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Title: Predictors of Disordered Eating in Young Males

Author(s): Rita Doumit, Joelle Abi-Kharma, Marie-Jose Sanchez, and Nadine Zeeni

Journal: Community Mental Health Journal

DOI/Link: <https://doi.org/10.1007/s10597-017-0163-2>

How to cite this post-print from LAUR:

Doumit, R., Abi Kharma, J., Sanchez-Ruiz, M. J., & Zeeni, N. (2018). Predictors of disordered eating in young males. *Community Mental Health Journal*, DOI, 10.1007/s10597-017-0163-2, <http://hdl.handle.net/10725/7766>

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# Community Mental Health Journal

## Predictors of disordered eating in young males

--Manuscript Draft--

<b>Manuscript Number:</b>	COMH-D-16-00270R1
<b>Full Title:</b>	Predictors of disordered eating in young males
<b>Article Type:</b>	Article
<b>Keywords:</b>	disordered eating; Middle-East; media influence; depression; body image dissatisfaction
<b>Corresponding Author:</b>	Nadine Zeeni Lebanese American University Byblos, LEBANON
<b>Corresponding Author Secondary Information:</b>	
<b>Corresponding Author's Institution:</b>	Lebanese American University
<b>Corresponding Author's Secondary Institution:</b>	
<b>First Author:</b>	Rita Doumit, PhD
<b>First Author Secondary Information:</b>	
<b>Order of Authors:</b>	Rita Doumit, PhD Joelle Abi Kharma Maria-Jose Sanchez-Ruiz Nadine Zeeni
<b>Order of Authors Secondary Information:</b>	
<b>Funding Information:</b>	
<b>Abstract:</b>	Recent findings suggest that disordered eating (DE) symptomatology may be underestimated in the male population. The present study examined depressive symptomatology as a potential mediator of the relationships between body image dissatisfaction, strategies to change body weight and muscles, media pressure, and DE (emotional, restrained and emotional eating) in 260 male undergraduates who completed a self-reported questionnaire. Path analyses indicated that media influence and strategies to decrease body weight had direct positive effects on depressive symptomatology, which in turn predicted emotional eating. Media influence had a direct positive effect on emotional eating, whereas strategies to decrease body weight did not exhibit a direct effect on emotional eating. Therefore, the latter pathway was removed from the model. The link between media pressure, strategies to decrease body weight and emotional eating was partially mediated by depressive symptomatology. The present findings can inform the development and implementation of prevention and education programs for DE in schools and universities.
<b>Response to Reviewers:</b>	Dear Prof. Feldman,  Thank you for your review of our manuscript entitled "Predictors of Disordered Eating in Young Males" (COMH-D-16-00270). We would like to take this opportunity to express our sincere gratitude to the reviewers who identified areas of our manuscript that needed corrections or modification. We believe that addressing the reviewers' comments has resulted in a more solid paper. In the text that follows, we discuss how we addressed each of the reviewers' comments. For your convenience, we have highlighted in blue where we made changes in the manuscript.  Hoping that the revised manuscript is accepted for publication in Community Mental

Health Journal,

Yours sincerely,

Corresponding author

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Reviewer #1

1. "Predictors of disordered eating in young males" represents an important contribution in the field of population health in males in which limited research has been conducted. A strength of the study is the use of multiple, validated survey instruments from which the relationship of disordered eating symptomatology was examined in relationship to depression, body image dissatisfaction, strategies to change body weight and muscles, and media pressure.

We appreciate your feedback and we thank you for highlighting the importance of our study.

2. Limitations of the study include possible bias from the use of only self-reported assessment methods.

Thank you for pointing out this relevant comment. We have already stated this possible bias in the first paragraph in the limitations section. We have highlighted it in blue.

3. While the body of scientific literature is limited in this field of study, and references could be updated to reflect the state of the science.

We acknowledge the point raised by the reviewer regarding the scarcity of the body of scientific literature in this field of study and in this particular population. We have updated the references by adding the following studies:

Daniel, S. & Bridges, S. K. (2010). The drive for muscularity in men: Media influences and objectification theory. *Body Image*, 7(1), 32-38.

Grogan, S. (2016). *Body image: Understanding body dissatisfaction in men, women and children*. London; New York: Routledge.

Lazaverich, I., Irigoyem Camacho, M. E., Velazquez-Alva, M. D., & Zepeda Zepeda, M. (2016). Relationship among obesity, depression, and emotional eating in young adults. *Appetite*, 1(107), 639-644. doi: 10.1016/j.appet.2016.09.011. Epub 2016 Sep 13.

Musaiger, A. O. Al-Mannai, M., & Al-Lalla, O. (2014). Risk of disordered eating attitudes and among male adolescents in five Emirates of the United Arab Emirates. *International Journal of Eating Disorders*, 47(8), 898-900.

Raevuori, A., Keski-Rahkonen, A., & Hoek, H. W. (2014). A review of eating disorders in males. *Current Opinions in Psychiatry*, 27(6), 426-430.

Rawana, J. S., McPhie, M. L., & Hassibi, B. (2016). Eating- and weight-related factors associated with depressive symptoms in emerging adulthood. *Eating Behavior*, 22, 101-8. doi: 10.1016/j.eatbeh.2016.04.002. Epub 2016 Apr 13.

4. Methodologically, the study aims are addressed in the path analysis; however, a number of issues need clarification including the process by which the sample size was determined and below items #5 and 6.

