Published in final edited form as:

Int J Eat Disord. 2019 February ; 52(2): 159–165. doi:10.1002/eat.23003.

Examining physical activity and correlates in adults with healthy weight, overweight/obesity, or binge-eating disorder

Meagan M. Carr, M.S.¹, Janet A. Lydecker, Ph.D.¹, Marney A. White, Ph.D., M.S.^{1,2}, and Carlos M. Grilo, Ph.D.^{1,3}

¹Department of Psychiatry, Yale School of Medicine, New Haven, CT

²Department of Social and Behavioral Sciences, Yale School of Public Health, New Haven, CT

³Department of Psychology, Yale University, New Haven, CT

Abstract

Objective: To examine physical activity and correlates among three subgroups of adults: healthy weight without binge eating (HW), overweight/obesity without binge-eating (OW/OB), and core-features of binge-eating disorder (BED).

Method: Participants ($N=2,384$) completed an online survey with established measures of physical activity, eating psychopathology, and health. Most participants were White (82.55%) women (66.65%). Participants were categorized into three study groups: HW ($n = 948$; 40%), OW/OB ($n = 1,308$; 55%), and BED ($n = 120$; 5%).

Results: The BED group had the highest proportion of self-reported insufficiently active individuals (63.8%), followed by OW/OB (41.7%), and HW (29.2%). Associations between self-reported physical activity, eating pathology, and health were generally small in HW and OW/OB groups, while associations were moderate in the BED group. Self-reported weekly bouts of physical activity were more strongly, positively related to self-reported physical health for OW/OB than HW, and this effect was even more pronounced for BED compared with HW or OW/OB.

Discussion: This is the first study, to our knowledge, to demonstrate a stronger association between self-reported physical activity and physical health for individuals with BED compared with OW/OB alone. The high rate of physical inactivity and the strong association between physical activity and health among participants with BED suggest physical activity as an important treatment target for individuals with BED.

Keywords

Physical Activity; Binge-eating; Obesity

Introduction

Obesity, which has increased steadily among adults, represents a major public health problem (Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016). Obesity is a complex heterogeneous medical condition with multiple causes and contributory factors (Keith et al., 2006) including insufficient physical expenditure (Church et al., 2011; Church & Martin, 2018; Sallis, Floyd, Rodriguez, & Saelens, 2012). Problematic eating patterns such as binge-

2015 and January 2017. Participants included 1,583 (66.65%) women and 792 (33.35%) men. Participants reported the following characteristics: 1,968 (82.55%) White, 58 (2.43%) Black, 248 (10.40%) Asian; and 110 (4.61%) “Other”; 190 (7.97%) identified as Hispanic or Latino and 2,194 (92.03%) non-Latino. Mean age and BMI were 35.65 ($SD = 11.59$) years and 28.11 ($SD = 7.06$) kg/m^2 , respectively. The 2,384 participants were categorized into the following three study group following our classification procedures: HW ($n = 948$; 39.9%), OW/OB ($n = 1,308$; 55.1%), and BED ($n = 120$; 5.1%). Study groups differed significantly on some demographic characteristics, although the effect sizes were generally small. BMI differences were large in magnitude, which reflects the use of BMI in classification algorithms.

Measures

Body Mass Index (BMI).—Participants reported their height and weight, which were used to calculate BMI.

Questionnaire on Eating and Weight Patterns 5 (QEWP-5).—The QEWP-5 assesses frequency of binge-eating episodes (i.e., eating an unusually large amount of food while feeling a sense of loss of control) as well as the associated features of BED as defined in the DSM-5, including the presence of two or more behavioral features of loss of control (e.g., eating rapidly or eating until uncomfortably full) and the absence of purging behaviors (Yanovski, Marcus, Wadden, & Walsh, 2014).

