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Mental imagery in the context of online compulsive buying-shopping disorder: The role of pleasure and relief

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ABSTRACT

Background: The rise of e-commerce has led to an increase in online compulsive buying-shopping disorder (OCBSD), an addictive disorder potentially driven by preoccupations like mental imagery, yet their occurrence and predictors have not been thoroughly explored.
Methods: This study investigated the expression of and associations with mental imagery in women with pathological ($n = 56$) or non-problematic buying-shopping ($n = 56$) applying hierarchical regression analyses. Participants were classified based on a structured diagnostic interview, completed self-report questionnaires assessing experiences of gratification and compensation during shopping, and a 14-day end-of-day ambulatory assessment, evaluating mental imagery intensity.
Results: Women with pathological buying-shopping reported significantly more intense shopping-specific mental imagery compared to women with non-problematic buying-shopping. Mental imagery was significantly predicted only by compensatory experiences in the pathological buying-shopping group with medium effect sizes.
Discussion: The findings suggest that in OCBSD, mental images likely arise from to the anticipated effects of relief, possibly indicating a maladaptive coping strategy.

1. Background

Given the immense growth of e-commerce, compulsive shopping is increasingly taking place on the Internet (Augsburger et al., 2020; Müller et al., 2022). Some individuals are at-risk for developing online compulsive buying-shopping disorder (OCBSD) which may be characterised by diminished control over shopping, increasing priority given to buying-shopping, and continuation or escalation of buying-shopping despite negative consequences and impairments in important areas of functioning (e.g., debts, family conflicts, clinically significant distress) (Müller, Laskowski, Wegmann, et al., 2021). Prominent clinical features of online (and offline) CBSD are preoccupations with buying/shopping and cue-induced affective and craving responses (Fineberg et al., 2022; Müller, Laskowski, Trotzke, et al., 2021). Research already addressed subjective craving responses in relation to OCBSD (Trotzke et al., 2015; Trotzke et al., 2019). In contrast, little research has focused on the role of extreme preoccupations, although their relevance has been highlighted in the literature (McElroy et al., 1994; Müller, Laskowski, Wegmann, et al., 2021). One such preoccupation could be mental imagery.

The Elaborated Intrusion Theory of Desire (EIT; Kavanagh et al., 2005) states that mental imagery is crucial to preoccupations such as the experience of strong desires and craving since it may mimic anticipated reward and relief associated with the activity. Mental images may appear as intrusive thoughts and can further be voluntarily created. The deliberate and effortful creation of mental images is called desire thinking, characterised by repetitive thoughts about obtaining a desired object or experience (Caselli & Spada, 2015). Its sub-facet, the imaginal prefiguration (i.e., mental imagery creation), is suggested to possess significant emotional power due to the integration of sensory information, simulating actual experiences along with all related sensations (Andrade et al., 2012). As for the area of buying-shopping online, imagery has frequently been the focus of consumer research and impulsive buying (e.g., Ko, 2020; Lao et al., 2021; Li et al., 2019; Park & Yoo,

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2020). Consumers may conjure situations where they pre-experience a shopping episode, for example, when they imagine interacting with a new product that they have never possessed before (Park & Yoo, 2020). If this mental simulation mainly evolves around hedonic aspects of consumption, this might favour purchases that were not planned and might thus be impulsive. Here, research has shown that the mental simulation of buying (i.e., quality and depth of elaborated sensory domains including visual, auditive, tactile, olfactory and, gustatory experiences, as well as verbal elaboration) might contribute to craving for online shopping (Brandtner & Brand, 2021; Ko, 2020) and impulsive purchase decisions (e.g., Kim et al., 2020; Li et al., 2019).

