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Perspective Paper

Buying-shopping disorder – Is there enough evidence to support its inclusion in ICD-11?

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Abstract

The phenomenon of buying-shopping disorder (BSD) was described over 100 years ago. Definitions of BSD refer to extreme preoccupation with shopping and buying, to impulses to purchase that are experienced as irresistible, and to recurrent maladaptive buying excesses that lead to distress and impairments. Efforts to stop BSD episodes are unsuccessful, despite the awareness of repeated break-downs in self-regulation, experiences of post-purchase guilt and regret, comorbid psychiatric disorders, reduced quality of life, familial discord, work impairment, financial problems and other negative consequences. A recent meta-analysis indicated an estimated point prevalence of BSD of 5%. In this narrative review, the authors offer a perspective to consider BSD as a mental health condition and to classify this disorder as a behavioral addiction, based on both research data and on long-standing clinical experience.

Introduction

While some might consider it a “modern” construct, the phenomenon of buying disorder (BSD) has been described for over 100 years in literature and in psychiatric textbooks.^{1,2} In 1899, the eminent German psychiatrist Emil Kraepelin mentioned the pathological propensity to buy (“*krankhafte Kauflust*”) alongside kleptomania and acquisitiveness (“*Sammelwuth*”) in the 6th edition of his Textbook of Psychiatry.³ In contrast, the most recent 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the recently released 11th revision of the International Classification of Diseases (ICD-11) have not included BSD as a formal mental health disorder.^{4,5} Past proposals to categorize BSD as a distinct mental health condition within modern psychiatric taxonomies have been ignored based on arguments that there is insufficient research on this topic.⁶ However, the authors of this paper argue that, while ongoing research into BSD is crucial as with all psychiatric disorders, failing to recognize BSD as a mental health disorder ignores the now well-documented burden of suffering, the associated impairment and reduced quality of life of patients with BSD, as well as the accelerating prevalence of BSD and its impact on public health within different cultural settings. In the following, we offer a perspective to consider BSD as a mental health condition and to classify this disorder as a behavioral addiction, based on both research data and on long-standing clinical experience.

Phenomenology

According to the early descriptions by Kraepelin, BSD is characterized by an inability to control one’s excessive buying behavior, a continuous delay in paying an accumulation of debts, and the absolute incapability of the individual to think differently, including to perceive the negative consequences of spending in excess.² Likewise, more recent definitions characterize BSD by the excessive preoccupations with buying/shopping, poorly controlled impulses to purchase that are experienced as irresistible, and recurrent maladaptive buying/shopping excesses that lead to marked distress and impairments.⁷ Patients with BSD report that they buy consumer goods that are not needed or that

are beyond their budget, or they purchase items in unnecessary quantities, and regularly spend much more time than they intended buying and shopping. It appears that the act of buying/shopping itself, which is mainly driven by an intense, compelling but temporary desire to instantly own a specific product, is the main issue in BSD. Most possessions purchased are rarely or never used, but instead they are hidden, stored, given away as gifts, forgotten, or discarded.⁸ In the early stages of the disorder process, individuals with BSD experience pleasure and other positive feelings while shopping and buying.^{9,10} This pattern appears to change over time, with buying episodes being used more and more to get relief from negative mood states, to the point where they become the primary response to negative events and feelings.^{11,12} Efforts to stop BSD episodes are unsuccessful, despite the awareness of repeated failures in self-regulation, experiences of post-purchase guilt and regret, and longer-term adverse consequences. The latter include the increase or *de novo* development of comorbid psychiatric disorders, increased familial discord, work impairment, financial problems (including bankruptcy), criminal proceedings due to spending-related deception and embezzlement, and decreased quality of life.^{7,9,13} Diagnostically, the specification of substantial impairments is important in order to differentiate BSD from occasional impulsive overbuying that is solely driven by materialistic goals focused on wealth, possessions, and status as per the way that social anxiety disorder is differentiated from normal anxiety or shyness, for example.¹⁴ In individuals with BSD, “retail therapy” is the primary or only way of coping with stress, discomfort and negative feelings. Most patients describe the course of BSD as chronic and episodic, with a typical age of onset in the late adolescence or early adulthood.¹⁵

