of Psychology.

We sent an email to Dr. Alix Timko at the University of the Sciences in Philadelphia to provide a copy of (Alanazi, 2014). She promised to respond after her holiday but we haven’t received any reply from her. We contacted the librarian who told us that the author did not give a permission for publication. In another trial we contacted Dr Kimberely Smith, who supervised Almushadaq (2016) at Brunel University, she replied that she had left for another university. We contacted the Psychology Department at Brunel University and two faculty members. One faculty member replied but could not provide a copy of the thesis.

We faced the same issue when trying to find a copy of unpublished master’s thesis earned from Saudi universities. For example, we were interested in a master’s thesis earned from King Saud University in Riyadh, that thesis was commonly referenced in many studies. The title is “Body image and its’ relation to anorexia nervosa and Bulimia nervosa among female students in King Saud University” by Dakhil, M.S. in 2007. We could not find any information about the thesis nor the author in the internet. We contacted several departments at King Saud University trying to find means to contact the author and to have a copy of the thesis. The chairman of Psychology Department refused to provide a copy for review purpose.

# Appendix B

Quality appraisal remarks

Quality checks highlighted several important points that are lacking in the included papers. Mainly the lack of follow up testing. If a sufficient follow up period was available, it would allow for rolling out any confounding factors to add robustness to the results. A lack of consistency was seen across papers. For example, if the study focused on eating disorders and the results and discussion focus on disordered eating attitudes, this was mainly shown in (Alanazi, 2014).

A small sample size with specific characteristics was seen in several papers. Given that higher education is not encouraged for females in rural areas and in some conservative communities in Saudi Arabia where early marriage and making a family is desirable means that recruiting university students will not help understanding eating disorders in the whole population. For example, As-Sa’Edi and colleagues (2013) recruit medicine students who do not represent the majority of Saudi females because studying medicine attracts advanced students welling to work for longer hours and night shifts which is not allowed in some local communities.

Important potential risk factors were not investigated. For example, Al-Subaie (2000) investigated English language fluency and Western exposure, he neglected other major risk factors like mood disorders, teasing, academic stress and personality traits such as perfectionism.

# Appendix C

CASP Checklist

A close up of a logo

Description automatically generated

CASP Checklist: 12 questions to help you make sense of a Cohort Study

How to use this appraisal tool: Three broad issues need to be considered when appraising a cohort study:

* Are the results of the study valid? (Section A)
* What are the results? (Section B)
* Will the results help locally? (Section C)

The 12 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is “yes”, it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a “yes”, “no” or “can’t tell” to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users’ guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Cohort Study) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

Paper for appraisal and reference:.........................................................................................................

Section A: Are the results of the study valid?

|  |
| --- |
|  |
|  |
|  |

1. Did the study address a clearly focused issue?

Yes Can’t Tell

No

HINT: A question can be ‘focused’

in terms of

* + the population studied
* the risk factors studied
* is it clear whether the study tried to detect a beneficial or harmful effect
  + the outcomes considered

Comments:

1. Was the cohort recruited in an acceptable way?

Yes Can’t Tell

No

HINT: Look for selection bias which might compromise the generalizability of the

findings:

|  |
| --- |
|  |
|  |
|  |

* was the cohort representative of a

defined population

* was there something special about the

cohort

* + was everybody included who should

have been

Comments:

Is it worth continuing?

1. Was the exposure accurately measured to minimise bias?

Yes Can’t Tell

No

HINT: Look for measurement or

classification bias:

|  |
| --- |
|  |
|  |
|  |

* + did they use subjective or objective

measurements

* do the measurements truly reflect what you want them to (have they been

validated)

* + were all the subjects classified into exposure groups using the

same procedure

Comments:

1. Was the outcome accurately measured to minimise bias?

Yes Can’t Tell

No

HINT: Look for measurement or

classification bias:

|  |
| --- |
|  |
|  |
|  |

* + did they use subjective or objective

measurements

* do the measurements truly reflect what you want them to (have they been

validated)

* has a reliable system been established for detecting all the cases (for measuring disease occurrence)
  + were the measurement methods similar in the different groups
* were the subjects and/or the outcome assessor blinded to exposure (does this matter)

Comments:

1. (a) Have the authors identified all important confounding factors?
2. (b) Have they taken account of the confounding factors in the design and/or analysis?

Comments:

Comments:

1. (a) Was the follow up of subjects complete enough?
2. (b) Was the follow up of subjects long enough?

