

2015

## Top 10 research questions to promote physical activity research in people with binge eating disorder

Davy Vancampfort

Simon Rosenbaum

Michel Probst

Joanne Connaughton

*University of Notre Dame Australia, joanne.connaughton@nd.edu.au*

Christy du Plessis

*See next page for additional authors*

Follow this and additional works at: [https://researchonline.nd.edu.au/physiotherapy\\_article](https://researchonline.nd.edu.au/physiotherapy_article)



Part of the [Physical Therapy Commons](#), and the [Physiotherapy Commons](#)

This article was originally published as:

Vancampfort, D., Rosenbaum, S., Probst, M., Connaughton, J., du Plessis, C., Yamamoto, T., Diedens, J., & Stubbs, B. (2015). Top 10 research questions to promote physical activity research in people with binge eating disorder. *Eating Disorders, Early View (Online First)*.

Original article available here:

<http://www.tandfonline.com/doi/full/10.1080/10640266.2015.1123988>

This article is posted on ResearchOnline@ND at [https://researchonline.nd.edu.au/physiotherapy\\_article/81](https://researchonline.nd.edu.au/physiotherapy_article/81). For more information, please contact [researchonline@nd.edu.au](mailto:researchonline@nd.edu.au).



---

**Authors**

Davy Vancampfort, Simon Rosenbaum, Michel Probst, Joanne Connaughton, Christy du Plessis, Taisei Yamamoto, Jolien Diedens, and Brendon Stubbs

**This is an Accepted Manuscript of an article published in *Eating Disorders* on 22 December 2015, available online:**

**<http://www.tandfonline.com/doi/10.1080/10640266.2015.1123988>**

Vancampfort, Davy; Rosenbaum, Simon; Probst, Michel; Connaughton, Joanne; Du Plessis, Christy; Yamamoto, Taisei; Diedens, Jolien; and Stubbs, Brendon. (2015) Top 10 research questions to promote physical activity research in people with binge eating disorder. *Eating Disorders*, Early View (Online First). doi: 10.1080/10640266.2015.1123988

Number of words abstract: 224

Number of words text: 3,325

## **Top 10 Research Questions to Promote Physical Activity Research in People with Binge Eating Disorder**

Davy Vancampfort<sup>a,b</sup>, PhD, Simon Rosenbaum<sup>c</sup>, PhD, Michel Probst<sup>b</sup>, PhD, Joanne Connaughton<sup>d</sup>, PhD, Christy du Plessis<sup>e</sup>, Bsc., Taisei Yamamoto<sup>f</sup>, PhD, Jolien Diedens<sup>b</sup>, Msc, Brendon Stubbs<sup>g,h</sup>, PhD

<sup>a</sup>UPC KU Leuven, campus Kortenberg, University of Leuven, Department of Neurosciences, Kortenberg, Belgium

<sup>b</sup>University of Leuven, Department of Rehabilitation Sciences, Leuven, Belgium

<sup>c</sup>School of Psychiatry, University of New South Wales, Sydney, Australia

<sup>d</sup>University of Notre Dame, School of Physiotherapy, Fremantle, Australia

<sup>e</sup>Free State University, Bloemfontein, South-Africa

<sup>f</sup>Kobe Gakuin University, Department of Medical Rehabilitation, Kobe, Japan

<sup>g</sup>Physiotherapy Department, South London and Maudsley NHS Foundation Trust, London, United Kingdom

<sup>h</sup>Health Service and Population Research Department, Institute of Psychiatry, King's College London, London, United Kingdom

\*Corresponding author: Davy Vancampfort. UPC KU Leuven, campus Kortenberg, KU Leuven – University of Leuven, Department of Neurosciences, Leuvensesteenweg 517, 3070 Kortenberg, Belgium; Tel.: +32 2 758 05 11; Fax: +32 2 759 9879. E-mail address: [davy.vancampfort@uc-kortenberg.be](mailto:davy.vancampfort@uc-kortenberg.be)

## **Abstract**

Despite emerging evidence illustrating the benefits of physical activity for people with binge eating disorder, engaging this population in physical activity is challenging. The International Organization of Physical Therapists in Mental Health (IOPTMH) set out to summarize, appraise and strengthen the direction of physical activity endeavors. This process led to the identification of 10 important research questions which are discussed. Addressing these 10 research questions is critical for developing evidence-based approaches for promoting and sustaining an active lifestyle in people with binge eating disorder.