Please find below the rationale behind the sample size calculation.

Most researchers according to the literature would recommend using sample sizes of at least 200 when running structural equation modeling (SEM); since it is referred to as a large sample technique.

"A useful rule of thumb concerning the relation between sample size and model complexity that also has some empirical support was referred to by Jackson (2003) as the N:q rule. This rule is applicable when the estimation method used is maximum likelihood (ML), which is by far the method used most often in SEM". In ML estimation, Jackson (2003) suggested that researchers think about minimum sample size in terms of the ratio of cases (N) to the number of model parameters that require statistical estimates (q). An ideal sample size-to-parameters ratio would be 20:1". Also Barrett (2007) suggested that reviewers of journal submissions routinely reject for publication any SEM analysis where  $N < 200$  unless the population studied is restricted in size.

This recommendation is not standard practice, but it highlights the fact that analyzing small samples in SEM is problematic. This was obtained from "Principles and practice of structural equation modeling", 3rd edition (Kline, 2011). (<http://www.imd.inder.cu/adjuntos/article/521/Principles%20and%20Practice%20of%20Structural%20Equation%20Modeling.pdf>)

5. Clarification regarding the inclusion of descriptive statistics with demographic and survey data in addition to the path analysis.

We would like to thank the reviewer for this pertinent comment. We have added a table of the results of the demographic data (table 1) to give the reader a better idea of our study population. As for the survey data and its descriptive statistics, it was reported in table 2 in line with the reported results in the SEM literature.

6. Implications for interprofessional educational interventions specific to model findings should be expanded.

Additional implications were added as requested. Thank you.

#### Reviewer #2

1. Formatting: The manuscript needs considerable polishing to conform to APA style (particularly the in-text citations with multiple authors).

We have now reviewed the manuscript following APA standards for referencing.

2. In addition, there are numerous grammatical and syntax errors. I would have expected a submitted manuscript to be in better shape.

We have now reviewed the manuscript and made all the changes that you have recommended as per your comments. Thank you.

3. Issues with content include: page 1/2nd paragraph: The distinction between disordered eating (DE) and eating disorders (ED) needs to be explicitly defined and contextualized.

Thank you for pointing that out. Details were added about DE, ED and their relationship.

4. Page 2/line 41: Where is the citation for the "recent review paper" -- if it is the Mond et al. article, that citation needs to appear sooner.

We apologize for this error. We have now moved this citation as per your recommendation. Thank you.

5. Page 3/line 12: Clarify which variables (BID? DE?)

We would like to thank the reviewer for this pertinent comment. We have now replaced the word "variables" by "the influence of BID and depression on DE in males" (highlighted in blue in text).

5. Page 3/lines 14-15: This line is almost an exact quote from the Brechan & Kvalem 2015 article -- cite the page number.

Thank you for this comment. Instead of referring to the page number, we have decided to paraphrase/reword this sentence in the manuscript.

6. Also, clarify "completely mediated" -- what does that mean in terms of support for your hypotheses? The Brechan & Kvalem results stem from a study using a highly homogenous sample and should be interpreted with considerable caution.

We agree with the reviewer's comment that the word "completely" could be misleading as we do not expect a complete mediation in our data, but we are just exploring any mediation effects (kindly see hypotheses).

7. Page 4/lines 31-36: "indirectly associated" or mediated? Be explicit about what you plan to test in your hypotheses.

In order to follow the terminology that is consistent with the path analysis performed, we have reviewed the hypotheses and references to them in the discussion, and rephrased them in terms of "mediational effects". This is because "mediation corresponds to an indirect effect of an independent variable on a dependent variable that through one or more mediator variables" (reference: <http://public.kenan-flagler.unc.edu/faculty/edwardsj/MEDIATE.NOT.pdf>).

8. Page 5: Demographics -- instead of major, use something less open to misinterpretation. For example, "field of study" or "degree program".

We have now replaced the word "major" by "degree program" as per your recommendation.

9. Page 6/lines 55-56: page # for the quotation.

The page number was added.

10. Page 7/line 26: convenience sample (not convenient)

This has been corrected in the reviewed manuscript.

11. Page 7/line 35: "all authors ..." -- should be at the end of the manuscript?

The statement was moved to the end of the manuscript, after the conflict of interest statement.

12. Page 8: Where is a reference to Table 2?

A reference to table 2 has been added to the paragraph about the path analysis in the results section.

13. Page 8/line 45: Correct the first paragraph or merge with 2nd paragraph (no one-sentence paragraphs)

The paragraphs were merged.

14. page 9/1st paragraph: Justify the connection you are making between depression, depressive symptoms, and negative emotions/affect.

This is a very valid point raised by the reviewer. We acknowledge the importance of using these terms in a consistent and coherent manner. We were using depression and depressive symptoms as interchangeably, but we have now modified that because depression often designates clinical outcomes, and the depressive symptoms measured in this sample could be subclinical. Therefore, we have decided to refer to "depressive symptomatology" throughout the paper.

Since negative emotions are at the basis of many depressive symptoms, in the paragraph mentioned by the reviewer, we have referred to studies using "negative emotions" to provide a rationale for our hypotheses. We have referred to the link between negative emotions and depressive symptomatology in the text.

15. page 10/line 4: MI? This is the first time MI is used in the narrative; you define it in Table 2, but there is no Table 2 reference. Make sure you have provided a solid operational definition of MI in the procedures.