Epidemiology

Population-based studies provide evidence that BSD is a cross-national problem with high prevalence rates within different cultural settings, including the United States, Europe, China, India, and Brazil.¹⁶⁻
²⁶ Exemplary prevalence estimates for BSD are listed in Table 1. A recent meta-analysis indicated an estimated point prevalence of BSD of 5%, which is similar to the levels of other high prevalence

mental health disorders that receive considerable attention and are acknowledged as distinct conditions.²⁰ Furthermore, the prevalence of BSD seems to increase in developing consumer societies.^{17, 19}

The majority of population-based surveys have found that there are higher prevalence rates among women.²⁰ Treatment-seeking samples with BSD consistently comprise more female than male patients.^{7, 27-29} Studies investigating gender differences in the prevalence of BSD in adolescents and young adults have had mixed results, with some studies reporting a higher propensity towards BSD in female participants^{17, 20, 23}, and others not finding a gender bias.^{18, 22, 24} While there is evidence for a higher prevalence of BSD in younger adults, pointing to the need of introducing and implementing prevention programs for BSD at an early age.¹⁷ Less pronounced gender differences in younger samples may reflect less traditional gender role identities and a stronger emphasis on buying and shopping amongst youth.³⁰ Most studies have failed to find significant differences between individuals with BSD and those without BSD with respect to other sociodemographic variables such as marital status, education, job situation or income.^{19, 23, 28}

((Table 1))

Comorbidity

Buying disorder rarely occurs as a problem in isolation. Comorbidity rates are high, with depressive disorder, social anxiety disorder, hoarding disorder, bulimia nervosa or binge eating disorder, gambling disorder, and substance use disorders being the most common comorbid conditions.^{27, 31-34}

The most prevalent personality disorders in individuals with BSD are avoidant (15-37%), obsessive-compulsive (22-27%), and borderline personality disorder (15-20%).³⁵ Although research on temporal order, symptom covariations, and family transmission of possible shared neurobiological or genetic risk factors for BSD and comorbid disorders is limited, there are indicators for increased familial incidence, especially with respect to other mental disorders. An earlier controlled study showed that

first-degree relatives of patients with BSD were more likely than comparison relatives to suffer from more psychiatric disorders, particularly depression and substance use disorder.³⁶ Another study investigated the relationship between gambling disorder and several DSM-IV impulse control spectrum disorders (i.e. intermittent explosive disorder, kleptomania, pyromania, trichotillomania, compulsive sexual behavior, Internet addiction, and BSD).³¹ BSD was by far the most frequent condition in individuals with pathological gambling and in their first-degree relatives.³¹ This finding suggests that there may be an underlying common etiological pathway between BSD and gambling disorder.

Classification of BSD

As noted previously, BSD was not included as a separate disorder in DSM-5.⁴ However, the high comorbidity between BSD and hoarding disorder and the fact that there is a subsection of those with hoarding disorder who do not engage in BSD but acquire through other means, including free items and inheritances, or even just a slow but insidious acquisition of items^{33,34}, have been acknowledged by the DSM in introducing the hoarding disorder specifier “With excessive acquisition”.⁴ Elsewhere in the DSM-5, excessive spending is listed as an example of the impulsive behaviors of borderline personality disorder.⁴ More generally, over the last three decades, several nosological categorizations for BSD have been suggested, with BSD considered either as a subtype of obsessive-compulsive-related disorders, an impulse control disorder or a behavioral addiction.³⁷

BSD as an obsessive-compulsive related disorder

There are some commonalities between BSD and obsessive-compulsive disorders (OCDs), explaining why BSD had been considered as a potential obsessive-compulsive related disorder in the 1990s.³⁴ For instance, preoccupations with buying and shopping are central to BSD. Past studies found a high comorbidity between OCDs and BSD.³⁸ Furthermore, selective serotonin reuptake inhibitors (SSRIs, i.e., fluvoxamine, citalopram, escitalopram), which are approved for the treatment of OCDs, have

shown promise in open label trials, case studies, and open-label lead-in studies for BSD.³⁹ However, controlled studies with fluvoxamine failed to confirm the optimism of earlier open-label trials.³⁹ Only one controlled trial of citalopram has shown benefit during double-blind discontinuation phases, but it failed to show efficacy with the more active compound escitalopram.³⁹

