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Estimated prevalence of eating disorders in Malaysia based on a diagnostic screen

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Abstract

Eating disorders (EDs) are debilitating health conditions and common across cultures. Recent reports suggest that about 14.0% of university students in Malaysia are at risk for developing an ED, and that prevalence may differ by ethnicity and gender. However, less is known about the prevalence of EDs in non-university populations.

Objective.—The current study seeks to (1) estimate the prevalence of EDs and ED risk status among adults in Malaysia using an established diagnostic screen; (2) examine gender and ethnic differences between ED diagnostic/risk status groups; and (3) characterize the clinical profile of individuals who screen positive for an ED.

Method.—We administered the Stanford-Washington University Eating Disorder Screen, an online ED screening tool, to adults in Malaysia in September 2020.

Results.—ED risk/diagnostic categories were assigned to 818 participants (ages 18 – 73 years) of which, 0.8% screened positive for anorexia nervosa, 1.4% for bulimia nervosa, 0.1% for binge-eating disorder, 51.4% for other specified feeding or eating disorder, and 4.8% for avoidant/restrictive food intake disorder. There was gender parity in the high-risk and the overall ED categories. The point prevalence of positive eating pathology screening among Malays was significantly higher than Chinese but no different from Indians.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Discussion.—This is the first study to estimate the prevalence of EDs using a diagnostic screen in a population-based sample of Malaysians. It is concerning that over 50% of Malaysians reported symptoms of EDs. This study highlights the need to invest more resources in understanding and managing eating pathology in Malaysia.

Keywords

Malaysia; prevalence; feeding and eating disorders; adult; ethnic groups; gender

Malaysia is a multicultural country in Southeast Asia of 30 million people, with an ethnic Malay majority (69%), and ethnic Chinese (22%) and Indian (7%) minority groups (Department of Statistics Malaysia (DOSM), 2020). As an upper-middle income developing nation, dietary patterns in Malaysia have shifted from consuming fresh and unprocessed foods to high caloric and often highly processed food products (Bodirsky et al., 2020), resulting in a rise in the national prevalence of excess body weight (Institute of Public Health (IPH), 2014). This nutrition transition is driven by actors associated with the paradox of higher body weight afforded by changes in nutrition, advancement in food related technology, urbanization, increase in income per capita, and global trade (Khambalia & Seen, 2010; Popkin, Adair & Ng, 2012). The same factors are also likely to increase the prevalence of eating disorders (EDs). For instance, urbanization is associated with the propagation of the thin ideal and modelling of weight control behaviors in popular culture and media (Pike & Dunne, 2015; Becker et al., 2004). Advancement in technology has facilitated the rise of social media, which in turn is associated with increased risk for disordered eating and negative body image (Wells et al., 2021). The changes of diet resulting from nutritional transition in combination with increasing weight-related pressures driven by urbanization suggest a need for a closer look at the prevalence of EDs in Malaysia (Hay & Mitchison, 2021). In this study, we administered an online ED screening tool to adults in Malaysia to estimate the overall prevalence of EDs and ED risk status, and prevalence by gender and ethnicity.

Using extrapolated prevalence data from other Asian countries, the Institute for Health Metrics and Evaluation (IHME, 2019) estimated that the age-standardized 12-month prevalence for anorexia nervosa (AN) in 2019 in Malaysia was 0.051% (0.027% for men and 0.077% for women) and 0.12% for bulimia nervosa (BN; 0.10% for men and 0.12% for women). The one-year cumulative incidence for AN was 0.0029% (0.0018% for men and 0.0042% for women) and 0.025% for BN (0.036% for men and 0.012% for women). There is a lack of clinical data on the national prevalence of EDs in Malaysia. A study published 40 years ago surveyed all practicing psychiatrists in Malaysia (N = 18), of which, 11 responded (Buhrich, 1981). The study reported that only 28 women and 2 men of 60, 000 psychiatric referrals were diagnosed with AN over a span of 9 years. Notably, the IHME estimates are significantly higher than the estimated prevalence of AN from psychiatric referrals.

Although national prevalence ED estimates in Malaysia are lacking, several studies have looked at general disordered eating among university students. Most of the ED-related studies in Malaysia used the English version of the Eating Attitudes Test (EAT-26) as

Malaysia is a former British colony where English is spoken widely and is the official second language in Malaysia (Thirusanku & Yunus, 2012). A recent study reported that 13.9% of Malaysian university students (n = 1017; mean age = 20.73 years; 51% women) scored above the EAT-26 cut-off point indicating a probable ED (Chan et al., 2020). Another large cross-cultural study of disordered eating (measured using the EAT-26) among university students in five Southeast Asian countries (Indonesia, Malaysia, Myanmar, Thailand and Vietnam; N = 3148; mean age = 20.5 years; 63% women) reported that 13.8% of university students in Malaysia (n = 1023; 50% women) were at risk of developing an ED (Pengpid & Peltzer, 2018). Malaysia had a higher prevalence of disordered eating compared to all other included countries (Indonesia 7.4%; Thailand 6.8%; Vietnam 9.1%) except Myanmar (20.6%).