Thank you for pointing that out. MI is now defined in the introduction, and the wording in the methods section has been fixed for consistency. Moreover, table 2 has now been referenced in the text.

16. page 10/line 14: "prone males" -- perhaps you meant predispose?

The word "prone" was replaced with "predispose". Apologies for the mistake.

17. page 10/line 39: "measure of body image"

This has been corrected in the reviewed manuscript.

18. page 10/line 45: distortion (not distorsion)

This has been corrected in the reviewed manuscript.

Thank you very much

**Predictors of disordered eating in young males**

**Doumit R<sup>1</sup>, Abi Kharma J<sup>2</sup>, Sanchez-Ruiz MJ<sup>3</sup>, Zeeni N\*<sup>4</sup>**

<sup>1</sup>Lebanese American University, School of Nursing, PO Box 36, Byblos, Lebanon

<sup>2,4</sup> Lebanese American University, School of Arts and Sciences, Department of Natural Sciences,  
PO Box 36, Byblos, Lebanon

<sup>3</sup>Lebanese American University, School of Arts and Sciences, Department of Social  
Sciences, PO Box 36, Byblos, Lebanon

\*Corresponding author: Nadine Zeeni, Department of Natural Sciences, School of Arts and Sciences, Lebanese American University, Tel. +9619547262 ext. 2317, Fax. +9619547256, P.O. Box: 36-Byblos, Lebanon, e-mail address: [nadine.zeeni@lau.edu.lb](mailto:nadine.zeeni@lau.edu.lb).

1 Running head: PREDICTORS OF DISORDERED EATING IN MALES  
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6 **Abstract**  
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8 Recent findings suggest that disordered eating (DE) symptomatology may be underestimated in [the male population](#).  
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10 The present study examined [depressive symptomatology](#) as a potential mediator of the relationships between body  
11 image dissatisfaction, strategies to change body weight and muscles, media pressure, and DE (emotional, restrained  
12 and emotional eating) in 260 male undergraduates who completed a self-reported questionnaire. Path analyses  
13 indicated that media influence and strategies to decrease body weight had direct positive effects [on depressive](#)  
14 [symptomatology](#), which in turn predicted emotional eating. Media influence had a direct positive effect on  
15 emotional eating, whereas strategies to decrease body weight did not exhibit a direct effect on emotional eating.  
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17 body weight and emotional eating was partially mediated by [depressive symptomatology](#). The present findings can  
18 inform the development and implementation of prevention and education programs for DE in schools and  
19 universities.  
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31 **Keywords:** predictors, emotional eating, depressive symptomatology, media influence, body weight.  
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33 **Word Count:** 4, 359 words  
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## Introduction

Adolescents and young adults are considerably vulnerable to pressure from perceived standards of physical appearance (Jones, 2004). The social environment of college students in particular engenders a keen awareness of social norms related to appearance and attractiveness that increases their risk for engaging in unhealthy body-change strategies (e.g., disordered eating; Bergstrom, Neighbors, & Lewis, 2004; Brunet, Sabiston, Dorsch, & McCreary, 2010).

Disordered Eating (DE) refers to altered eating patterns, including binge eating, extreme dieting, and inappropriate weight-loss techniques (Neumark-Sztainer, Wall, Guo, Story, Haines, & Eissenberg, 2006). In the mid-1980s, Van Strien and colleagues (1986) defined three types of DE behaviors: restrained, emotional, and external eating (Van Strien, Frijters, Bergers, & Defares, 1986). Restrained eating indicates mindful control over food consumption to prevent gaining weight; emotional eating involves extreme eating in response to certain stimuli; and external eating refers to eating in response to food-related cues irrespective of the actual physical state of hunger or satiety. As symptoms of DE intensify and their severity increases, eating habits may shift to extremes, and individuals become at increased risk to develop a clinical eating disorder (ED; Fairburn, Cooper, Doll, & Davieset, 2005). Therefore, the importance behind studying DE stems from the fact that these behaviors are believed to be at the roots of the development of ED if they are not diagnosed at their preliminary stages (Snoek, Van Strien, Janssens, & Engels, 2007).

It was previously believed that DE primarily affects women and the vast majority of DE research focused on females. However, recent studies have suggested that DE symptomatology may be underestimated in the male population. Indeed, over the last decade, it was revealed that a substantial number of men suffer from DE and ED (Musaiger, Al-Mannai, & Al-Lalla, 2014; Raevuori, Keski-Rahkonen & Hoek, 2014; Striegel, Bedrosian, Wang, & Schwartz, 2012; Strother, Lemberg, Stanford, & Tuberville, 2012), and that up to 25% of all individuals with ED are males (Hudson, Hiripi, Pope, & Kesler, 2007). Moreover, a recent review paper revealed that 42-45% of individuals engaging in binge eating were males (Mond, Mitchison, & Hay, 2014). Laxative abuse among genders was nearly even, and fasting for weight loss was endorsed by nearly 40% of the males (Mond, Mitchison, & Hay, 2014).

