

Treatments for compulsive buying: A systematic review of the quality, effectiveness and progression of the outcome evidence

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Background and aims: This review appraises the progression and status of the evidence base for the treatment of compulsive buying disorder (CBD), in order to highlight what currently works and to prompt useful future research. *Methods:* Online databases ISI Web of Knowledge, PsycINFO, and PubMed via Ovid were searched at two time points. Two quality checklists and an established model of therapy evaluation (hourglass model) evaluated the quality and progression of both psychotherapy and pharmacotherapy treatments for CBD. Uncontrolled effect sizes were calculated and meta-regression analyses were performed regarding treatment duration. *Results:* A total of 29 articles met the inclusion criteria, which were divided into psychotherapy ($n = 17$) and pharmacotherapy treatments ($n = 12$). Of the 29 studies, only 5 studies have been tested under conditions of high methodological quality. Both forms of treatment had been evaluated in a haphazard manner across the stages of the hourglass model. Although large effects were demonstrated for group psychotherapy and pharmacotherapy, such evidence of effectiveness was undermined by poor study quality and risk of publication bias. Long-term CBD treatment was associated with improved outcome with pharmacotherapy, but not when delivering psychotherapy. *Discussion:* Group psychotherapy currently appears the most promising treatment option for CBD. Poor methodological control and sporadic evaluation of specific treatments have slowed the generation of a convincing evidence base for CBD treatment. Defining the active ingredients of effective CBD treatment is a key research goal.

Keywords: compulsive buying disorder, effectiveness, treatments, meta-analysis, review

BACKGROUND AND AIMS

Compulsive buying disorder (CBD) is characterized by excessive or poorly controlled preoccupations, urges, or behaviors regarding shopping and spending, which leads to adverse consequences (Black, 2007). CBD is distinguished by a motivation to feel better, rather than from excessive spending and materialism alone (O’Guinn & Faber, 1989), often creating serious associated impacts on lives, such as substantial debt, relationship problems, elevated risk of criminal behavior, and suicide attempts (Black, 2007; Boundy, 2000; Lejoyeux, Tassain, Solomon, & Adès, 1997; O’Guinn & Faber, 1989).

CBD was included in the earliest attempts at classification of mental disorders as “impulsive insanity” (Bleuler, 1930; Kraepelin, 1915), but has since been largely ignored until the last few decades, when the self-help movement testified to the emotional, financial, and interpersonal impacts of CBD (Benson, 2000; Faber, 2011). Categorization of CBD still remains a debate, reinforced by its omission in the most recent edition of the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association, 2013). Historically, CBD was classified within the DSM-III-R as an example of an impulse control disorder not elsewhere specified (American Psychiatric Association, 1987). CBD has also

been conceptualized as a form of obsessive–compulsive disorder, and thus, CBD has been characterized as existing on the impulsive–compulsive spectrum (Frost, Kim, Morris, Bloss, & Murray-Close, 1998). More recently, research has indicated correlates of behavioral addictions like cue reactivity and cravings (Starcke, Schlereth, Domass, Schöler, & Brand, 2013; Trotzke, Starcke, Pederson, & Brand, 2014), adding further debate to the categorization of CBD.

The development of a clinical screening tool for CBD has supported the progression of epidemiological research (Faber & O’Guinn, 1992). A recent meta-analysis of 49 prevalence estimates from 16 countries produced a pooled prevalence estimate of 4.9% for CBD (Maraz, Griffiths, & Demetrovics, 2016). Early research indicated a higher proportion of females than males meeting criteria (Christenson et al., 1994; Dittmar, 2005), though recent larger studies have evidenced an equal gender distribution (Koran, Faber, Aboujaoude, Large, & Serpe, 2006; Mueller et al., 2010). Epidemiological research has also indicated that CBD is associated with high rates of psychiatric comorbidity with both

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depression (Mueller et al., 2010) and anxiety (Schlosser, Black, Repertinger, & Freet, 1994), with base rates higher than when compared with the general population (Black, Repertinger, Gaffney, & Gabel, 1998). Steffen and Mitchell (2011) noted that CBD outcome research benefited from the development of the Yale–Brown Obsessive Compulsive Scale–Shopping Version (YBOCS-SV; Monahan, Black, & Gabel, 1996). This is because the YBOCS-SV provides a psychometrically robust and sensitive measure of change during CBD treatment (Black, Gabel, Hansen, & Schlosser, 2000; Black, Monaghan, & Gabel, 1997).

Despite increased clarity regarding the phenomenology of CBD, no evidence-based treatments have emerged (Black, 2007). Lourenço Leite, Pereira, Nardi, and Silva (2014) conducted a qualitative review of psychotherapeutic treatments for CBD, supporting the potential for cognitive behavioral group therapy. However, the effectiveness or quality of the psychotherapy studies was not quantitatively examined in that review. Moreover, pharmacotherapy of CBD constitutes a significant proportion of the treatment evidence base (Aboujaoude, 2014; Steffen & Mitchell, 2011) and this type of intervention was omitted from the Lourenço Leite et al.'s (2014) review. This review therefore sought to gain greater clarity concerning the quality and effectiveness of both psychotherapy and pharmacotherapy treatments of CBD in order to guide clinicians regarding treatment allocation and to stimulate further targeted research.

The “hourglass model” is a recognized framework for supporting the appropriate stage development of treatments and therapies (Salkovskis, 1995) and has previously been used to evaluate a psychotherapy evidence base (see Calvert & Kellett, 2014 for an example). In stage 1 of the hourglass model, small practice-based treatment studies (e.g., small N designs) demonstrate proof of concept. In stage 2, treatments are then tested under controlled conditions with larger samples, strict criteria for inclusion, and standardized measurement. Efficacy research designs (such as randomized controlled and deconstruction trials) at stage 2 refine the focus of key ingredients first found in the exploratory research. In the final stage, large-scale practice-based research evaluates the effectiveness of treatment in routine clinical practice and is conducted across multiple sites. The framework is also purposefully cyclical, to be responsive to any conceptual or treatment limitations unearthed. Due to the relative infancy of CBD outcome research, the hourglass model is also used here to indicate and promote appropriate progression of safe and effective treatments. The specific aims of this review were to (a) assess the quality of CBD outcome research, (b) synthesize the progression of CBD outcome research according to the stages of the hourglass model, (c) compare the effectiveness of CBD treatments, (d) illuminate the developmental areas for CBD models, and (e) define the best practice regarding future research methodologies.

METHODS

Literature search

Relevant literature was identified by (a) searching online databases ISI Web of Knowledge, PsycINFO, and PubMed

via Ovid search tools on February 1, 2014, (b) searching article reference lists and citation in the extracted articles, and (c) contacting authors for studies in press (Figure 1). The following keywords were used in each database in a range of combinations: “compulsive buying,” “pathological buying,” “shopping addiction,” “oniomania,” “overspending,” and “treatments” or “exp. Psychotherapy” or “interventions.” Moreover, the asterisk function was used to capture the differences in spelling between the UK and the US and also to consider variations (e.g., “buy*” to capture buying and buyers). Initial search titles and abstracts provided 244 studies from ISI Web of Knowledge, 98 studies from PubMed, and 609 studies from PsycINFO. After duplicates were removed and titles were screened for relevance, 225 articles were considered using the following inclusion criteria: (a) treatment was described in the design; (b) treatment primarily targeted compulsive buying; and (c) articles published in English. After screening full articles, 24 studies met the inclusion criteria. No further exclusion filter was imposed due to the low number of CBD treatment studies. A further four studies were included following the correspondence with key authors. An updated search was conducted on August 6, 2015 using the same search criteria, and a further one study was found and included in this review.

Data synthesis

Both qualitative and quantitative data syntheses were conducted on the extracted articles. First, standardized quality ratings assessed the methodological quality of extracted studies. Second, a narrative synthesis of the outcome research was employed, structured by stages of the hourglass model (Salkovskis, 1995). Third, effect sizes of CBD outcomes were calculated in order to enable effectiveness comparisons, meta-regressions were computed to assess associations between treatment duration and effect size, and funnel plots examined potential publication bias.

Quality ratings. Two quality ratings assessed the methodological quality of studies. First, the Downs and Black (1998) checklist provides a standardized score (0–32) from a list of 27 criteria and is a valid and reliable tool to assess randomized and non-randomized studies (Brouwers et al., 2005; Deeks et al., 2003). As the checklist is difficult to use with case-controlled studies (Higgins et al., 2011), the tool was modified to a 28-criteria scale. Adapted versions of the checklist have been used in previous systematic reviews, where randomized controlled trials (RCTs) are few in number (e.g., MacLehose et al., 2000; Samoocha, Bruinvels, Elbers, Anema, & van der Beek, 2010; Sohanpal, Hooper, Hames, Priebe, & Taylor, 2012). Specifically, the scoring for question 27 dealing with statistical power was simplified to a choice of awarding either 1 or 0 point depending on the presence of a power analysis. A score of 17 points or more identified studies of high methodological quality (Brouwers et al., 2005). Second, the Critical Appraisal Skills Program (CASP UK, 2010) assessed the methodological quality according to specific research design (e.g., RCTs, case-controlled studies, and qualitative studies). For this review, all studies were scored by the first author and 4 of the 29 (14%) studies were selected at

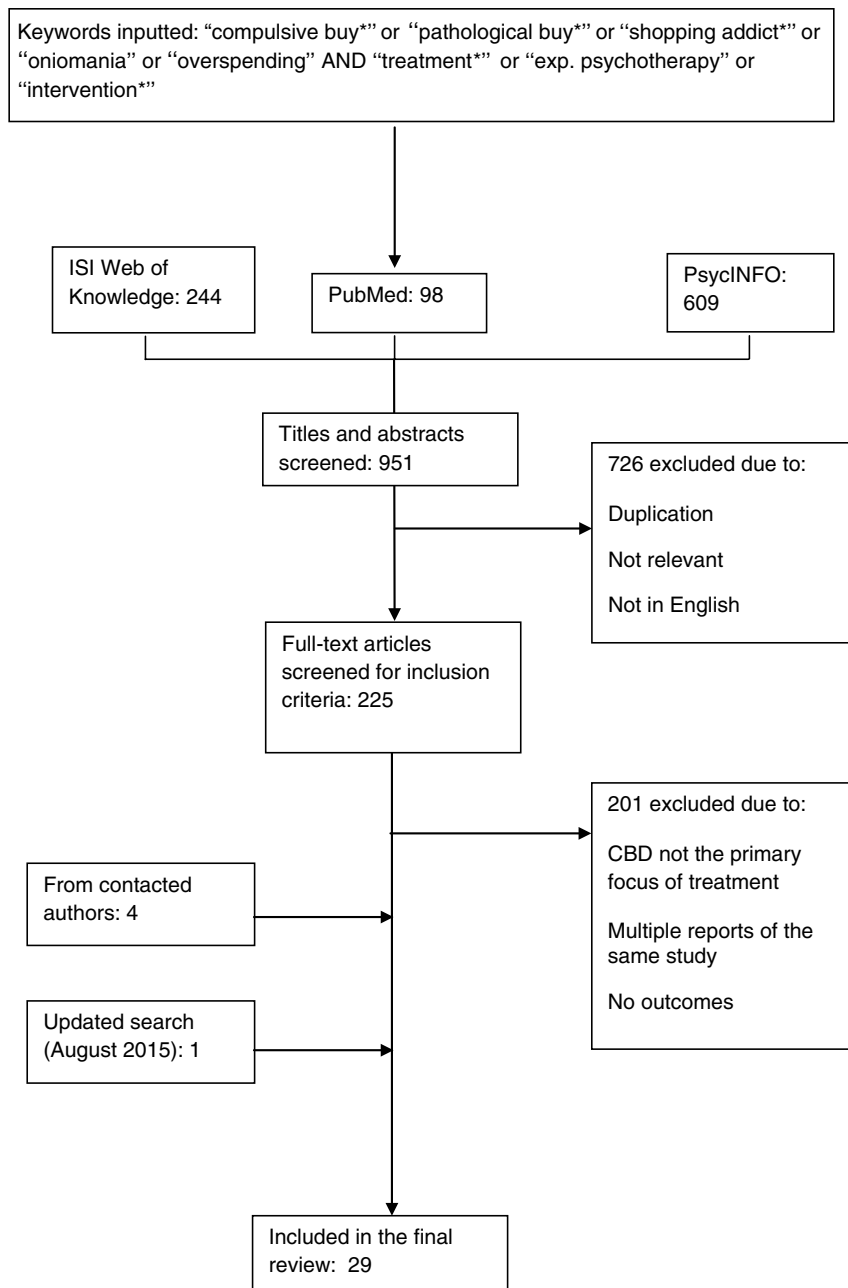


Figure 1. Flowchart of the literature search process

random and scored by an independent rater. Good inter-rater reliability was achieved on Downs and Black (1998) checklist ratings ($K = 0.67$; Altman, 1991), with moderate agreement on CASP ratings ($K = 0.51$; Altman, 1991).

Calculating and considering effect sizes. Outcome studies are summarized via forest plot analysis to provide a visual representation of the average effect sizes across the studies and enable comparisons of effectiveness between psychotherapy and pharmacotherapy for CBD. Studies were included in the forest plot analysis that (a) reported mean and standard deviations of outcomes at pre- and post-treatment and associated sample sizes, (b) employed the YBOCS-SV (Monahan et al., 1996) as the primary outcome measure, and (c) recruited samples larger than $N = 1$. Pre-post ES calculations were undertaken using STATA v.10

(StataCorp, 2007) dividing the mean pre- to post-treatment change in YBOCS-SV scores by the pre-treatment standard deviation (Becker, 1988). The YBOCS-SV was the outcome measure of choice because it reports on both distress and behaviors associated with CBD and has been shown to be sensitive to change during CBD treatment (Monahan et al., 1996). Although other CBD assessment measures are available (see Maraz et al., 2015 for examples), these measures were not used here due to their absence in retrieved CBD treatment studies.

Forest plots were then generated on STATA, commanded by Metan (Harris et al., 2008). Tests for heterogeneity were calculated using I^2 , a statistic that indicates the percentage of variance in a meta-analysis attributable to study heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003).

As this review was trying to estimate the combined effect of sets of studies investigating the effectiveness of psychotherapy and pharmacotherapy for CBD, there needed to be a check that the effects found in the individual studies were similar enough that the combined estimate was a meaningful description. The I^2 indicated whether there was more heterogeneity than would be expected by the chance alone.

To assess whether treatment duration was associated with YBOCS-SV effect size for each type of treatment (psychotherapy, drug treatment, and placebo), a series of univariate meta-regressions were conducted using the METAREG macro (Wilson, 2005). Funnel plots of YBOCS-SV effect sizes (plotted against the effect size standard error) were used to check for publication bias (Egger, Smith, & Minder, 1997). Three separate funnel plots were produced for each treatment type (psychotherapy, drug treatment, and placebo). Publication bias is indicated by visual asymmetry in funnel plots, the absence of trials in the bottom corner of the plot suggesting inflation of the population effect size estimate (Higgins & Green, 2011).