Desire thinking has been associated with a range of addictive behaviours (Albery et al., 2024; Allen et al., 2017; Awad et al., 2022; Bonner et al., 2022; Chen et al., 2024; Mattioni et al., 2024). It may be initiated with relief- as well as pleasure-oriented motivations (e.g., Brandtner & Brand, 2021; Craparo et al., 2020; Kavanagh et al., 2005), most likely depending on the level of pleasure and/or relief experienced during shopping encounters (Wegmann et al., 2022). Whether feelings of pleasure and/or relief are (equally) dominant in desire thoughts may vary depending on the phase of the addiction development, as theorised in the Interaction of Person-Affect-Cognition-Execution (I-PACE) model: When done recreationally, gratification is likely experienced during shopping activities whereas towards pathological stages of shopping, compensational experiences may be additionally involved or even more prominent (Brand et al., 2019). That is, gratifying experiences during the earlier stages of OCBSD may foster a pleasure-oriented initiation of desire thinking whereas compensatory experiences towards the later stages of the addiction may additionally promote a relief-oriented creation of imaginal desire thoughts (Brand et al., 2019; Brandtner et al., 2021).

Although the EIT, the I-PACE model, and related consumer research suggest the importance of mental imageries and desire thinking for impulsive behaviours, the concrete hypotheses stated in the EIT and I-PACE have not been tested specifically in the context of OCBSD. Therefore, we aim to investigate the role of mental imagery in OCBSD and test the hypotheses that i) mental images are more expressed with pathological online shopping behaviours compared to non-problematic online shopping behaviours. Further, we explore the pathways postulated in the EIT and I-PACE model and test the hypothesis that ii) gratifying experiences should be more strongly associated mental imagery in non-problematic buying-shopping whereas compensatory experiences should be more strongly associated with mental imagery in pathological buying-shopping. Given the female preponderance in clinical samples (Laskowski et al., 2024; Müller et al., 2019), our study focuses exclusively on women.

2. Methods

2.1. Procedure

The methodology and test battery utilised in this study are integral components of a multi-center addiction research unit (FOR2974) funded by the German Research Foundation (DFG), focusing on 'Affective and Cognitive mechanisms of Specific Internet-use Disorders, ACSID (Brand et al., 2021). ACSID targets prominent online addictive behaviours, of which online buying-shopping is the focus of this current investigation. This sub-project's procedure was preregistered on the Open Science Framework (OSF; https://osf.io/6x93n/) and approved by the institutional review boards of the Hannover Medical School (8767_BO_S_2019) and the University of Duisburg-Essen (ID: 1911APBM0457). An initial telephone screening evaluated the inclination for non-problematic or pathological online buying-shopping, medication usage, and potential exclusion criteria (e.g., medical and psychological illness that interferes with cognitive performance, intake or abuse of psychoactive substances, abnormal circadian rhythm). Subsequently, participants were invited to our laboratories for an extensive clinical interview and a comprehensive test-battery, including the here used self-report questionnaires measuring ICD-11 symptoms of online buying-shopping disorder, and experiences of gratification and compensation. The next days, participants received an automatic email containing a link to participate in the end-of-day ambulatory assessment. This email was sent daily at 6:00 pm for 14 consecutive days. Participants could retrospectively fill out the survey until 9:00 am the following day, after which it became inaccessible.

2.2. Participants

The sample in this study was drawn from an investigation on the affective and cognitive functions associated with OCBSD, which forms a component of the Research Unit ACSID (FOR2974). Female participants were recruited between October 2021 and September 2022 from various sources, including the behavioural addiction outpatient clinic at Hannover Medical School, counselling and treatment facilities for behavioural addictions, as well as from the general population through mailing lists, online social networks, and word-of-mouth referrals. During this period, Covid-19-related restrictions in Germany included a 2-status-rule (i.e., allowing access only to vaccinated or recovered individuals) for shops, excluding essential services such as supermarkets, pharmacies, and drugstores. Before October 2021, Covid-19-related restrictions in Germany included stricter measures, such as lockdowns and broader limitations on leaving home, alongside a 3-status-rule (allowing access to vaccinated, recovered, or tested individuals) for many public spaces and shops, with essential services like supermarkets, pharmacies, and drugstores remaining accessible to everyone. The initial sample consisted of $N = 127$ participants. A data screening ensured that participants had filled in at least 50 % (i.e., 7 days) of the ambulatory assessment, resulting in $n = 118$. After removing extreme outliers ($n = 6$; see Statistical analyses), the final sample includes $n = 112$ women ($M_{age=}$32.05, $SD = 12.81$, range = 18–64) with either non-problematic buying-shopping ($n = 56$) or pathological buying-shopping ($n = 56$). Individuals were classified according to the result of a clinical diagnostic interview (see below).