There is also evidence that disordered eating may differ across ethnicities in Malaysia. Edman and Yates (2004) (n = 267; mean age = 20.97; 55% women; 70% Malays) found that Malay university students had higher scores on the EAT-26 than Chinese students. A study among Malaysian children (n = 816, ages 10–11, 65% girls) found that 30.8% of children (32.8% boys, 29.7% girls) reported disordered eating and that the odds of disordered eating were higher among Malay and Indian children compared to Chinese children (Chong et al., 2017). Several studies in Singapore have also found a higher percentage of Malays were at risk for developing an ED compared to Chinese and Indians, as assessed by the EAT-26 (Kamaruzaman et al., 2018; Kwok et al., 2017). Likewise, there is evidence that ED risk factors may be higher among certain ethnic groups. Malay and Indian women report higher actual-ideal body weight discrepancy scores than Chinese women (Swami et al., 2013). Malay and Indian adolescents report greater pressure from family members to lose weight compared to Chinese adolescents, which in turn is related to engaging in weight-loss behaviors (Mellor et al., 2009). However, it remains to be seen if the prevalence of EDs differ by ethnicity in Malaysia.

It is also important to consider the issue of gender considering the recent reports of gender parity in ED prevalence in Asian countries. In China, men were estimated to have a higher age-standardized prevalence and incident rates of BN than women but lower prevalence and incidents rates than women of AN (Li et al., 2021). A recent study conducted in Singapore (n = 797; ages 21 – 77 years; 50.8% women) reported gender parity in overall EDs point prevalence (41% of women and 46% of men screened positive for an ED) (Chua et al., 2021). Studies among university students in Malaysia also found gender parity of eating pathology using the English version of EAT-26 (Chan et al., 2020; Pengpid & Peltzer, 2018), and the Bahasa Malaysia (BM) versions of the EDE-Q 6.0 and EAT-26 (Taib et al., 2021).

It is worth noting that in contrast to past reports of cultural differences in ED clinical presentations in Asia (Pike & Dunne, 2015), the DSM-5 ED categories appear to reflect the clinical profile of common eating pathology found in Malaysia. To our knowledge, ED case reports in Malaysia indicate that the clinical presentations of patients with AN are similar to that in Western countries – high weight shape concerns, restriction of food intake, and body image disturbance (Khairani et al., 2011; Lai & Tan, 2013; Koh & Norharlinar, 2016). Likewise, ED case reports in Singapore, Malaysia's neighboring country with a similar historical and cultural heritage, patients with ARFID (Lai, Chee & Kwok, 2019), AN and

BN (Kua et al., 1982; Ung et al., 1997; Kwok et al., 2020), and binge eating disorder (Boon et al., 2017) report similar clinical presentations as patients in Western countries. There is little evidence of significant cultural variation in ED clinical presentation, which may be due to Malaysia's history of British imperialism and continued acculturation to Western culture through media.

In summary, most studies on ED prevalence in Malaysia have been conducted among university students. Little is known about the prevalence of EDs in the general population in Malaysia, particularly by gender and ethnicity. In addition, a recent report highlighted the importance of including the prevalence of types of EDs such as other specified feeding or eating disorders (OSFED) as they account for the majority of ED cases and disability adjusted life-years (DALYs) (Santomauro et al., 2021). DALYs refer to the total number of years lost to ill-health or early death. This study is particularly timely as several studies have reported that prevalence of EDs have increased during the COVID-19 pandemic (Taquet et al., 2021). The current study seeks to (1) estimate the prevalence of EDs and ED risk status among adults in Malaysia using an established diagnostic screen; (2) examine gender and ethnic differences between ED diagnostic/risk status groups; and (3) characterize the clinical profile of individuals who screen positive for an ED with regards to weight and shape concerns, and disordered eating and weight control behaviors.

Method

We used YouGov, a market research and data analytics company, to administer the Stanford-Washington Eating Disorder Screen (SWED; Graham et al., 2019) to an online panel of adult participants. There is high internet access (91.7%) and usage (89.6%) in Malaysia (DOSM, 2021). This project received institutional review board (IRB) approval from Nanyang Technological University. Participants were given the option to opt out of answering the SWED completely or any items without penalty. The survey was conducted in September 2020, during the COVID-19 pandemic partial lockdown in Malaysia.

Nonprobability sampling methodology

The sample selection for this study was done through quota sampling. A survey router randomly selects and screens a percentage of individuals from Yougov's base panel in Malaysia (N=138000) for their eligibility to participate in current live surveys. An invitation to participate is then sent to potential participants. The invitation does not provide any information on the topic, client or length of the live surveys. The quota requirements for our study were set to according to Malaysia's national population demographic breakdown of age, gender, ethnicity and state of residence. The sampling frame consisted of 27 quota cells. The response rate was 52.2%, with 927 participants completing the survey. The response rate was relatively low but comparable to the average response rate of 20% for online probability and nonprobability surveys (Pennay et al., 2018). Information on sampling and specific quota percentages of the sample are reported in the appendix.

Demographic data

Participants self-reported on height (cm) and weight (kg), which was used to calculate body mass index (BMI; kg/m^2), age (years), gender ("male", "female"; Malaysia does not legally recognize non-binary or third gender classifications), ethnicity ("Chinese", "Malay", "Indian", "other"), state of residence (the 13 states of Malaysia and 3 federal territories), current marital status ("married", "living with partner", "in relationship, but not living with partner", "widowed", "divorced", "separated", "single"), monthly net household income (10 categories ranging from "RM999 and below" to "above RM10,000"), highest level of education completed (8 categories ranging from "Primary 6" (equivalent to grade school) to "professional higher education"), and current employment status (8 categories ranging "from not working" to "working full time").

Probable ED diagnoses and risk status

The SWED is a screening tool used to identify possible DSM-5 ED diagnoses and risk based on ED behaviors and impairment to enable early detection and intervention. The SWED consists of 18 items from other established ED measures. Weight-shape concerns are assessed using the 5-item Weight Concern Scale (WCS; Killen et al., 1994); disordered eating and weight control behaviors are assessed using items adapted from the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994) and the Eating Disorder Diagnostic Scale (Stice et al., 2000).