RESULTS

Study characteristics

Table 1 summarizes the studies ($N=29$) extracted for this review, reporting total quality scores. Psychotherapy ($n=17$) and pharmacotherapy studies ($n=12$) are presented in two sections and studies are arranged by research methodology consistent with identified stages of the hourglass model. Studies that described both psychotherapy and pharmacotherapy treatments ($n=2$) were included in the treatment arm that provided the greatest detail in the paper. Table 2 summarizes the CBD treatments ($n=6$) that have been tested under conditions of high methodological quality, adjudged by scoring 17 or higher according to the Downs and Black (1998) criteria.

Nine case reports constituted over half (53%) of the CBD psychotherapy evidence base. Methodological quality was generally poor across each of the quantitative case reports ($n=8$, $M=6.3$, range 0–14, and 0 of 8 rated as high quality). A notable exception was a cognitive behavioral therapy (CBT) single case experimental design (SCED) that scored on 8 of the 11 quality criteria on the CASP. The qualitative case study on family therapy ($n=1$) met only 4 of the 10 quality criteria on the CASP. Four effectiveness studies were of varying quality ($M=11.6$, range 6–18, and 1 of 4 rated as high quality) and testing group mindfulness-based stress reduction ($n=1$), CBT groups ($n=2$), and experiential therapy ($n=1$). Four psychotherapy RCTs were identified: (a) group self-control approach ($n=1$); (b) group CBT ($n=2$); and (c) integrated group therapy ($n=1$). RCTs were generally of high quality ($M=18.0$, range 9–23, and 3 of 4 rated as high quality; Table 2). No large-scale practice-based research has been conducted (i.e., stage 3 of the hourglass model).

For CBD pharmacotherapy treatment, six case reports (50%) were extracted that tested tricyclic and selective serotonin reuptake inhibitor (SSRI) antidepressants ($n=2$), an opioid receptor antagonist ($n=1$), an NMDA-receptor

Table 1. Data extraction table for CBD treatments

Reference	Treatment	Design (stage of the hourglass model)	Treatment duration (weeks)	Intervention group (N)	Control group (Y/N)	Standardized outcome measures	Downs and Black score	CASP score
Bernik et al. (1996)	Behavior therapy	Case report (1)	4	2	N	–	3	1
Braquehais et al. (2012)	CBT and drug therapy (flvoxamine/topiramate)	Case report (1)	4	1	N	–	8	3
Donahue et al. (2011)	Behavior therapy and motivational interviewing	Case report (1)	12	1	N	–	5	1
Kellett and Bolton (2009)	CBT	Case report (1)	14	1	N	YBOCS-SV, CBS, BDI, BSI, IIP-32	13	7
Kellett and Robinson (2009)	CBT and counseling	SCED (1)	10	1	Y	YBOCS-SV, CBS, BDI, BSI, IIP-32	14	8
Krueger (1988)	Psychodynamic psychotherapy	Case report (1)	–	4	N	–	0	0
Marčinko and Karlović (2005)	CBT and drug therapy (flvoxamine)	Case report (1)	52	1	N	YBOCS-SV	6	0
Park et al. (2006)	Family therapy	Qualitative case report (1)	15	1	N	–	–	4
Winstone (1985)	Psychoanalytic psychotherapy	Case report (1)	–	1	N	–	0	0
Armstrong (2012)	Mindfulness-based stress reduction	Pre-post study (1)	8	8	N	YBOCS-SV	11	6

Filomensky and Tavares (2009)	Group CBT	Pre-post study (1)	20	9	N	YBOCS-SV	6 (9)	4 (4)
Klontz et al. (2008)	Experiential therapy	Pre-post study (1)	<1	33	N	BSI, MAS, FHS	11	4
Mitchell et al. (2006)	Group CBT	Controlled trial (1)	12	28	Y	YBOCS-SV, CBS	18 ^a	9
Benson et al. (2014)	Group psychotherapy	RCT (2)	12	22	Y	YBOCS-SV	20 ^a	7
Mueller et al. (2008)	Group CBT	RCT (2)	12	60	Y	YBOCS-SV, CBS	23 ^a	9
Müller et al. (2013)	Group CBT versus guided self-help	RCT (2)	12 (CBT) 10 (GSH)	56	Y	YBOCS-SV, CBS, BDI	20 ^a (17 ^b)	8 (8)
Paulsen et al. (1977)	Self-control treatment versus psychoanalytic	RCT (2)	4	16	N	-	9	5
Grant (2003)	Opioid antagonist (naltrexone)	Case report (1)	48	3	N	-	3	1
Guzman et al. (2007)	Anticonvulsant (topiramate)	Case report (1)	12	1	N	BDI	6	2
Kim (1998)	Opioid antagonist (naltrexone)	Case report (1)	36	15	N	-	5	2
McElroy et al. (1991)	TCA/SSRI antidepressants	Case report (1)	12	3	N	-	4	2
McElroy et al. (1994)	TCA/SSRI antidepressants	Case report (1)	-	20	N	-	6	1
Ye et al. (2014)	Anticonvulsant (topiramate)	Case report (1)	6	1	N	YBOCS-SV	4	3
Black et al. (1997)	SSRI antidepressant (fluvoxamine)	Pre-post study (1)	12	10	N	YBOCS-SV, HAM-D	13	7
Grant et al. (2012)	NMDA-receptor agonist (memantine)	Pre-post study (1)	10	9	N	YBOCS-SV	13 (14)	7 (5)
Black et al. (2000)	SSRI antidepressant (fluvoxamine)	RCT (2)	9	12	Y	YBOCS-SV, CBS, HAM-D	19 ^a	8
Koran et al. (2003)	SSRI antidepressant (citalopram)	RCT (2)	9	24	Y	YBOCS-SV, MADRS	15	5
Koran et al. (2007)	SSRI antidepressant (escitalopram)	RCT (2)	9	26	Y	YBOCS-SV, MADRS	8 (12)	4 (5)
Ninan et al. (2000)	SSRI antidepressant (fluvoxamine)	RCT (2)	13	23	Y	YBOCS-SV, HAM-D	14	6

Note. SCED = Single-Case Experimental Design; RCT = randomized controlled trial; BDI = Beck Depression Inventory; BSI = Brief Symptom Inventory; CBS = Compulsive Buying Scale; FHS = Financial Health Scale; IP-32 = Inventory of Interpersonal Problems-32; MADRS = Montgomery-Asberg Depression Rating Scale; MAS = Money Attitude Scale; YBOCS-SV = Yale-Brown Obsessive Compulsive Scale-Shopping Version; GSH = guided self-help; TCA = tricyclic; SSRI = selective serotonin reuptake inhibitor; HAM-D = Hamilton Rating Scale for Depression; NMDA = N-Methyl-D-Aspartate. Scores in parenthesis denote the independent second rating.
^aStudy rated as high quality.

Table 2. High-quality CBD treatments and outcomes

CBD treatment (duration; components)	Reference	Sample (n); outcome
Group CBT (12 weeks)	Mitchell et al. (2006)	28; significant pre–post and pre-6-month-follow-up reductions in YBOCS-SV
Stopping overshopping group (12-week group program; CBT/MI/DBT/ACT)	Benson et al. (2014)	11; significant pre–post and pre-6-month-follow-up reductions in YBOCS-SV
Group CBT (12 weeks; Mitchell’s group program)	Mueller et al. (2008)	60; significant pre–post and pre-6-month-follow-up reductions in YBOCS-SV
Group CBT (12 weeks)	Müller et al. (2013)	22; significant reductions in YBOCS-SV compared with wait-list
Telephone-guided self-help (12 weeks)	Müller et al. (2013)	20; significant reductions in YBOCS-SV compared with wait-list
SSRI antidepressant fluvoxamine (8 weeks)	Black et al. (2000)	24; no difference between drug and placebo in YBOCS-SV

Note. MI = motivational interviewing; DBT = dialectical behavior therapy; ACT = acceptance and commitment therapy.

antagonist ($n = 1$), and anticonvulsants ($n = 2$). All case reports were low quality ($M = 4.7$, range 3–6, and 0 of 6 rated as high quality). Two effectiveness studies were found testing SSRI antidepressant ($n = 1$) and an NMDA-receptor antagonist treatment ($n = 1$) and were rated equally in quality ($M = 13.0$, range 13–13, and 0 of 2 rated as high quality). The four RCTs conducted tested three types of SSRI antidepressants and were of mixed quality ($M = 14.0$, range 8–19, and 1 of 4 rated as high quality; Table 2). Again, no large practice-based outcome research (stage 3 of the hourglass model) was available.

Synthesis of the CBD psychotherapy evidence base

Case reports (stage 1 of the hourglass model). Ubiquitous positive outcomes for compulsive buyers were reported in case reports describing the psychoanalysis (Winestine, 1985), psychodynamic psychotherapy (Krueger, 1988), behavioral approaches (Bernik, Akerman, Amaral, & Braun, 1996; Donahue, Odlaug, & Grant, 2011), and cognitive-behavioral approaches augmented with antidepressant medication (Braquehais, Del Mar Valls, Sher, & Casas, 2012; Marčinko & Karlović, 2005). Despite the encouraging conclusions, these six case reports had common methodological flaws and omissions, consistently lacking a standardized measure to assess CBD and also an index of treatment adherence. Moreover, all were inadequately described, rendering the research vulnerable to many internal biases.

Of higher quality were a case report (Kellett & Bolton, 2009) and an SCED (Kellett & Robinson, 2009) describing a 10-session cognitive-behavioral intervention that comprised planned avoidance, exposure and response prevention, emotional regulation, and assertiveness training. Clinically significant change was shown on the YBOCS-SV between assessment and termination, with no deterioration at 6-month follow-up. Both reports provided a clear detail on CBT formulation and treatment, with the behavioral measures in the SCED adding objectivity to outcome assessment. Notably, the SCED (Kellett & Robinson, 2009) provided a comparator with counseling, but this within-subject control was undermined by an absence of statistical comparisons between treatment phases. Again, external validity was compromised in both reports by an absence

of the source of participant and practitioner qualification. Finally, qualitative evaluation of family therapy provided an appropriate methodology to explore mechanisms of change during CBD treatment (Salkovskis, 1995). Park, Cho, and Seo (2006) evaluated family therapy via grounded theory, in which a clear description of the 15-session treatment is provided. Rigorous analysis was employed on session transcripts, including a validation process by client feedback and then by independent researchers. Conversely, no clear information about the selection of compulsive buyers or a clear statement of outcome was given. As with the other case studies, these omissions compromise the generalizability of the findings.

Effectiveness studies (stage 1 of the hourglass model). All four effectiveness studies considered group treatment of CBD. All studies reported significant reductions in YBOCS-SV scores or distress associated with CBD, but only one group study (Mitchell, Burgard, Faber, Crosby, & de Zwaan, 2006) was rated as high quality. Mitchell et al. (2006) compared female participants assigned (non-randomly) to either group CBT ($n = 28$) or wait-list ($n = 11$). Participants were screened using the Compulsive Buying Scale (CBS; Faber & O’Guinn, 1992) and excluded if they had alcohol or drug dependence. CBT comprised 12-weekly sessions covering psychoeducation, cognitive restructuring, financial planning, and exposure techniques, with between-sessions homework. Significant pre–post and pre-follow-up reductions were found in CBD episodes and the money spent on consumer items. However, the considerable attrition rates found at both recruitment (32%) and during treatment (28%) question the acceptability of the treatment. Although selection bias was uncontrolled through a lack of randomization, internal validity was improved by clear sourcing of participants, standardized assessment tools, and intention-to-treat analysis on dropouts. In a smaller CBT group pilot ($N = 9$), Filomensky and Tavares (2009) delivered the same Mitchell et al. (2006) protocol within an extended 20-week program to more actively target CBD cognitions. Full attendance for the group (100%) and significant reductions in cognitive components of the YBOCS-SV were reported post-treatment. Unlike Mitchell et al. (2006), the authors failed to provide information regarding the participants, the location, or the therapists

involved. Inadequate reporting therefore limited the exploration of the results.

Klontz, Bivens, Klontz, Wada, and Kahler (2008) reported intensive 6-day group programs with problem spenders ($N = 33$), comprising financial planning integrated with the experiential therapy. Results indicated significant improvements in mood and reductions in problematic attitudes toward buying at termination and at 3-month follow-up. Caution must be applied to the findings, as no formal measures were used to determine diagnosis beyond “money-disordered behaviors.” Also, the external validity of the experiential program was questionable, as participants were required to stay at a retreat and engage in over 100 hr of treatment. Armstrong (2012) employed a mixed methods approach to monitor the effectiveness of a small sample ($n = 6$) undertaking group mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982). Following the treatment, clinically significant change was found in YBOCS-SV scores of the CBD group receiving MBSR. Interpretative phenomenological analysis also revealed greater awareness of physiological drives to buy, in addition to control over emotional regulation when buying. Despite clear recruitment and treatment procedures, lack of randomization and opportunistic sampling rendered the sample vulnerable to selection bias.

RCTs (stage 2 of the hourglass model). The four RCTs completed also tested group treatment for CBD and were largely (3 of 4) of high quality. The (low quality) exception was the early Paulsen, Rimm, Woodburn, and Rimm (1977) RCT. Participants ($N = 19$) were randomized to receive either CBT groups that comprised reinforcement principles and practical planning around buying (over 4 weeks) or a placebo condition in which buying was discussed using psychoanalytic constructs. Full attendance in the CBT condition reflected high treatment acceptability. Conclusions, however, are limited to a self-selected and non-clinical sample. The lack of information regarding the recruitment procedure also limits the external validity of the findings.

Two (high quality) RCTs have tested the Mitchell et al. (2006) group CBT approach. First, Mueller et al. (2008) compared the 12-week program to a wait-list condition over the same period. Compulsive buyers were recruited through local advertising and assessed for CBD using a diagnostic interview developed in previous CBD research (McElroy, Keck, Pope, Smith, & Strakowski, 1994). Participants were included only if they were stable on antidepressants for 3 months, but were excluded if they met criteria for manic depression, or had current suicidal intent. Accordingly, only 12% did not meet the inclusion criteria. Eligible participants ($N = 60$) were randomized to either group CBT or wait-list. Those in the experimental condition showed improvement on the YBOCS-SV and CBS post-treatment and at 6-month follow-up. Müller, Arikian, de Zwaan, and Mitchell (2013) not only employed a similar wait-list RCT design but also used a low-intensity guided self-help (GSH) intervention as an additional active control. Participants randomized to GSH devoted time to reading a manual and completing self-directed tasks (based on Mitchell et al., 2006) and were also supported over the telephone at five time points over a 10-week period. Group CBT ($n = 22$) and GSH ($n = 20$)

participants showed a marked improvement in YBOCS-SV scores compared with wait-list, with equivalent reliable CBD change rates (45% in GSH group compared with 50% in CBT group). In both of these trials, standardized outcome measures were used and differences in age and severity were controlled for. Equally, intention-to-treat was appropriately employed in both studies, considering attrition rates of 19% (Mueller et al., 2008) and 27% (Müller et al., 2013), respectively. Importantly, Mueller et al. (2008) showed that attendance was a significant predictor of outcome.