Yes Can’t Tell

No

Yes Can’t Tell

No

Yes Can’t Tell

No

Yes Can’t Tell

No

HINT:

* + list the ones you think might be important, and ones the author missed

|  |
| --- |
|  |
|  |
|  |

HINT:

|  |
| --- |
|  |
|  |
|  |

* look for restriction in design, and techniques e.g. modelling, stratified-, regression-, or sensitivity analysis to correct, control or adjust for confounding

factors

HINT: Consider

|  |
| --- |
|  |
|  |
|  |

* the good or bad effects should have

had long enough to reveal

themselves

* the persons that are lost to follow-up may have different outcomes than those available for assessment
  + in an open or dynamic cohort, was there anything special about the outcome of the people leaving, or the exposure of the people entering the

cohort

|  |
| --- |
|  |
|  |
|  |

Comments:

Section B: What are the results?

1. What are the results of this study? HINT: Consider

* what are the bottom line

results

* have they reported the rate or the proportion between the exposed/unexposed, the ratio/rate difference
  + how strong is the association between exposure and

outcome (RR)

* + - what is the absolute risk

reduction (ARR)

Comments:

1. How precise are the results? HINT:

* look for the range of the confidence

intervals, if given

Comments:

1. Do you believe the results? Yes Can’t Tell

|  |
| --- |
|  |
|  |
|  |

No

HINT: Consider

* big effect is hard to ignore
* can it be due to bias, chance or

confounding

* are the design and methods of this study sufficiently flawed to make the

results unreliable

* + Bradford Hills criteria (e.g. time sequence, dose-response gradient, biological plausibility, consistency)

Comments:

Section C: Will the results help locally?

1. Can the results be applied to the local population?

Yes Can’t Tell

No

HINT: Consider whether

* a cohort study was the appropriate method to answer this question

|  |
| --- |
|  |
|  |
|  |

* the subjects covered in this study could be sufficiently different from your population to cause concern
  + your local setting is likely to differ much from that of the study
* you can quantify the local benefits and

harms

Comments:

|  |
| --- |
|  |
|  |
|  |

1. Do the results of this study fit with other available evidence?

Yes Can’t Tell

No

Comments:

1. What are the implications of this study for practice?

Yes

Comments:

Can’t Tell

No

HINT: Consider

* one observational study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health

|  |
| --- |
|  |
|  |
|  |

policy decision making

* + for certain questions, observational studies provide the

only evidence

* recommendations from observational studies are always stronger when supported by oth

# Appendix 3.1. Information sheet

**Eating pathology and body image dissatisfaction in young women in Saudi Arabia**

**Information Sheet**

**(Invitation)**

You are invited to participate in this research. Before deciding to do so, it is important to understand why we are conducting the research and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. Ask us if anything is unclear or if you would like to know more details. Take the time to decide whether or not you want to participate.

Thanks for reading this.

**What is the purpose of the study?**

This study aims to measure the prevalence of eating disorders, levels of disordered eating attitudes and behaviours, body image dissatisfaction, and psychological comorbidities in undergraduate females in the Kingdom of Saudi Arabia and compare them with undergraduate females in Western countries.

**Why was I selected?**

You have been selected because you are a Saudi undergraduate female.

**Do I have to take part?**

It is up to you to decide whether or not to participate. If you choose to participate, you can withdraw at any time while completing the surveys without any negative consequences. Since all data are anonymous, it will not be possible to pull your answers from the dataset once the survey is completed.

**What will happen to me if I participate?**

You will be required to complete an online questionnaire that takes 15–20 minutes.

**What should I do?**

Please answer the questions in the questionnaire. There are no other obligations associated with participation.

**What are the potential disadvantages and risks of participating?**

Participation is not expected to cause any risks or inconvenience. However, if there are any problems, we will suggest appropriate steps you can take, such as talking to your doctor or student advisory services.

**What are the possible benefits of participating?**

There are no immediate benefits for you. The research will provide an overview of eating pathology and body image in young women in Saudi Arabia, which will contribute to planning prevention and treatment.

**Will my participation in this project remain confidential?**

Your participation will be confidential and your data will be anonymous.

**What is the legal basis for processing my data?**

According to data protection legislation, we are required to inform you that the legal basis we are applying to process your data is that ‘processing is necessary for the performance of a task carried out in the public interest’ (Article 6(1)(e)). Further information can be found in the University’s Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

**What will happen to the data collected and the results of the research project?**

The collected data will be stored anonymously and securely. They will only be used to conduct this research and for inclusion in publications if appropriate. Your details will not be available to anyone. If you are interested in receiving a copy of the Final Report, please email me at mhalshebali11@sheffield.ac.uk.

**Who is organizing and funding the research?**

This research is part of my PhD thesis and is funded by the Princess Nourah bint Abdulrahman University.