Based on their responses, participants are categorized into one of the following DSM-5 diagnostic categories with a hierarchical order as follows: AN; BN; binge eating disorder (BED); other specified feeding or eating disorder – bulimia nervosa of low frequency and/or limited duration (OSFED-BN); other specified feeding or eating disorder – binge-eating disorder of low frequency and/or limited duration (OSFED-BED); other specified feeding or eating disorder – purging disorder (OSFED-PD); other specified feeding or eating disorder – other (OSFED-other); high risk for an ED (HR); low risk for an ED (LR) and avoidant/restrictive food intake disorder (ARFID). Briefly, the categorization of AN is based on BMI, restriction of energy intake and elevated weight and shape concerns; other EDs and OSFEDs are based on binge eating and/or disordered weight control behaviors (vomiting, use of diuretics/laxatives, excessive exercise, and fasting ≥24 hours to influence weight) in the past three months; HR is based on elevated weight and shape concerns; LR is based on not screening positive for the ED categories above; and ARFID is based on screening positive for LR and ARFID related eating or feeding difficulties (refer to the appendix for a detailed explanation of SWED's operational definitions of DSM-5 ED diagnostic categories).

The SWED has been validated with female college students in the USA (Graham et al., 2019) and has been used widely among men and women across the USA (Fitzsimmons-Craft et al., 2019). Specificities ranged from 0.65 (OSFED-BED) to 0.98 (AN) and sensitivities ranged from 0.60 (OSFED-PD) to 0.94 (OSFED-BED) compared to a diagnostic interview (Graham et al., 2019). The specificity and sensitivity for any ED was 0.66 and 0.86 respectively. This is the first time the SWED has been used in Malaysia, but it was previously used in Singapore (Chua et al., 2021).

The SWED was translated to Bahasa Malaysia (BM) according to the guidelines set by the World Health Organization (2010). The SWED was first forward translated into BM by a qualified subjective-specialist native-speaker translator. The translation was checked by a bilingual panel consisting of two non-expert qualified native-speaker translators, the first author, and an independent clinical psychologist. Items that seemed unclear or problematic were back-translated by two independent translators who had no prior knowledge of the questionnaire. The backtranslation was reviewed by the research team. This process was repeated until a satisfactory version was reached (reasonable confidence that the questionnaire would be interpreted in the same way in English and BM). The emphasis on the forward and back-translation was on conceptual and cultural equivalence, rather than linguistic equivalence. The questionnaire was administered in BM or in English, depending on the participant's language preference.

Analysis

We recategorized net monthly income into 3 groups according to the Malaysian government's gross income categories ("T20" (top 20%), "M40" (middle 40%), "B40" (bottom 40%) (DOSM, 2019). We adjusted gross income categories by a factor of 0.13 to approximate net income categories (Abdul Hamid et al., 2019). B40 group monthly net household income threshold <RM4,000; M40 monthly net household income ranged from RM4,001 to RM9,999; and T20 monthly net household income was >RM10,000. Education status was recategorized into "Primary School Achievement Test" (grade school equivalent), "secondary school" (high school equivalent), "diploma/university", "post graduate" and "other". Employment status was recategorized to "full time work", "part time work", "full time student", "retired/unemployed/not working" and "other".

The data were cleaned using the guidelines described in Chua et al., 2021, whereby biologically implausible values for ED behaviors (>500 times over the past 3 months; 0.3% of the sample), weight (<12 kg or >200kg), height (<100 cm or >250 cm; 1.1% of the sample), and BMI (BMI <10 kg/m^2 or BMI >80 kg/m^2) were removed and considered missing. Height, weight, and BMI cut-offs were selected based on past studies conducted with Asian populations (Lam et al., 2015; Odegaard et al., 2009; Song et al., 2019). As height and weight values were self-reported, we used the Median Absolute Deviation (MAD) method (Leys et al., 2013), with a conservative cut-off of ± 3 times the MAD to detect outliers (Templ et al., 2019). Based on the MAD cut-offs, 1.5% and 0.5% of weight and height values respectively were considered implausible and considered missing.

To improve the representativeness of the estimates and to generate unbiased population estimates, raked weights were created using the SPSS rake extension to ensure that the marginal proportions in the sample after removal of outliers match the national online population by gender, age group, ethnicity, and state of residence. We used 2018 population statistics as the source for the control totals (DOSM, 2020) and raked the data on gender (2 categories), age group (5 categories), race (4 categories), and state of residence (16 categories). All analyses were conducted on the sample assigned an ED category (n=818). The weights ranged from 0.37 to 1.55, median = 0.99, IQR = 0.25. Raked weights were not trimmed as there were no extremely low or high values (Battaglia et al., 2004).

Chi-square tests and analyses of variances (ANOVAs) were used to examine group differences. The Bonferroni correction was used to adjust for multiple comparisons.

Results

In total, 1771 individuals were invited to participate in the online survey, of which, 927 individuals ages 18 to 73 years (57.2% women) agreed to participate. There were 511 (55.1%) participants who completed the questionnaire in English and 416 (44.9%) participants who completed the questionnaire in BM. Most participants who completed the questionnaire in BM were ethnic Malays (95.2%). Malays who completed the questionnaire in English were more educated, had higher income, and were more likely to be employed full-time than those who completed the questionnaire in BM (further information is provided in the appendix). There were no significant group differences in frequency of disordered weight control behaviors, weight-shape concerns or prevalence of EDs based on questionnaire language. Thus, for the purpose of the analysis, we did not differentiate between participants who completed the questionnaires in English vs. BM.

Of the 927 participants who completed the questionnaire, 79 participants were dropped due to missing weight/height information, and another 30 participants were dropped due to biologically implausible values. The remaining 818 participants were assigned an ED risk/diagnostic category.