In further contrast to OCD but akin to hoarding disorder, BSD is typically not associated with unwanted (intrusive) thoughts about spending, but is characterized by ego-syntonic attitudes, in this instance towards identity-seeking and materialism.^{30, 40, 41} Patients describe their shopping and buying habits as being chaotic and unplanned rather than being ritualized.¹⁰ Buying and shopping are used to relieve tension as BSD progresses, but not at the onset of the disease, which is different from OCD. Noteworthy, more recent studies investigating clinical variables related to the BSD phenotype compared to OCDs or other behavioral addictions revealed close similarities between BSD and gambling disorder, but considerably less similarity between BSD and OCDs.^{27, 34} While treatments for BSD are emerging, their overall efficacy is not yet as robust as that for OCDs nor is there a standard approach or clinical guidelines for treatment. Cognitive-behavioral treatments have been found to be effective, although larger scale quality studies need to be conducted.^{29, 42}

The previously reported high comorbidity of BSD with OCDs is probably accounted for by the inclusion before DSM-5 of hoarding as a dimension of OCD.⁴³ The fact that excessive acquisition (according to the ICD-11: “*repetitive urges or behaviours related to amassing or buying items*”)⁵ is one of the core characteristics of hoarding could serve as an argument to understand BSD as being simply a symptom of hoarding disorder.⁴⁴ However, at least in treatment-seeking samples, only about half of patients with BSD suffer from hoarding, whereas the remaining patients have no difficulty discarding possessions and do not accumulate the items purchased, clearly differentiating BSD from hoarding disorder which is centrally characterised by the psychological difficulty in discarding, resulting in clutter.^{33, 45} It is important to note that patients with BSD and hoarding symptoms are less likely to respond to BSD treatment than those without hoarding.²⁹ To our opinion,

hoarding should be considered as a specifier for BSD, especially in light of a subtyping treatment approach that might be helpful in the treatment of patients with BSD.

BSD as an impulse control disorder or a behavioral addiction

The classification of BSD as an impulse control disorder (ICD) has been favored over the past 20 years by many researchers. According to the ICD-11 working group on obsessive-compulsive and related disorders, ICDs “...should be defined by the repeated failure to resist an impulse, drive, or urge to perform an act that is rewarding to the person (at least in the short-term), despite longer term harm either to the individual or others.”⁴⁶ The clinical picture seen in patients with BSD meets these criteria. It is often characterized by increasing tension prior to a BSD episode, which is relieved while shopping or spending. Furthermore, BSD is associated with high impulsivity, with failures in impulse control, and in many cases with the violation of the rights of others.^{9,47} In the ICD-11 coding tool, BSD (according to the ICD-11 coding tool: “*compulsive buying-shopping disorder*”) is now mentioned as an example for the residual category “Other specified impulse control disorders” (category 6C7Y).⁵

Recent considerations have moved away from the conceptualization of BSD as an ICD due to intriguing research findings indicating shared key characteristics of BSD with substance-use disorders and gambling disorder, suggesting that BSD might be viewed most appropriately as a behavioral addiction.^{27, 48-50} Factors that appear to link BSD and substance-use disorders/gambling disorder are maladaptive decision-making processes, increased salience of disorder-specific stimuli, cue-induced craving and reward seeking.⁵¹⁻⁵⁶ Models referring to the sensitization of reward-related neural structures and the accompanying cognitive interferences, which are well known as being related to substance use disorders and gambling disorder, can also be applied to BSD.^{57, 58} In the beginning, when buying/shopping is a pleasant experience, different cues become related to the positive reinforcing features of buying/shopping (‘liking’), resulting in incentive salience. Sensitization of incentive salience is associated with strong craving reactions (‘wanting’) and the maintenance of buying/shopping even in the face of several negative consequences.⁵¹ In accordance with recent

models of addiction, a transition from initial positive reinforcement motivations (impulsivity) to later negative reinforcement (compulsivity) can be observed. Impulsivity occurs during the early stages of BSD when the person acts on powerful urges to experience the pleasure of recreational buying/shopping. As BSD progresses, buying/shopping becomes habitual (compulsive) and is used to relief from negative mood states.^{12, 59}