Eating Disorder Examination-Questionnaire (EDE-Q).—The EDE-Q retrospectively measures eating-disorder psychopathology over the past 28 days (Fairburn & Beglin, 1994). The current study used a brief version of the full scale, which has three subscales (Dietary Restraint, Overvaluation, and Dissatisfaction) and a Global scale. This brief version has demonstrated superior psychometric properties in nonclinical and clinical studies compared with those from the original measure (Grilo, Henderson, Bell, & Crosby, 2013; Grilo, Reas, Hopwood, & Crosby, 2015; Machado, Grilo, & Crosby, 2018). This brief version reduces items for the existing subscale of Dietary Restraint, while the Dissatisfaction subscale includes two items assessing dissatisfaction with weight and dissatisfaction with shape, and the Overvaluation subscale includes items assessing the importance of one’s shape and one’s weight (Grilo et al., 2013). Items yielded internally consistent subscales in the current study $\alpha = .89$ – $.91$.

Godin Leisure Time Exercise Questionnaire (GLTEQ).—The GLTEQ assesses the frequency of SR-PA across intensities (mild, moderate, strenuous) during a typical week (Godin & Shepard, 1985). Participants report the number of times per week they spend more than 15 minutes engaged in each level of PA. In the current study, we used a sum of bouts of moderate and strenuous SR-PA, as defined by engaging in the activity for 15 minutes or more. We also categorized participants as sufficiently or insufficiently physically active according to the Amireault and Godin (2015) coding scheme: individuals reporting activity levels ≥ 24 metabolic equivalent units per week were considered sufficiently active. The validation study (Amireault & Godin, 2015) demonstrated convergent validity between their classification and external measures of fitness and activity: sufficiently active individuals

had significantly higher VO₂Max, lower body fat percentages, and went to the gym more frequently.

Medical Outcomes Study Short Form Health Survey–12 Item Version (SF-12).

—The SF-12 is a twelve-item short form of the SF-36 that assesses physical and mental health functioning (Ware, Sherbourne, & Davies, 1992). The SF-12 demonstrates adequate psychometric properties across diverse samples, including individuals with obesity (Wee, Davis, & Hamel, 2008).

Patient Health Questionnaire-2 (PHQ-2).—The PHQ-2 is a two-item questionnaire that assesses depressed mood over the past two weeks (Kroenke, Spitzer, & Williams, 2003). The PHQ-2 is a short form of the PHQ-9 and demonstrates similar psychometric properties (Kroenke, Spitzer, & Williams, 2001). Items demonstrated good internal consistency (Cronbach's $\alpha = .90$).

Creation of Study Groups

Classification algorithms used QEWP-5 behavior items and BMI weight categories to classify participants into study groups. Participants in the healthy-weight group (HW; $n = 948$) had a BMI $< 25 \text{ kg/m}^2$ and denied weekly binge-eating episodes. Participants in the overweight/obesity group (OW/OB; $n = 1308$) had a BMI $> 25 \text{ kg/m}^2$ and denied weekly binge-eating episodes. Participants in the group demonstrating core features of binge-eating disorder (BED; $n = 120$) reported weekly binge-eating episodes, associated distress with binge eating episodes, and denied weekly purging behaviors.

Statistical Analyses

For mean group difference testing, Welch's F was used (due to violations of the homogeneity of variance assumption); ω^2 were used as a measures of effects size, which can be interpreted proportion of the total variance in the dependent variable that is accounted for by the levels of the independent variable; and Games-Howell post-hoc tests were used for multigroup comparisons. χ^2 tests were used to compare groups on categorical variables, with “number needed to treat (NNT)” used as the measure of effect size. NNT describes, based on proportions, the number of individuals who would need to be assessed before the specified outcome is observed when comparing two groups. NNT is calculated by calculating the difference in proportion by group, taking the reciprocal, and then rounding up to the next highest integer. An NNT value equal to 1 indicates a perfect effect, larger NNT values over 1 indicate smaller effects (Citrome, 2008). Log transformation corrected for positive skew to improve normality. Non-parametric correlations were used to explore the linear relationship between depressive symptoms, eating-disorder psychopathology, health-related quality of life, SR-PA, and study group. To compare the magnitude of the correlations among groups, Kendall's τ correlations were first converted to Pearson's r based on the methods described by Walker (2003), and then compared using Fisher's r -to- z transformation. Parallel analyses restricted to women were run on key findings to explore whether the pattern of significant findings remained the same.