Keywords: Physical Activity; Exercise

## **Introduction**

Binge eating disorder (BED) is associated with psychiatric co-morbidity and significant medical and psychosocial impairments (Javaras et al., 2008). For example, almost 70% of BED patients have at least one additional lifetime psychiatric disorder (Javaras et al., 2008). The most common disorders include mood disorder, anxiety disorders and substance-abuse (Becker & Grilo, 2015). Physical health problems are also common and are strongly associated with obesity and physical inactivity (Vancampfort et al., 2014a, 2014b).

Due to severe co-morbid psychiatric and physical conditions the multidisciplinary treatment of BED is a clinical challenge (Yager, 2008). The treatment for people with BED is mainly focused on improving key parameters such as weight and body shape concerns, body dissatisfaction, health related quality of life, obesity and physical inactivity (Vanderlinden, Buis, Pieters, & Probst, 2007). Specialized psychotherapies, in particular cognitive behavioral therapy (CBT) and interpersonal therapy are effective for reducing binge eating but not all BED patients respond adequately (Vocks et al., 2010) and the evidence base regarding the efficacy of medications for BED is limited (Reas & Grilo, 2014). Despite the fact that the benefits of physical activity are substantial and the literature is unequivocal on its beneficial effect to prevent cardiovascular disease in the general population (Naci & Ioannidis, 2013), research that considers its importance in people with binge eating disorder has only slowly started to emerge in the last 2 decades (Vancampfort et al., 2012). Very few people with binge eating disorder meet recommended physical activity guidelines and are significantly more sedentary (Levine, Marcus, & Moulton, 1996). The level of physical activity reported by obese individuals who binge is approximately half of that of an age and weight matched community sample (Levine, Marcus, & Moulton, 1996). A reason for the sedentary nature of people with binge eating disorder might be that they experience a range of unique challenges in adopting and maintaining an active lifestyle and guidance is needed to help direct future

research and clinicians facilitating physical activity programs in clinical practice (Vancampfort et al., 2015). Given this, the International Organization of Physical Therapists in Mental Health (IOPTMH) (Probst, 2012) set out to summarize, appraise and strengthen the direction of physical activity endeavors in this population. We have undertaken a consultation of the national organizations of the IOPTMH member countries to identify 10 pertinent questions to place the future of physical activity research endeavors on a strong footing tomorrow whilst providing answers to the most pressing issues for clinicians today.

## **Methods**

All the member countries (n=13) of the International Organization of Physical Therapy in Mental Health, an official subgroup of the World Confederation of Physical Therapy were requested to provide a list of the 5 most prominent physical activity research questions. This way we were able to collect 65 research questions. In a second stage 4 different researchers from 4 different continents (MP, CP, JC, TY) selected the 15 most reported research questions. In a third stage, three researchers (DV, SR, BS), all with extensive experience and publication history in the areas of physical activity, exercise and rehabilitation, reviewed and discussed these questions until a consensus was reached on the top 10 questions. The three authors primarily ranked questions on how they addressed a clinically relevant issue and / or addressed a gap within the scientific literature. Therefore, we were able to generate questions that will be considered most pressing by most researchers and clinicians. Interestingly, many of our top 10 questions run parallel with those developed for other chronic conditions as cancer (Courneya, Rogers, Campbell, Vallance, & Friedenreich, 2015) and multiple sclerosis (Motl, Learmonth, Pilutti, Gappmaier, & Coote, 2015). In our pursuit to answer the top 10 questions, we relied upon the most recent evidence and where possible drew conclusions based upon systematic reviews and randomized controlled trials.

## **Results**

The top 10 questions are listed in Table 1. The ranking does not reflect the relative importance of the questions. In accordance with similar research in multiple sclerosis (Motl et al., 2015), we have organized the questions by topics such that the first 2 reflect consequences of physical activity prescription, the next 6 reflect processes for promoting physical activity, and the last 2 reflect other issues of sedentary behavior and measurement of physical activity. In the discussion, we provide a brief background and rationale for the top 10 questions and answer it with appropriate literature.