The demographic characteristics of participants assigned an ED risk/diagnostic category are reported in Table 1. There were slightly more women (57.4%) then men (41.3%) in our sample. There were 68.1% Malays, 23.7% Chinese and 7.2% Indians. The average age was 32.75 years, and the average BMI kg/m was 24.20. Most of the participants were either married (40.9%) or single (48.8%). 62.1% were in the labor force, and 69.7% had at least a diploma or higher. 41.9% were in the low-income category, 21.4% were in the middle-income category and 7.6% were in the high-income category.

Although women had higher mean weight-shape concern scores compared to men, there was gender parity in the mean frequency of disordered weight control behaviors over the past 3 months (Table 2). The breakdown of individuals who screened positive for an ED (58.5% of the sample; 59.9% female) is reported in Table 3. The point prevalence for a positive ED screening is as follows: 1.4% for BN (1.5% men; 1.3% women), 14.1% for OSFED-BN (12.2% men; 15.6% women), 36.9% for OSFED-other (37.8% men; 36.3% women), and 4.8% for ARFID (5.2% men; 4.5% women). Only women screened positive for AN (1.4%), BED (0.2%), OSFED-BED (0.5%), and OSFED-PD (0.2%). A total of 19.7% of participants screened positive for high risk for an ED (17.1% men; 21.7% women). The percentage of men and women in the high-risk category, and the overall ED category were comparable.

We also found ethnic differences in disordered eating behaviors and point prevalence of a positive ED screening. Malays had a higher mean BMI than Chinese and reported a higher mean frequency of fasting than Chinese (Table 4). The overall point prevalence of a positive ED screening among Malays (61.9%) was significantly higher than Chinese (47.4%) (Table

5). There was also a higher percentage of Chinese (31.0%) in the LR category compared to Malays (18.3%). There were no other group differences by ethnicity.

Finally, between the ED categories, weight shape concerns were highest among those who screened positive for BN/OSFED-BN and AN (Table 6). Those who screened positive for BN/OSFED-BN also reported the highest frequency of binge eating and disordered weight control behaviors over the past 3 months. There was a high percentage of individuals who screened positive for OSFED-other (36.9%). The OSFED-other category consists of a binge-eating subgroup (38.7%) and a compensatory behaviors subgroup (61.3%) (Table 7). There was a higher percentage of women in the binge-eating subgroup (64.8%) compared to the compensatory subgroup (51.1%). Most individuals in the binge-eating subgroup reported at least 3–10 binge eating episodes (92.3%) and did not engage in any compensatory behaviors (76.1% - 97.9%) in the past three months. A majority of individuals in the compensatory behaviors subgroup reported at least one episode of fasting to lose weight (69.2%) or excessive exercising (77.9%) in the past three months.

Discussion

Recent studies suggest that EDs are increasingly common in Asia (Kim, Nakai & Thomas., 2021) but not much is known about EDs in Malaysia. Recent changes in diet and activity patterns associated with economic development in Malaysia have led to an increase in excess body weight. Importantly, the same factors that are associated with population body weight gain have also been linked to a rise in eating pathology (Pike & Dunne, 2015). It is also well-documented that the rise in population body weight associated with a parallel rise in weight stigma (Papadoulos & Brennan, 2015). Societal fatphobia and weight stigma in turn can promote thin-ideal internalization, and weight and shape concerns (Thompson & Stice, 2001). This study seeks to estimate the prevalence of ED symptoms using a diagnostic screen in a population-based sample of Malaysians.

We found a higher point prevalence of positive screening for AN (0.8%) and BN (1.4%) than the IHME's extrapolated 12-month prevalence estimates of AN (0.05%) and BN (0.12%) in Malaysia. Overall, 2.3% of the sample screened positive for current clinical ED (AN, BN and BED combined). Although this is higher than those that have been reported before in the general population in Malaysia, the estimated point prevalence for a positive screening for AN (1.4% women, 0% men) and BN (1.3% women, 1.5% men) are comparable to the global estimated point prevalence for AN (2.8% women, 0.3% men) and BN (1.5% women, 0.1% men) (Galmiche et al., 2019). The point prevalence for a positive screening for BED (0.1%), OSFED-BED (0.3%) and OSFED-PD (0.1%) in Malaysia is comparable to the point prevalence in Singapore using the same instrument (BED = 0.2%, OSFED-BED = 0.4%, OSFED-PD = 0.1%; Chua et al., 2021).

In addition, the prevalence of a positive screen for BED/OSFED-BED is relatively low in comparison to estimated global prevalence (1.5% women, 0.3% men) (Keski-Rahkonen, 2021). To the best of our knowledge, the prevalence of BED has not been estimated previously in Malaysia. The low prevalence of BED in our sample may be due to the high weight and shape concerns among Malaysians, which are associated with compensatory

behaviors (Taib et al., 2021). The most common diagnostic category was OSFED-other, accounting for 63% (302/479) of the clinical cases. To meet this definition, the individual does not meet criteria for other EDs and reports that, within the past 3 months, having experienced 3 or more episodes of binge eating and/or 3 or more episodes of purging, diuretics, laxatives, excessive exercise, or fasting ≥ 24 hours to lose weight. It is possible that the high prevalence of OSFED in our study was inflated given the subjective nature of the assessment. Participants may be endorsing these symptoms much more inclusively than the OSFED diagnosis definition would have intended as the assessment of bingeing behavior via self-report tends to be less reliable than other ED behaviors (Vannucci et al., 2013).