**Who is the data controller?**

The University of Sheffield will act as the data controller for this study. The university is responsible for taking care of your information and using it properly.

**Who ethically reviewed the project?**

The Research Ethics Committee at the Princess Nourah bint Abdulrahman University ethically approved this project.

**What if something goes wrong and I would like to complain about the research?**

If anything goes wrong and you want to file a complaint, please contact me (mhalshebali1@sheffield.ac.uk) or my research supervisor, Professor Glenn Waller (g.waller@sheffield.ac.uk). You can always file a complaint via the university system at https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

**Appendix 3.2. Consent form**

**Eating pathology and body image dissatisfaction in young women in Saudi Arabia**

**Consent Form**

I have had the opportunity to ask questions about the research. I understand that my participation is voluntary and that I can withdraw from the study at any time to the point of submitting my questionnaire. I do not have to give any reasons for not wanting to participate, and there will be no negative consequences if I choose to withdraw. I understand that participating in the project will involve completing online surveys. I understand and agree that other accredited researchers will not access this anonymous data unless they agree to keep the information confidential as required by this form. I permit the anonymous data I am providing to the Research Ethics Committee at Princess Nourah bint Abdulrahman University to be used for research and future learning.

Do you wish to continue?

Please click " I agree " to acknowledge that you have read and understood this information and wish to continue the research study; please click "I agree".

# Appendix 3.3. Eating Disorder Examination-Questionnaire (EDE-Q, version 6.0)

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# Appendix 3.4. Body Shape Questionnaire (BSQ-8C)

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# Appendix 3.5. Body-Related Behaviours Scale (BRBS)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **BRBS**  **The following statements reflect how some people feel about their body and some related behaviours. For each of these statements, please place a tick in the column that most closely sums up how much you agree with it. Do not spend a lot of time thinking about each answer, but just respond with the answer that feels right.** | | | | | | |
| **Scale** | **Item** | **How accurate is this statement?**  *(tick the appropriate box)* | | | | |
| Not at all | Occasionally | Sometimes | Often | All the time |
| Ch | I weigh myself. |  |  |  |  |  |
| Ch | I use clothes to let me know if my size has changed. |  |  |  |  |  |
| Ch | I check my size by measuring parts of my body with my fingers. |  |  |  |  |  |
| Ch | I spend time in front of the mirror, checking that I am not gaining weight. |  |  |  |  |  |
| Ch | I ask others to reassure me that my weight has not risen. |  |  |  |  |  |
| Ch | I believe that checking my appearance ensures that I keep control of my weight. |  |  |  |  |  |
| Ch | Checking my body tells me how much weight I have put on. |  |  |  |  |  |
| Ch | Checking my body makes me feel calmer. |  |  |  |  |  |
| Ch | My memory for my appearance is poor, so I have to keep checking how I look. |  |  |  |  |  |
| Ch | I believe that checking my body weight will make it shoot up. |  |  |  |  |  |
| A | I do not use mirrors if I can avoid them. |  |  |  |  |  |
| A | If I think anyone will comment on my appearance, I tend to get out of that situation or change the subject. |  |  |  |  |  |
| A | I avoid seeing myself naked. |  |  |  |  |  |
| A | My wardrobe tends to consist of baggy clothes, which hide my true shape. |  |  |  |  |  |
| A | I tend to look away if I catch sight of my reflection or if I see a photograph of myself. |  |  |  |  |  |
| A | If I can avoid seeing my body, then I am less upset by my appearance. |  |  |  |  |  |
| A | If I see myself, then I will be disgusted and I will have to hide away. |  |  |  |  |  |
| A | Wearing tight or fitted clothes means that others will be critical of me. |  |  |  |  |  |
| A | Not giving others the chance to talk about my appearance means that they will not be critical. |  |  |  |  |  |
| A | Seeing myself naked distresses me. |  |  |  |  |  |
| Cm | I focus on other people’s size. |  |  |  |  |  |
| Cm | Other people’s appearance is a good way of determining if I look acceptable. |  |  |  |  |  |
| Cm | I judge my appearance in comparison with those people around me. |  |  |  |  |  |
| Cm | Checking other people’s appearance means that I can feel more secure about how they see me. |  |  |  |  |  |
| Cm | If I spend time studying others’ appearance, then I know what I should look like or try to look like. |  |  |  |  |  |
| Cm | Other people’s weight loss gives me a guide about how I should eat. |  |  |  |  |  |
| Cm | If others look bad, then I tend to feel better about my own appearance. |  |  |  |  |  |
| Cm | If I see someone who looks slim, then I tend to see myself as fat. |  |  |  |  |  |
| D | I wear clothes that show my shape. |  |  |  |  |  |
| D | I like others to be able to see my bones through my skin. |  |  |  |  |  |
| D | My body makes good clothes look even better. |  |  |  |  |  |
| D | I give others a good example of how they could look if they tried harder. |  |  |  |  |  |
| D | I wear tight and fitted clothes. |  |  |  |  |  |
| D | If others see how I really look, they will be concerned about me. |  |  |  |  |  |
| D | Others tend to admire my appearance. |  |  |  |  |  |
| D | I like to feel that others have a good idea of how well I can control my body. |  |  |  |  |  |
| D | If I could not show other people how my body looks, then they would not notice me. |  |  |  |  |  |
| D | Showing my body means that others are less distracted by my personality. |  |  |  |  |  |