Research on the association between depressive symptomatology and DE in males is limited by the use of female-only samples (Ferreiro, Wichstrom, Seoane, & Senra, 2014). The existing but limited body of DE in males shows that depressive symptoms are associated with an elevated risk for the onset of several types of eating

problems, including binge eating (Ferreiro, Seoane, & Senra, 2011; Striegel et al., 2012), emotional eating (Kontinen, Männistö, Sarlio-Lähteenkorva, Silventoinen & Haukkala, 2010) and DE in general (Ferreiro, Wichstrom, Seoane, & Senra, 2014; Santos, Richards, & Beckley, 2007; Valls, Callahan, Rousseau, & Chabrol, 2014).

Body image dissatisfaction (BID) has become an important issue for males, as between 68-95% of males report BID (Jung, Forbes, & Chan, 2010; Neighbors & Sobal, 2007). Males tend to report dissatisfaction with muscularity, which leads some men to express a desire to increase weight and others to reduce weight to improve body composition by increasing lean body mass (Grogan, 2016; McCabe & Ricciardelli, 2004). Research has also found that depressive symptomatology and DE both have BID as a risk factor (Johnson & Wardle, 2005; Siegel, 2002). However, most of the evidence linking depressive symptomatology and BID to DE is primarily from studies with female subjects only. Indeed, research has only just begun to examine the influence of BID and depressive symptomatology on DE in males, and findings are mixed. For example, a recent study demonstrated that depressive symptomatology and self-esteem mediated the relationship between BID and DE (Brechan & Kvalem, 2015). Bergeron & Tylka (2007) also found a significant association between BID and depressive symptoms in a sample of college males.

The impact of body change strategies, which include strategies to alter muscles and the use of food supplements, as well as weight loss among males, on depressive symptomatology has received little attention. In fact, to our knowledge, only one study has examined the impact of strategies to lose weight, increase muscle tone and use food supplements on both positive and negative affect (anxiety, sadness); (McCabe, Ricciardelli, & Banfield, 2001). Results showed that levels of depressive symptomatology in adolescent males were directly predicted by strategies to decrease weight, food supplements, and strategies to increase muscle tone. The adoption of body change strategies can also lead to overall increases in anxiety and depression levels.

There is scarcity of literature investigating the impact of body change strategies on DE. While both females and males have been shown to engage in DE, they do not necessarily share the same body change strategies. Males were shown to be more likely to engage in strategies to increase muscle tone (Grogan, 2016; Heywood & McCabe, 2006) and gain weight (McCabe & Ricciardelli, 2001) as compared to females. Shape, rather than weight, was shown to be particularly relevant for males, concurrently with the increasing media focus on the muscular ideal (Daniel & Bridges, 2010; McCabe & Ricciardelli, 2001). Preoccupations with muscularity were associated with DE

among male adolescents in France (Rodgers, Ganchoub, Frankoa, & Chabrolb, 2012). On the other hand, males with high body mass index (BMI) were shown to have the most BID, to use strategies to lose weight, (McCabe & Ricciardelli, 2001), and engage in dietary restraint and bulimia (Heywood & McCabe, 2006).

An array of sociocultural influences has also been linked to the development of DE behaviors. Peer pressure, weight-related teasing, and negative comments from family members about image and body size are important factors that lead to BID and DE in female and male populations (Ata, Ludden & Lally, 2007; Vincent & McCabe, 2000; Lampard, Maclehose, Eisenberg, Neumark-Sztainer, & Davison, 2014). Another important factor is media influence (MI) in its various forms (TV, magazines and internet), which has been pivotal in predisposing individuals towards adopting DE attitudes and behaviors. Analysis of popular magazine content has documented an increase in the frequency of images showing semi-naked males over the past 30 years (Halliwell, Dittmar, & Orsborn, 2007). Furthermore, media may play a significant role in the perception of what the “ideal” male body looks like. The current body type standard for young boys and males is a V-shaped muscular structure that is characterized by a narrow waist and well-developed chest, shoulders, and arms (Harvey & Robinson, 2003). A recent study indicated a marked increase in BID when males were exposed to images of idealized male bodies with low body fat and high muscle mass (Galioto & Crowther, 2013), in turn, leading to preoccupation with weight, dieting, and DE behaviors such as restrained eating (Dye, 2016). After viewing television advertisements, males reported increased depressive symptomatology after exposure to images of muscular male models (Halliwell, Dittmar, & Orsborn, 2007).

A recent study has focused on investigating psychological variables in relation to DE and eating disorders in a sample of males and females (Sanchez-Ruiz, El-Jor, Abi Kharma, Bassil, & Zeeni, in press). However, this is the first study to investigate psychosocial predictors of DE in a sample of Middle-Eastern males, thus findings will provide prevalence data about DE behaviors in this context. Based on findings from the literature, it was hypothesized that: Depressive symptomatology will mediate the relationship between BID and DE (Hypothesis 1); Depressive symptomatology will mediate the relationship between strategies to change muscle and weight, and DE (Hypothesis 2); Depressive symptomatology will mediate the relationship between Media Influence (MI) and DE (Hypothesis 3).

## Methods

### *Participants*

Participants were recruited from a Lebanese university with campuses in different areas in the region. [The complete results of the demographic characteristics are presented in table 1.](#) The sample consisted of 260 male students aged from 17 to 33 years old ( $M = 20.24$ ;  $SD = 1.89$ ). Participants were enrolled in business (39.62%), architecture and engineering (27.69%), arts and social sciences (27.3%) and natural/health sciences (5.39%). Around half of the participants performed physical activity to be healthy (49.23%) and 32.69% to increase their muscle mass. Out of those who performed physical activity, 37.31% reported engaging in > 3 hours per week of physical activities. The mean BMI of the sample was 24.21 kg/ m<sup>2</sup> ( $SD = 4.25$ ).