Hypotheses on the brain processes involved in BSD

There is a considerable lack of human studies that investigate the extent to which neural circuits are involved in BSD. Of interest is a brain imaging study that was conducted in patients with BSD compared to healthy control participants.⁶⁰ Similar to several findings relating to substance use disorders/gambling disorder⁶¹, the functional magnetic resonance imaging (fMRI) study indicated an activation of the ventral striatum (nucleus accumbens) during the anticipation phase of reward processing (i.e., the presentation of purchasable products).⁶⁰ In addition, lower activity of the insula was found during presentation of product and price, indicating lower price sensitivity in patients with BSD compared to controls.⁶⁰

With regard to clinical research, it has been suggested that the use of opioid receptor antagonists may be efficacious in BSD, as these have shown positive effects in the treatment of alcohol use disorder, opioid use disorder, kleptomania and gambling disorder, following the assumption that dopaminergic reward pathways are also involved in BSD.³⁹ Two case studies reported improvement of BSD symptoms due to naltrexone administration, but systematic studies are lacking.³⁹

In analogy to disorders due to substance use or addictive behaviors, it has been argued that the imbalance of interacting neural circuits is likely to contribute to BSD.⁸ Referring to the dual-process models framework, addictive behaviors may occur because the impulsive neural system (subcortical brain regions involved in reward: ventral striatum, amygdala, orbitofrontal cortex) is not down-regulated by the reflective neural system (prefrontal cortex, hippocampus) or overrides the reflective system due to neuroadaptations in response to repeated drug exposure.⁶² Applying the dual-process

model of addiction to BSD, it can be assumed that the interplay of personal and situational factors contribute to a predominantly impulsive processing mode, which is associated with diminished reflective processing.⁵¹ Similarly, the brain disease model of addiction⁶³ could be applied to BSD. Future research could profit from the integration of consumer neuroscience findings, including neuroeconomics research that focus on neural correlates of economic decision-making.⁶⁴ However, it is important to consider the ecological relevance of these paradigms to BSD. Although it is mandatory to understand brain processes involved in the disorder, BSD should be examined in its genetic, psychological, social, cultural, and environmental contexts.

Implications of the National Institutes of Health Research Domain Criteria (RDoC) framework for BSD research

Considering the complexity of BSD, the dimensional RDoC approach⁶⁵ could be useful for addressing the neurobiological, physiological, genetic and behavioral underpinnings of BSD. Recently, the RDoC units of analysis and research domains have been used to conceptualize impulsivity and compulsivity and their interaction with respect to addictions.⁶⁶ The findings of Brooks et al.⁶⁶ call for the examination of transdiagnostic processes in relation to BSD. In our opinion, the RDoC system could be helpful for the conceptualization of BSD as it highlights moving beyond shared symptoms and comorbidity. Using the research-oriented RDoC system would focus on evaluating whether the underpinnings of obsessive-compulsive related disorders (including hoarding disorder), impulse control disorders, substance use disorders or behavioral addictions (e. g. gambling disorder) are contributing to BSD.

Conclusion

Considering recent research findings, the high prevalence rates of BSD, its dysfunctionality and interference with daily functioning, and the increasing number of individuals seeking treatment for BSD, we believe that there is no question that it really is time to recognize BSD as separate mental

health condition. Given that BSD has much in common with substance use disorders and gambling disorder it should be considered as a candidate for the ICD-11 category “Other specified disorders due to addictive behaviours (6C5Y)” that belongs to the “Substance use and related disorders” chapter according to the ICD-11.⁵ The inclusion of BSD in the ICD-11 would enable researchers to accumulate further knowledge that will result in advanced diagnostic tools, etiological models and treatment strategies for BSD, and it would support the promotion of public health efforts relating to policies and prevention.

Table 1: Prevalence estimates of buying-shopping disorder

Country	Sample (year)	N	Prevalence [%]
United States¹⁶	General population	2513	5.8
Germany¹⁷	General population	1017	6.5 (East Germany) 8.1 (West Germany)
Germany¹⁸	General population	2350	6.9
Denmark¹⁹	General population	964	5.1
Hungary²⁰	General population	2710	1.8
Spain (Galicia)²³	General population	2159	7.1
India²⁵	General population	2755	4.0
Brazil²⁶	General population	359	10.3
Estonia²¹	Convenience sample	310	8
Italy²²	High school students	2853	11.3
China²⁴	University students	601	6.0