[Insert Table 1 about here]

## **Discussion**

### *1. What are the Benefits of Physical Activity for People with Binge Eating Disorder?*

A recent review of the benefits of physical activity interventions in persons with BED demonstrated that, although still limited, there is evidence that aerobic and yoga exercises might reduce the number of binges and the body mass index (BMI) of BED patients (Vancampfort et al., 2013). Furthermore, aerobic exercise might reduce depressive symptoms. Combining aerobic exercise with cognitive behavioral therapy is more effective in reducing depressive symptoms than cognitive behavioral therapy alone (Pendleton et al., 2002). If future longitudinal research confirms the available evidence on the binge eating-modifying effects of physical activity, the door will be open for lifestyle changes becoming a cornerstone in the management of binges in people with BED. Future longitudinal research should also confirm the limited evidence already available on the weight reducing and antidepressant effects of physical activity. This research will further confirm the importance of physical activity for managing the consequences of BED. There is also an important mechanistic inquiry that should be embedded in the study of physical activity as a disease-modifying behavior e.g., does physical activity have beneficial effects through psychological pathways? Future longitudinal mediating research could explore whether physical activity facilitates abstinence from binge eating through psychological pathways related to the recreational nature of the activity itself, i.e. do the antidepressant effects of physical activity result in less binges and/or does physical activity buffer the effect that anxiety sensitivity (a fear of anxiety and related sensations) has on binge eating. De Boer, Tart, Presnell, Powers, Baldwin, & Smits (2012) previously showed in a cross-sectional study that anxiety sensitivity was not related to binge eating among those who frequently engaged in moderate physical activity but was related to binge eating among those who did not report engaging in moderate physical activity. More adequately powered RCTs with long-term follow-up are needed to explore

further the efficacy on physical and mental health parameters, but also the cost-effectiveness of physical activity as a treatment intervention either alone or in combination with other treatments (such as cognitive behavioral therapy and pharmacotherapy).

## *2. What are the Most Prominent Safety Issues for Physical Activity Prescription in People with Binge Eating Disorder?*

Questions about the safety of physical activity participation are critical in any chronic disease populations including people with BED who are at risk for a wide range of somatic comorbidities. To date, no serious adverse events from participation in physical activity have been reported in the literature (Vancampfort et al., 2013). Studies have however been selective in the recruitment of participants, excluding high-risk patients with somatic comorbidities that may actually reflect the majority of binge eating disorder patients. Next to this comprehensive adverse event reporting has been limited in the published literature. The biased populations and limited information on adverse events pose a challenge to documenting the safety of physical activity for all people with BED. Longitudinal, observational studies are needed to systematically report adverse events and target higher-risk patients with BED rather than excluding these patients. Finally, the most appropriate safety screening and medical clearance approach for physical activity in clinical and community settings for people with BED remains a topic for future research.

## *3. What is the Optimal Physical Activity Prescription for People with Binge Eating Disorder?*

Although a number of physical activity programs have been demonstrated to be efficacious in people with BED (Vancampfort et al., 2013), the optimal physical activity prescription for people with BED is not fully established. To date, the majority of studies have compared a

single physical activity intervention to no physical activity at all (i.e., usual care, wait list) (Vancampfort et al., 2013). As a result, the current physical activity recommendations for people with BED provide rather general recommendations that people with BED should avoid inactivity and/or follow the general population guidelines for aerobic and strength exercise. Physical activity is, however, not a one-size-fits-all intervention (Vancampfort, Stubbs, Ward, Teasdale, Rosenbaum, 2015) and in the first instance the focus in this debate should not be on the most ideal dose-response (i.e., efficacy), but rather on how people with binge eating disorder might include physical activity in their daily lives (i.e., effectiveness).

Regardless, our current consultation shows that there is a call from clinicians worldwide to research in more detail the ideal physical activity prescription, despite recognition in this debate that a perfect prescription does not exist. To determine the ideal physical activity prescription for people with binge eating disorder, “second-generation” studies are needed that directly compare physical activity prescriptions with each other. In terms of the type of physical activity, no study to date has compared physical activity types with each other in this population. With increased interest in other types of physical activity as treatment modalities, such as yoga (McIver, O’Halloran, & McGartland, 2009) additional studies comparing for example, aerobic exercise with yoga are warranted.