Results

Table 1 summarizes the demography and SR-PA of participants. Almost 40% of the overall sample was insufficiently active. The BED group had the greatest proportion of individuals who were insufficiently active ($n = 74$; 63.8%), followed by the OW/OB group ($n = 529$; 41.7%), and the HW group ($n = 265$; 29.2%). When comparing OW/OB group with the HW group, an additional 8 cases would need to be assessed in order for one additional sufficiently active case to be identified. The comparison of BED and HW groups indicated that an additional 3 cases would need to be assessed in order to identify one additional sufficiently active case. BED compared with OW/OB would need an additional 5 cases to be assessed to identify one additional sufficiently active case. Study groups also significantly differed in the self-reported number of bouts of moderate to strenuous PA ($p < .001$). Games-Howell post-hoc analyses showed that the HW group reported significantly more SR-PA than OW/OB and BED groups and the OW/OB group reported significantly more SR-PA as compared with the BED group (all $ps < .05$). A parallel series of analyses restricted to women only revealed the same pattern of significant and non-significant findings.

In the overall sample, self-reported number of bouts of moderate/strenuous PA was significantly related to self-reported physical health, mental health, dietary restraint, body dissatisfaction, and depressive symptoms (all $ps < .001$). Table 2 includes a summary of these findings, including 1) Pearson's r (transformed from r_T) for self-reported bouts of PA and biopsychosocial variables in the total sample, 2) Pearson's r (transformed from r_T) for self-reported bouts of PA and biopsychosocial variables for each specific study group, 3) the z -score for the difference in correlations between study groups, and 4) an explanation of which study groups differed significantly based on the z -score and the direction of the effect. In the HW group, self-reported bouts of moderate to strenuous PA were significantly related to self-reported physical health, mental health, dietary restraint, and was inversely related to overvaluation of shape and weight and depressive symptoms (all $ps < .001$). In the OW/OB group, self-reported bouts of PA were significantly and positively related to self-reported physical health, mental health, and dietary restraint, and were significantly and inversely correlated with body dissatisfaction and depressive symptoms (all $ps < .001$). In the BED group, self-reported bouts of PA were significantly positively related to self-reported physical health ($p < .001$), mental health and dietary restraint ($ps < .05$), and inversely associated with depressive symptoms ($p < .05$). Correlations in HW and OW/OB groups were generally small. Correlations within the BED study group were generally moderate. Self-reported bouts of PA were significantly more strongly, positively related to self-reported physical health for the OW/OB group than the HW group ($p = .006$), and the strength of the effect was even more pronounced for the BED group as compared with either the HW ($p < .001$) or OW/OB ($p = .006$) groups. Overvaluation was weakly yet positively associated with self-reported bouts of PA among the HW group ($p < .05$), and not significantly associated with bouts of PA in the OW/OB or BED group ($ps > .05$). The difference in magnitude of the correlation related to overvaluation across all group comparisons was significant ($p < .05$). Body dissatisfaction was significantly more strongly, negatively related to SR-PA bouts in

the OW/OB group than the HW group ($p = .003$). No other significant differences were observed.

Discussion

The current study examined SR-PA and associated correlates in an online community sample. Participants generally had a high level of *inactivity*, and the highest rates of inactivity occurred among individuals with core features of BED. Consistent with prior research, SR-PA was significantly associated with several important biopsychosocial variables, including self-reported physical health, eating-disorder psychopathology, and depressive symptoms. Our study adds to the existing literature by comparing associations of SR-PA and biopsychosocial variables among individuals with BED, individuals with excess weight and no eating disorder, and individuals with healthy weight and no eating disorder.

Approximately 40% of the sample was classified as insufficiently active, and SR-PA differed based on weight status and BED, with about 31% of HW, 42% of OW/OB, and 65% of BED participants reporting insufficient levels of PA. Significantly lower SR-PA in the BED than OW/OB study group aligns with other research in community samples showing that people with BED are particularly at risk for high levels of physical inactivity (Crandall et al., 2012). These differences are also observed when considering self-reported total bouts of moderate to strenuous PA. More research is needed to understand possible contributing factors to the high rates of inactivity, particularly among individuals with BED; some research supports internalization of obesity stereotypes (Pearl, Puhl, & Dovidio, 2015), negative body image (Anton, Perri, & Riley, 2000; Hrabosky, White, Masheb, & Grilo, 2007), and perceived physical competence (Vancampfort, De Herdt, et al., 2014).