2.3. Measures

2.3.1. Structured clinical interview

Participants underwent a structured diagnostic clinical interview, assessing nine diagnostic criteria for Gaming Disorder based on the Assessment of Internet and Computer Game Addiction – Structured Clinical Interview, adopted for OCBSD (AICA-SKI:IBS, German version; Müller & Wölfling, 2017). The DSM-5 approximated criteria include preoccupation, withdrawal, tolerance, loss of control, loss of interest, continued overuse, deceiving, escaping negative feelings, and loss of important relations or future perspectives. For the current analysis, participants fulfilling 0–1 criteria were allocated in the non-problematic buying-shopping group (np-BSh) and participants fulfilling 5 criteria or more were assigned to the pathological buying-shopping group (p-BSh). Clinical interviews were conducted by trained PhD students who were regularly supervised by the last author.

2.3.2. Experience of gratification

To assess the experience of gratification, the Experience of Gratification Scale (EGS, German version; Wegmann et al., 2022) was used. The EGS consists of two factors which are represented by three items each, namely "gratification of needs" (e.g., "feel successful") and "experience of pleasure" (e.g., "feel good"). Answers are given on a five-point Likert scale ranging from 0 = *never* to 4 = *very often*. Mean scores were calculated for each of the subscales. The EGS had a good reliability with Cronbach's $\alpha = 0.85$ in the current sample.

2.3.3. Experience of compensation

To assess the experience of compensation, we used the Experience of

Compensation Scale (ECS, German version; Wegmann et al., 2022). This scale was developed alongside the Experience of Gratification Scale wherefore item structure and answering format are comparable. In addition to meeting preferable validity and reliability criteria (Wegmann et al., 2022), this rationale underpins the selection and combination of these scales. The ECS consists of two factors which are represented by three items each, reflecting the "compensation of needs" (e.g., "feel less unsuccessful") and "experience of relief from negative feelings" (e.g., "feel less constricted"). The answers were given on a five-point Likert scale ranging from 0 = *never* to 4 = *very often*. Mean scores were calculated for each of the subscales. The ECS had a good reliability with Cronbach's $\alpha = 0.91$ in the current sample.

2.3.4. End-of-day mental imagery

Mental imagery was assessed via a single item during the end-of-day assessment in the ambulatory survey. For ecological reasons in the ambulatory assessment, the intensity of mental imagery was assessed using a single item to condense measures of vividness and emotionality. Participants were asked, "How intensely did you visually imagine yourself shopping online today?" (German original: "Wie intensiv haben Sie sich heute bildlich vorgestellt, wie Sie online shoppen?"). Participants rated it on a 10-point Likert scale, where 1 indicated "not intense at all" and 10 represented "very intense," to express the intensity of their active imagination regarding the activity. Mean scores, derived by averaging ratings across days of participation, served as an indicator of the overall intensity of mental images in daily life, with higher mean scores reflecting more intense mental imagery elaboration.

2.4. Statistical analyses

Descriptive statistics, correlational and hierarchical regression analyses were conducted with R v4.3.2 on a MacBook Pro running Sonoma v14.1. Multivariate outliers among predictor variables were identified using Mahalanobis distance and excluded from analyses ($n = 6$). Variance Inflation Factors below 2.89 (non-problematic buying-shopping) and 2.98 (pathological buying-shopping) indicated mild multicollinearity among independent variables. Durbin Watson Statistics of 0.94 (non-problematic buying-shopping) and 0.57 (pathological buying-shopping) indicated a trend for positive autocorrelation in the residuals. A Breusch-Pagan test in the non-problematic buying-shopping group ($p = .002$) and pathological buying-shopping group ($p = .18$) indicated heteroskedasticity in the non-problematic buying-shopping group. Robust standard errors were used in regression analyses to encounter assumption violations. Table 1 shows descriptive statistics of study variables and Table 2 shows correlations among predictor and dependent variables. A hierarchical and step-wise regression analysis was used to statistically mirror the additional involvement of compensating experiences next to gratifying experiences with progressing stages of the addiction development (Brand et al., 2024).