The main components of a physical activity prescription are the frequency, intensity, type, and time, or the FITT-principle. Each of these components can be manipulated to determine its effects on a given binge eating disorder outcome. The intensity of physical activity is one important component that can be adapted appropriately. The safety and efficacy of high-intensity interval training compared to a standard continuous aerobic exercise prescription or a comparison of different physical activity intensities using a fixed physical activity volume (i.e., time to achieve the same energy expenditure) have not yet been reported in binge eating disorder.

Time or duration can also be manipulated in physical activity studies. Such additional studies manipulating different components of the physical activity prescription will assist in determining their effects on specific outcomes and will hopefully refine the current general physical activity recommendations for people with binge eating disorder.

#### *4. What are the Key Barriers for Engaging People with Binge Eating Disorder in Physical Activity?*

Drop-outs from physical activity programs of people with eating disorders need more attention (Schlegel, Hartmann, Fuchs, & Zeeck, 2015). Behavioral theories such as socio-ecological models are useful in attempting to understand specific barriers to physical activity participation. Socio-ecological models posit that multiple levels of impact including intrapersonal (e.g. demographic, biological, psychological, cognitive, emotional), interpersonal / cultural (e.g. social support), physical environment (e.g. distance to the facilities, low program cost, enjoyable scenery, neighborhood safety and the presence of sidewalks) and policy (e.g. laws, rules, regulations, codes) factors all influence health behavior (Sallis Cervero, Adcher, Henderson, Kraft, & Kerr, 2006). A previous systematic review of people with BED (Vancampfort et al., 2014c) demonstrated that significant correlates were found in three of these four categories (only not at policy level) supporting the hypothesis that amongst people with binge eating disorder, physical participation is a complex behavior determined by many factors. However, no consistent correlates (i.e. reported in at least four different studies) were reported. The only barrier reported in more than one study was a negative body attitude (Vancampfort et al., 2014c). Therefore, the current evidence regarding barriers is limited and mainly based on cross-sectional studies, which does not enable the elucidation of directionality. Future longitudinal and interventional study designs are needed to better understand factors influencing physical activity in this population. If the

ultimate purpose of physical activity research is to inform and motivate policy changes that will improve the mental and physical health of people with BED, merely documenting the relation of intrapersonal, interpersonal/cultural, physical environment and policy variables to physical activity behavior is insufficient. Environmental and policy change research is needed and should include assessments of broader health outcomes, such as changes in prevalence of chronic comorbidities, physical activity service utilization, as well as the economic costs and benefits of proposed policy changes.

5. *How Can we Ensure Integration of Physical Therapists Within the Multidisciplinary Mental Health Treatment Team?*

Integration of clinicians with expertise in exercise prescription (e.g. physical therapists and exercise physiologists) and training in psychopathology, as members of the multidisciplinary mental health team is an important step towards ensuring people with BED have adequate access to physical activity interventions (Stubbs et al., 2014). One way to ensure integration is through education by these experts of the existing mental health workforce. There is a clear need for the development of education modules and minimal educational standards outlining the role of physical activity in the treatment of BED to be delivered across a range of disciplines including psychiatry, psychology, mental health nursing, occupational therapy and social work. Furthermore, it is imperative that students studying physical therapy receive training in psychopathology. While this is commonplace in some countries (e.g., Belgium and Norway), it is often neglected in others (Probst, 2012).

6. *What are the Most Effective Motivational Interventions for Physical Activity Adoption and Maintenance in People with Binge Eating Disorder?*