Participants' reports of higher PA were related to reports of greater physical and mental health, lower body dissatisfaction and depressive symptoms, and greater restraint, although correlations generally had small magnitudes in the total sample and HW sample. Across study groups, the strongest association was demonstrated for SR-PA and higher levels of self-reported physical health. The cross-sectional nature of this study precludes any statements about directionality or causality; we note it is possible, for example, that individuals who feel physically healthy are more likely to be physically active and those who are physically active are more likely to experience the benefits of improved physical health (Schuch et al., 2017).

In the OW/OB group, the association between self-reported physical health and self-reported bouts of PA was significantly stronger than the association observed in the HW group. Growing evidence supports the role of PA in predicting morbidity and mortality over and above weight status (Fogelholm, 2010; Haskell, 2007), which supports the importance of interventions that incorporate a focus on increasing PA rather than interventions that focus on weight reduction alone. With respect to eating-disorder psychopathology, a pattern emerged where the association between self-reported bouts of PA and overvaluation of weight/shape had significantly greater, positive magnitude among individuals with HW as compared with the OW/OB group. In contrast, the association between SR-PA and body dissatisfaction had significantly greater, negative magnitude among individuals with

overweight or obesity. PA as an effective strategy for reducing body image disturbances has been established prospectively (Campbell & Hausenblas, 2009; Teixeira et al., 2006), and the current work further supports the association.

For the BED group, the association between SR-PA and self-reported physical functioning was significantly more positive than the association within both the HW and OW/OB groups. This is the first study, to our knowledge, to demonstrate a stronger association between SR-PA and physical functioning for individuals with BED as compared with OW/OB alone. No other significant differences in the correlates of SR-PA were observed for the BED group. Examination of the correlation coefficients reveals moderate effect sizes for the relationship between self-reported bouts of PA and higher levels of mental health and lower rates of depressive symptoms. The combined findings related to high rates of physical inactivity among the BED group and the strong association between SR-PA and self-reported physical health among participants with BED suggest PA as an important treatment target for individuals with BED.

Study findings should be considered within the context of several limitations. First, individuals with overweight or obesity were older than the HW group, which could have contributed to some of the observed differences, although the effect size for the difference in age was small. Second, while racial and gender diversity was observed in the current sample, the sample was predominantly White, which may limit generalizations to other racial/ethnic groups. Additionally, the BED group was formed according to self-reported binge-eating episodes (at-least weekly) and associated distress. Such a classification is less rigorous and specific than clinical diagnosis according to the full features of BED using semi-structured interview procedures. Finally, SR-PA has known limitations (Steene-Johannessen et al., 2015; Warren et al., 2010), with large-scale epidemiologic data suggesting poor concordance for self-reported and objective measurements of PA. However, data consistently demonstrate that general populations *overestimate* levels of PA, and as such, these results may be considered a minimum estimate for the level of inactivity in this sample. Further, the dichotomization of participants into sufficiently or insufficiently active groups with established construct validity (Amireault & Godin, 2015) increases confidence in findings. Nonetheless, future research should include objective measures of PA. The only available study utilizing objective measurements of PA with a small sample of BED patients provided conflicting evidence with higher levels of activity observed (Mathisen et al., 2018). Prospective and experimental studies are needed to expand on these cross-sectional findings.

Overall, these data reveal a high rate of inactivity and highlight the need to increase PA generally. The results also suggest important differences in both the amount and correlates of SR-PA when comparing HW, OW/OB, and BED study groups. Future research should consider how other sociodemographic characteristics, such as gender, may further moderate the relationship between weight, binge-eating status, and correlates of PA. The known sequelae of overweight, obesity, and BED, and the evidence supporting the positive role PA might play for individuals with these conditions, further stresses the importance of creating and testing interventions aimed at increasing PA for these groups. More research is needed to understand how to influence barriers to PA, how to create sustainable change in the rates

of PA, as well as how these changes might influence the experience and trajectory of conditions such as obesity and BED.