As with recent studies in Asia (Chan et al., 2020; Chua et al., 2021; Feng & Abebe, 2017; Pengpid & Peltzer, 2018), the prevalence of men and women who screened positive for an ED or at risk for developing an ED was comparable. The popularization of “flower boys” in East Asia may be contributing to the rise of EDs among Asian men. The “flower boy” male body image is characterized by a slim, smooth and toned body with double eye-lids and a high nose bridge (Monocello & Dressler, 2020). Much like attaining a good quality education, taking steps to attain the ideal body appearance is viewed as an investment in one’s future as it increases the likelihood of success in important life domains for both men and women (Wen, 2021). For example, Chinese adolescent boys were equally or more likely than girls to consider cosmetic surgery, despite reporting lower levels of facial dissatisfaction (Wang et al., 2021). Similarly in a university-aged sample in Malaysia, even though women reported higher weight and concerns than men on the EDE-Q 6.0, there were similar levels of restraints, eating concerns, and shape/weight evaluations across men and women (Taib et al., 2021). This suggests that gender differences in body dissatisfaction may not necessarily lead to gender differences in the prevalence of eating pathology. Future research could examine alternative causal pathways to eating pathology for Asian men including the internalization of the beauty ideal and beliefs of functional beauty.

In general, the point prevalence for a positive ED screening was highest among Malays (61.9%) and Indians (62.7%). We found significant ethnic differences between Malays and Chinese. Malays reported a higher mean BMI and more fasting episodes over three months compared to Chinese. This is consistent with past nationally representative studies. The 2014 Malaysian Adult Nutrition Survey found that Indians (mean BMI 26.07 kg/m^2) and Malays (mean BMI 26.07 kg/m^2) had a higher mean BMI as compared to Chinese (mean BMI 24.46 kg/m^2) (IPH, 2014). In addition, the 2017 Adolescent Nutrition Survey (ages 10–17) found that fasting to lose weight was highest among Malay adolescents (4.1%) as compared to Chinese (2.5%) and Indians (1.6%) (IPH, 2017).

It is possible that the higher prevalence of eating pathology among Malays and Indians are associated to the socioeconomic and cultural differences between ethnic groups in Malaysia. Chinese have the highest median household (Lee, 2020a) and the lowest levels of food insecurity in Malaysia (Ahmad et al., 2020). Indians are generally more socially disadvantaged than Malays and Chinese as they receive significantly less development assistance than other ethnic groups, despite having a similar level median income to Malays (Lee, 2020b). Socioeconomic status and food insecurity are linked to disordered eating (Hazzard et al., 2020). In addition, it is also important to consider the intersectionality of

religion and ethnicity as Malays are required by the Constitution of Malaysia to be Muslims. Muslims are required to fast (time-restricted feeding) during the Ramadan period (a month devoted to fasting, prayer and reflection) and encouraged to engage in voluntary fasting throughout the year. Some studies have reported that Ramadan fasting which is motivated mainly by religious reasons does not increase the risk of EDs (Düzçeker, et al., 2019; Erol et al., 2008; Savas et al., 2014). However, Ramadan fasting may exacerbate ED symptoms among those who are at-risk for an ED (Akgül et al., 2014). In Malaysia, both mandatory and voluntary Islamic fasting practices are promoted by the Ministry of Health (2014) and medical researchers (Suriani et al., 2015a; Suriani et al., 2015b) as opportunities for weight loss. The practice of fasting in the Malay culture contribute to the high prevalence of fasting among Malays in our study. Fasting may have become a culturally sanctioned weight control method, and weight/shape concerns may influence an individual's decision to engage in religious fasting. It would be useful to examine if Ramadan affects the prevalence of disordered weight control behaviors or if fasting motivated by weight-shape concerns is elevated among Malays independent of Ramadan. To better understand ethnic differences in EDs, future studies with a larger sample size of ethnic minorities to understand how culture influences the prevalence and risk factors of EDs should be conducted.

While this study presents initial data on eating pathology on a national level in Malaysia, there are several limitations that should be considered. Firstly, the SWED is not validated in Asian populations, males, across the lifespan, and outside university populations. We also note that ED screens generally have low positive predictive value due to the low prevalence of EDs (Jacobi, Abascal & Taylor, 2004). In light of the limitations of ED screens and the lack of validation of the SWED in this specific population, the prevalence estimates of this study should be interpreted cautiously. The true prevalence of EDs in Malaysia is likely to be lower than 59% and follow-up studies using clinical interviews to provide more accurate estimates are needed. Nonetheless, online screening can provide a crude estimate of the prevalence of disorders and treatment needs, and is useful to guide the development and dissemination of targeted interventions. Indeed, using web-based screening to estimate the prevalence of mental disorders is increasingly common e.g. in the WHO World Mental Health International College Student project which runs in 17 countries (Auerbach et al., 2018). Given the high rates of positive screens, this study highlights the need for more resources to address eating pathology in Malaysia. The data reported in this study can be used by stakeholders to estimate the resources needed to develop a stepped care mental health system that offers tailored, evidence-based interventions to promote population health (Wilfley, Agras & Taylor, 2013).

Secondly, as with all studies using non-probability samples, our sample may differ from the general population in unmatched demographic variables. Our sample matched the demographic characteristics of the general population in age, sex, ethnicity and state of residence, but appears to be more highly educated than the general population. Although education does not appear to be associated to the prevalence of EDs (Huryk, Drury & Loeb, 2021; Mitchison & Hay, 2014), some evidence suggests that higher education is associated with greater prevalence of positive ED screens levels (Yao et al., 2021). It is possible that the higher education level of our sample contributed to the high number

of positive screens in our study. More studies are needed to understand the relationship between sociodemographic factors and prevalence of EDs.