The adoption of motivational strategies is essential to increase uptake and adherence of physical activity in people with BED. It is essential to determine the most effective interventions to assist people with BED to increase their physical activity levels. Effective technologies for changing physical activity behavior in other clinical populations are understudied in BED and warrant further research. Preliminary findings in people with mental health problems suggest that online physical activity interventions may have positive effects on symptoms of depression, but the size of the effects and mechanism of change remain unclear (Rosenbaum, Newby, Steel, Andrews, Ward, 2015). Further research is therefore needed to explore the efficacy and acceptability of online physical activity interventions for people with BED. Next to this, there is need to construct interventions targeting the underpinning psychological mediators of behavior change that may result in physical activity interventions being more effective (Vancampfort & Faulkner, 2014). Incorporating mediator analyses into future research will help confirm if any action theory links or conceptual theory links exist between theoretical frameworks and desired behavioral goals. The current evidence certainly suggests that behavior change theories used in the general population, such as the self-determination theory (Deci & Ryan, 2000) and the transtheoretical model of change (Prochaska & Di Clemente, 1983) appear to also be applicable among individuals with binge eating disorder (Vancampfort et al., 2014d). Large-scale effectiveness trials in real-world settings and comparative effectiveness studies of motivational strategies are however urgently needed. Implementation of evidence-based behavior change interventions is a critical step in achieving improved outcomes, and reduced costs of care for this vulnerable population

### *7. How do we Incorporate Physical Activity as a Vital Sign in Clinical Practice?*

Exercise physiologists or physical therapists should educate people with BED about becoming more active, provide comprehensive resources to make active lifestyle choices, and record patients' physical activity levels to highlight the importance of regular physical activity. Future research should explore the content and discriminant validity of "physical activity as a vital sign" (Sallis, 2011). For example, a simple question method for taking a "physical activity vital sign" on patients to reduce their risk for disease and illness and validated in the general population (Milton, Clemes, & Bull, 2013) could be tested for its validity in people with BED. If valid, during every patient visit, along with routine vital sign checks health care providers could ask the following question "In the past week, on how many days have you done a total of 30 min or more of physical activity, which was enough to raise your breathing rate? This may include sport, exercise and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job." The answer to this question can be recorded in each patient's medical record as a vital sign. Next, longitudinal research should explore whether such physical activity data in electronic medical records are associated with health care use, cost, and chronic disease burden. Research will in particular be needed to identify the most efficient and cost-effective method to achieve successful implementation of a "physical activity as a vital sign" approach within the mental health care system.

### *8. How do we Translate Physical Activity Research into Clinical and Community Practice?*

The UK National Collaborating Centre for Mental Health (2004) recommend that people with eating disorders should first be offered community and outpatient treatment and that inpatient care should be used for those who do not respond or who present with high risk. To date there have not been any effectiveness trials for people with BED in community settings. A physical activity intervention algorithm might assist clinicians and researchers. However, such

algorithms should be validated. Algorithms should also be adapted when new evidence becomes available regarding the optimal physical activity type, dose, timing, and enablers of response. Another approach for maximizing translation likely resides within the interaction between patients and health care providers. Researchers should explore what patients in clinical and community settings want from their care providers regarding physical activity counseling and which resources are required to this end. This kind of qualitative research could inform clinicians and researchers to develop a physical activity counseling model and tool kit for physical activity promotion through patient-health care provider interactions. It is, without a doubt, an important step to ensuring that interventions are feasible and translatable into everyday practice.

#### *9. How Can we Prevent Sedentary Behavior in People with Binge Eating Disorder?*

Sedentary behavior refers to activities that do not increase energy expenditure substantially above the resting level and includes activities such as sleeping, sitting, lying down, watching television, and other forms of screen-based entertainment (Pate, O'Neill, & Lobelo 2008). There is a growing body of evidence in the general population that sedentary behavior may, even independent of physical activity, be a distinct risk factor for multiple adverse health outcomes. For example, sedentary behavior is associated with a 112% increase in the relative risk (RR) for diabetes (RR 2.12; credible interval [CrI]=1.61-2.78), a 147% increase in the RR for cardiovascular events (RR 2.47; 95%CrI=1.44-4.24), a 90% increase in the risk of cardiovascular mortality (Hazard ratio, HR=1.90; 95%CrI=1.36-2.66) and a 49% increase in the risk of all-cause mortality (HR=1.49; 95%CrI=1.14-2.03) (Wilmot et al., 2012). Next to this, sedentary behavior is associated with increased risk of depression. The summary RR of depression for the highest versus non-occasional/occasional sedentary behavior is 1.25 (95%CI=1.16-1.35,  $I^2=50.7\%$ ). The pooled RRs of depression for sedentary behavior are 1.31