References

- Amireault S, & Godin G (2015). The godin-shephard leisure-time physical activity questionnaire: validity evidence supporting its use for classifying healthy adults into active and insufficiently active categories. *Perceptual and Motor Skills*, 120(2), 604–622. 10.2466/03.27.PMS.120v19x7 [PubMed: 25799030]
- Anton SD, Perri MG, & Riley JR (2000). Discrepancy between actual and ideal body images: impact on eating and exercise behaviors. *Eating Behaviors*, 1(2), 153–160. 10.1016/S1471-0153(00)00015-5 [PubMed: 15001058]
- Barber JA, Ivezaj V, & Barnes RD (2018). Comparing physical activity in individuals with overweight/obesity with and without binge eating disorder. *Obesity Science & Practice*, 4(2), 134–140. 10.1002/osp4.154 [PubMed: 29670751]
- Behrend TS, Sharek DJ, Meade AW, & Wiebe EN (2011). The viability of crowdsourcing for survey research. *Behavior Research Methods*, 43, 800–813. 10.3758/s13428-011-0081-0 [PubMed: 21437749]
- Campbell A, & Hausenblas HA (2009). Effects of exercise interventions on body image: a meta-analysis. *Journal of Health Psychology*, 14(6), 780–793. 10.1177/1359105309338977 [PubMed: 19687115]
- Church TS, & Martin CK (2018). The Obesity epidemic: A consequence of reduced energy expenditure and the uncoupling of energy intake? *Obesity*, 26(1), 14–16. 10.1002/oby.22072 [PubMed: 29265774]
- Church TS, Thomas DM, Tudor-Locke C, Katzmarzyk PT, Earnest CP, Rodarte RQ, ... Bouchard C (2011). Trends over 5 decades in U.S. occupation-related physical activity and their associations with obesity. *PLoS ONE*, 6(5), 1–8. 10.1371/journal.pone.0019657
- Citrome L (2008). Compelling or irrelevant? Using number needed to treat can help decide. *Acta Psychiatrica Scandinavica*, 117(6), 412–419. [PubMed: 18479317]
- Crandall KJ, A. Eisenman P, Ransdell L, & Reel J (2012). Exploring binge eating and physical activity among community-dwelling women. *International Journal of Psychology and Behavioral Sciences*, 1(1), 1–8. 10.5923/j.ijpbs.20110101.01
- Fairburn CG, & Beglin SJ (1994). Assessment of eating disorders: interview or self-report questionnaire? *International Journal of Eating Disorders*, 16(4), 363–370. 10.1002/1098-108X(199412) [PubMed: 7866415]
- Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, & Ogden CL (2016). Trends in obesity among adults in the United States, 2005 to 2014. *JAMA*, 315(21), 2284–2291. 10.1001/jama.2016.6458 [PubMed: 27272580]
- Fogelholm M (2010). Physical activity, fitness and fatness: Relations to mortality, morbidity and disease risk factors. A systematic review. *Obesity Reviews*, 11(3), 202–221. 10.1111/j.1467-789X.2009.00653.x [PubMed: 19744231]
- Godin G, & Shephard RJ (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*, 10(3), 141–146.
- Goodpaster BH, DeLany JP, Otto AD, Kuller L, Vockley J, South-Paul JE, ... Jakicic JM (2010). Effects of diet and physical activity interventions on weight loss and cardiometabolic risk factors in severely obese adults. *JAMA*, 304(16), 1795–1802. 10.1001/jama.2010.1505 [PubMed: 20935337]
- Grilo CM, Henderson KE, Bell RL, & Crosby RD (2013). Eating disorder examination-questionnaire factor structure and construct validity in bariatric surgery candidates. *Obesity Surgery*, 23(5), 657–662. 10.1007/s11695-012-0840-8 [PubMed: 23229951]
- Grilo CM, Reas DL, Hopwood CJ, & Crosby RD (2015). Factor structure and construct validity of the eating disorder examination-questionnaire in college students: Further support for a modified brief version. *International Journal of Eating Disorders*, 48(3), 284–289. 10.1002/eat.22358 [PubMed: 25346071]