### *Measures*

The instrument was administered in English, given that this is the primary language of instruction at the University. The questionnaire was comprised of various sections and scales including:

*Demographics.* The survey included questions about age, [degree program](#), self-reported estimated height and weight. In addition, two close-ended questions addressed physical activity (i.e., “How frequently do you practice physical activity?”, and “If you exercise, what is the main purpose?”).

*Body Image Dissatisfaction* was measured through the *Contour Drawing Rating Scale* (CDRS; Thompson & Gray, 1995). This scale consists of nine female and male images, the first image representing less body fat and gradually increasing in weight. Participants are asked to circle the body figure that best matches their current and their ideal body shape from 1 to 9. Then the difference “ideal – current” is calculated. The higher the absolute number the more the body dissatisfaction. A Pearson product-moment correlation for current body size revealed acceptable reliability ( $r = .78$ ,  $p < .001$ ) (Thompson & Gray, 1995). The CDRS has shown good to excellent test–retest and construct validity (Wertheim, Paxton, & Tilgner, 2004). The scale has been translated into Arabic and validated in a similar population in a neighboring Arab country ([Mansar, Jariwala., Behih, Shahzad, & Anggraini 2014](#)). In this study, female figures were removed since our study included only males.

*Eating behaviors* were measured through the *Dutch Eating Behaviour Questionnaire* (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). The DEBQ is a 33-item self-report questionnaire widely used to measure three aspects of dysfunctional eating (10 items, score ranging from 10 to 50), emotional eating (13 items, score ranging from 13 to 65), and external eating (10 items, score ranging from 10 to 50) (Van Strien et al., 1986). The responses

on this scale range from 1 (“Never”) to 5 (“Very Often”), indicating the frequency of engaging in the questioned behavior. For example, an item concerning emotional eating read, ‘Do you have the desire to eat when you are irritated?’ The DEBQ has been administered in Lebanon among a sample of 398 Lebanese female undergraduate students aged 17-25 from the Lebanese American University. The scale showed good internal reliability for restrained eating ( $\alpha = .93$ ), external eating ( $\alpha = .82$ ), and emotional eating ( $\alpha = .95$ ; Katsounari & Zeeni, 2012). Similar reliability results were obtained in the current study ( $\alpha = .94$  for restrained eating,  $\alpha = .94$  for emotional eating, and  $\alpha = .83$  for external eating).

*Media Influence* was measured through the *Sociocultural Attitudes towards Appearance Questionnaire* (SATAQ-3; Thompson, Van Den Berg, Roehrig, Guarda, & Heinberg, 2004). This tool is a 30-item scale with four theoretical subscales. Two of these subscales are based on different internalization factors. The first, with nine items, is Internalization-General, and assesses general MI related to TV, magazines, and movies ( $\alpha = .82$ ). The second, with five items, is Internalization-Athlete, and assesses the internalization of athletic and sports models ( $\alpha = .76$ ). The other two subscales are Information, with nine items, which assesses how far it is acknowledged that various media are considered important sources of information about appearance ( $\alpha = .75$ ), and Pressures, with seven items, which assesses subjective feelings of pressure from exposure to media images and messages to modify one’s appearance ( $\alpha = .82$ ). Items are rated on a 5-point rating scale ranging from 1 (‘Definitely Disagree’) to 5 (‘Definitely Agree’). Sample items included ‘I have felt pressure from TV or magazines to be thin’ (pressures subscale) and ‘I wish I looked as athletic as a sports star’ (athlete internalization subscale). The SATAQ-3 has shown excellent convergent validity with measures of body image and eating disturbance in previous studies (e.g., Calogero, Davis, & Thompson, 2004), and scores have shown adequate internal consistency (e.g., Santoncini, García, & Peresmitré, 2006).

*Depressive symptomatology* was measured through the *Center for Epidemiologic Studies Depression Scale* (CESD-R; Eaton Smith, Ybarra, Muntaner, & Tien, 2004). CES-D is a 20-item self-rating questionnaire developed by Radloff (1977) that is used widely in research and clinical settings for screening depressive symptoms. It has been used in different cultures and cross-cultural studies (e.g., Mackinnon, McCallum, Andrews, & Anderson, 1998). Although the CES-D was initially developed for epidemiological studies, it has also been used in clinical populations (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977) and primary care settings (Thomas & Brantley, 2004). The CES-D has empirically supported scales for Depressed Affect (DA), (lack of) Positive Affect

(PA), Somatic Symptoms and Retarded Activity (SS), and Interpersonal Difficulties (ID). However, the recommended (Radloff, 1977) and common practice for screening depressive symptoms has been to use the total score based on all items, rather than the scores for the different scales (Edwards, Cheavens, Heiy, & Cukrowicz, 2010). For a multidimensional scale such as the CES-D, the support for a general factor can be evaluated using a bifactor model (an orthogonal factor model, with one general depression factor on which all the CES-D items load, and specific factors for DA, PA, SS, and ID items). For CES-D ratings, the current study examined support for a bifactor model, and also the internal consistency reliability ( $\alpha = 0.92$ ) and external validity of the factors in the model.