(95%CI=1.16- 1.48) in cross-sectional studies and 1.14 (95%CI=1.06-1.21) in longitudinal studies. In subgroup analysis by different types of sedentary behavior, the pooled RRs of depression are 1.13 (95%CI=1.06-1.21) for long-time TV viewing and 1.22 (95%CI=1.10-1.34) for prolonged computer or internet use (Zhai, Zhang, & Zhang, 2014). To date, subjective data and objective assessments of both total sedentary time (accelerometers) as well as the specific behavior of sitting (inclinometers) are missing in people with BED. Along with an objective assessment of sedentary behavior in people with BED, future studies should therefore focus as well on longitudinal associations between sedentary time and physical health outcomes such as the long-term risk for cardio-metabolic diseases, cardiorespiratory fitness, muscular strength, but also relapses and risk for premature mortality. Determining the unique contribution of sedentary time to these health outcomes is essential in order to define treatment priorities and to refine the current health recommendations and clinical practice guidelines.

#### *10. What is the Most Appropriate Physical Activity Assessment Method?*

Accelerometers provide objective measurement of physical activity and are particularly useful for measuring light intensity physical activities, which may be interspersed throughout the day, and thus more difficult to recall accurately than moderate to vigorous physical activity. In most mental health care settings clinicians will not have access to these devices. Interviews and questionnaires are cheaper and easier to use but often prone to systematic errors because of poor recall (Soundy, Roskell, Stubbs, & Vancampfort, 2014). Valid physical activity instruments that accurately capture sedentary behaviors and physical activity in people with BED have not been developed to date. One of the most important challenges in physical activity research in people with BED is producing a low cost, easy to use, reliable and valid physical activity questionnaire that captures sedentary behaviors and physical activities. Such

a reliable and valid questionnaire is necessary for standardization across studies and clinical practices that occur worldwide and would permit meaningful comparisons of values, for example between pre- and post-physical activity interventions.

### **Acknowledgements**

The authors would like to thank the following persons for their assistance in the data collection: Dr. Graciela Rovner (University of Gothenburg, Göteborg, Sweden), Assoc. Prof. Dr. Amanda Lundvik-Gyllensten (University of Lund, Sweden), Prof. Dr. Liv Helvik Skjaerven (Høgskolen i Bergen, Bergen, Bergen, Norway), Rutger Ijntema (Hogeschool Utrecht, The Netherlands), Anne Parker (NHS Lothian, Edinburgh, Scotland, UK), Mikko Patovirta (Tampere, Finland), Assoc. Prof. Dr. Daniel Catalan Matamoros (University of Carlos III Madrid, Spain).

### **References**

- Becker, D. F., & Grilo, C. M. (2015). Co-morbidity of mood and substance use disorders in patients with binge eating disorder: Associations with personality disorder and eating disorder pathology. *Journal of Psychosomatic Research*, *79*, 159-164. doi: 10.1016/j.jpsychores.2015.01.016
- Courneya, K. S., Rogers, L. Q., Campbell, K. L., Vallance, J. K., & Friedenreich, C. M. (2015). Top 10 research questions related to physical activity and cancer survivorship. *Research Quarterly for Exercise and Sport*, *86*, 107-116. doi: 10.1080/02701367.2015.991265
- De Boer, L. B., Tart, C. D., Presnell, K. E., Powers, M. B., Baldwin, A. S., & Smits, J. A. (2012). Physical activity as a moderator of the association between anxiety sensitivity and binge eating. *Eating Behaviors*, *13*, 194-201. doi: 10.1016/j.eatbeh.2012.01.009

- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychological Inquiries, 11*, 227-268. doi: 10.1207/S15327965PLI1104\_01
- Javaras, K. N., Pope, H. G., Lalonde, J. K., Roberts, J. L., Nillni, Y. I., & Laird, N. M., et al. (2008). Co-occurrence of binge eating disorder with psychiatric and medical disorders. *Journal of Clinical Psychiatry, 69*, 266-273. doi: 10.4088/JCP.v69n0213
- Levine, M. D., Marcus, M. D., & Moulton, P. (1996). Exercise in the treatment of binge eating disorder. *International Journal of Eating Disorders, 19*, 171-177. Doi: 10.1002/(SICI)1098-108X(199603)19:2<171::AID-EAT7>3.0.CO;2-K
- McIver, S., O’Halloran, P., & McGartland, M. (2009). Yoga as a treatment for binge eating disorder: a preliminary study. *Complementary Therapies in Medicine, 17*, 196-202. doi: 10.1016/j.ctim.2009.05.002
- Psychiatry, 165*, 4-6. doi: 10.1176/appi.ajp.2007.07101541
- Milton, K., Clemes, S., & Bull, F. (2013). Can a single question provide an accurate measure of physical activity? *British Journal of Sports Medicine, 47*, 44-48. doi:10.1136/bjsports-2011-090899
- Motl, R. W., Learmonth, Y. C., Pilutti, L. A., Gappmaier, E., & Coote, S. (2015). Top 10 research questions related to physical activity and multiple sclerosis. *Research Quarterly for Exercise and Sport, 86*, 117-129. doi: 10.1080/02701367.2015.1023099
- National Collaborating Centre for Mental Health. (2004). *National Clinical Practice Guideline: eating disorders: core interventions in the treatment and management of anorexia nervosa, bulimia nervosa, and related eating disorders*. London, UK: National Institute for Clinical Excellence.
- Naci, H., & Ioannidis, I. (2013). Comparative effectiveness of exercise and drug interventions

- on mortality outcomes: meta-epidemiological study. *British Medical Journal*, 347, 5577. doi: 10.1136/bmj.f5577
- Pate, R. R., O'Neill, J. R., & Lobelo, F. (2008). The evolving definition of “sedentary”. *Exercise and Sport Science Reviews*, 36, 173-178. doi:0091-6331/3604/173Y178
- Pendleton, V. R., Goodrick, G. K., Poston, W.S., Reeves, R. S., & Foreyt, J. P. (2002). Exercise augments the effects of cognitive-behavioral therapy in the treatment of binge eating. *International Journal of Eating Disorders*, 31, 172-184.
- Probst, M. (2012). The International Organization of Physical Therapists working in Mental Health. *Mental Health and Physical Activity*, 5, 20-21. doi:10.1016/j.mhpa.2012.04.003
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: towards an integrative model of change. *Journal of Consultation in Clinical Psychology*, 51, 390-395.
- Rosenbaum, S., Newby, J. M., Steel, Z., Andrews, G., & Ward, P. B. (2015). Online physical activity interventions for mental disorders: A systematic review. *Internet Interventions*, 2, 214–220. doi: 10.1016/j.invent.2015.04.001.
- Reas, D. L., Grilo, C. M. (2014). Current and emerging drug treatments for binge eating disorder. *Expert Opinion on Emerging Drugs*, 19, 99-142. doi: 10.1517/14728214.2014.879291
- Sallis, J. F., Cervero, R. B., Adcher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annals Reviews in Public Health*, 27, 297-322. doi: 10.1146/annurev.publhealth.27.021405.102100
- Sallis, R. (2011). Developing healthcare systems to support exercise: exercise as the fifth vital sign. *British Journal of Sports Medicine*, 45, 473-474. doi:10.1136/bjism.2010.08346
- Schlegel, S., Hartmann, A., Fuchs, R., & Zeeck, A. (2015). The Freiburg sport therapy

- program for eating disordered outpatients: a pilot study. *Eating and Weight Disorders*, 20, 319-327. doi: 10.1007/s40519-015-0182-3
- Stubbs, B., Probst, M., Soundy, A., Parker, A., De Herdt, A., ... Vancampfort, D. (2014). Physiotherapists can help implement physical activity programmes in clinical practice. *British Journal of Psychiatry*, 204, 164. doi: 10.1192/bjp.204.2.164.
- Soundy, A., Roskell, C., Stubbs, B., & Vancampfort, D. (2014). Selection, use and psychometric properties of physical activity measures to assess individuals with severe mental illness: a narrative synthesis. *Archives of Psychiatric Nursing*, 28, 135-151. doi: 10.1016/j.apnu.2013.12.002
- Vancampfort, D., Vanderlinden, J., Pieters, G., De Herdt, A., Schueremans, A., Adriaens, A., ... Probst, M. (2012). The importance of movement-directed interventions in the multidisciplinary treatment of binge eating disorder: an overview. *Tijdschrift voor Psychiatrie*, 54, 719-730.
- Vancampfort, D., Vanderlinden, J., De Hert, M., Adámkova, M., Skjaerven, L. H., ... Probst, M. (2013). A systematic review on physical therapy interventions for patients with binge eating disorder. *Disability and Rehabilitation*, 35, 2191-2196. doi: 10.3109/09638288.2013.771707
- Vancampfort, D., & Faulkner, G. (2014). Physical activity and serious mental illness: A multidisciplinary call to action. *Mental Health and Physical Activity*, 7, 153-154. doi: 10.1016/j.mhpa.2014.11.001
- Vancampfort, D., De Herdt, A., Vanderlinden, J., Lannoo, M., Soundy, A., Pieters, G., ... Probst, M. (2014a). 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, 97-102. doi: 10.1016/j.psychres.2014.01.015
- Vancampfort, D., Probst, M., Adriaens, A., Pieters, G., De Hert, M., Soundy, A., ...