- Hrabosky JI, White MA, Masheb RM, & Grilo CM (2007). Physical activity and its correlates in treatment-seeking obese patients with binge eating disorder. *International Journal of Eating Disorders*, 40(1), 72–76. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18095307> [PubMed: 16958117]
- Ivezaj V, Kalebjian R, Grilo CM, & Barnes RD (2014). Comparing weight gain in the year prior to treatment for overweight and obese patients with and without binge eating disorder in primary care. *Journal of Psychosomatic Research*, 77(2), 151–154. 10.1016/j.jpsychores.2014.05.006 [PubMed: 25077857]
- Keith SW, Redden DT, Katzmarzyk PT, Boggiano MM, Hanlon EC, Benca RM, ... Allison DB (2006). Putative contributors to the secular increase in obesity: Exploring the roads less traveled. *International Journal of Obesity*, 30(11), 1585–1594. 10.1038/sj.ijo.0803326 [PubMed: 16801930]
- Kessler RC, Berglund PA, Chiu WT, Deitz AC, Hudson JI, Shahly V, ... Xavier M (2013). The prevalence and correlates of binge eating disorder in the World Health Organization world mental health surveys. *Biological Psychiatry*, 73(9), 904–914. 10.1016/j.biopsych.2012.11.020 [PubMed: 23290497]
- Kroenke K, Spitzer RL, & Williams JBW (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. 10.1046/j.1525-1497.2001.016009606.x [PubMed: 11556941]
- Kroenke K, Spitzer RL, & Williams JBW (2003). The patient health questionnaire-2: validity of a two-item depression screener. *Medical Care*, 41(11), 1284–1292. 10.1097/01.MLR.0000093487.78664.3C [PubMed: 14583691]
- Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA, ... & Bauman A (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116(9), 1081–1093. [PubMed: 17671237]
- Leitzmann MF, Park Y, Blair A, Ballard-Barbash R, Mouw T, Hollenbeck AR, & Schatzkin A (2007). Physical activity recommendations and decreased risk of mortality. *Arch Intern Med*, 167(22), 2453–60. 10.1001/archinte.167.22.2453 [PubMed: 18071167]
- Machado PPP, Grilo CM, & Crosby RD (2018). Replication of a modified factor structure for the eating disorder examination-questionnaire: extension to clinical eating disorder and non-clinical samples in Portugal. *European Eating Disorders Review*, 26(1), 75–80. 10.1002/erv.2569 [PubMed: 29152813]
- Mathisen TF, Rosenvinge JH, Friborg O, Pettersen G, Stensrud T, Hansen BH, ... Sundgot-Borgen J (2018). Body composition and physical fitness in women with bulimia nervosa or binge-eating disorder. *International Journal of Eating Disorders*, 51(4), 331–342. 10.1002/eat.22841 [PubMed: 29473191]
- Pearl RL, Puhl RM, & Dovidio JF (2015). Differential effects of weight bias experiences and internalization on exercise among women with overweight and obesity. *Journal of Health Psychology*, 20(12), 1626–1632. 10.1177/1359105313520338 [PubMed: 24505060]
- Sallis JF, Buono MJ, Roby JJ, Micalo FG, & Nelson JA (1993). Seven-day recall and other physical activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise*, 25(1), 99–108. 10.1249/00005768-199301000-00014 [PubMed: 8423762]
- Sallis JF, Floyd MF, Rodriguez DA, & Saelens BE (2012). Role of built environments in physical activity, obesity, and cardiovascular disease. *Circulation*, 125(5), 729–737. 10.1161/CIRCULATIONAHA.110.969022 [PubMed: 22311885]
- Schuch F, Vancampfort D, Firth J, Rosenbaum S, Ward P, Reichert T, ... Stubbs B (2017). Physical activity and sedentary behavior in people with major depressive disorder: a systematic review and meta-analysis. *Journal of Affective Disorders*, 210(August 2016), 139–150. 10.1016/j.jad.2016.10.050 [PubMed: 28033521]
- Steene-Johannessen J, Anderssen SA, van der Ploeg HP, Hendriksen IJM, Donnelly AE, Brage S, & Ekelund U (2015). Are Self-report Measures Able to Define Individuals as Physically Active or Inactive? *Medicine and Science in Sports and Exercise*, 48(2), 235–244. 10.1249/MSS.0000000000000760
- Teixeira PJ, Going SB, Houtkooper LB, Cussler EC, Metcalfe LL, Blew RM, ... Lohman TG (2006). Exercise motivation, eating, and body image variables as predictors of weight control. *Medicine*