*The Body Change Inventory (BCI, Ricciardelli & McCabe, 2002)*. This instrument consisted of three body change scales— Strategies to Decrease Body Size ( $\alpha = .89$ ), Strategies to Increase Body Size ( $\alpha = .92$ ), and Strategies to Increase Muscle Size ( $\alpha = .91$ ). It consists of 18 questions that assess body change strategies in males and females and study the “normative development of different kinds of body change strategies and how these changes may lead to behavioral problems such as disordered eating, exercise dependence, and steroid use” (Ricciardelli & McCabe, 2002, p.45). The novel aspect of this instrument is that it evaluates strategies to increase body size and increase muscle size, as well strategies to decrease body size. Each scale consisted of six items. Items are rated on a 5-point rating scale ranging from 1 (‘Never’) to 5 (‘Always’), in which participants indicated how often they had thought about, and felt like or actually engaged in the behaviors. Sample items included ‘How often do you change your eating to decrease your body size? (strategies to decrease body size subscale), ‘How often do you worry about changing your levels of exercise to increase your body size?’ (strategies to increase body size subscale) and ‘How often do you change your food supplements to increase the size of your muscles?’ (strategies to increase muscle size subscale). High scores indicated a high use of the strategies (range 6–30). The three subscales have been found to have adequate content and construct validity, and a high level of internal consistency ( $\alpha > .95$ ) (Ricciardelli & McCabe, 2002).

### ***Procedure***

After obtaining the ethical approval of the university Institutional Review Board, which is constituted in accordance with the US Code of Federal Regulation (45CFR 46.107, 21CFR 56.107), and Good Clinical Practice ICH (Section 3), a convenience sample of undergraduates was asked to participate voluntarily in the study. Confidentiality and anonymity were ensured. Data was collected during class time and testing sessions lasted around

35 minutes. Each student received a survey pack with an informed consent. The questionnaires were administered in the following order: Demographics, CDRS, SATAQ, CES-D and BCI.

### *Statistical Analysis*

To test causal models of disordered eating (emotional, external and restrained eating), path analyses were conducted using STATA 13. The analysis was specified to indicate variables that would lead to [depressive symptomatology](#) which in turn would lead to disordered eating. The ordering of variables in the model was consistent with the previously reviewed literature. Standardized  $\beta$  coefficients for the pathways were estimated using maximum likelihood estimation. One full model was estimated with all possible direct and indirect pathways to test the mediating effect in line with the abovementioned hypothesis. Three goodness-of-fit indices were used to evaluate the adequacy of the models' fit: The Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI) with  $>.90$  and  $.95$  for acceptable and excellent fit, respectively; and the Root Mean Square Error of Approximation (RMSEA); with  $<.05$  and  $<.80$  for close and reasonable fit respectively, along with its corresponding PCLOSE; best if above 0.05. The  $\chi^2$  test was not used due to its dependency on the sample size (Marsh, Hau, & Wen, 2004). [In line with the literature on structural equation modeling, the aim was to recruit a sample size greater than 200 participants; taking into account the best ratio of cases to parameters to be 20:1 \(Kline, 2011\).](#)

### **Results**

The main results from the correlational analyses are presented in Table 2. [Depressive symptomatology](#) correlated positively with restrained and emotional eating ( $r = .13, p < .05$  and  $r = .22, p < .001$ , respectively), but not with external eating. [Depressive symptomatology](#) also correlated positively with strategies to increase body weight ( $r = .36, p < .001$ ), decrease body weight ( $r = .34, p < .001$ ), increase muscle mass ( $r = .23, p < .001$ ) and all subscales of media influence; the strongest correlation was with the media pressure subscale ( $r = .40, p < .001$ ).

Restrained eating correlated positively with body image dissatisfaction scores ( $r = .35, p < .001$ ), strategies to decrease body weight ( $r = .53, p < .001$ ) and increase muscle mass ( $r = .15, p < .05$ ), but not with strategies to increase body weight. Both restrained and emotional eating correlated positively with all subscales of media influence, except the intern-athlete subscale, which was only correlated with restrained eating ( $r = .16, p < .01$ ). The strongest correlation was with media pressure ( $r = .42, p < .001$  for restrained eating and  $r = .29, p < .001$  for emotional eating). External eating correlated positively with strategies to increase muscle mass ( $r = .19, p < .01$ ).

### *Path Analysis*

Figure 1 represents the significant pathways for emotional eating through depressive symptomatology and Table 3 includes all the standardized coefficients for the pathways. Media pressure and strategies to decrease body weight had direct positive effects on depressive symptomatology ( $\beta = .85$  and  $.18$ , respectively), which in turn predicted emotional eating. Media pressure had a direct positive effect on emotional eating ( $\beta = .57$ ), whereas strategies to decrease body weight did not exhibit a direct effect on emotional eating ( $\beta = -.16$  with 95% CI  $-.47$ -. $.15$ ). Therefore, the latter pathway was removed from the model. The link between media pressure, strategies to decrease body weight and emotional eating was partially mediated by depressive symptomatology. The full model provided an acceptable fit to the data: CFI = .99, TLI = .99 and RMSEA = .01 with PCLOSE of .45.