Table 1
Descriptive statistics and independent *t*-tests for groups of individuals with non-problematic and pathological buying-shopping behaviours.

	np-BSh group (n = 56)	p-BSh group (n = 56)	Independent t-tests	Cohen's d
	M(*SD*)	*M*(*SD*)	*t*(*df*)	
Demographic information				
Age	31.48 (13.34)	32.63 (12.35)	$t(109.4) = -0.47$, $p = .639$	−0.09
Study variables				
EGS Experience of pleasure	1.87 (0.84)	2.98 (0.75)	$t(108.6) = -7.34$, $p < .001$	−1.38
EGS Gratification of needs	0.58 (0.49)	1.72 (0.80)	$t(91.8) = -9.09$, $p < 0.001$	−1.73
ECS Experience of relief	0.34 (0.47)	2.10 (1.08)	$t(75.1) = -11.21$, $p < .001$	−2.12
ECS Compensation of needs	0.21 (0.35)	1.69 (1.03)	$t(66.7) = -10.20$, $p < .001$	−1.93
Intensity of mental imagery	1.36 (0.73)	4.61 (1.80)	$t(72.5) = -12.52$, $p < .001$	−2.37

Note. np-BSh = non-problematic buying-shopping, p-BSh = pathological buying-shopping, EGS = Experience of Gratification Scale, ECS = Experience of Compensation Scale.

3. Results

3.1. Descriptive statistics and group comparison

Table 1 shows the descriptives of study variables separately for the non-problematic buying-shopping and the pathological buying-shopping group. All participants were female, age did not differ between groups. All study variables were significantly more pronounced in the pathological buying-shopping group.

Correlational analyses show moderate to strong associations between predictor variables (see Table 2) promoting mild multicollinearity among independent variables (see Statistical analyses).

3.2. Regression analyses

In the following, regression analyses are shown in Tables 3 and 4 for the two sub-samples separately. In the non-problematic buying-shopping group, mental imagery was not associated with any of the hypothesised variables. In the pathological buying-shopping group, mental imagery was associated with the two subscales of the ECS.

4. Discussion

This project investigated the experience of mental images in online shopping behaviours. We explored to what extent (associations between) mental imagery and the experience of gratification and compensation are present in women with pathological and non-problematic online buying-shopping.

Our results show that mental images were experienced significantly more intensely in women with pathological as compared to women with non-problematic buying-shopping. That is, women with pathological buying-shopping reported averagely higher intensity of shopping-specific mental imageries for a period of up to 14 days. This finding resonates with theory (Kavanagh et al., 2005) and observations (e.g., Kiyak et al., 2023) that mental images play a key role in the experience of irresistible desires and preoccupations and that this might also be the case for OCBSD. Mental imagery may therefore be an underlying mechanism of OCBSD (Müller, Laskowski, Trotzke, et al., 2021) assuming that its maladaptive effects are primarily linked to an emotional amplification (Ji et al., 2019). That is, simulations or "weak perceptions" (Pearson et al., 2015) of anticipated reward and/or relief may evoke strong emotional reactions and drive behavioural motivation. Experiences of gratification and compensation were significantly higher in individuals with pathological compared to those with non-problematic buying-shopping (see Table 1). The most relevant difference was observed in the experience of relief, emphasizing that online shopping done to reduce stressful feelings may result in a powerful instrumental learning mechanism with its consequences being an important mechanism driving OCBSD (Brand et al., 2019; Thomas et al., 2024).