- and Science in Sports and Exercise, 38(1), 179–188. 10.1249/01.mss.0000180906.10445.8d [PubMed: 16394972]
- Udo T, & Grilo CM (2018). Prevalence and Correlates of DSM-5–Defined Eating Disorders in a Nationally Representative Sample of U.S. Adults. *Biological Psychiatry*, 84(5), 345–354. 10.1016/j.biopsych.2018.03.014 [PubMed: 29859631]
- Vancampfort D, De Herdt A, Vanderlinden J, Lannoo M, Adriaens A, De Hert M, ... Probst M. (2015). The functional exercise capacity and its correlates in obese treatment-seeking people with binge eating disorder: An exploratory study. *Disability and Rehabilitation*, 37(9), 777–782. 10.3109/09638288.2014.942000 [PubMed: 25030711]
- Vancampfort D, De Herdt A, Vanderlinden J, Lannoo M, Soundy A, Pieters G, ... Probst. (2014). Health related quality of life, physical fitness and physical activity participation in treatment-seeking obese persons with and without binge eating disorder. *Psychiatry Research*, 216(1), 97–102. 10.1016/j.psychres.2014.01.015 [PubMed: 24530157]
- Vancampfort D, Vanderlinden J, Stubbs B, Soundy A, Pieters G, Hert M. De & Probst M. (2014). Physical activity correlates in persons with binge eating disorder: A systematic review. *European Eating Disorders Review*, 22(1), 1–8. 10.1002/erv.2255 [PubMed: 24014460]
- Walker D. a. (2003). JMASM9: converting Kendall's tau For correlational Or meta-analytic analyses. *Journal of Modern Applied Statistical Methods*, 2(2), 525–530. 10.22237/jmasm/1067646360
- Ware J, Sherbourne C, & Davies A (1992). Developing and testing the MOS 20-item short-form health survey In Stewart AL & Ware JE (Eds.), *Measuring Functioning and Well-Being: The Medical Outcomes Study Approach* (pp. 277–290). Durham: Duke University Press Retrieved from http://www.rand.org/pubs/external_publications/EP19920058
- Warren JM, Ekelund U, Besson H, Mezzani A, Geladas N, & Vanhees L (2010). Assessment of physical activity – a review of methodologies with reference to epidemiological research: a report of the exercise physiology section of the European Association of Cardiovascular Prevention and Rehabilitation. *European Journal of Cardiovascular Prevention & Rehabilitation*, 17(2), 127–139. 10.1097/HJR.0b013e32832ed875 [PubMed: 20215971]
- Wee CC, Davis RB, & Hamel MB (2008). Comparing the SF-12 and SF-36 health status questionnaires in patients with and without obesity. *Health and Quality of Life Outcomes*, 6, 1–7. 10.1186/1477-7525-6-11 [PubMed: 18179687]
- Yanovski SZ, Marcus MD, Wadden T. a., & Walsh BT (2014). The Questionnaire on Eating and Weight Patterns-5: An updated screening instrument for binge eating disorder. *International Journal of Eating Disorders*, 48(3), 259–261. 10.1002/eat.22372 [PubMed: 25545458]