### Discussion

To our knowledge, the present study is the first to explore the psychosocial predictors of DE in a sample of Middle-Eastern males and to explore the mediating effect of depressive symptomatology on DE. In a similar study conducted in the UAE (Schulte & Thomas, 2013), men exhibited DE pathologies. Higher scores on depressive symptomatology were correlated positively with DE behaviors among both genders; moreover, in males, depressive symptomatology was the most powerful predictor in the regression model which included BMI, age, and body dissatisfaction. In a recent study, although men reported lower disordered eating behaviors compared to women, it is noteworthy to mention that men did in fact report some levels of disordered eating (Lundahl, Wahlstrom, Christ, & Stoltenberg, 2015).

Our first aim was to investigate whether depressive symptomatology mediated the relationship between BID and DE. Our results did not support this hypothesis, as the effect of BID on DE behavior was not mediated by depressive symptomatology. The few studies that have investigated the relationship between BID and DE through depressive symptomatology in samples including males have yielded inconsistent results. Even though there is empirical support for this mediation (Brechan & Kvaalem, 2015), some studies have failed to show a mediational role of negative emotions, which are at the basis of the core depressive symptoms, in the relationship between BID and restrained eating among males (e.g., Heywood & McCabe, 2006). In a study conducted by Ricciardelli and McCabe (2001), negative emotions did not mediate the relationship between BID and symptoms of bulimia among males wishing to be bigger. In fact, negative emotions were not significantly related to bulimia symptoms. In other studies, restrained eating (Rawana, McPhie, & Hassibi, 2016) and emotional eating (Lazarevich, Camacho, del Consuelo Velázquez-Alva, & Zepeda, 2016) were significantly related to depressive symptoms among men. In the case of our



sample, [depressive symptomatology](#) correlated with DE (restrained eating and especially with emotional eating, as expected) but the effect of BID on DE (which were only related in the case of restrained eating) could not be explained by depressive symptoms. It could be the case because we have used a measure of a disparity of depressive symptoms (negative and lack of positive affect, somatic symptoms and interpersonal difficulties), which is best scored using a unidimensional approach (Fong et al., 2016). The resulting total score might have masked possible differential relationships with DE. Thus, future studies could benefit from investigating depressive symptoms separately (e.g., negative and lack of positive affect, somatic symptoms, and interpersonal difficulties), as mediators between BID and DE.

Our second aim was to investigate [whether depressive symptomatology mediated the relationship between strategies](#) to change muscle and weight, [and DE](#). Our results showed that [depressive symptomatology](#) correlated positively with strategies to increase body weight, decrease body weight, and increase muscle mass, but it only mediated the relationship between strategies to decrease body weight and emotional eating, which partially supports our second hypothesis (H2). Similar results have been obtained in previous studies (e.g., McCabe & [Ricciardelli](#), 2001). In the case of our sample, males engaging in behaviors aiming at decreasing weight were more likely to develop maladaptive eating patterns following emotional cues. Clinically, it is important to pay attention to behaviors among males that aim at becoming thinner through a change of eating patterns, food choice, and exercise. Such behaviors are indicative of worry and concern about losing weight, which can lead to negative feelings (especially if the behaviors are ineffective, or the individual has the intention but is unable to consistently apply those strategies to decrease weight), Those feelings can, in turn, result in emotional eating, which is ultimately a risk factor for eating disorders (Fairburn, Cooper, Doll, & Davies, 2005).

Our third aim was to investigate [whether depressive symptomatology mediated the relationship between MI and DE](#). Our results partially supported this hypothesis. MI pressure influenced emotional eating, not only directly, but also indirectly through [depressive symptomatology](#). It is worth noting that MI was very strongly associated with [depressive symptomatology](#), in line with previous research (Halliwell, Dittmar, & Orsborn, 2007). The image that media (e.g., magazines, television, social media, etc.), portrays of the “ideal male body” seems to have a strong psychological impact in our sample. In particular, media pressure can generate negative emotions and depressive symptoms [in particular](#), which in turn, can [predispose](#) males to eat in response to their emotional state. Those negative emotions might be the result of concerns about losing weight and/or build muscle ([Chang, Chopra, Zhang,](#)

& Woolford, 2013). While past research showed an association between media and restrained eating (Dye, 2016), our results demonstrate that media pressure has also an important role in emotional eating in males.

### **Limitations and recommendations for future studies**

The correlational nature of this study does not allow causal explanations of the relationships found. In order to approach causality, longitudinal and experimental designs could be adopted in future research. In addition, data for this study consisted of self-reports, introducing the possibility of a mono-method bias. Future studies could employ objective measures of variables such as body image, which can also be assessed through a computer manipulation method (Sands, Maschete, & Armatas, 2004).

In addition, the CDRS as a measure of body image has been criticized due to its limited ecological validity (Gardner, 2001). Especially when measuring male body figure, and as noted earlier, muscularity and boy shape are often more important than weight (Grogan, 2015). Thus future research could benefit from administering a more sensitive and realistic assessment of BID, such as video distortion (Gardner & Boice, 2004). Lastly, participants of this study were Lebanese undergraduates ranging in age from 18 to 31. Due to the specificity sample, findings cannot be extrapolated to the Lebanese youth. Forthcoming studies could use more diverse samples and also test these mediations in patients diagnosed with eating disorders such as Bulimia or Anorexia Nervosa. The key role of media could be further investigated in future work through mixed-method or experimental designs in which different types of media to test for differential influences.