References

1. Zola É. *Au Bonheur des Dames*. Paris: Émile Zola; 1883.
2. Kraepelin E. *Psychiatrie. Ein Lehrbuch für Studierende und Ärzte*. Leipzig, Germany: J. A. Barth; 1909.
3. Kraepelin E. *Psychiatrie: Ein Lehrbuch für Studierende und Aerzte*. 6 ed. Leipzig, Germany: J. A. Barth; 1899.
4. APA. *Diagnostic and Statistical Manual of mental disorders, 5th ed*. Washington DC: American Psychiatric Press; 2013.
5. WHO. *ICD-11*. [cited 26.08.2018]; Available from: https://icd.who.int/ct11_2018/icd11_mms/en/release#/.
6. Grant JE, Chamberlain SR. Expanding the definition of addiction: DSM-5 vs. ICD-11. *CNS Spectr*. 2016;21(4):300-303.
7. McElroy SL, Keck PE, Jr., Pope HG, Jr., Smith JM, Strakowski SM. Compulsive buying: A report of 20 cases. *J Clin Psychiatry*. 1994;55(6):242-248.
8. Weinstein A, Maraz A, Griffiths MD. Compulsive buying - Features and characteristics of addiction. In: Preedy V, ed. *The neuropathology of drug addictions and substance misuse*. New York: Elsevier Academic Press; 2016:993-1007.
9. Christenson GA, Faber RJ, de Zwaan M, et al. Compulsive buying: Descriptive characteristics and psychiatric comorbidity. *J Clin Psychiatry*. 1994;55(1):5-11.
10. Kellett S, Bolton JV. Compulsive buying: A cognitive-behavioural model. *Clin Psychol Psychother*. 2009;16(2):83-99.
11. Kyrios M, McQueen P, Moulding R. Experimental analysis of the relationship between depressed mood and compulsive buying. *J Behav Ther Exp Psychiatry*. 2013;44(2):194-200.
12. Müller A, Mitchell JE, Crosby RD, et al. Mood states preceding and following compulsive buying episodes: An ecological momentary assessment study. *Psychiatry Res*. 2012;200(2-3):575-580.
13. Zhang C, Brook JS, Leukefeld CG, De La Rosa M, Brook DW. Compulsive buying and quality of life: An estimate of the monetary cost of compulsive buying among adults in early midlife. *Psychiatry Res*. 2017;252:208-214.
14. Kasser T. Materialistic values and goals. *Annu Rev Psychol*. 2016;67:489-514.
15. Black DW, Shaw M, Allen J. Five-year follow-up of people diagnosed with compulsive shopping disorder. *Compr Psychiatry*. 2016;68:97-102.
16. Koran LM, Faber RJ, Aboujaoude E, Large MD, Serpe RT. Estimated prevalence of compulsive buying behavior in the United States. *Am J Psychiatry*. 2006;163(10):1806-1812.