Among the sample of women shopping non-problematically, only the gratification of needs is associated with mental imagery in daily life with a medium effect size, although not significant (see Table 3). In the sample of women shopping pathologically, the experience of relief and the compensation of needs were significantly associated with mental imagery over and above experiences of pleasure (see Table 4). This resonates with the I-PACE model that experiences of compensation become additionally and more dominantly involved towards

Table 2
Correlational analyses for variables of interest in both sub-samples.

		np-BSh				
	Study variables	1.	2.	3.	4.	5.
p-BSh	1. EGS Experience of pleasure	–	.678***	.383**	.271*	.459***
	2. EGS Gratification of needs	.563***	–	.421**	.393**	.557***
	3. ECS Experience of relief	.519***	.412**	–	.789***	.308*
	4. ECS Compensation of needs	.448***	.598***	.746***	–	.157
	5. Intensity of mental imagery	.375**	.140	.421**	.157	–

Note. Results are shown for the sample of individuals with non-problematic (np-BSh; top right) and pathological (p-BSh; bottom left) behaviours. ***$p < .001$, **$p < .01$, *$p < .05$.

Table 3
Predicting mental imagery in the non-problematic buying-shopping group.

	B (*SE*)	β	*t*	*p*	R^2	*F*	*p* for *F*
Model 1					0.04	2.31	0.13
Age	−0.01 (0.01)	−0.20	−2.19	.032			
Model 2					0.32	3.15	0.08
Age	0.00 (0.00)	0.01	0.18	.859			
EGS Experience of pleasure	0.13 (0.12)	0.15	1.13	.262			
EGS Gratification of needs	0.68 (0.36)	0.46	1.87	.067			
Model 3					0.36	3.20	0.07
Age	−0.00 (0.00)	0.00	−0.13	.897			
EGS Experience of pleasure	0.09 (0.13)	0.10	0.67	.503			
EGS Gratification of needs	0.71 (0.36)	0.48	1.99	.052			
ECS Experience of relief	0.47 (0.32)	0.30	1.45	.153			
ECS Compensation of needs	−0.61 (0.57)	−0.30	−1.08	.285			

Note. $n = 56$; np-BSh = non-problematic buying-shopping, EGS = Experience of Gratification Scale, ECS = Experience of Compensation Scale.

Table 4
Predicting mental imagery in the pathological buying-shopping group.

	B (*SE*)	β	*t*	*p*	R^2	*F*	*p* for *F*
Model 1					0.09	5.15	0.027
Age	−0.04 (0.02)	−0.30	−2.22	.031			
Model 2					0.18	5.51	0.023
Age	−0.03 (0.02)	−0.19	−1.50	.141			
EGS Experience of pleasure	0.86 (0.37)	0.36	2.35	.023			
EGS Gratification of needs	−0.18 (0.35)	−0.08	−0.50	.623			
Model 3					0.30	6.25	0.016
Age	−0.03 (0.02)	−0.17	−1.45	.153			
EGS Experience of pleasure	0.45 (0.41)	0.18	1.10	.279			
EGS Gratification of needs	0.02 (0.40)	0.01	0.05	.958			
ECS Experience of relief	0.95 (0.30)	0.57	3.21	.002			
ECS Compensation of needs	−0.66 (0.28)	−0.38	−2.38	.021			

Note. $n = 56$; p-BSh = pathological buying-shopping, EGS = Experience of Gratification Scale, ECS = Experience of Compensation Scale.

pathological stages of online buying-shopping. Shopping (and even the mere imagery of it) may function as a maladaptive coping mechanism, which aligns with the hypothesis of (imagery-based) desire thinking being a maladaptive coping mechanism in the context of addictive disorders (Spada et al., 2013). This has already been shown for a variety of (potentially) addictive behaviours (Brandtner & Brand, 2021; Dragan & Grajewski, 2021; Solem et al., 2020), now also including OCBSD. Interestingly, the compensation of needs was negatively associated with mental imagery, suggesting that a lower compensatory need satisfaction through online shopping provokes more mental images in daily life. This effect approximates the concept of "wishful thinking" (Melnikoff & Strohminger, 2024) where beliefs are updated in the direction of desired outcomes rather than what experiences empirically imply. It may mirror "chasing" described in the gambling disorder context (Breen & Zuckerman, 1999). That is, shopping to reduce stress may have worked well off and on in earlier stages of the disorder, then increasingly less often or for shorter periods, and yet the reward is still pursued. Individuals may therefore be insensitive to punishment (Ersche et al., 2016) and rather defensively optimistic that online shopping will still satisfy one's needs although or especially because it has not done so in the past. Vice versa, women who had indeed experienced the compensation of needs may have been less prone to have mental images in daily life.