# Appendix 3.6. Brief Version of the Fear of Negative Evaluation Scale (BFNE)

A screenshot of a cell phone

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# Appendix 3.7. Patient Health Questionnaire (PHQ-9)

A close up of a piece of paper

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# Appendix 3.8. Rosenberg Self-Esteem Scale (RSES)



# 

**Appendix 3.9. Internalization of Western Values Scale items and responses of the sample in this study**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Item | Yes | No |
| 1 | I go out on my own | 261 | 242 |
| 2 | I wear Western fashion | 123 | 380 |
| 3 | I like to meet Western beauty standards as much as I can | 172 | 331 |
| 4 | I watch Western movies and TV shows | 347 | 156 |
| 5 | I eat Western food and drink Western coffee | 300 | 203 |
| 6 | I want to have the choice of the number of children I will have | 368 | 135 |
| 7 | I want to have equal education opportunities to those of men have | 318 | 185 |
| 8 | I want to have equal job opportunities to those of men | 327 | 176 |
| 9 | I want to have equal salary scales to those of men | 350 | 153 |
| 10 | I am willing to vote in a political election | 239 | 264 |
| 11 | I will nominate myself for a political position if I want to | 282 | 221 |

# Appendix 4.1. Eating Disorders Diagnostic Scale (EDDS) - DSM-5 version

A screenshot of a social media post

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**A screenshot of a social media post

Description automatically generated**

**A screenshot of a cell phone

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# 

# Appendix 4.2. Eating disorder formulae

We utilized the following formula to allocate diagnoses for each eating disorder. Items are labelled EDDS1 through EDDS 22.

* Anorexia nervosa = BMI < 17.5 & EDDS2 ≥ 4 & EDDS3 ≥ 4
* Bulimia nervosa = EDDS4 = 1 & EDDS5 = 1 & EDDS6 ≥ 4 & (EDDS13 + EDDS14 + EDDS15 + EDDS16) ≥ 8 & EDDS3 ≥ 4
* Binge eating disorder = EDDS4 = 1 & EDDS5 = 1 & EDDS6 ≥ 4 & (EDDS13 + EDDS14 + EDDS15 + EDDS16) = 0 & EDDS12 =1 & (EDDS7 + EDDS8 + EDDS9 + EDDS10 + EDDS11) ≥ 3
* Atypical bulimia nervosa = EDDS4 = 1 & EDDS5 = 1 & EDDS6 < 4 & EDDS6 ≥ 1 & (EDDS13 + EDDS14 + EDDS15 + EDDS16) < 8 & (EDDS13 + EDDS14 + EDDS15 + EDDS16) ≥ 1 & EDDS3 ≥ 4
* Atypical binge eating disorders = EDDS4 = 1 & EDDS5 = 1 & EDDS6 < 4 & EDDS6 ≥1 & (EDDS13 + EDDS14 + EDDS15 + EDDS16) = 0 & EDDS12 =1 & (EDDS7 + EDDS8 + EDDS9 + EDDS10 + EDDS11) ≥ 3

# Appendix 4.3. Definitions of eating disorders used to create the coding equations in SPSS

**Anorexia nervosa**

“A disorder characterized by deliberate weight loss, induced and sustained by the patient. It occurs most commonly in adolescent girls and young women, but adolescent boys and young men may also be affected, as may children approaching puberty and older women up to the menopause. The disorder is associated with a specific psychopathology whereby a dread of fatness and flabbiness of body contour persists as an intrusive overvalued idea, and the patients impose a low weight threshold on themselves. There is usually undernutrition of varying severity with secondary endocrine and metabolic changes and disturbances of bodily function. The symptoms include restricted dietary choice, excessive exercise, induced vomiting and purgation, and use of appetite suppressants and diuretics” (World Health Organization, 2010).

**Atypical anorexia nervosa**

“Where someone has all the symptoms a doctor looks for to diagnose anorexia, except their weight remains within a “normal” range” (Beat, 2019).