Most recently, Benson, Eisenach, Abrams, and van Stolck-Cooke (2014) developed the “stopping overshopping program.” This program integrated CBT (Mitchell et al., 2006; Mueller et al., 2008; Müller et al., 2013), acceptance and commitment therapy, and psychodynamic principles. A 12-week pilot was conducted on a small sample ($N = 11$), with a comparable recruitment process to the CBT group RCTs. Secondary outcome measures assessed the potential benefit to known comorbid issues associated with CBD. Clinically significant reductions in CBS and YBOCS-SV scores were reported in the CBD group (but not wait-list) at termination, with additional reductions in associated item hoarding. Similar to the CBT group RCTs, the inclusion of a 6-month follow-up period in the Benson et al. (2014) study was a strength of the design, revealing durable gains for compulsive buyers.

In summary, group psychotherapeutic treatment of CBD in terms of delivery of adapted CBT, self-control strategies, and eclectic approaches appears effective in reducing distress and maladaptive buying behavior associated with CBD. The evidence suggests that treatment gains following group intervention are durable. When group psychotherapy outcomes have been compared with a low-intensity intervention (one-to-one telephone GSH for CBD), effects appear comparable.

Synthesis of the CBD pharmacotherapy evidence base

Case reports (stage 1 of the hourglass model). Six case reports describe positive conclusions from treating CBD with tricyclic and SSRI antidepressants (McElroy et al., 1994; McElroy, Satlin, Pope, Keck, & Hudson, 1991), a course of the opioid antagonist, naltrexone with the aim of reducing urges associated with CBD (Grant, 2003; Kim, 1998), and a 3-month treatment of the anticonvulsant topiramate with the rationale that it has shown some efficacy with mood disorders and obsessive and compulsive symptoms (Guzman, Filomensky, & Tavares, 2007; Ye, Kadia, & Lippmann, 2014). The case reports make a poor contribution to CBD pharmacotherapy outcome evidence base, as outcomes in all but one report (Ye et al., 2014) were unsupported by valid or reliable outcome measurement. All case reports had in common a lack of sufficient methodological control and the insufficient detail in general reporting would also greatly limit generalizability and replication. Adverse effects also undermined the effectiveness of each drug (McElroy et al., 1991, 1994).

Effectiveness studies (stage 1 of the hourglass model). Two of the extracted pharmacotherapy studies employed a pre-post design, with varied quality. Black et al. (1997)

examined a 9-week course of fluvoxamine (SSRI antidepressant) in an uncontrolled CBD sample ($N = 10$). Results show significant reductions in YBOCS-SV outcome scores after placebo phase, with further reductions post-treatment. The inclusion of a single-blind placebo phase in the Black et al. (1997) study provided conditions to test the true effect of the drug. However, no comparison was made between improvement pace/rates in each phase, limiting conclusions about continued effect of placebo in active treatment. Grant, Odlaug, Mooney, O'Brien and Kim (2012) completed an open-label study of the effectiveness of memantine (an NMDA-receptor agonist used in the treatment of impulsivity). In the small uncontrolled sample ($N = 9$), significant improvements in YBOCS-SV scores between baseline and end of treatment were reported. No follow-up data were provided and so restricted any conclusions about durability of memantine and the lack of a control group limited treatment efficacy comparisons. For both studies, inclusion of the YBOCS-SV improved the internal validity of the methodologies used, reflecting a progression from case report methodology. The lack of information regarding the recruitment procedures limits the conclusions concerning generalizability.

RCTs (stage 2 of the hourglass model). Four RCTs have tested the SSRI antidepressants citalopram (Koran, Chuong, Bullock, & Smith, 2003), escitalopram (Koran, Aboujaoude, Solvason, Gamel, & Smith, 2007), and fluvoxamine (Black et al., 2000; Ninan et al., 2000), producing contrasting outcomes. Two comparable placebo-controlled studies tested the efficacy of fluvoxamine to replicate Black et al.'s (1997) findings under stricter methodological conditions. In a high-quality study, Black et al. (2000) recruited compulsive buyers ($N = 24$), who all first received placebo for 1 week in a "wash-out" phase. Participants were then assigned to either fluvoxamine or placebo for 8 weeks, with weekly check-ups around side effects and dosage. Use of standardized measures of CBD, randomization, and analysis inclusive of dropouts minimized selection bias, improving the internal validity of the findings. No differences were found between fluvoxamine and placebo; the clinically significant change rate (on YBOCS-SV scores) was greater for placebo (55%) than fluvoxamine (17%). Significantly greater symptoms of nausea, insomnia, decreased motivation, and sedation were found in the active drug treatment arm. This method was replicated in a larger university student-based study ($N = 42$) over a 13-week period (Ninan et al., 2000). No significant differences were found between treatment and placebo in domains of CBD distress, general functioning, and depression. High attrition rates (45%) occurred from recruitment, with a further eight participants (19%) dropping out due to the adverse side effects from taking Fluoxetine. Failure to report the characteristics of these participants limited conclusions about the potential harms of treatment. The initial promising findings for the SSRI fluvoxamine were subsequently not confirmed in high-quality trials, in which experience of side effects appeared common and prominent.

Koran et al. (2003, 2007) completed equivalent double-blind discontinuation trials of the SSRI's citalopram ($N = 24$) and escitalopram ($N = 26$), respectively. Participants were randomized to a 9-week discontinuation phase of

placebo or drug treatment, following a 7-week open-label phase. Koran et al. (2003) found reductions in YBOCS-SV scores after open-label treatment. Further improvements were reported in the citalopram group following the discontinuation phase (though non-significant), while YBOCS-SV scores in the placebo group were significantly deteriorated. In the Koran et al. (2007) replication study, findings were reversed for escitalopram. In both trials, weekly consultations monitored drug dosages across study phases. Internal validity was improved from antidepressant case reports (McElroy et al., 1991, 1994) due to the presence of randomization and standardized assessment procedures, outcome monitoring, and the exclusion of participants with comorbid presentations. Substantial relapse rates (defined by scores over 16 on the YBOCS-SV) were found after the discontinuation phase in both the escitalopram arm (63%) and placebo arm (67%). In both studies, a significant number met responder status by the end of open-label treatment, indicating a large placebo effect prior to randomization. Promising findings for citalopram in Koran et al. (2003) requires further study. Conversely, a marked improvement from the open-label phase Koran et al. (2007) failed to confirm true drug effects of escitalopram. Failure to detail safeguards for blinding both the researchers and the participants suggests that vulnerability to these internal biases could account for contrasting outcomes.

Effect of psychotherapy and pharmacotherapy treatments on CBD

Effect sizes were calculated for appropriate CBD treatment studies, with a pre-post effect being employed due to the large proportion of uncontrolled studies (67%). Fourteen CBD treatments met the criteria for inclusion (within 10 CBD studies). Effect sizes were then divided into CBD psychotherapy ($n = 6$) and CBD pharmacotherapy ($n = 8$) interventions, with the latter subdivided into active treatment ($n = 5$) and placebo ($n = 3$).

Effect of psychotherapy intervention. Figure 2 illustrates an overall uncontrolled effect size for psychotherapy CBD treatments ($n = 6$) of $d = 1.51$ (95% CI = 1.18–1.84), $p < .001$. Although a range of psychotherapeutic approaches were delivered, tests for heterogeneity showed non-significant differences ($I^2 = 8.04$, $df = 5$, $p = .154$), indicating that psychotherapy for CBD were homogenous. Group CBT studies contributed most of the weighting (72.8%) in the large effect size found. The GSH active control arm in the (high quality) Müller et al. (2013) trial produced an equivalent outcome effect to group CBT. Figure 4 (top) shows the funnel plot for the CBD psychotherapy outcome studies. Observed asymmetry indicates that less precise (smaller) psychotherapy studies with non-significant findings may not have been published. This therefore suggests that treatment effect size estimates for psychotherapy for CBD reported may represent an overestimation of the effect. Meta-regression found that duration of psychotherapy was not significantly associated with CBD treatment effects ($\beta = -0.28$, $z = -1.33$, $p = \text{not significant}$).

Effect of pharmacotherapy intervention. Figure 3 illustrates the effect sizes for pharmacotherapy CBD treatments and placebo comparisons, respectively. The

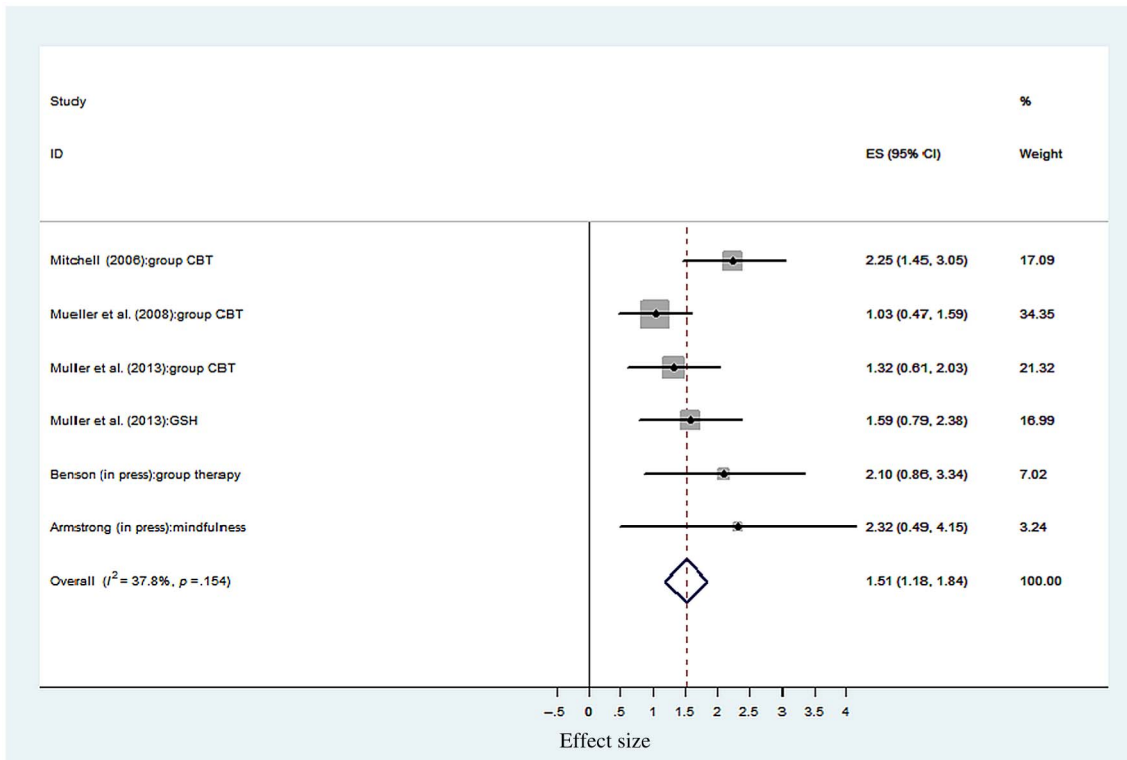


Figure 2. Uncontrolled effect sizes for CBD psychotherapy. ES = effect size and 95% CI; % weight = sample size determines the weighting of each study toward the overall ES; GSH = guided self-help (control) condition

Koran et al. (2007) study on escitalopram effect size was not calculated due to the lack of reported outcomes in the post-discontinuation phase. Overall, pharmacological treatments ($n = 5$) produced an uncontrolled effect size of $d = 1.84$ (95% CI = 1.27–2.40), $p < .001$. Placebo controls within the same studies ($n = 3$) produced an equivalent effect of $d = 1.26$ (95% CI = 0.59–1.93), $p < .001$. This overlap between drug and placebo confidence intervals suggests a non-significant difference between active and placebo CBD drug treatments. The poor methodological quality of the outcome studies of fluvoxamine (Black et al., 1997; Ninan et al., 2000) and memantine (Grant et al., 2012) undermines the large effect size found. Black et al.’s (2000) trial revealed the comparable effects of placebo to fluvoxamine. However, during the double-blind phase, Koran et al.’s (2003) study effects demonstrate the maintenance of clinical effects with citalopram, and not placebo (Figure 3). The differences in methodological quality, sample size, and intervention contributed to significant heterogeneity being found across active drug treatments ($I^2 = 14.47$, $df = 4$, $p = .006$) and placebo ($I^2 = 22.85$, $df = 2$, $p < .001$). Asymmetry in the drug treatment funnel plot (Figure 4, middle) indicates that less precise drug treatment studies, with non-significant findings, may not have been published resulting in an overestimation of treatment effects. As expected, given the small number of placebo studies assessed, the corresponding funnel plot (Figure 4, bottom) was also asymmetrical. It is, therefore, likely that publication bias also affected the effect size estimate for CBD placebo studies. Duration of drug treatment was significantly associated with CBD outcome ($\beta = 0.69$, $z = 7.48$, $p < .001$), as was the duration of the

placebo period ($\beta = 0.53$, $z = 8.64$, $p < .001$). Therefore, longer drug treatments and placebo periods were both associated with improved CBD treatment outcomes.

In summary, the large effects in studies of high methodological quality for group psychotherapy and also GSH for CBD indicate the promise of such approaches. In contrast, the synthesis and effect sizes for pharmacotherapy CBD treatments highlighted a mismatch between the effectiveness of the intervention and the quality of the study conducted, with the possible exception of Koran et al.’s (2003) citalopram study. Caution is indicated regarding the interpretation of all the calculations across type of CBD intervention as (a) uncontrolled effect sizes are often larger than the controlled effects (Field, 2005) and (b) large effect sizes are potentially compromised once poor acceptability, unknown durability and poor treatment model fidelity are considered.