Table 1.**Group Differences in Demographic and Physical Activity Variables**

Variable	HW (<i>n</i> = 948)	OW/OB (<i>n</i> = 1308)	BED (<i>n</i> = 120)	Statistic	Effect Size	Post Hoc
Demographic Characteristics						
Women <i>n</i> (%)	645 (68.18)	844 (64.87)	89 (74.17)	$\chi^2(2, 2367) = 5.90$, $p = .052$	NNT _{OW - HW} = -30 NNT _{BED - HW} = 17 NNT _{OW - BED} = 11	—
BMI, <i>M</i> (SD)	22.21 (1.71)	31.91(6.34)	33.25(8.06)	Welch's <i>F</i> (2, 297.63) = 1483.47, $p < .001$	$\omega^2 = .466$	HW < OW/OB, BED [†]
Age, <i>M</i> (SD)	33.89 (11.23)	37.01 (11.81)	34.81 (10.27)	Welch's <i>F</i> (2, 337.03) = 20.74, $p < .001$	$\omega^2 = .016$	HW < OW/OB [†]
White, <i>n</i> (%)	751 (79.22)	1107 (84.63)	105 (87.50)	$\chi^2(2, 2376) = 13.32$ $p = .001$	NNT _{OW - HW} = 18 NNT _{BED - HW} = 12 NNT _{OW - BED} = 35	HW < OW/OB, BED
HS Edu, <i>n</i> (%)	112 (11.81)	224 (17.13)	14 (11.67)	$\chi^2(2, 2376) = 13.29$, $p = .001$	NNT _{OW - HW} = -19 NNT _{BED - HW} = 677 NNT _{OW - BED} = 18	HW < OW/OB
Physical Activity						
Insufficiently Active, <i>n</i> (%)	265 (29.25)	529 (41.72)	74 (63.79)	$\chi^2(2, N = 2290) =$ 69.71, $p < .001$	NNT _{OW - HW} = 8 NNT _{BED - HW} = 3 NNT _{OW - BED} = 5	HW < OW/OB < BED
SR-PA [‡] <i>M</i> (SD)	4.67 (3.72)	3.67 (3.41)	2.10 (2.63)	Welch's <i>F</i> (2, 312.06) = 35.10, $p < .001$	$\omega^2 = .030$	HW < OW/OB < BED [†]

Note. HW: healthy weight; OB: individuals with overweight or obesity and without BED; BED: individuals with core features of binge-eating disorder; HS: High school SR-PA is a self-report measure of bouts of moderate/strenuous PA, lasting 15 minutes or longer per week.

[†]Significant group differences using Games-Howell post-hoc tests at $p < .05$ level are noted.

[‡]mean difference testing used the natural log of bouts of SR-PA per week; mean and standard deviation reported in original units for ease of interpretation.

Table 2.
Correlations between Self-reported Physical Activity and Biopsychosocial Variables Among Groups

	Total M (SD)	Total [†]	HW [†] (n = 948)	OW/OB [†] (n = 1308)	BED [†] (n = 120)	Z-Score for Difference [‡]	Sig. Group Differences
Physical Health (SF-12)	49.92 (9.20)	0.27***	0.16***	0.27***	0.50***	Z = -2.77, p = .006; Z = -3.94, p < .001; Z = -2.77, p = .006;	HW < OW/OB; HW < BED; OW/OB < BED
Mental Health (SF-12)	44.56 (12.27)	0.20***	0.17***	0.16***	0.23*	—	no significant differences
Restraint (EDE-Q)	2.53 (2.10)	0.17***	0.22***	0.20***	0.22*	—	no significant differences
Overvaluation (EDE-Q)	3.06 (1.91)	-0.03	0.12***	-0.03	-0.11	Z = 2.29, p = .022; Z = 3.50, p < .001	HW > OW/OB HW > BED
Dissatisfaction (EDE-Q)	3.25 (1.94)	-0.19***	-0.05	-0.18***	-0.10	Z = 2.94, p = .003	HW < OW/OB
Depression (PHQ-2)	1.68 (1.78)	-0.21***	-0.18***	-0.17***	-0.23*	—	no significant differences

Note. Correlations and magnitude differences were calculated using r based on the transformation from Kendall's tau.

SR-PA is a self-report measure by bouts of moderate/strenuous PA, lasting 15 minutes or longer per week.. HW: healthy weight; OB: individuals with overweight or obesity and without BED; BED: individuals with core features of binge-eating disorder; SF-12: Short Form Health Survey; EDE-Q: Eating Disorder Examination Questionnaire. PHQ-2: Patient Health Questionnaire-Short Depression Screener.

[†] Significance flags indicate whether the correlation is significantly different than 0.

[‡] Correlations were compared using Fisher's r -to- z test.

* p .05

*** p < .001