17. Neuner M, Raab G, Reisch LA. Compulsive buying in maturing consumer societies: An empirical re-inquiry. *Journal of Economic Psychology*. 2005;26(4):509-522.
18. Müller A, Mitchell JE, Crosby RD, et al. Estimated prevalence of compulsive buying in Germany and its association with sociodemographic characteristics and depressive symptoms. *Psychiatry Res*. 2010;180(2-3):137-142.
19. Hubert M, Hubert M, Gwozdz W, Raab G, Reisch LA. Compulsive buying: An increasing problem? Investigating and comparing trends in Germany and Denmark, 2010-2012. *Journal of Consumer Protection and Food Safety*. 2014;9(3):280-284.
20. Maraz A, Griffiths MD, Demetrovics Z. The prevalence of compulsive buying: A meta-analysis. *Addiction*. 2016;111(3):408-419.
21. Raudsepp M, Parts O. Compulsive buying behaviour in Estonian market *Economics and Business*. 2015;27(1):81-85.
22. Villella C, Martinotti G, Di Nicola M, et al. Behavioural addictions in adolescents and young adults: Results from a prevalence study. *J Gambl Stud*. 2011;27(2):203-214.
23. Otero-Lopez JM, Villardefrancos E. Prevalence, sociodemographic factors, psychological distress, and coping strategies related to compulsive buying: a cross sectional study in Galicia, Spain. *BMC Psychiatry*. 2014;14:101.
24. Jiang Z, Shi M. Prevalence and co-occurrence of compulsive buying, problematic Internet and mobile phone use in college students in Yantai, China: relevance of self-traits. *BMC Public Health*. 2016;16(1):1211.
25. Sharma MK, Rao GN, Benegal V, Thennarasu K, Thomas D. Problematic shopping behavior: Prevalence and implication for screening & intervention in health care setting. *Asian J Psychiatr*. 2018;31:96-97.
26. Leite PL, Silva AC. Psychiatric and socioeconomic aspects as possible predictors of compulsive buying behavior. *Trends Psychiatry Psychother*. 2016;38(3):141-146.
27. Mestre-Bach G, Steward T, Jiménez-Murcia S, Fernández-Aranda F. Differences and similarities between compulsive buying and other addictive behaviors. *Curr Addict Rep* 2017;4:228–236.
28. Müller A, de Zwaan M, Mitchell JE, Zimmermann T. Pathological buying and partnership status. *Psychiatry Res*. 2016;239:122-123.
29. Mueller A, Mueller U, Silbermann A, et al. A randomized, controlled trial of group cognitive-behavioral therapy for compulsive buying disorder: posttreatment and 6-month follow-up results. *J Clin Psychiatry*. 2008;69(7):1131-1138.
30. Dittmar H. Compulsive buying--a growing concern? An examination of gender, age, and endorsement of materialistic values as predictors. *Br J Psychol*. 2005;96(Pt 4):467-491.

31. Black DW, Coryell W, Crowe R, Shaw M, McCormick B, Allen J. The relationship of DSM-IV pathological gambling to compulsive buying and other possible spectrum disorders: Results from the Iowa PG family study. *Psychiatry Res.* 2015;226(1):273-276.
32. Fernandez-Aranda F, Pinheiro AP, Thornton LM, et al. Impulse control disorders in women with eating disorders. *Psychiatry Res.* 2008;157(1-3):147-157.
33. Frost RO, Steketee G, Tolin DF. Comorbidity in hoarding disorder. *Depress Anxiety.* 2011;28(10):876-884.
34. Lawrence LM, Ciorciari J, Kyrios M. Relationships that compulsive buying has with addiction, obsessive-compulsiveness, hoarding, and depression. *Compr Psychiatry.* 2014;55(5):1137-1145.
35. Claes L, Müller A. Resisting temptation: Is compulsive buying an expression of personality deficits. *Current Addiction Reports.* 2017;4(3):237-245.
36. Black DW, Repertinger S, Gaffney GR, Gabel J. Family history and psychiatric comorbidity in persons with compulsive buying: Preliminary findings. *Am J Psychiatry.* 1998;155(7):960-963.
37. Hollander E, Allen A. Is compulsive buying a real disorder, and is it really compulsive? *Am J Psychiatry.* 2006;163(10):1670-1672.
38. Lejoyeux M, Bailly F, Moula H, Loi S, Ades J. Study of compulsive buying in patients presenting obsessive-compulsive disorder. *Compr Psychiatry.* 2005;46(2):105-110.
39. Soares C, Fernandes N, Morgado P. A review of pharmacologic treatment for compulsive buying disorder. *CNS Drugs.* 2016;30(4):281-291.
40. Claes L, Müller A, Luyckx K. Compulsive buying and hoarding as identity substitutes: The role of materialistic value endorsement and depression. *Compr Psychiatry.* 2016;68:65-71.
41. Moulding R, Duong A, Nedeljkovic M, Kyrios M. Do you think that money can buy happiness? A review of the role of mood, materialism, self, and cognitions in compulsive buying. *Current Addiction Reports.* 2017;4(3):254–261.
42. Hague B, Hall J, Kellett S. Treatments for compulsive buying: A systematic review of the quality, effectiveness and progression of the outcome evidence. *J Behav Addict.* 2016;5(3):379-394.
43. Torres AR, Fontenelle LF, Shavitt RG, et al. Comorbidity variation in patients with obsessive-compulsive disorder according to symptom dimensions: Results from a large multicentre clinical sample. *J Affect Disord.* 2016;190:508-516.
44. Fontenelle LF, Grant JE. Hoarding disorder: A new diagnostic category in ICD-11? *Rev Bras Psiquiatr.* 2014;36 Suppl 1:28-39.