DISCUSSION

This review assessed the standing, progression, and outcomes of the CBD psychotherapy and pharmacotherapy treatment evidence bases. This review used the Salkovskis (1995) hourglass model as a framework for treatment research progression, whereby externally valid small N practice-based research are the foundation stone for controlled trials whose external validity is then tested again in large N practice-based research. This systematic and meta-analytic review of the CBD outcome research draws the following conclusions: (a) the evidence base for CBD

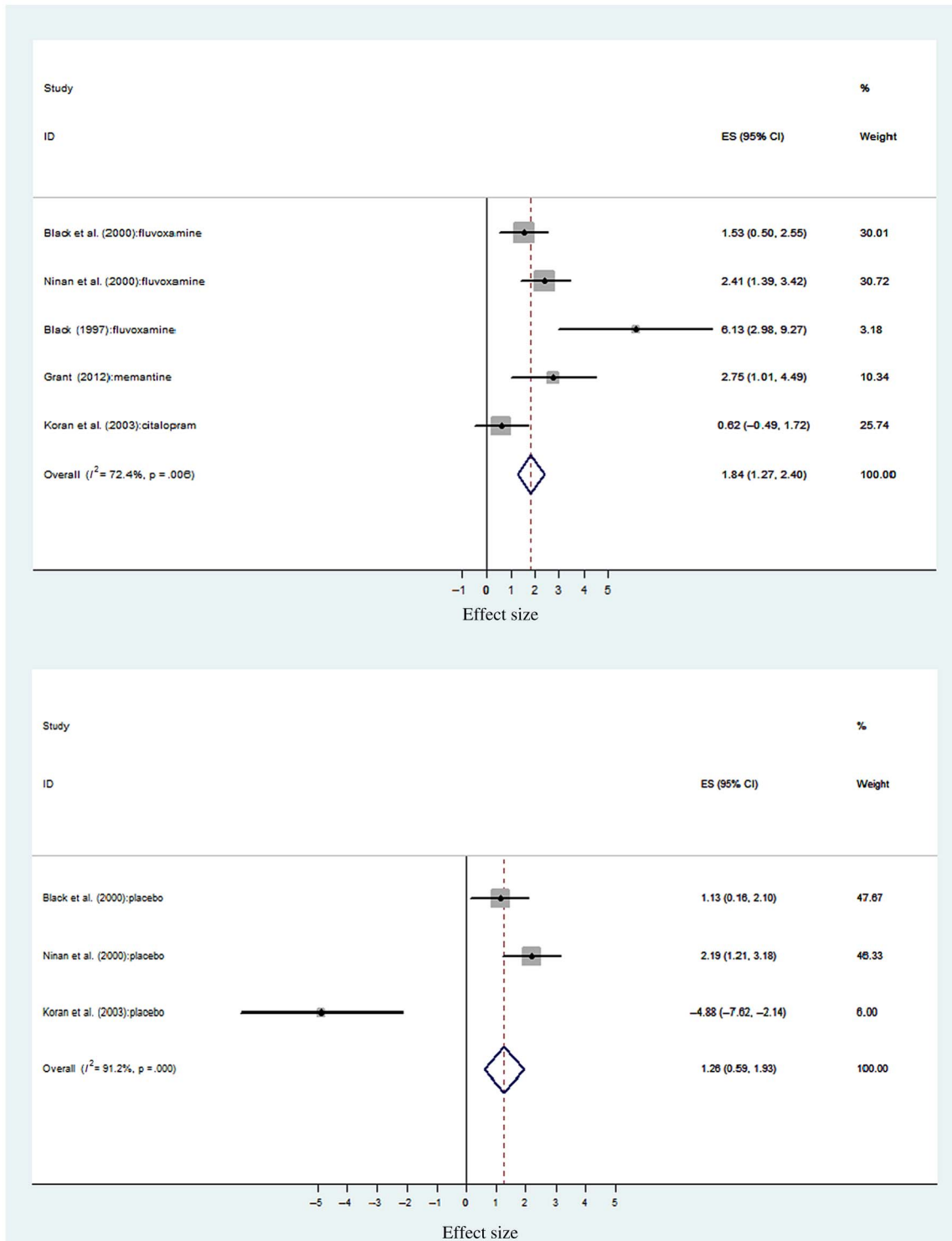


Figure 3. Uncontrolled effect sizes for CBD pharmacotherapy and placebo. ES = effect size and 95% CI; % weight = sample size determines the weighting of each study toward the overall ES

treatments is somewhat undermined by inconsistent study quality and the risk of publication bias; (b) both psychotherapy and pharmacotherapy treatments have been studied somewhat haphazardly and sporadically across the stages of the hourglass model; (c) large pre-post effect sizes in high-quality studies of group psychotherapy show the promise of this approach; (d) large uncontrolled effect sizes for drug

treatments are undermined by poor methodological quality; (e) there appears a significant placebo effect when treating CBD with medication; and finally, (f) the lack of large-scale practice-based studies (stage 3 of the hourglass) is appropriate, given the paucity of controlled psychotherapy and pharmacotherapy outcome studies at stage 2 of the hourglass model.

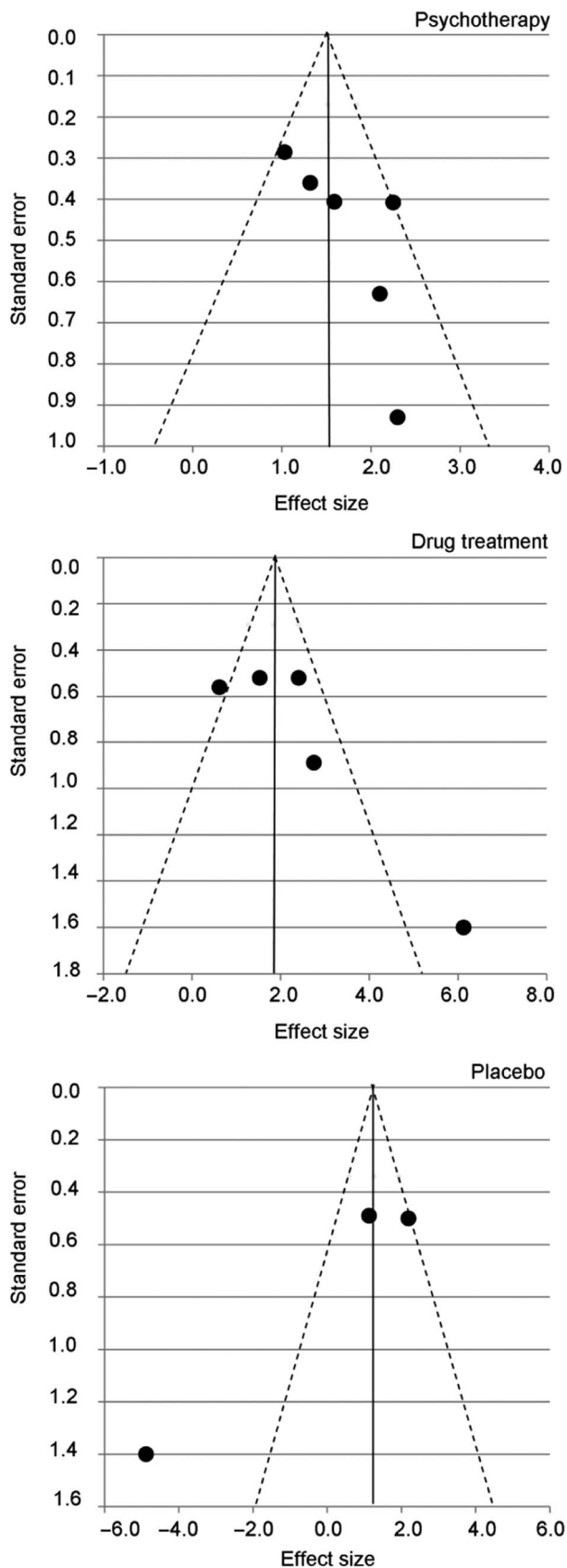


Figure 4. Funnel plots of YBOCS-SV effect sizes for studies included in the forest plot analyses ($k = 14$), broken down by the treatment type assessed: psychotherapy (top), drug treatment (middle), and placebo (bottom)

Clinical implications

Group psychotherapy that primarily adopts a cognitive-behavioral approach, or use the cognitive-behavioral approach nested within an eclectic approach appear to be useful and have a durable effect in reducing distress associated with CBD and maladaptive buying behavior. Group treatments have shown to be effective with other impulse control disorders such as pathological gambling (Cowlshaw et al., 2012) and intermittent explosive disorder (McCloskey, Noblett, Deffenbacher, Gollan, & Coccaro, 2008). Recent experimental evidence suggests that impulse control training should be a core component of CBD treatment (Hague, Kellett, & Sheeran, 2016). It is worth noting that attrition rates show that group psychotherapy may not be an acceptable approach for all CBD patients, and that patient choice and suitability are also still important considerations.

Results also need to be considered in light of the stepped care delivery model for psychological interventions (Bower & Gilbody, 2005). This is because the evidence suggests that a low-intensity GSH approach to treating CBD was comparative to high-intensity group CBT. If patients can be treated with effective, brief, and less intensive psychological intervention first, then this can increase service throughput and efficiency (Firth, Barkham, & Kellett, 2015). Investigation of contemporary interventions such as internet-based therapist-assisted self-help programs also usefully mimic the shift of consumer behavior toward online shopping (Ridgeway, Kukar-Kinney, & Monroe, 2011). Recent research shows that excitability regarding online shopping and CBD are mediated by internet use expectancies (Trotzke, Starcke, Müller, & Brand, 2015). Treatments clearly need to reflect the context within which CBD occurs.

Large effect sizes were found for SSRI antidepressant medication. However, SSRIs did not show significant superiority in terms of efficacy when treating CBD compared with placebo. Interestingly, the SSRI's citalopram and escitalopram (which share the same active compound) showed contradictory findings. Further high-quality research into the role of SSRIs in treating CBD is required; particularly as these studies currently constitute a large proportion of the current pharmacotherapy evidence base. Greater detail and consistency in reporting outcomes in studies are also highlighted by the lack of effect size calculations in Koran et al.'s (2007) study. Controlled studies of fluvoxamine showed no greater benefit than placebo in treating CBD. The apparent mismatch between large effect sizes and poor quality of SSRI outcome studies particularly emphasizes the importance of consistent utilization of robust outcome methodologies in future CBD pharmacotherapy outcome research. Longer treatments appear associated with improved treatment outcomes when using pharmacotherapy to treat CBD and less when delivering psychotherapy. Why this longitudinal relationship is the case demands further investigation. Harm in terms of side effects and risk of dropout also needs to be carefully considered in relation to the pharmacotherapy of CBD.

A lack of clarity remains in the comparison of psychotherapeutic and pharmacological interventions for CBD. This is because there is a paucity of sufficiently sized trials comparing psychotherapies and pharmacotherapies with

themselves and between each other. There is less utility in conducting more passive control wait-list control trials of psychotherapeutic interventions for CBD (more use of active treatment controls is indicated) and conversely the need for more double-blind placebo-controlled trials in pharmacological treatment evidence base. Researchers need to consider randomizing participants to types of psychotherapy following the initial pharmacotherapy (and vice versa). The current CBD evidence base would suggest that clinicians should initially consider a psychotherapeutic treatment option, prior to starting pharmacotherapy. This is because ES metrics should always be considered in the context of the quality of the evidence base. The group psychotherapy effects were found in the context of studies with sufficient methodological quality.

Scientific state of the CBD treatment evidence

Low-quality case reports constitute a worryingly large proportion of CBD treatment evidence base. According to the hourglass model, initial practice-based designs are essential in developing clinical concepts, but are then required to be rigorously tested and refined under strict methodological conditions (Salkovskis, 1995). The CBD evidence base is therefore unbalanced by the number of stage 1 type studies, which have additionally not proven the stimulus or foundation stone for future detailed and controlled inquiry. The small numbers of subsequent stage 2 high-quality studies (i.e., randomized and controlled) means that efficacy of CBD treatments has not been extensively tested. No treatment component analyses have been conducted at stage 2, so that identifying the active ingredients of CBD treatments has been hindered. Due to trials having strict inclusion and exclusion criteria, then CBD participants with comorbid presentations have tended to be excluded. No large-scale stage 3 service evaluations have been attempted and this would seem appropriate given the need for more model-specific stage 1 and 2 evidence as the foundation stone upon which such studies could be based. Future research should endeavor to utilize the hourglass model in order to target treatments and methodologies at appropriate stages to enhance the CBD evidence base. For some psychotherapy modalities (particularly more interpersonal/psychodynamic approaches), it would be a mistake to rush into conducting a trial.

When specific CBD treatments were isolated for analysis, then this review highlights that they have typically been studied sporadically across the stages of the hourglass model. Of the fifteen different treatment modalities extracted, only group CBT and SSRI antidepressant interventions had progressed through more than one stage. The vital importance of the connected progression of outcome research is typified by SSRI antidepressant outcome studies (Black et al., 2000; Koran et al., 2007), where poor efficacy and harm were only highlighted when the complexity of methodological designs were refined and improved. Stage 1 studies can unwittingly and artificially inflate the assumed safety and effectiveness of an intervention. The common inconsistency of study quality indicates the potential presence of a consistent “type-I error” as well as the under-reporting of negative outcomes and the potential for publication bias. All studies and across treatment types need to pay more attention to recording untoward

incident and harm rates during treatment. This neglect in the effective sequencing of exploration, refining, and generalizing of CBD treatments has the potential to significantly compromise patient care (Salkovskis, 1995).

Future research

Revisiting the initial stages of the hourglass model is clearly required using mixed methods approaches to enhance the CBD outcome evidence. The potential danger of false-positive outcomes can be addressed with robust outcome measurement and detailed information regarding participants and treatments. SCEDs offer an empirical framework to develop CBD practice-based evidence with minimal restrictions over the service setting (McMillan & Morley, 2010). Moreover, the flexibility inherent to SCED makes it well placed to acknowledge the complexities of CBD (Barkham, Hardy, & Mellor Clark, 2010). On comprehensive stage 1 evidence, then future trials at stage 2 need to compare individual versus group psychotherapy for CBD. Qualitative research has the potential to enhance the understanding of high dropout rates evidenced during group psychotherapy of CBD, by exploring the patient experience of treatment. Furthermore, qualitative methodology offers the possibility of defining the common and shared features of CBD treatments (Denzin & Lincoln, 2000). Understanding the active components of effective CBD psychotherapy is a key research goal, using dismantling or additive trial methodologies at the second stage of the hourglass. Robust stages 1 and 2 evidence would enable practice-based research networks to flourish across services (Zarin, West, Placus, & McIntyre, 1996).

The promising findings from the controlled study of citalopram (Koran et al., 2003) and uncontrolled studies of topiramate (Guzman et al., 2007), naltrexone (Grant, 2003; Kim, 1998), and memantine (Grant et al., 2012) require further scrutiny under large sample RCT conditions. This comment also applies to substantiate the initial claims regarding the effectiveness of MBSR for CBD (Armstrong, 2012). More controlled research comparing low- and high-intensity psychological interventions needs to be conducted. Future outcome research needs to consistently use the YBOCS-SV (Monahan et al., 1996) as the primary outcome measure and then consistently report treatment response rates using common clinical and reliable change metrics. The size of future trials needs to be increased in order to reduce the possibility of publication bias and reduce the potential confound of a “small study effect” in future reviews (Rücker, Carpenter, & Schwarzer, 2011). Finally, follow-up across the psychotherapeutic and pharmacological studies tended to be short and so future studies need genuinely long-term follow-up periods to assess the durability of treatment effects.

Limitations

This review had several limitations. First, the large number of poor quality studies failed to use any standardized outcome measurement (38%) and this compromised calculating CBD treatment effects across a wide range of studies. Interpretations regarding the efficacy and effectiveness of

CBD treatments were limited by consistently small sample sizes, poor methodological control, a variety of treatment approaches, and risk of publication bias. The inter-rater reliability of the CASP was weak and the lack of a defined quality cutoff compromises its utility. Nevertheless, this review represents a step forward from Lourenço Leite et al.'s (2014) review, due to better consideration of study quality and greater analytical specificity.