### **Implications**

The present study is the first to report the prevalence of DE behavior in the Lebanese male community and its potential risk factors, especially depressive symptomology and media pressure. This information will assist in the development of prevention and intervention programs targeting the roots of DE, and ultimately eating disorders. Specifically, health practitioners could assess psychopathology indicators, and in particular depressive symptoms in males, once they detect that strategies to lose weight are being applied, as a preventive measure against distorted eating. In addition, findings from this study bring attention to the impact of media and importance of restructuring the perceptions of an “ideal” male figure that directly impacts males’ emotional functioning, which reflects in emotional eating patterns.

These findings have special relevance in the Lebanese context. The region is in need of centralized efforts to provide holistic health education and care to males at risk of developing DE habits. Psychological, medical,

interpersonal, and sociocultural features define the multifaceted nature of DE. Health professionals and educators should therefore have knowledge, confidence, and competence in DE and their risk factors. An interprofessional approach to treatment is required to accommodate this nature, whereby psychologists, public health and nursing professionals, as well as nutritionists can join efforts to prevent, detect, assess, and treat DE behaviors. Moreover, early detection through school-based screening can help adolescents get treatment at a younger age and prevent worsening of their physical and psychological status.

#### **Conflict of Interest**

Authors declare that there are no known conflicts of interest and certify responsibility for the manuscript.

Table 1.

*Demographic characteristics of study participants*

	<i>M (SD)</i>
Age	20.24 (1.90)
BMI	24.21 (4.25)
	N (%)
<u><i>Social status</i></u>	
Single	18 (6.43%)
Married	208 (74.29%)
Divorced	15 (5.36%)
Widowed	39 (13.93%)
<u><i>Frequency of PA</i></u>	
< 1 hour/ week	55 (21.15%)
1 hour/ week	28 (10.77%)
2 hours/week	49 (18.85%)
3 hours/week	31 (11.92%)
> 3 hours/ week	97 (37.31%)
<u><i>Purpose of PA</i></u>	
To be healthy	128 (49.23%)
To increase muscular weight	85 (32.69%)
To fill free time	35 (13.46%)
Peer pressure	12 (4.62%)

*Note.* Data is presented as mean ± SD for continuous variables and N (%) for categorical variables. PA= Physical activity.

Table 2.

*Descriptive Statistics and Intercorrelations among the Key Study Variables (N = 260)*

Variable	1	2	3	4
<u>Depressive symptomatology</u>	-	-	-	-
<u>Eating behaviors (DE)</u>				
Restrained Eating	.13*	-	-	-
Emotional Eating	.22***	.23***	-	-
External Eating	.02	-.001	.20***	-
<u>Body image dissatisfaction scores</u>	.06	.35***	.12	-.04
<u>Strategies to decrease body weight</u>	.34***	.53***	.11	-.07
<u>Strategies to increase body weight</u>	.36***	-.05	.07	.09
<u>Strategies to increase muscle mass</u>	.23***	.15*	.07	.19**
<u>Media influence</u>				
Intern-General	.28***	.29***	.18**	-.02
Intern-Athlete	.13*	.16**	.06	-.0009
Pressure	.40***	.42***	.29***	.04
Information	.14*	.16*	.14	.04
<i>M</i>	22.67	31.27	39.83	39.83
<i>SD</i>	15.29	9.36	13.17	8.24

Note. Only significant results were reported in the table. DE = Disordered Eating; 1 = depressive symptomatology; 2 = restrained eating; 3 = emotional eating; 4 = external eating. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Table 3.

*Standardized Coefficients for Pathways in Causal Model of Emotional Eating through Depressive Symptomatology*

Pathway- Emotional eating through Depressive symptomatology (N=260)	$\beta$
Depressive symptomatology-Emotional eating	.12*
MI pressure-Emotional eating	.57**
Strategies to decrease body weight -Emotional eating	-.16
MI pressure-Depressive symptomatology	.85*
Strategies to decrease body weight-Emotional eating	.18**

*Note.* MI = Media Influence. \*  $p < .05$ , \*\* $p < .01$ .

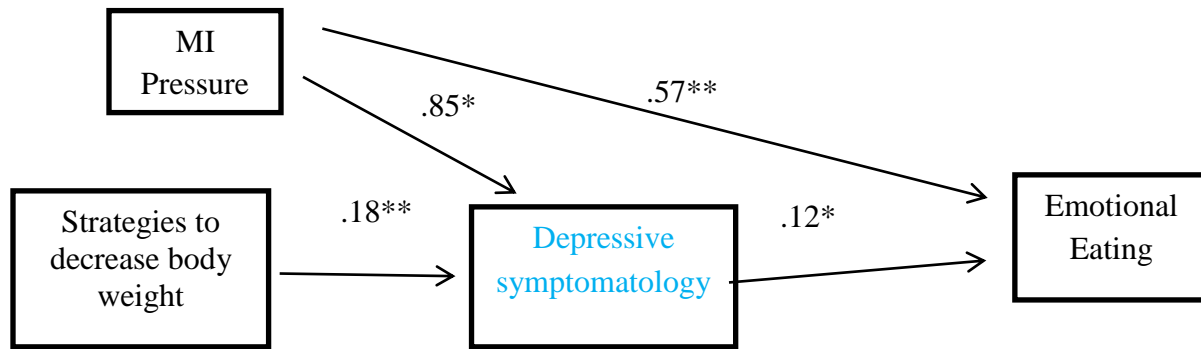


Figure 1. Structural model with standardized path coefficients of Emotional Eating via Depressive symptomatology.

\* $p < .05$ . \*\* $p < .01$ .

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