Finally, as this study was conducted in September 2020, it is possible that the high prevalence of eating pathology in our sample reflect the increase in ED related symptoms associated with the COVID-19 pandemic (Rodgers et al., 2020; Simone et al., 2021). Although we are unable to compare the prevalence of eating pathology pre-COVID-19 pandemic due to the lack of epidemiology data, general mental health has declined in Malaysia throughout the pandemic (Marzo et al., 2021). In addition, the economic downturn during the pandemic has exacerbated food insecurity in Malaysia, which is a risk factor for eating pathology (Hazzard et al., 2020). Follow-up studies should be done to track the prevalence of eating pathology in Malaysia.

This study estimates that over 50% of Malaysians screened positive for an ED or are at risk for developing an ED. While the SWED has reasonable sensitive and specificity, it might overestimate the true prevalence of EDs. Nonetheless, as Malaysia has limited mental health resources and no specialized ED services, this study serves as a starting point to dedicate more resources to this health issue in Malaysia. There is a need for validated eating disorder assessments, a national surveillance system to track eating disorders across the country and increased research funds to develop prevention and treatment interventions for eating disorders in Malaysia. This is particularly important as public health campaigns in Malaysia have focused primarily on tackling excess body weight. Yet these public health campaigns can have unintended negative consequences on body image, weight satisfaction, and weight control behaviors (Sánchez-Carracedo, Neumark-Sztainer & López-Guimerà, 2012). As Malaysia continues to experience sociocultural and environmental changes associated with economic development, it is important, now more than ever, to shine a light on EDs in this country (Katzman, 2021).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Public Significance statement

This study estimates the prevalence of eating disorders among adults in Malaysia using an online eating disorders screen. Over 50% of Malaysians report symptoms of eating disorders. The study highlights the need for more resources and funding to address this important public health issue through surveillance, prevention, and treatment of eating disorders in Malaysia.

Table 1.

Demographic characteristics of the sample of Malaysian adults ages 18–73 assigned a SWED risk/diagnostic category.

	Overall (*N* = 818)	Males (*n* = 338)	Females (*n* = 470)
	Mean(SD)	**Mean(SD)**	**Mean(SD)**
BMI	24.20 (5.20)	24.67 (4.37)	23.86 (5.72)
Age	32.75 (11.20)	36.09 (12.75)	30.26 (9.15)
	***n* (%)**	***n* (%)**	***n* (%)**
Marital status			
Married	334 (40.9)	160 (46.0)	174 (37.0)
Living with partner	12 (1.5)	5 (1.4)	8 (1.6)
In relationship, but not living with partner	41 (5.0)	18 (5.1)	23 (5.0)
Widowed	12 (1.5)	9 (2.5)	4 (0.8)
Divorced	15 (1.9)	7 (2.0)	8 (1.7)
Separated	3 (0.4)	1 (0.3)	3 (0.5)
Single	339 (48.8)	149 (42.7)	250 (53.3)
Ethnicity			
Chinese	194 (23.7)	102 (29.2)	92 (19.6)
Malay	557 (68.1)	219 (63.0)	338 (72.0)
Indian	59 (7.2)	26 (7.5)	32 (6.9)
Other	8 (1.0)	1 (0.3)	7 (1.5)
Income group			
Low income (<RM4000)	323 (41.9)	146 (41.8)	197 (42.0)
Middle income (RM4000-RM9999)	175 (21.4)	91 (26.1)	84 (17.9)
High income (>RM10000)	62 (7.6)	26 (7.4)	37 (7.8)
Missing	238 (29.0)	86 (24.7)	151 (32.3)
Education			
Primary school	8 (1.0)	2 (0.5)	6 (1.3)
Secondary school	240 (29.4)	96 (27.6)	144 (30.7)
Diploma/University	493 (60.2)	222 (63.6)	271 (57.7)
Post graduate	75 (9.2)	29 (8.2)	46 (9.9)
Other	2 (0.3)	0	2 (0.5)
Employment status			
Full time work	432 (52.8)	216 (61.9)	217 (46.1)
Part time work	76 (9.3)	39 (11.1)	38 (8.1)
Full time student	142 (17.3)	52 (15.0)	90 (19.1)
Retired/unemployed/not working	152 (18.6)	34 (9.7)	118 (25.1)
Other	16 (1.9)	8 (2.3)	8 (1.6)

Note. Raked weights based on those assigned an ED category were applied to the analysis.

Table 2.

Means and standard deviations of weight-shape concerns, and frequency of binge eating and disordered weight control behaviors by gender.

	Total (*N* = 818)	**Males (*n* = 348)**	**Females (*n* = 470)**	**Significance**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**F(df); *p***
Weight concerns scale	46.36 (25.35)	41.54 (23.92)	49.94 (25.81)	27.86 (1, 784); < 0.001
Binge eating	4.08 (9.81)	3.72 (8.23)	4.36 (10.82)	0.43 (1, 657); 0.51
Disordered weight control behaviors				
Vomiting	0.31 (1.56)	0.35 (1.79)	0.29 (1.39)	0.13 (1, 798); 0.72
Diuretics/laxatives	0.67 (6.79)	0.68 (7.74)	0.67 (6.02)	0.04 (1, 798); 0.84
Excessive exercise	2.45 (7.71)	2.63 (6.96)	2.33 (8.23)	0.73 (1, 800); 0.39
Fasting	2.23 (6.57)	2.06 (6.47)	2.37 (6.64)	0.12 (1, 796); 0.73

Note. Raked weights based on those assigned an ED category were applied to the analysis. Group differences for weight control scale, binge eating and disordered weight control behaviors controlled for BMI and age.