CONCLUSIONS

The CBD treatment evidence base is clearly a work in progress. Progress has been jointly hindered by the consistent use of poor quality methodologies and the sporadic evaluation of treatments. Greater effort in developing and evaluating interventions in keeping with the hourglass model will improve understanding of the potential benefits and risks of CBD treatments. The promise shown by high-quality group CBT approach that is particularly useful and a component analysis of group CBT for CBD is particularly indicated. Less-intrusive GSH treatments for CBD appear to hold clinical promise and are suitable for detailed inquiry. SSRI citalopram requires further controlled study to build on promising outcomes. Clearly, CBD remains an under-recognized and challenging clinical disorder to treat. Ensuring and improving the methodological quality of future studies will improve confidence in the initial evidence that compulsive buyers can manage their compulsions to spend through relatively short-term theory-based psychotherapeutic interventions.

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A review of compulsive buying disorder

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Compulsive buying disorder (CBD) is characterized by excessive shopping cognitions and buying behavior that leads to distress or impairment. Found worldwide, the disorder has a lifetime prevalence of 5.8% in the US general population. Most subjects studied clinically are women (~80%), though this gender difference may be artifactual. Subjects with CBD report a preoccupation with shopping, pre-purchase tension or anxiety, and a sense of relief following the purchase. CBD is associated with significant psychiatric comorbidity, particularly mood and anxiety disorders, substance use disorders, eating disorders, and other disorders of impulse control. The majority of persons with CBD appear to meet criteria for an Axis II disorder, although there is no special "shopping" personality. Compulsive shopping tends to run in families, and these families are filled with mood and substance use disorders. There are no standard treatments. Psychopharmacologic treatment studies are being actively pursued, and group cognitive-behavioral models have been developed and are promising. Debtors Anonymous, simplicity circles, bibliotherapy, financial counseling, and marital therapy may also play a role in the management of CBD.

Key words: Compulsive shopping, compulsive buying, impulse control disorders

(World Psychiatry 2007;6:14-18)

Compulsive buying disorder (CBD) was first described clinically in the early 20th century by Bleuler (1) and Kraepelin (2), both of whom included CBD in their textbooks. Bleuler writes: "As a last category Kraepelin mentions the buying maniacs (oniomaniacs) in whom even buying is compulsive and leads to senseless contraction of debts with continuous delay of payment until a catastrophe clears the situation a little – a little bit never altogether because they never admit to their debts" (1). Bleuler described CBD as an example of a "reactive impulse", or "impulsive insanity", which he grouped alongside kleptomania and pyromania.

CBD attracted little attention throughout the 20th century except among consumer behaviorists (3-6) and psychoanalysts (7-9). Interest was revived in the early 1990s, when clinical case series from three independent research groups appeared (10-12). The disorder has been described worldwide, with reports coming from the US (10-12), Canada (5), England (4), Germany (6), France (13), and Brazil (14).

The appropriate classification of CBD continues to be debated. Some researchers have linked CBD to addictive disorders (15), while others have linked it to obsessive-compulsive disorder (16), and still others to mood disorders (17). While not included in DSM-IV (18), CBD was included in DSM-III-R (19) as an example of an "impulse-control disorder not otherwise specified". Research criteria have been developed that emphasize its cognitive and behavioral aspects (10). Some writers have criticized attempts to categorize CBD as an illness, which they see as part of a trend to "medicalize" behavioral problems (20). Yet, this approach ignores the reality of CBD, and both trivializes and stigmatizes attempts to understand or treat the disorder.

EPIDEMIOLOGY

Koran et al (21) recently estimated the point prevalence

of CBD to be 5.8% of respondents, based on results from a random telephone survey of 2,513 adults conducted in the US. Earlier, Faber and O'Guinn (22) had estimated the prevalence of CBD to fall between 2% and 8% of the general population of Illinois. Both research groups had used the Compulsive Buying Scale (CBS) (23) to identify compulsive buyers. Other surveys have reported figures ranging from 12% to 16% (24,25). There is no evidence that CBD has increased in prevalence in the past few decades.

Community based and clinical surveys suggest that 80% to 95% of persons with CBD are women (10-12,23). The reported gender difference could be artifactual: women readily acknowledge that they enjoy shopping, whereas men are more likely to report that they "collect". The report of Koran et al (21) suggests that this may be the case: in their survey, a near equal percentage of men and women met criteria for CBD (5.5% and 6.0%, respectively). However, Dittmar (26) concluded from a general population survey in the United Kingdom, in which 92% of respondents considered compulsive shoppers were women, that the gender difference is real and is not an artifact of men being underrepresented in samples.

The age of onset of CBD appears to be in the late teens or early twenties (11,12,27), though McElroy et al (10) reported a mean age at onset of 30 years. It may be that the age of onset corresponds with emancipation from the home, and the age at which people first establish credit accounts.

There are no careful longitudinal studies of CBD, but the majority of subjects studied by Schlosser et al (12) and McElroy et al (10) describe their course as continuous. Aboujaoude et al (28) suggested that persons with CBD who responded to treatment with citalopram were likely to remain in remission during one-year follow-up, a finding that suggests that treatment could alter the natural history of the disorder. The authors' personal observation is that subjects with CBD typically report decades of compulsive shopping

behavior at the time of presentation, although it might be argued that clinical samples are biased in favor of severity.

There is some evidence that CBD runs in families and that within these families mood, anxiety, and substance use disorders are excessive. McElroy et al (8) reported that, of 18 individuals with CBD, 17 had one or more first-degree relatives (FDRs) with major depression, 11 with an alcohol or drug use disorder, and three with an anxiety disorder. Three had relatives with CBD. Black et al (29) used the family history method to assess 137 FDRs of 33 persons with CBD. FDRs were significantly more likely than those in a comparison group to have depression, alcoholism, a drug use disorder, "any" psychiatric disorder, and "more than one psychiatric disorder". CBD was identified in 9.5% of the FDRs of the CBD probands (CBD was not assessed in the comparison group). In molecular genetic studies, Devor et al (30) failed to find an association between two serotonin transporter gene polymorphisms and CBD, while Comings (31) reported an association of CBD with the DRD1 receptor gene.

CLINICAL SYMPTOMS

Persons with CBD are preoccupied with shopping and spending, and devote significant time to these behaviors. While it might be argued that a person could be a compulsive shopper and not spend, and confine his or her interest to window shopping, this pattern is uncommon. The author's personal observation is that the two aspects – shopping and spending – are intertwined. Persons with CBD often describe an increasing level of urge or anxiety that can only lead to a sense of completion when a purchase is made.

The author has been able to identify four distinct phases of CBD: 1) anticipation; 2) preparation; 3) shopping; and 4) spending. In the first phase, the person with CBD develops thoughts, urges, or preoccupations with either having a specific item, or with the act of shopping. In the second phase, the person prepares for shopping and spending. This can include decisions on when and where to go, on how to dress, and even which credit cards to use. Considerable research may have taken place about sale items, new fashions, or new shops. The third phase involves the actual shopping experience, which many individuals with CBD describe as intensely exciting, and can even lead to a sexual feeling (12). Finally, the act is completed with a purchase, often followed by a sense of let down, or disappointment with oneself (21). In a study of the antecedents and consequences of CBD, Miltenberger et al (32) reported that negative emotions (e.g., depression, anxiety, boredom, self-critical thoughts, anger) were the most commonly cited antecedents to CBD, while euphoria or relief from the negative emotions were the most common consequence.

Individuals with CBD tend to shop by themselves, although some will shop with friends who may share their interest in shopping (11,12). In general, CBD is a private pleasure which could lead to embarrassment if someone

not similarly interested in shopping accompanied them. Shopping may occur in just about any venue, ranging from high fashion department stores and boutiques to consignment shops or garage sales. Income has relatively little to do with the existence of CBD: persons with a low income can still be fully preoccupied by shopping and spending, although their level of income will lead them to shop at a consignment shop rather than a department store.

Typical items purchased by persons with CBD include (in descending order) clothing, shoes, compact discs, jewelry, cosmetics, and household items (11,12,32). Individually, the items purchased by compulsive shoppers tend not to be particularly expensive, but the author has observed that many compulsive shoppers buy in quantity resulting in out of control spending. Anecdotally, patients often report buying a product based on its attractiveness or because it was a bargain. In the study by Christenson et al (11), compulsive shoppers reported spending an average of \$110 during a typical shopping episode compared with \$92 reported in the study by Schlosser et al (12).

Although research has not identified gender specific buying patterns, in the author's experience men tend to have a greater interest than women in electronic, automotive, or hardware goods. Like women, they are also interested in clothing, shoes, and compact discs.

Subjects generally are willing to acknowledge that CBD is problematic. Schlosser et al (10) reported that 85% of their subjects expressed concern with their CBD-related debts, and that 74% felt out of control while shopping. In the study by Miltenberger et al (32), 68% of persons with CBD reported that it negatively affected their relationships. Christenson et al (11) reported that nearly all of their subjects (92%) tried to resist their urges to buy, but were rarely successful. The subjects indicated that 74% of the time they experienced an urge to buy, the urge resulted in a purchase.

CBD tends to occur year round, although it may be more problematic during the Christmas or other important holidays, and around the birthdays of family members and friends (12). Schlosser et al (12) found that subjects reported a range of behaviors regarding the outcome of a purchase, including returning the item, failing to remove the item from the packaging, selling the item, or even giving it away.

In a study of 44 subjects with CBD, Black et al (33) reported that greater severity was associated with lower gross income, less likelihood of having an income above the median, and spending a lower percentage of income on sale items. Subjects with more severe CBD were also more likely to have comorbid Axis I or Axis II disorders. These data suggest that the most severe forms of CBD are found in persons with low incomes who have little ability to control or to delay their urge to make impulsive purchases.

PSYCHIATRIC COMORBIDITY

Persons with CBD frequently meet criteria for Axis I dis-

orders, particularly mood disorders (21-100%) (27,34), anxiety disorders (41-80%) (10,12), substance use disorders (21-46%) (11,29), and eating disorders (8-35%) (10,27). Disorders of impulse control are also relatively common in these individuals (21-40%) (10,11).

Schlosser et al (12) found that nearly 60% of subjects with CBD met criteria for at least one Axis II disorder. While there was no special "shopping" personality, the most frequently identified personality disorders were the obsessive-compulsive (22%), avoidant (15%), and borderline (15%) types. Krueger (7), a psychoanalyst, described four patients who he observed to have aspects of narcissistic character pathology.

ETIOLOGY

The etiology of CBD is unknown, though speculation has settled on developmental, neurobiological, and cultural influences. Psychoanalysts (7-9) have suggested that early life events, such as sexual abuse, are causative factors. Yet, no special or unique family constellation or pattern of early life events has been identified in persons with CBD.

Neurobiological theories have centered on disturbed neurotransmission, particularly involving the serotonergic, dopaminergic, or opioid systems. Selective serotonin reuptake inhibitors (SSRIs) have been used to treat CBD (27,34-38), in part because investigators have noted similarities between CBD and obsessive-compulsive disorder, a disorder known to respond to SSRIs. Dopamine has been theorized to play a role in "reward dependence", which has been claimed to foster "behavioral addictions" (e.g., CBD, pathological gambling) (39). Case reports suggesting benefit from the opiate antagonist naltrexone have led to speculation about the role of opiate receptors (40,41). There is currently no direct evidence to support the role of these neurotransmitter systems in the etiology of CBD.

Cultural mechanisms have been proposed to recognize the fact that CBD occurs mainly in developed countries (42). Elements which appear necessary for the development of CBD include the presence of a market-based economy, the availability of a wide variety of goods, disposable income, and significant leisure time. For these reasons, CBD is unlikely to occur in poorly developed countries, except among the wealthy elite (Imelda Marcos and her many shoes come to mind).

ASSESSMENT

The goal of assessment is to identify CBD through inquiries regarding the person's attitudes and behaviors towards shopping and spending (43). Inquiries might include: "Do you feel overly preoccupied with shopping and spending?"; "Do you ever feel that your shopping behavior is excessive, inappropriate or uncontrolled?"; "Have your shopping desires, urges, fantasies, or behaviors ever been overly time consuming, caused you to feel upset or guilty, or lead

to serious problems in your life such as financial or legal problems or the loss of a relationship?"

Clinicians should note past psychiatric treatment, including medications, hospitalizations, and psychotherapy. A history of physical illness, surgical procedures, drug allergies, or medical treatment is important to note, because it may help rule out medical explanations as a cause of the CBD (e.g., neurological disorders, brain tumors). Bipolar disorder needs to be ruled out as a cause of the excessive shopping and spending. Typically, the manic patient's unrestrained spending corresponds to manic episodes, and is accompanied by euphoric mood, grandiosity, unrealistic plans, and often a giddy, expansive affect. The pattern of shopping and spending in the person with CBD lacks the periodicity seen with bipolar patients, and suggests an ongoing preoccupation.

Normal buying behavior should also be ruled out. In the US and other developed countries, shopping is a major pastime, particularly for women, and frequent shopping does not necessarily constitute evidence in support of a diagnosis of CBD. Normal buying can sometimes take on a compulsive quality, particularly around special holidays or birthdays. Persons who receive an inheritance or win a lottery may experience shopping sprees as well.

Several instruments have been developed to either identify CBD or rate its severity. The CBS (23), already mentioned, consists of seven items representing specific behaviors, motivations, and feelings associated with compulsive buying, and reliably distinguishes normal buyers from those with CBD. Edwards (44) has developed a useful 13-item scale that assesses important experiences and feelings about shopping and spending. Monahan et al (45) modified the Yale Brown Obsessive-Compulsive Scale to create the YBOCS-Shopping Version (YBOCS-SV) to assess cognitions and behaviors associated with CBD. This 10-item scale rates time involved, interference, distress, resistance, and degree of control for both cognitions and behaviors. The instrument is designed to measure severity of CBD, and change during clinical trials.

TREATMENT

There are no evidence-based treatments for CBD. In recent years, treatment studies of CBD have focused on the use of psychotropic medication (mainly antidepressants) and cognitive-behavioral therapy (CBT).

Interest in CBT has largely replaced earlier interest in psychodynamic therapies. Several competing CBT models have been developed, the most successful involving the use of group treatment (46-49). The first use of group therapy was described by Damon (46). Subsequent group models were developed by Burgard and Mitchell (47), Villarino et al (48), and more recently by Benson and Gengler (49). Mitchell et al (50) reported that their group CBT model produced significant improvement compared to a wait list in a 12-week pilot study; improvement was maintained during a 6-months follow-up. Benson (51) has recently developed a

comprehensive self-help program which combines cognitive-behavioral strategies with self-monitoring. A detailed workbook, a shopping diary, and a CD-ROM are included.