45. Möllenkamp M, de Zwaan M, Müller A. Hoarding with and without excessive buying: Results of a pilot study. *Psychopathology*. 2015;48(1):56-59.
46. Grant JE, Atmaca M, Fineberg NA, et al. Impulse control disorders and "behavioural addictions" in the ICD-11. *World Psychiatry*. 2014;13(2):125-127.
47. Zander H, Claes L, Voth EM, de Zwaan M, Müller A. Impulsive behaviors in patients with pathological buying. *J Behav Addict*. 2016;5(3):457-464.
48. Jimenez-Murcia S, Granero R, Moragas L, et al. Differences and similarities between bulimia nervosa, compulsive buying and gambling disorder. *Eur Eat Disord Rev*. 2015;23(2):111-118.
49. Potenza MN, Higuchi S, Brand M. Call for research into a wider range of behavioural addictions. *Nature*. 2018;555(7694):30.
50. Guerrero-Vaca D, Granero R, Fernandez-Aranda F, et al. Underlying mechanism of the comorbid presence of buying disorder with gambling disorder: A pathways analysis. *J Gambli Stud*. 2018. [Epub ahead of print]
51. Trotzke P, Brand M, Starcke K. Cue-reactivity, craving, and decision-making in buying disorder: A review of the current knowledge and future directions. *Current Addiction Reports*. 2017;4:246-253.
52. Lawrence LM, Ciorciari J, Kyrios M. Cognitive processes associated with compulsive buying behaviours and related EEG coherence. *Psychiatry Res*. 2014;221(1):97-103.
53. Vogel V, Kollei I, Duka T, et al. Pavlovian-to-instrumental transfer: A new paradigm to assess pathological mechanisms with regard to the use of Internet applications. *Behav Brain Res*. 2018;347:8-16.
54. Starcke K, Antons S, Trotzke P, Brand M. Cue-reactivity in behavioral addictions: A meta-analysis and methodological considerations. *J Behav Addict*. 2018;7(2):227-238.
55. Derbyshire KL, Chamberlain SR, Odlaug BL, Schreiber LR, Grant JE. Neurocognitive functioning in compulsive buying disorder. *Ann Clin Psychiatry*. 2014;26(1):57-63.
56. Voth EM, Claes L, Georgiadou E, et al. Reactive and regulative temperament in patients with compulsive buying and non-clinical controls measured by self-report and performance-based tasks. *Compr Psychiatry*. 2014;55(7):1505-1512.
57. Berridge KC, Robinson TE. Liking, wanting, and the incentive-sensitization theory of addiction. *Am Psychol*. 2016;71(8):670-679.
58. Clark L, Averbeck B, Payer D, Sescousse G, Winstanley CA, Xue G. Pathological choice: The neuroscience of gambling and gambling addiction. *J Neurosci*. 2013;33(45):17617-17623.
59. Nicolai J, Daranco S, Moshagen M. Effects of mood state on impulsivity in pathological buying. *Psychiatry Res*. 2016;244:351-356.

60. Raab G, Elger CE, Neuner M, Weber B. A neurological study of compulsive buying behaviour. *J Consum Policy*. 2011;34(4):401-413.
61. Potenza MN. Clinical neuropsychiatric considerations regarding nonsubstance or behavioral addictions. *Dialogues Clin Neurosci*. 2017;19(3):281-291.
62. Bechara A. Decision making, impulse control and loss of willpower to resist drugs: A neurocognitive perspective. *Nat Neurosci*. 2005;8(11):1458-1463.
63. Volkow ND, Koob GF, McLellan AT. Neurobiologic advances from the brain disease model of addiction. *N Engl J Med*. 2016;374(4):363-371.
64. Javor A, Koller M, Lee N, Chamberlain L, Ransmayr G. Neuromarketing and consumer neuroscience: Contributions to neurology. *BMC Neurol*. 2013;13:13.
65. Cuthbert BN, Insel TR. Toward the future of psychiatric diagnosis: The seven pillars of RDoC. *BMC Med*. 2013;11:126.
66. Brooks SJ, Lochner C, Shoptaw S, Stein D. Using the research domain criteria (RDoC) to conceptualize impulsivity and compulsivity in relation to addiction. *Prog Brain Res*. 2017;235:177-218.