**Bulimia nervosa**

“A syndrome characterized by repeated bouts of overeating and an excessive preoccupation with the control of body weight, leading to a pattern of overeating followed by vomiting or use of purgatives. This disorder shares many psychological features with anorexia nervosa, including an overconcern with body shape and weight. Repeated vomiting is likely to give rise to disturbances of body electrolytes and physical complications. There is often, but not always, a history of an earlier episode of anorexia nervosa, the interval ranging from a few months to several years” (World Health Organization, 2010).

**Atypical bulimia nervosa**

“Disorders that fulfil some of the features of bulimia nervosa, but in which the overall clinical picture does not justify that diagnosis. For instance, there may be recurrent bouts of overeating and overuse of purgatives without significant weight change, or the typical over concern about body shape and weight may be absent” (World Health Organization, 2010).

**Atypical bulimia**

“Bulimia nervosa (of low frequency and/or limited duration) – where someone has all of the symptoms of bulimia, except the binge/purge cycles don’t happen as often or over as long a period of time as doctors would expect” (Beat, 2019)

**Binge eating disorder**

“Is characterized by frequent episodes of binge eating, with emotional triggers and consequences. For example, the individual might binge once a week or more for several months, feeling disgust and shame about their eating behaviours. Binge eating disorder is distinct from bulimia nervosa as it is not followed by purging behaviours” (World Health Organization, 2018).

**Atypical binge eating disorder**

“Binge eating disorder (of low frequency and/or limited duration) – where someone has all of the symptoms of binge eating disorder, except the binges don’t happen as often or over as long a period of time as doctors would expect” (Beat, 2019).

# Appendix 6.1. Ethical approval

A screenshot of a social media post

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# Appendix 6.2. Information and consent sheet

A screenshot of a cell phone

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# Appendix 6.3. Reflection survey questions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Did you find the workshop useful? | | | | | |
| Very useful | Useful | Sometimes useful | | Not useful | |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | Did you find the workshop enjoyable? | | | | | |
| Very enjoyable | Enjoyable | | Sometimes enjoyable | | Not enjoyable |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | What do you think about the session techniques (displaying pictures of models, role play, debriefing home exercise) | | | | | |
| Very Helpful | Helpful | | Sometimes helpful | | Not helpful |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | Did you find the intervention understandable? | | | | | |
| Very understandable | Understandable | | Sometimes understandable | | Not understandable |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | Did you find home exercises enjoyable? | | | | | |
| Very enjoyable | Enjoyable | | Sometimes enjoyable | | Not enjoyable |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | What do you think about the number of sessions? | | | | | |
| Adequate | A lot | | Few | | |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | What do you think about the length of sessions (1 hour)? | | | | | |
| Adequate | Long | | Short | | |
| Why? | | | | | |
| How can we improve it? | | | | | |
|  | Which part of the workshop worked for you? Why? | | | | | |
|  | Would you recommend this workshop to other students? | | | | | |
|  | What are you suggestions for advertising for the workshop (e.g. via emails, class visit to explain the idea of the workshop) | | | | | |

# Appendix 7.1 Clinical trial registration

﻿The trial is registered at www.clinicaltrials.gov as NCT05071521. <https://clinicaltrials.gov/ct2/show/NCT05071521?cond=The+Effectiveness+of+an+Eating+Disorders+Prevention+Program+for+Young+Women+in+Saudi+Arabia&draw=2&rank=1>

# Notes on Inclusion of Published Work

As detailed below, the empirical work has been published. Two papers are published. One study is under review for publication.

**Chapter 3 and Chapter 4:** AlShebali, M., AlHadi, A. & Waller, G. (2020). The impact of ongoing westernization on eating disorders and body image dissatisfaction in a sample of undergraduate Saudi women. *Eating and Weight Disorders,* *26*, 1835-1844. <https://doi.org/10.1007/s40519-020-01028-w>

**Chapter 6:** AlShebali, M., Becker, C., Kellett, S., AlHadi, A., & Waller, G. (2021). Adapting the Body Project to a non-western culture: A dissonance-based eating disorders prevention program for Saudi women. *Eating and Weight Disorders*. [https://doi.org/10.1007/s40519-021- 01104-9](https://doi.org/10.1007/s40519-021-%2001104-9)

**Chapter 7:** AlShebali, M., Becker, C., Kellett, S., AlHadi, A., & Waller, G. Dissonance-based prevention of eating pathology in non-Western women: A randomized controlled trial of the Body Project among young adults in Saudi Arabia. Submitted to *The International Journal of Eating Disorders* in October 2021, under review.