Several self-help books (bibliotherapy) are available (52-54), and may be helpful to some persons with CBD. Debtors Anonymous, patterned after Alcoholics Anonymous, is a voluntary, lay-run group that provides an atmosphere of mutual support and encouragement for those with substantial debts. Simplicity circles are available in some US cities; these voluntary groups encourage people to adopt a simple lifestyle, and to abandon their CBD (55). Many subjects with CBD develop substantial financial problems, and may benefit from financial counseling (56). The author has seen cases in which a financial conservator has been appointed to control the patient's finances, and appears to have helped. While a conservator controls the person's spending, this approach does not reverse his or her preoccupation with shopping and spending. Marriage (or couples) counseling may be helpful, particularly when CBD in one member of the dyad has disrupted the relationship (57).

Psychopharmacologic treatment studies have yielded mixed results. An early case series suggested that antidepressants could curb CBD (58), and an early open-label trial using fluvoxamine showed benefit (34). Yet, two subsequent randomized controlled trials found that fluvoxamine did no better than placebo (35,36). In another open-label trial (28), citalopram produced substantial improvement. In this particular study, responders to open-label citalopram were then enrolled in a nine-week randomized placebo controlled trial (38). Compulsive shopping symptoms returned in five of eight subjects assigned to placebo compared with none of the seven who continued taking citalopram. By comparison, escitalopram showed little effect for CBD in an identically designed discontinuation trial by the same investigators (39). Grant (40) and Kim (41) have described cases in which persons with CBD improved with naltrexone, suggesting that opiate antagonists might play a role in the treatment of CBD. Interpretation of treatment studies is complicated by the high placebo response rate associated with CBD (ranging to 64%) (35).

The author has developed a set of recommendations (59). First, pharmacologic treatment trials provide little guidance, and patients should be informed that they cannot rely on medication. Further, patients should: a) admit that they have CBD; b) get rid of credit cards and checkbooks, because they are easy sources of funds that fuel the disorder; c) shop with a friend or relative; the presence of a person without CBD will help curb the tendency to overspend; and d) find meaningful ways to spend one's leisure time other than shopping.

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Compulsive Buying Behavior: Clinical Comparison with Other Behavioral Addictions

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Compulsive buying behavior (CBB) has been recognized as a prevalent mental health disorder, yet its categorization into classification systems remains unsettled. The objective of this study was to assess the sociodemographic and clinic variables related to the CBB phenotype compared to other behavioral addictions. Three thousand three hundred and twenty four treatment-seeking patients were classified in five groups: CBB, sexual addiction, Internet gaming disorder, Internet addiction, and gambling disorder. CBB was characterized by a higher proportion of women, higher levels of psychopathology, and higher levels in the personality traits of novelty seeking, harm avoidance, reward dependence, persistence, and cooperativeness compared to other behavioral addictions. Results outline the heterogeneity in the clinical profiles of patients diagnosed with different behavioral addiction subtypes and shed new light on the primary mechanisms of CBB.

Keywords: behavioral addictions, compulsive buying behavior, gambling disorder, internet gaming disorder, internet addiction, sex addiction

INTRODUCTION

Compulsive buying behavior (CBB), otherwise known as shopping addiction, pathological buying or compulsive buying disorder, is a mental health condition characterized by the persistent, excessive, impulsive, and uncontrollable purchase of products in spite of severe psychological, social, occupational, financial consequences (Müller et al., 2015b). Whereas, ordinary non-addicted consumers state value and usefulness as their primary motives for shopping, compulsive buyers make purchases in order to improve their mood, cope with stress, gain social approval/recognition, and improve their self-image (Lejoyeux and Weinstein, 2010; Karim and Chaudhri, 2012; McQueen et al., 2014; Roberts et al., 2014). Although the aftermath of protracted CBB includes feelings of regret/remorse over purchases, shame, guilt, legal and financial problems, and interpersonal difficulties, people with CBB fail in their attempts to stop compulsive buying (Konkolý Thege et al., 2015).

The frequency of CBB has increased worldwide during the two last decades. A recent meta-analysis estimated a pooled prevalence of 4.9% for CBB in adult representative samples, with higher ratios for university students, those of non-community origin and shopping-specific participants (Maraz et al., 2015). However, prevalence estimations in epidemiological research vary and can range from 1 to 30% depending on the type of sample studied (Basu et al., 2011).

One major difficulty in estimating CBB prevalence is that the categorization of this psychopathological condition in international classification systems continues to be debated and consensus on diagnosis criteria has yet to be reached. As a matter of fact, the concept of “addiction” itself was a contentious subject matter in the preparation of the Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM-5; American Psychiatric Association, 2013; Piquet-Pessôa et al., 2014). Currently the available operational definitions for CBB have relied on similarities with disorders in the impulsive control spectrum (Potenza, 2014; Robbins and Clark, 2015), mainly linked to substance use disorders (Grant et al., 2013), obsessive-compulsive disorder (Weinstein et al., 2015), eating disorders (Fernández-Aranda et al., 2006, 2008; Jiménez-Murcia et al., 2015) and other behavioral addictions such as gambling disorder (Black et al., 2010), Internet gaming disorder (IGD) and Internet addiction (Suissa, 2015; Trotzke et al., 2015), and sexual addiction (Derbyshire and Grant, 2015; Farré et al., 2015).

The specific etiology of CBB is still unknown. Diverse factors have been proposed as likely contributors and the few CBB studies conducted to date have largely been centered on neurobiological factors, with research on genetic factors and CBB being nonexistent. As in substance use disorders, brain imaging studies in people with CBB and other behavioral addictions have consistently found abnormalities in frontoparietal regions, reward processing, and limbic systems (Raab et al., 2011; Baik, 2013; Leeman and Potenza, 2013; Probst and van Eimeren, 2013; Vanderah and Sandweiss, 2015). However, the presently available neurological evidence does not fully explain how concrete neural mechanisms and cognitive processes can cause normal-shopping behavior to become addictive in the absence of exogenous drug stimulation (Clark, 2014; Engel and Caceda, 2015). Unlike in other addictive conditions, it has been stated that the development of CBB depends on the presence of particular cultural mechanisms, such as a market-based economy, a wide variety of available goods, disposable income, and materialistic values (Unger et al., 2014).

Regarding the CBB phenotype, research studies highlight shared common features with other behavioral addictions (El-Guebaly et al., 2012; Choi et al., 2014; Grant and Chamberlain, 2014; Di Nicola et al., 2015). Gray's Reinforcement Sensitivity Theory, which has been applied to other behavioral addictive disorders, argues that high levels of behavioral approach system (BAS) predispose individuals to engage in impulsive behaviors (Franken et al., 2006). It has also been used to explain the addictive processes underlying CBB: both reinforcement-punishment systems seem to participate in the onset and development of this disorder (Davenport et al., 2012). Although

in clinical samples, a greater association has been found between this disorder and higher levels of behavioral activation (Claes et al., 2010; Müller et al., 2014). Furthermore, dysfunctional emotion regulation also seems to be implied in the phenotype of behavioral addictions, particularly in aspects such as managing cravings and withdrawal symptoms (Kellett et al., 2009; Williams and Grisham, 2012).

The early onset of problematic behavior is also considered a common feature of these addictive activities, and epidemiological research has found that addictive behaviors tend to become problematic in late adolescence (Balogh et al., 2013; Maraz et al., 2015). It is during this stage of development when impulsivity and risky behaviors may be most socially tolerated or even promoted by peers, which could constitute a potential risk factor for developing an addiction (Dayan et al., 2010; Hartston, 2012). It must be highlighted however that some representative surveys in Europe in the recent years have demonstrated increases in the estimated prevalence of behavioral addictions in older adult populations (Mueller et al., 2010).

The study of the CBB phenotype and related personality traits has also generated consistent results with other behavioral addictions. Research has shown that compulsive buying is characterized by high impulsivity scores, novelty seeking and compulsivity (Black et al., 2012; Di Nicola et al., 2015; Munno et al., 2015), along with high levels in both positive and negative urgency traits (Rose and Segrist, 2014), coinciding with the findings obtained in gambling disorder (Janiri et al., 2007; Tárrega et al., 2015), IGD or in sexual addictions (Jiménez-Murcia et al., 2014b; Farré et al., 2015).

Finally, CBB is associated with significant comorbidity, particularly with psychiatric conditions that are also highly prevalent in other behavioral addictions (Mueller et al., 2010; Aboujaoude, 2014), such as mood disorders, anxiety disorders, substance use, other impulse control disorders, and eating disorders (Fernández-Aranda et al., 2006, 2008).

Heterogeneous features in both clinical and personality aspects have also been reported when comparing CBB with other behavioral addictions. Firstly, epidemiological studies point to strong sex differences (Fattore et al., 2014): whereas CBB is more prevalent in women (Otero-López and Villardefrancos, 2014), gambling disorder (Ashley and Boehlke, 2012), and sexual addiction (Farré et al., 2015) are more prevalent in men.

Regarding CBB patients' psychopathological state, to our knowledge few studies with clinical samples have assessed the specific differences between CBB and other behavioral addictions. As such, the objectives of this study are: (a) to ascertain the most relevant socio-demographic and clinical characteristics associated to CBB in a large clinical sample of patients with behavioral addictions; and (b) to compare the CBB profile with other behavioral addictions (sexual addiction, IGD, Internet addiction, and gambling disorder).

MATERIALS AND METHODS

Sample

All the patients who arrived at the Pathological Gambling Unit in the Psychiatry Department at Bellvitge University Hospital

in Barcelona (Spain), from January 2005 to August 2015, were potential participants in this study. Exclusion criteria for the study were the presence of an organic mental disorder, intellectual disability, or active psychotic disorder. Bellvitge University Hospital is a public hospital certified as a tertiary care center for the treatment of behavioral addictions and oversees the treatment of highly complex cases. The catchment area of the hospital includes over two million people in the Barcelona metropolitan area.

All participants were diagnosed according to DSM-IV criteria (SCID-I; First et al., 1996) and using specific questionnaires for each disorder. Interviews were conducted by psychologists and psychiatrists with more than 15 years of experience in the field.

The study sample included $n = 3324$ patients, who were classified into five groups according to their diagnostic subtype: CBB ($n = 110$), sexual addiction ($n = 28$), IGD ($n = 51$), Internet addiction ($n = 41$), and gambling disorder ($n = 3094$). Mutual exclusivity criterion was required to include the patients in the groups, that is, the addictions considered in this study did not occur at the same time to allow for the estimation and comparison of the specific clinical state of each behavioral addiction type (39 patients were excluded from our analyses for meeting the criteria of having more than one behavioral addiction).

Measures

Evaluation of Current and Lifetime Substance use Disorders and Impulsive Related Behaviors

Patients were assessed using a structured clinical face-to-face interview modeled after the Structured Clinical Interview for DSM-IV (SCID-I; First et al., 1996), covering the lifetime presence of impulsive behaviors, namely alcohol and drug abuse, comorbid impulse control disorders (such as CBB, sexual addiction, and IGD and Internet addiction).

Diagnostic Questionnaire for Pathological Gambling According to DSM Criteria (Stinchfield, 2003)

This 19-item questionnaire allows for the assessment of DSM-IV (American Psychiatric Association, 1994) diagnostic criteria for pathological gambling (in the present study called GD). Convergent validity with the SOGS scores in the original version was very good [$r = 0.77$ for representative samples and $r = 0.75$ for gambling treatment groups (Stinchfield, 2003)]. Internal consistency in the Spanish adaptation used in this study was $\alpha = 0.81$ for the general population and $\alpha = 0.77$ for gambling treatment samples (Jiménez-Murcia et al., 2009). In this study, the total number of DSM-5 criteria for GD was analyzed. Cronbach's alpha in the sample was very good ($\alpha = 0.81$).

South Oaks Gambling Screen (SOGS) (Lesieur and Blume, 1987)

This self-report, 20-item, screening questionnaire discriminates between probable pathological, problem, and non-problem gamblers. The Spanish validated version used in this study has shown excellent internal consistency ($\alpha = 0.94$) and test-retest reliability ($r = 0.98$; Echeburúa et al., 1994). Consistency in the sample of this work was adequate ($\alpha = 0.76$).

Diagnostic Criteria for Compulsive Buying According to McElroy et al. (1994)

These criteria have received wide acceptance in the research community, although their reliability and validity have not yet been determined (Tavares et al., 2008). It's worth noting that no formal diagnostic criteria for CBB have been accepted for the DSM or the ICD-10. At present, it is recommended that CBB diagnosis be determined via detailed face-to-face interviews which explore "buying attitudes, associated feelings, underlying thoughts, and the extent of preoccupation with buying and shopping" (Müller et al., 2015b).

Diagnostic Criteria for IGD According to Griffiths and Hunt (1995, 1998)

To assess IGD diagnosis and to establish the level of dependence on video games, clinical experts conducted a clinical face-to-face interview considering the scale designed by Griffiths and Hunt (1995, 1998). This interview evaluated aspects such as the frequency of the problematic behavior, the interference generated in daily functioning because of maladaptive use of video games or the presence of tolerance and difficulties in abstinence management.

Diagnostic Criteria for Sexual Addiction According to DSM-IV-TR (American Psychiatric Association, 2000)

To assess sexual addiction, a battery of items was administered, which were based on the proposed definition in the DSM-IV-TR (American Psychiatric Association, 2000) in the Sexual Disorders Not Otherwise Specified section (302.9). In making our assessment, the following clinical description was given special weight: "distress about a pattern of repeated sexual relationship involving a succession of lovers who are experienced by the individual only as things to be used."

Diagnostic Criteria for Internet Addiction According to Echeburúa (1999)

To assess Internet addiction, a clinical interview that adapts the nine criteria from Echeburúa (1999) in yes/no responses was used. Four to six scores indicate a risk of dependency and 7–9 an already established problem. Internet addiction categorization is focused on excessive and continuous use of the Internet (social networking, watching videos, television series, and movies online, etc.). These items also explore the urge to carry out this behavior or the failed attempts to reduce its frequency.

Temperament and Character Inventory-Revised (TCI-R) (Cloninger, 1999)

The TCI-R is a reliable and valid 240-item questionnaire which measures seven personality dimensions: four temperament (novelty seeking, harm avoidance, reward dependence, and persistence) and three character dimensions (self-directedness, cooperativeness, and self-transcendence). All items are measured on a 5-point Likert-type scale. The scales in the Spanish revised version showed adequate internal consistency (Cronbach's alpha α mean value of 0.87; Gutiérrez-Zotes et al., 2004). Cronbach's alpha (α) in the sample used in this study is in the good to excellent range (index for each scale is included in **Table 2**).

Symptom Checklist-Revised (SCL-90-R) (Derogatis, 1990)

The SCL-90-R evaluates a broad range of psychological problems and psychopathological symptoms. This questionnaire contains 90 items and measures nine primary symptom dimensions: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. It also includes three global indices: (1) a global severity index (GSI), designed to measure overall psychological distress; (2) a positive symptom distress index (PSDI), to measure symptom intensity; and (3) a positive symptom total (PST), which reflects self-reported symptoms. The Spanish validation scale obtained good psychometrical indexes, with a mean internal consistency of 0.75 (Cronbach's alpha; Martínez-Azumendi et al., 2001). Cronbach's alpha (α) in the sample of this study is in the good to excellent range (indexes for each scale are included in Table 2).

Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993)

This test was developed as a simple screening method for excessive alcohol consumption. AUDIT consists of 10 questions examining alcohol consumption levels, symptoms of alcohol dependence and alcohol-related consequences. Internal consistency has been found to be high, and retest-retest data have suggested high reliability (0.86) and sensitivity around 0.90; specificity in different settings and for different criteria averages 0.80 or more. Three categories were considered for this study, based on the ranges defined by Reinert and Allen (2002): null-low (raw scores under 6 for women and under 8 for men), abuse (raw scores between 6 and 20 for women and between 8 and 20 for men) and risk of dependence (raw scores above 20).

Additional Data

Demographic, clinical, and social/family variables related to gambling were measured using a semi-structured, face-to-face clinical interview described elsewhere (Jiménez-Murcia et al., 2006). Some of the CBB behavior variables covered were the age of CBB onset, the mean and maximum monetary investment in a single shopping episode, and the total amount of accumulated debts.

Procedure

The present study was carried out in accordance with the latest version of the Declaration of Helsinki. The University Hospital of Bellvitge Ethics Committee of Clinical Research approved the study, and signed consent was obtained from all participants. Experienced psychologists and psychiatrists conducted the two face-to-face clinical interviews.

Statistical Analysis

Statistical analysis was carried out with Stata13.1 for Windows. First, the comparison of the sociodemographical, clinical and personality measures between the derived empirical clusters was based on chi-square tests (χ^2) for categorical variables and analysis of variance (ANOVA) for quantitative measures. Cohen's- d measured the effect size of pairwise comparisons ($|d| >$

0.50 was considered moderate effect size and $|d| > 0.80$ high effect size). Bonferroni-Finner's correction controlled for Type-I error due to multiple statistical comparisons for variables measuring clinical state.

Second, a multinomial model valued the capacity of the participants' sex, age, age of onset, education level, civil status, and personality traits levels to discriminate the presence of CBB compared to the other behavioral addictions (gambling, Internet, IGD, and sexual addiction). This model constitutes a generalization of the logistic regression to multiclass-nominal-criteria (dependent variables with more than two categorical levels). Its parameters are estimated to predict the probability of the different categories compared to a reference category-level. In this study, with the aim of obtaining a discriminative model for the presence of CBB, this diagnostic subtype was defined as the reference level. In addition, the set of independent variables was simultaneously included into the model to determine the specific contribution of each variable in identifying CBB. The global predictive capacity of the model was assessed using the McFadden pseudo- R^2 coefficient.

Third, multiple regressions models valued the predictive capacity of the participants' sex, age, age of onset, and personality traits on the psychopathology symptom levels registered on the SCL-90-R depression, anxiety and GSI scales. The ENTER procedure was used to simultaneously include the set of predictors to obtain the specific contribution of each factor to symptom levels.

RESULTS

Evolution of the Prevalence of Consultations for Behavioral Addictions

Figure 1 shows the prevalence of patients attending the specialized unit for treatment because of CBB in comparison to other behavioral addictions (gambling disorder, sexual addiction, IGD, or Internet addiction). The prevalence of consultations due to CBB increased from 2.48% in 2005 to 5.53% in 2015, obtaining a significant linear trend ($\chi^2 = 17.3$, $df = 1$, $p =$

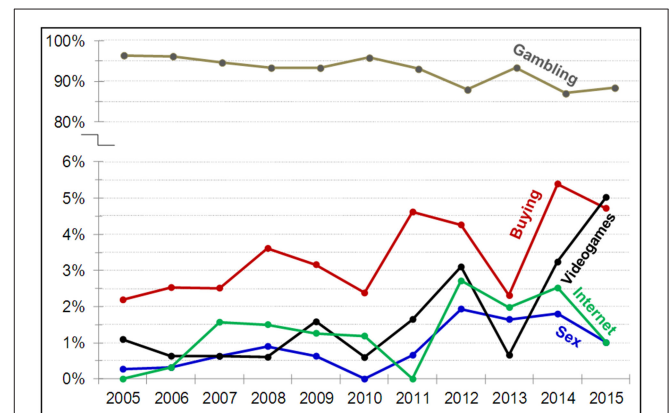


FIGURE 1 | Evolution of the prevalence of consultations due to different behavioral addictions.

0.006) and no statistically significant deviation from linearity ($\chi^2 = 7.27, df = 9, p = 0.609$). Our results demonstrate that the prevalence of gambling disorder was significantly higher compared to the other behavioral additions. As a whole, the prevalence of consultations was higher for CBB compared to IGD, Internet, and sexual addiction (except for IGD in 2015), but these differences were low.

Comparison between CBB and the Other Behavioral Addictions

Table 1 contains the difference between diagnostic subtypes and the patients' sociodemographical variables, as well as data on substance abuse. The frequency of women in the CBB group (71.8%) was clearly higher when compared to the other diagnostic conditions (between 3.6% for sex addiction to 26.8% to Internet addiction). Considering other variables, CBB was characterized by: (a) a higher level of education compared to IGD and gambling addiction; (b) higher prevalence of being married

or living with a partner compared to the IGD and Internet addiction groups; (c) higher levels of employment compared to IGD; and (d) compared to gambling disorder, lower prevalence of smoking, and alcohol abuse and other drug use/abuse.

Table 2 includes mean comparisons between CBB and other diagnostic subtypes for the variables measuring clinical state: patients' age, age of onset, and duration of the problematic behaviors, psychopathological symptoms (SCL-90-R scales) and personality traits (TCI-R scales). No statistical differences emerged comparing CBB with the sexual addiction group. Compared to IGD, Internet addiction and gambling disorder, the CBB clinical profile was characterized by: (a) higher mean age and age of onset compared to IGD and Internet addiction; (b) as a whole, higher psychopathological symptoms (many SCL-90-R scales obtained higher mean scores); and (c) higher mean scores in the personality traits novelty seeking, harm avoidance (in comparison with gambling disorder), reward dependence (in comparison with IGD and gambling disorder),

TABLE 1 | Comparison between diagnostic subtypes for categorical variables: chi-square test and contrasts of buying subtype vs. the other diagnostic subtype.

	Proportions (%)					Group			Contrasts: buying vs. other addictions							
	Buying	Sex	Internet/ gaming	Internet	Gambling	Chi-square tests			Sex	Internet/gaming		Internet		Gambling		
	<i>n</i> = 110	<i>n</i> = 28	<i>n</i> = 51	<i>n</i> = 41	<i>n</i> = 3.094	χ^2	<i>df</i>	<i>p</i>	<i>p</i>	<i> d </i>	<i>P</i>	<i> d </i>	<i>p</i>	<i> d </i>	<i>p</i>	<i> d </i>
SEX																
Female	71.8	3.6	5.9	26.8	10.1	387.15	4	<0.001*	0.001*	1.98†	0.001*	1.84†	0.001*	1.01†	0.001*	1.61†
Male	28.2	96.4	94.1	73.2	89.9											
ORIGIN																
Immigrant	1.8	0	3.9	2.4	6.5	7.41	4	0.131	0.472	0.19	0.425	0.13	0.808	0.04	0.100	0.24
Spanish	98.2	100	96.1	97.6	93.5											
EDUCATION																
Primary	33.7	26.9	40.0	32.5	57.8	88.61	8	<0.001*	0.778	0.15	0.022*	0.13	0.291	0.02	0.001*	0.50†
Secondary	43.3	50.0	55.6	55.0	36.3					0.14		0.25		0.24		0.14
University	23.1	23.1	4.4	12.5	5.9					0.00		0.56†		0.28		0.50†
CIVIL STATUS																
Single	35.5	22.2	91.8	65.0	35.4	84.98	8	<0.001*	0.260	0.30	0.001*	1.44†	0.005*	0.62†	0.962	0.00
Married-couple	49.5	51.9	6.1	30.0	50.5					0.05		1.11†		0.41		0.02
Divorced	15.0	25.9	2.0	5.0	14.1					0.27		0.48		0.34		0.03
EMPLOYED																
No	50.0	35.7	79.6	56.1	43.5	30.00	4	<0.001*	0.177	0.29	0.001*	0.65†	0.506	0.12	0.183	0.13
Yes	50.0	64.3	20.4	43.9	56.5											
SMOKE USE																
No	62.7	67.9	76.5	75.6	38.7	83.36	4	<0.001*	0.614	0.11	0.084	0.30	0.137	0.28	0.001*	0.49
Yes	37.3	32.1	23.5	24.4	61.3											
AUDIT																
Low	95.4	85.7	98.0	95.1	85.0	19.19	8	0.018*	0.065	0.34	0.415	0.15	0.940	0.01	0.010*	0.36
Abuse	4.6	14.3	2.0	4.9	14.3					0.34		0.15		0.01		0.34
Risk dependence	0	0	0	0	0.7					0.00		0.00		0.00		0.12
OTHER DRUGS																
No	97.2	85.7	92.2	95.0	90.9	6.97	4	0.138	0.014*	0.42	0.146	0.23	0.506	0.12	0.024*	0.27
Yes	2.8	14.3	7.8	5.0	9.1											

*Bold, significant comparison (0.05 level). †Bold: effect size in the moderate ($|d| > 0.50$) to high ($|d| > 0.80$) range. *p*-values include Bonferroni-Finner correction.

TABLE 2 | Comparison of clinical profiles between diagnostic subtypes at baseline: ANOVA and effect size for pairwise comparisons.

	Means Buying			Sex			Internet/gaming			Gambling			ANOVA			Contrasts: buying vs. other addictions		
	n = 110	n = 28	n = 51	n = 41	n = 3,094	F _{4;3319}	p	p	d	p	d	p	p	d	p	d	p	d
Age (years)	43.3	41.3	22.0	31.7	42.9	38.03	<0.001*	0.909	0.17	0.001*	2.15†	0.001*	0.001*	0.96†	0.997	0.03		
Onset (years)	38.9	37.5	19.9	29.8	38.3	26.25	<0.001*	0.973	0.11	0.001*	1.81†	0.001*	0.001*	0.72†	0.973	0.05		
Duration (years)	4.4	4.3	2.5	2.4	4.9	3.82	0.013*	0.999	0.01	0.233	0.42	0.253	0.45	0.776	0.09			
SCL-90-R: Somatization	1.4	1.1	0.5	0.9	0.9	11.96	<0.001*	0.151	0.37	0.001*	1.03†	0.001*	0.001*	0.62†	0.001*	0.52†		
SCL-90-R: Obs./comp.	1.8	1.5	1.1	1.5	1.1	16.99	<0.001*	0.406	0.25	0.001*	0.79†	0.001*	0.193	0.31	0.001*	0.68†		
SCL-90-R: Int. sensitivity	1.4	1.3	1.1	1.1	1.0	6.63	<0.001*	0.880	0.14	0.135	0.30	0.138	0.35	0.001*	0.44			
SCL-90-R: Depressive	2.0	1.8	1.0	1.5	1.5	11.98	<0.001*	0.454	0.25	0.001*	0.99†	0.001*	0.004*	0.56†	0.001*	0.53†		
SCL-90-R: Anxiety	1.5	1.3	0.8	1.0	1.0	9.81	<0.001*	0.776	0.16	0.001*	0.77†	0.001*	0.006*	0.53†	0.001*	0.48		
SCL-90-R: Hostility	1.2	1.2	1.1	1.0	0.9	5.15	<0.001*	0.999	0.03	0.509	0.20	0.268	0.31	0.001*	0.37			
SCL-90-R: Phobic	0.8	0.6	0.3	0.5	0.5	6.93	<0.001*	0.168	0.36	0.001*	0.61†	0.018*	0.44	0.001*	0.42			
SCL-90-R: Paranoid	1.3	1.1	1.1	1.0	0.9	6.43	<0.001*	0.850	0.15	0.617	0.17	0.108	0.38	0.001*	0.43			
SCL-90-R: Psychotic	1.1	1.3	0.6	1.0	0.9	4.65	0.001*	0.512	0.23	0.004*	0.56†	0.855	0.14	0.065	0.22			
SCL-90-R: GSI	1.5	1.3	0.9	1.1	1.0	10.41	<0.001*	0.645	0.20	0.001*	0.78†	0.017*	0.49	0.001*	0.53†			
SCL-90-R: PST	54.0	50.7	37.2	48.0	46.3	5.53	<0.001*	0.895	0.14	0.001*	0.79†	0.416	0.28	0.002*	0.35			
SCL-90-R: PSDI	2.3	2.1	1.8	1.9	1.9	11.07	<0.001*	0.740	0.21	0.001*	0.63†	0.001*	0.006*	0.59†	0.001*	0.60†		
TCI-R: Novelty seeking	114.4	108.2	103.0	101.5	108.8	8.13	<0.001*	0.154	0.42	0.001*	0.85†	0.001*	0.001*	0.91†	0.001*	0.39		
TCI-R: Harm avoidance	109.7	103.7	102.8	105.8	101.3	6.05	<0.001*	0.341	0.32	0.089	0.34	0.617	0.20	0.001*	0.44			
TCI-R: Reward depend.	104.8	102.5	95.3	98.1	99.7	3.93	0.006*	0.902	0.14	0.002*	0.55†	0.073	0.39	0.005*	0.33			
TCI-R: Persistence	108.0	104.0	94.8	95.5	109.4	9.83	<0.001*	0.821	0.19	0.002*	0.65†	0.008*	0.68†	0.924	0.07			
TCI-R: Self-directed.	125.0	118.8	125.2	123.0	128.1	2.27	0.069	0.505	0.27	1.000	0.01	0.971	0.09	0.494	0.13			
TCI-R: Cooperativeness.	137.1	128.3	128.6	132.4	132.0	2.76	0.037*	0.074	0.52†	0.025*	0.45	0.448	0.27	0.019*	0.30			
TCI-R: Self-Trans.	66.0	63.6	59.3	64.0	64.4	1.57	0.178	0.888	0.15	0.050	0.41	0.903	0.13	0.706	0.10			

*Bold, significant comparison (0.05 level). †Bold: effect size in the moderate (|d| > 0.50) to high (|d| > 0.80) range. α: Cronbach's-alpha for the scale in the sample. p-values include Bonferroni-Finner correction.

persistence (in comparison with IGD and Internet addiction), and cooperativeness (in comparison with IGD and gambling disorder).

Figure 2 includes two radar-charts to graphically summarize the clinical and personality profiles for the different diagnostic subtypes in the most relevant variables of the study. The percentage of women was plotted for gender distribution and the z-standardized scores in the own sample for the quantitative clinical measures (standardization was made due to the different ranges –minimum to maximum values– of these variables).