Table 3.

Prevalence of eating disorder diagnostic and risk categories by gender.

	Total (*N* = 818)	Males (*n* = 348)	Females (*n* = 470)	Significance
	***n* (%)**	***n* (%)**	***n* (%)**	**χ^2(df); *p***
Eating disorder diagnostic and risk categories				
Low risk	178(21.8)	92 (26.3)[a]	86 (18.4)[b]	8.72 (2, 817); <0.05
High risk	161 (19.7)	59 (17.1)	102 (21.7)	
EDs	479 (58.5)	197 (56.6)	282 (59.9)	
AN	7 (0.8)	0	7 (1.4)	
BN	11 (1.4)	5 (1.5)	6 (1.3)	
BED	1 (0.1)	0	1 (0.2)	
OSFED-BN	116 (14.1)	42 (12.2)	74 (15.6)	
OSFED- BED	2 (0.3)	0	2 (0.5)	
OSFED-PD	1 (0.1)	0	1 (0.2)	
OSFED-other	302 (36.9)	132 (37.8)	170 (36.3)	
ARFID	39 (4.8)	18 (5.2)	21 (4.6)	

Note. AN = Anorexia nervosa; BN = Bulimia nervosa; BED = Binge eating disorder; OSFED-BN = Other specified feeding or eating disorder bulimia nervosa (of low frequency and/or limited duration); OSFED-BED = Other specified feeding or eating disorder binge eating disorder (of low frequency and/or limited duration); OSFED-PD = Other specified feeding and eating disorder - purging disorder; OSFED - other = Other feeding or eating disorder - other; ARFID = Avoidant/restrictive food intake disorder. ED= All possible DSM-5 clinical/OSFED diagnosis groups.

Raked weights based on those assigned an ED category were applied to the analysis. Gender differences for ED diagnostic and risk categories was tested using a chi-square test. As some cells had 5 or less observations, we collapsed across ED diagnostic categories. The chi-square test is calculated on a 3 (low risk, high risk, ED) X 2 (men, women) table. Groups with different superscripts are significantly different from each other ($p < .05$).

Table 4.

Means and standard deviations of BMI (kg/m^2) and weight-shape concerns, and frequency of binge eating and disordered weight control behaviors by ethnicity.

	Chinese (*n* = 194)	Malays (*n* = 557)	Indians (*n* = 59)	Significance
	Mean (SD)	Mean (SD)	Mean (SD)	F(df); *p*
BMI (kg/m^2)	23.41(4.10)[a]	24.43 (5.51)[b]	24.44 (5.22)	10.65 (2,807); < 0.01
Weight concerns scale	40.20 (22.34)	49.03 (25.67)	42.11 (27.26)	1.29 (2, 774); 0.28
Binge eating	3.13 (7.70)	4.29 (9.90)	3.64 (5.20)	0.04 (2,649); 0.96
Disordered weight control behaviors				
Vomiting	0.28 (0.90)	0.31 (1.73)	0.41 (1.48)	0.29 (2,788); 0.75
Diuretics/laxatives	0.24 (1.18)	0.87 (8.17)	0.21 (1.00)	0.93 (2,788); 0.40
Excessive exercise	2.54 (7.85)	2.22 (7.57)	4.00 (8.55)	2 .10 (2,790); 0.12
Fasting	0.61 (2.26)[a]	2.72 (7.01)[b]	2.16 (8.04)	5.96 (2,786); < 0.01

Note. Raked weights based on those assigned an ED category were applied to the analysis. Group differences for BMI controlled for gender and age; group differences for weight control scale, binge eating and disordered weight control behaviors controlled for gender, BMI and age.

Table 5.

Prevalence of eating disorder diagnostic and risk categories by ethnicity.

	Chinese (*n* = 194)	Malays (*n* = 557)	Indians (*n* = 59)	Significance
	***n* (%)**	***n* (%)**	***n* (%)**	**χ^2(df); *p***
Low risk	60 (31.0)[a]	102 (18.3)[b]	13 (21.8)	16.92 (4, 810); < 0.001
High risk	42 (21.8)	110 (19.8)	9 (15.5)	
EDs	92 (47.4)[a]	345 (61.9)[b]	37 (62.7)	
AN	1 (0.5)	6 (1.1)	0	
BN	1 (0.5)	7 (1.3)	1 (2.1)	
BED	1 (0.5)	0	0	
OSFED-BN	21 (10.9)	85 (15.2)	9 (14.6)	
OSFED- BED	0	2 (0.4)	0	
OSFED-PD	0	1 (0.2)	0	
OSFED-other	60 (31.2)	214 (38.5)	24 (40.9)	
ARFID	7 (3.6)	30 (5.3)	3 (5.1)	

Note. AN = Anorexia nervosa; BN = Bulimia nervosa + subclinical bulimia nervosa; BED = Binge eating disorder + Subclinical binge eating disorder; OSFED-OTHER = Unspecified feeding or eating disorder + Other specified feeding and eating disorder- purging disorder; ARFID = Avoidant/restrictive food intake disorder. Eating disorder status group differences were tested using ANOVA tests.

Raked weights based on those assigned an ED category were applied to the analysis. Ethnic differences for ED diagnostic and risk categories was tested using a chi-square test. As some cells had 5 or less observations, we collapsed across ED diagnostic categories. The chi-square test is calculated on a 3 (low risk, high risk, ED) X 3 (Chinese, Malay, Indian) table.

Table 6.

Means and standard deviations of BMI, weight-shape concerns, and frequency of binge eating and disordered weight control behaviors in the past 3 months across eating disorder status groups (n = 818).