- Vanderlinden, J. (2014b). Clinical correlates of global functioning in obese treatment seeking persons with binge eating disorder. *Psychiatria Danubina*, *26*, 256-260.
- Vancampfort, D., Vanderlinden, J., Stubbs, B., Soundy, A., Pieters, G., ... Probst, M. (2014c). Physical activity correlates in persons with binge eating disorder: a systematic review. *European Eating Disorder Reviews*, *22*, 1-8. doi: 10.1002/erv.2255.
- Vancampfort, D., Probst, M., Adriaens, A., Pieters, G., De Hert, M., ... Vanderlinden, J. (2014d). Changes in physical activity, physical fitness, self-perception and quality of life following a 6-month physical activity counseling and cognitive behavioral therapy program in outpatients with binge eating disorder. *Psychiatry Research*, *219*, 361-366. doi:10.1016/j.psychres.2014.05.016
- Vancampfort, D., De Herdt, A., Vanderlinden, J., Lannoo, M., Adriaens, A., ... 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*, 777-782. doi: 10.3109/09638288.2014.942000
- Vancampfort, D., Stubbs, B., Ward, P.B., Teasdale, S., & Rosenbaum, S. (2015). Why moving more should be promoted for severe mental illness. *Lancet Psychiatry*, *4*, 295. doi: 10.1016/S2215-0366(15)00099-1
- Vanderlinden, J., Buis, H., Pieters, G., & Probst, M. (2007). Which elements in the treatment of eating disorders are necessary 'ingredients' in the recovery process? A comparison between the patient's and therapist's view. *European Eating Disorders Review*, *15*, 357-365. doi: 10.1002/erv.768
- Vocks, S., Tuschen-Caffier, B., Pietrowsky, R., Rustenbach, S. J., Kersting, A., & Herpertz, S. (2010). Meta-analysis of the effectiveness of psychological and pharmacological treatments for binge eating disorder. *International Journal of Eating Disorders*, *43*, 205-217. doi: 10.1002/eat.20696

Wilmot, E. G., Edwardson, C. L., Achana, F., Davies, M. J., Gorely, T., ... Biddle, S. J.

(2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, 55, 2895-905.

doi:10.1007/s00125-012-2677-z

Yager, J. (2008). Binge eating disorder: The search for better treatments. *American Journal of*

Zhai, L., Zhang, Y., & Zhang, D. (2014). Sedentary behaviour and the risk of depression: a

meta-analysis. *British Journal of Sports Medicine*, 4, 705-709. doi:10.1136/bjsports-

2014-093613

**Table 1.** Top 10 Research Questions for Physical Activity Research in Binge Eating Disorder

---

1. What are the benefits of physical activity for people with binge eating disorder?
  2. What are the most prominent safety issues for physical activity prescription in people with binge eating disorder?
  3. What is the optimal physical activity prescription for people with binge eating disorder?
  4. What are the key barriers for engaging people with binge eating disorder in physical activity?
  5. What are the most effective motivational interventions for physical activity adoption and maintenance in people with binge eating disorder?
  6. How can we ensure integration of physical therapists within the multidisciplinary mental health treatment team?
  7. How do we translate physical activity research into community practice?
  8. How do we incorporate physical activity as a vital sign in clinical practice?
  9. How can we prevent sedentary behavior in people with bipolar disorder?
  10. What is the most appropriate physical activity assessment method?
-