Discriminative Model for the Presence of CBB Compared to other Behavioral Addictions

Table 3 contains the results of the multinomial model measuring the discriminative capacity of patients' sex, age, age of onset, education level, marital status, and personality profile. Compared to all the other diagnostic subtypes, the probability of CBB is clearly higher in women and individuals with higher scores in the personality traits novelty seeking, harm avoidance and self-directedness. However, it should be noted that scores on self-directedness were in the clinically low range for all groups when considering general population normative scores. The opposite pattern emerges in the case of harm avoidance, in that all diagnostic groups were in the clinically high range, with those with CBB scoring the highest. In addition, older age is predictive of CBB compared to Internet and IGD, higher education levels increased the probability of CBB compared to gambling disorder, and moderate levels of persistence (rather than low) are more likely in CBB compared to Internet and IGD.

Predictive Models of Psychopathology Symptoms for the CBB Group

Table 4 contains the three multiple regressions measuring the predictive capacity of the patients' sex, age, age of onset, and personality traits profile on levels of depression, anxiety, and GSI-index measured through the SCL-90-R for the CBB group (n = 110). High levels of depression were associated with women and patients with high scores in novelty seeking, harm avoidance, and cooperativeness, but low levels in reward dependence and self-directedness. High anxiety was registered for women, and

those patients with high scores in harm avoidance and low scores in self-directedness. High GSI scores were linked to women; obtaining high scores in novelty seeking, harm avoidance and self-transcendence; and low scores in self-directedness.

DISCUSSION

This study analyzed the specific characteristics of CBB compared to other behavioral addictions: gambling disorder, Internet gaming disorder, Internet addiction and sexual addiction. The results obtained in a large sample of treatment-seeking patients show that although CBB could likely be related to other addictive behaviors, significant differences in its phenomenology exist. CBB is characterized by a higher proportion of women, older age and age of onset, poorer general psychopathological state and higher levels of novelty seeking and harm avoidance and moderate levels of reward dependence, persistence, and cooperativeness. In this sense, CBB patients could be described as being curious, easily bored, impulsive and active seekers of new stimuli and reward, but at the same time showing pessimism and worry in anticipation of upcoming challenges. Several sociocultural contributors might also take part in the onset and maintenance of CBB, such as one's personal financial state, materialistic values, and the variety of goods available (Dittmar, 2005). One should also take into account the fact that in hoarding, one of the most commonly reported symptoms is acquiring behavior, and that other studies have identified numerous similarities between the two disorders (Frost et al., 2002). Clinical differences are lower compared to sex addiction and higher compared to gambling disorder, IGD, and Internet addiction.

Regarding gender, differences between diagnostic subtypes emerged in this study: the CBB group included a considerably higher proportion of women compared to other behavioral addictions. This result is consistent with other studies, which had also reported higher levels of compulsive buying in women (Fattore et al., 2014; Otero-López and Villardefrancos, 2014). Possible reasons for the elevated prevalence of women with CBB are most likely related to the higher frequency of shopping as a recreational activity in this group and other related socio-cultural factors (Maraz et al., 2015).

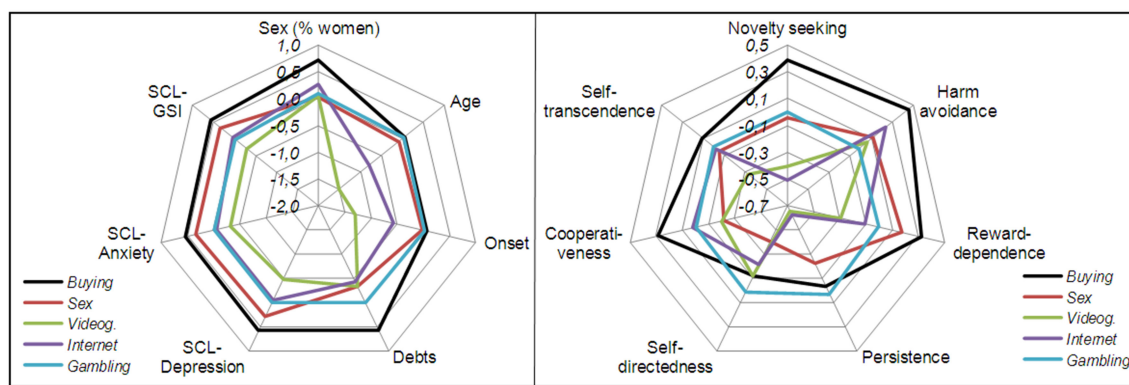


FIGURE 2 | Radiar-charts for the main clinical variables in the study and personality traits.

TABLE 3 | Discriminative capacity of age, age of onset, studies level, civil status, and personality profile in the presence of a diagnostic subtype (n = 3.324).

	Likelihood ratio			Parameter estimates															
	tests			Gambling vs. buying				Internet vs. buying				Internet/gaming vs. buying				Sex vs. buying			
	χ^2	p		p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	
Sex (male)	152.7	<0.001		<0.001	19.47	11.68	32.46	0.005	4.10	1.53	10.94	0.001	16.49	3.30	82.29	<0.001	77.04	9.25	641.4
Age (years-old)	80.54	<0.001		0.155	1.03	0.99	1.08	0.004	0.85	0.76	0.95	<0.001	0.78	0.70	0.88	0.972	1.00	0.91	1.09
Onset (years-old)	4.78	0.311		0.486	0.98	0.94	1.03	0.170	1.08	0.97	1.21	0.622	0.97	0.86	1.09	0.829	1.01	0.93	1.10
Studies (university)	23.66	<0.001		<0.001	0.28	0.15	0.51	0.403	0.59	0.17	2.04	0.195	0.32	0.06	1.79	0.579	1.37	0.45	4.21
Civil status (married)	3.37	0.498		0.144	0.71	0.45	1.12	0.392	0.68	0.28	1.64	0.152	0.30	0.09	1.44	0.633	0.80	0.31	2.03
TCI+R: Novelty seeking	56.44	<0.001		<0.001	0.96	0.95	0.98	<0.001	0.92	0.89	0.94	<0.001	0.90	0.87	0.93	0.001	0.95	0.92	0.98
TCI+R: Harm avoidance	16.04	0.003		<0.001	0.97	0.95	0.99	0.002	0.96	0.93	0.98	0.008	0.96	0.94	0.99	0.028	0.97	0.94	1.00
TCI+R: Reward dependence	5.78	0.217		0.521	0.99	0.98	1.01	0.515	0.99	0.96	1.02	0.432	0.99	0.96	1.02	0.106	1.03	0.99	1.07
TCI+R: Persistence	31.17	<0.001		0.733	1.00	0.98	1.01	<0.001	0.96	0.93	0.98	0.002	0.96	0.94	0.99	0.223	0.98	0.96	1.01
TCI+R: Self-directedness	12.17	0.016		0.018	0.98	0.97	1.00	0.010	0.97	0.95	0.99	0.046	0.97	0.95	1.00	0.003	0.96	0.93	0.99
TCI+R: Cooperativeness	3.29	0.511		0.740	1.00	0.98	1.01	0.340	1.02	0.98	1.05	0.504	1.01	0.98	1.04	0.445	0.99	0.95	1.02
TCI+R: Self-Transcendence	3.55	0.470		0.703	1.00	0.98	1.01	0.219	1.02	0.99	1.05	0.611	1.01	0.98	1.04	0.724	0.99	0.96	1.03

Bold, significant coefficient. Models obtained with multinomial regression entering simultaneously the set of predictors (ENTER procedure) (McFadden-R² = 0.283).

Results of this study also show that the proportion of patients attending our specialized unit for CBB treatment had a tendency to increase during the last decade, with a similar trend occurring for Internet, IGD and sexual addictions. However, these proportions of treatment-seeking patients were significantly lower compared to the number of consultations for gambling disorder. With regards to the evolution of the proportion of CBB consultations during the last decade, our results point to a drop between the years of 2010 and 2013, coinciding with the worst years of the economic crisis in Europe, and, more specifically, in Spain. Moreover, this decrease is consistent with results exploring other behavioral addictions requiring substantial amounts of money. In the case of gambling disorder, a significant drop in prevalence was also found during the European economic crisis (Jiménez-Murcia et al., 2014b), especially in 2010.

Patients' age and the mean age of onset of problematic addictive behaviors greatly differed between diagnostic subtypes, with older ages being found in CBB (mean age was 43.3 years and mean onset 38.9, nearly followed by gambling disorder and sex addiction) and younger ages for IGD (mean age 22.0 and mean onset 19.9 in this study). This finding dovetails with several studies reporting that young age is linked to problematic video game and Internet use (Griffiths and Meredith, 2009; Achab et al., 2011; Jiménez-Murcia et al., 2014a). Other variables, such as the endorsement of materialistic values among young people, should be considered in the scientific literature as an effective mediator of the young age of onset in some addictive behaviors, particularly in the case of compulsive buying (Dittmar, 2005).

Differences in the psychological state and personality traits between the diagnostic subtypes are also relevant: CBB and sexual addiction showed similar profiles, with their psychopathological symptoms and personality scores being clearly worse than for gambling, IGD, and Internet addictions. Although in behavioral addictions, impulsivity appears to be a core feature (Dell'Osso et al., 2006; Billieux et al., 2012; Lorains et al., 2014), multiple studies also show the existence of high levels of compulsivity (Blanco et al., 2009; Fineberg et al., 2010; Bottesi et al., 2015). Impulsivity and compulsivity seem to be characterized by deficits in self-control capacity. Nonetheless, a key distinction between impulsivity and compulsivity is that the former is associated with immediate gratification and reward seeking, while compulsion is aimed at finding relief from negative emotions.

Overall, the findings obtained in this study show that this combination of symptoms (impulsive/compulsive) is especially prominent in CBB and sexual addiction. This leads us to postulate the existence of phenotypical and possibly endophenotypical overlap across these disorders. This results support previous research that has found numerous shared features in CBB and sexual addiction (Müller et al., 2015a) and other behavior addictions (Lejoyeux et al., 2008; Villeda et al., 2011). However, a notable difference in the sex prevalence of both disorders (higher proportion of women in CBB and of men in sex addiction) exists. This fact may partly explain why the similarities between these disorders have hardly been explored (Álvarez-Moya et al., 2007). Lastly and quite possibly due to higher awareness of this condition, the number of GD patients was vastly higher than

TABLE 4 | Predictive capacity of age, age of onset, and personality traits in the psychopathology symptom levels for the CBB group (n = 110).

↓ Predictor	SCL-90-R: depression (adjusted R ² = 0.607)					SCL-90-R: anxiety (adjusted R ² = 0.580)					SCL-90-R: GSI index (adjusted R ² = 0.676)									
	B	SE	Beta	t	p	95%CI(B)	B	SE	Beta	t	p	95%CI(B)	B	SE	Beta	t	p	95%CI(B)		
Constant	0.439	1.869		0.235	0.815	-3.28	4.16	-2.562	1.870	-1.370	0.174	-6.28	1.16	-1.900	1.339	-1.419	0.160	-4.56	0.76	
Sex (male)	-0.692	0.172	-0.289	-4.032	<0.001	-1.03	-0.35	-0.516	0.172	-3.005	0.003	-0.86	-0.17	-0.469	0.123	-0.246	-3.817	<0.001	-0.71	-0.22
Age (years)	-0.004	0.016	-0.041	-0.266	0.791	-0.04	0.03	-0.006	0.016	-0.369	0.713	-0.04	0.03	-0.004	0.011	-0.047	-0.338	0.736	-0.03	0.02
Age of onset (years)	0.001	0.014	0.006	0.037	0.970	-0.03	0.03	0.010	0.014	0.718	0.474	-0.02	0.04	0.005	0.010	0.069	0.492	0.624	-0.02	0.03
TCI-R: Novelty seeking	0.014	0.006	0.180	2.167	0.033	0.00	0.03	0.012	0.006	1.959	0.053	0.00	0.02	0.013	0.004	0.210	2.809	0.006	0.00	0.02
TCI-R: Harm avoidance	0.019	0.006	0.356	3.436	0.001	0.01	0.03	0.025	0.006	4.504	<0.001	0.01	0.04	0.023	0.004	0.522	5.591	<0.001	0.01	0.03
TCI-R: Reward depend.	-0.012	0.005	-0.177	-2.193	0.031	-0.02	0.00	0.001	0.005	0.112	0.911	-0.01	0.01	-0.003	0.004	-0.052	-0.718	0.475	-0.01	0.01
TCI-R: Persistence	0.004	0.004	0.086	1.065	0.290	0.00	0.01	0.007	0.004	1.613	0.110	0.00	0.02	0.005	0.003	0.120	1.645	0.104	0.00	0.01
TCI-R: Self-directedness	-0.023	0.005	-0.503	-4.489	<0.001	-0.03	-0.01	-0.015	0.005	-2.897	0.005	-0.02	0.00	-0.012	0.004	-0.332	-3.289	0.001	-0.02	0.00
TCI-R: Cooperativeness	0.013	0.006	0.193	2.182	0.032	0.00	0.02	0.002	0.006	0.326	0.746	-0.01	0.01	0.002	0.004	0.040	0.495	0.622	-0.01	0.01
TCI-R: Self-Transcend.	0.002	0.005	0.037	0.464	0.644	-0.01	0.01	0.009	0.005	1.815	0.073	0.00	0.02	0.008	0.004	0.157	2.180	0.032	0.00	0.02

Models obtained with multiple regression entering simultaneously the set of predictors (ENTER procedure). Bold, significant coefficient.

the other behavioral addictions examined in this study. Future studies should aim to use larger, more diverse samples in order to overcome this drawback. The role of materialistic values and hoarding are also topics that should be considered. However, our findings should be considered in light of their limitations and we stress that the features of treatment-seeking patients in a single unit for behavioral addictions does not necessarily reflect the actual frequency of an addiction in the origin population. The lack of consensus regarding the diagnostic criteria for the behavioral addictions examined in the study also limits the generalizability of our results.

CONCLUSION

The results of this study suggest that CBB should be considered as a behavioral addiction, in the same manner as other excessive behaviors (such as sexual addiction, gambling, IGD, or Internet addiction). At present, an integrative model for describing the underlying mechanisms which lead to the onset and development of the CBB is not available. Additional empirical evidence is needed to identify core contrasting factors so as to clarify whether CBB represents a distinct psychiatric entity or is better conceptualized as an epiphenomenon of other psychiatric disorders characterized by addictive and/or impulse control behaviors. As with most complex, multifaceted-multidimensional processes, these studies should cover different areas: neurobiological (to recognize implicated regions, networks, and executive/cognitive functions), clinical (to dispose of the complete patient phenotype and to identify distinct developmental trajectories of the condition), and psycho-socio-cultural (to clarify what consumer-culture and financial resources interact with psychological, individual, and personality traits to lead to an increase in buying behavior).

Ultimately, a detailed understanding of the CBB will allow for improving prevention and treatment efforts. New empirical studies are required to gain a better understanding of the etiology of CBB and to establish more effective intervention programs.

AUTHOR CONTRIBUTIONS

RG, FF, JM, ST, and SJ designed the experiment based on previous results and clinical experience of AD, MB, LM, NA, NM, and MG. RG, GM, TS, FF, and SJ conducted the experiment, analyzed the data, and provided a first draft of the manuscript. SJ, TS, GM, RG, and FF further modified the manuscript.

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