M (SD)	LR	HR	AN	BN/OSFED-BN	BED/OSFED-BED	OSFED-OTHER	ARFID	Significance
	(*n* =178)	(*n* =161)	(*n* = 7)	(*n* = 127)	(*n* = 3)	(*n* = 303)	(*n* = 39)	F(df); *p*
BMI (kg/m^2)	22.67 (4.54)	24.35 (5.08)	17.47 (0.82)	26.22 (4.83)	30.08 (5.60)	24.67 (5.40)	21.19 (4.36)	13.07 (6,811); <0.001 HR,BN,BED,OSFED-OTHER>LR, AN;BN,BED,OSFED-OTHER>ARFID; BN>HR
Weight concerns scale	20.96 (12.86)	54.70 (18.60)	70.58 (15.72)	71.15 (15.73)	59.06 (32.28)	48.19 (23.92)	24.91 (11.14)	88.33 (6,778); <0.001 AN,BN,BED,OSFED-OTHER,HR>LR,ARFID; AN,BN> HR>OSFED-OTHER
Binge eating	0.38 (0.69)	0.52 (0.81)	3.75 (3.02)	9.87 (15.66)	0	5.09 (9.89)	0.75 (0.82)	13.18 (6,651);<0.001 BN>OSFED-OTHER>LR,HR BN>ARFID
Disordered weight control behaviors								
Vomiting	0.005 (0.07)	0.02 (0.15)	2.26 (3.88)	1.02 (3.01)	0	0.34 (1.44)	0	9.45 (6,792); <0.001 AN,BN>LR,OSFED-OTHER,HR,ARFID
Diuretics/ laxatives	0.01 (0.16)	0.01 (0.10)	0.56 (0.78)	2.41 (12.74)	0	0.75 (7.28)	0.03 (0.17)	1.71 (6,792);0.12
Excessive exercise	0.14 (0.43)	0.29 (0.71)	5.11 (2.87)	6.91 (10.32)	0	3.28 (9.92)	0.12 (0.47)	15.02 (6,694); <0.001 BN>LR,HR,ARFID,OSFED-OTHER;OSFED-OTHER>LR,HR
Fasting	0.08 (0.33)	0.23 (0.58)	8.45 (11.19)	5.98 (9.43)	0	3.07 (7.89)	0.13 (0.42)	F(6,790)=14.80, *p*<0.001 AN,BN>LR,HR,ARFID; BN>OSFED-OTHER>LR; BN>ARFID

Note. AN = Anorexia nervosa; BN = Bulimia nervosa + OSFED-bulimia nervosa; BED = Binge eating disorder + OSFED binge eating disorder; OSFED-OTHER = Other specified feeding and eating disorder- purging disorder; ARFID = Avoidant/restrictive food intake disorder. Raked weights based on those assigned an ED category were applied to the analysis. Eating disorder status group differences were tested using ANCOVA tests. Group differences for BMI (kg/m^2) controlled for gender and age; group differences for weight concerns, binge eating, and disordered weight control behaviors controlled for gender, BMI and age.

Table 7.

Characteristics of OSFED-other binge eating and compensatory behaviors subgroups and associated features of binge eating episodes in the past 3 months (n = 302).

	Total (n = 302)	Binge eating subgroup (n = 117)	Compensatory behaviors subgroup (n = 185)	Significance
	n (%)	n (%)	n (%)	χ^2(df); p
Females %	170 (56.4)	76 (64.8)[a]	95 (51.1)[b]	5.40 (1,302); <0.05
Binge eating				209.54 (3,301); <0.001
0 −2	25 (8.4)	0[a]	25 (78.1)[b]	
3–10	203 (67.3)	108 (92.3)[a]	23 (12.5)[b]	
11 or more	13 (4.4)	9 (7.7)[a]	4 (2.3)[b]	
Missing	60 (20.0)	0[a]	60 (32.6)	
Vomiting				
0	259 (85.6)	114 (97.0)[a]	145 (78.4)[b]	26.58 (2,303); <0.001
1–10	42 (13.8)	2 (1.5)[a]	40 (21.6)[b]	
11 or more	0	0	0	
Missing	2 (0.6)	2 (1.4)	0	
Diuretics/laxatives				
0	261 (86.5)	115 (97.9)[a]	147 (79.2)[b]	27.55 (3,303); <0.001
1–10	38 (12.7)	1 (0.7)[a]	37 (20.2)[b]	
11 or more	1 (0.3)	2 (1.4)	1 (0.5)	
Missing	2 (0.5)	0	0	
Excessive exercise				
0	130 (43.0)	89 (76.1)[a]	41 (22.1)[b]	92.43 (3,302); <0.001
1–10	156 (51.7)	26 (22.2)[a]	130 (70.3)[b]	
11 or more	14 (4.6)	0[a]	14 (7.6)[b]	
Missing	2 (0.6)	2 (1.7)	0	
Fasting				
0	156 (51.8)	99 (85.0)[a]	57 (30.8)[b]	93.96 (3,303); <0.001
1–10	125 (41.3)	15 (12.7)[a]	110 (59.3)[b]	
11 or more	18 (6.1)	0[a]	18 (9.9)[b]	
Missing	3 (0.9)	3 (2.4)[a]	0[b]	

Note. OSFED-other = Other specified feeding or eating disorder -other. Binge eating subgroup = total episodes of binge eating in the past 3 months ≥ 3 in the past 3 months; compensatory behaviors subgroup = total frequency of vomiting, use of diuretics/laxatives, excessive exercise and fasting to control weight/shape ≥ 3 in the past 3 months. Raked weights based on those assigned an ED category were applied to the analysis. Groups with different superscripts are significantly different from each other (p < .05).