Taken together, our findings could not provide clear support for appetitive learning processes in non-problematic buying-shopping where an experienced rush or pleasure while shopping is associated with increased imagery-based desire thinking in daily life, as postulated in the EIT and I-PACE model. By contrast, empirical evidence for avoidance learning processes was more robust. Towards the later stages of OCBSD, experiences of relief may become more dominantly associated with imagery-based desire thinking. This effect does align with ideas from the EIT, I-PACE model, and conceptual considerations on desire thinking being a coping mechanism to reduce feelings of discomfort (Kavanagh et al., 2005; Spada et al., 2015). Experiencing the effect that online shopping helps downregulating unpleasant mood and cognitive states may be consolidated as a long-term memory together with sensory information. When thinking of online shopping in daily life, either triggered intrinsically or externally through, for example, (pop-up) advertisements, influencers etc., this integrated information may facilitate memory retrieval and conscious elaboration in the form of mental images as theorised in the EIT (Kavanagh et al., 2005). Whether the content of these mental images themselves is constituted of pleasure-oriented or relief-oriented thoughts and memories was not measured in this study, but assessing the emotional quality experienced with these images would provide an interesting direction for future research around OCBSD. Until then, it may be hypothesised that especially the stress and need compensation experienced with online shopping are most likely underpinning the cognitive and emotional content of mental images.

Several limitations should be considered in interpreting the results of this study. Our study focused exclusively on women, limiting the generalizability of the findings to men and other gender identities. The sample size, while adequate, may not capture the full variability within the population of individuals with OCBSD. Although the end-of-day assessment started after the laboratory study part, our study still falls

into a cross-sectional design and may not allow for conclusions about causality. It may be that compensatory experiences lead to increased mental imagery and vice versa, that intense mental imagery exacerbates compensatory shopping experiences. While the end-of-day assessment provides up to 14 data points, we decided to calculate one robust mean score which neglects the variance of mental imagery over time. The cultural context in which the study was conducted may influence shopping behaviours and the expression of OCBSD, potentially limiting the applicability of the results to other cultural settings. While the study focused on mental imagery intensity, other accompanying cognitive and emotional factors contributing to OCBSD have not been fully explored, limiting the scope of the conclusions. Finally, we faced several assumption violations in our regression analyses which we tried to encounter with a more robust regression model. An important strength of this study, however, is that we have included a relatively large sample of well-diagnosed individuals with pathological buying-shopping, based on a clinical interview.

This study provides insights into the role of mental imagery in OCBSD. Women with pathological buying-shopping exhibited more intense mental imagery compared to those with non-problematic buying-shopping. Notably, compensatory experiences, such as stress reduction and need fulfilment, were significant predictors of mental imagery in women with pathological buying-shopping. These findings suggest that mental imagery could be a crucial mechanism in OCBSD, potentially driving the behaviour by providing emotional relief. Future research should explore the emotional quality and content of mental imagery to better understand its impact on shopping behaviours. By addressing these cognitive and emotional processes, interventions can be better tailored to reduce the impact of mental imageries on OCBSD-affected individuals.

Declaration of interest

AB reports financial support was provided by German Research Foundation.

MB reports financial support was provided by German Research Foundation. MB reports a relationship with International Society for the Studies of Behavioral Addictions that includes: board membership. MB reports a relationship with German Federal Ministry of Education and Research that includes: funding grants. MB reports a relationship with Horizon Europe that includes: funding grants. MB has performed grant reviews for research-funding agencies; has edited journals and journal sections; has given academic lectures in clinical or scientific venues; and has generated book chapters for publishers of mental health texts.

AM reports financial support was provided by German Research Foundation. AM reports a relationship with International Society for the Studies of Behavioral Addictions that includes: board membership. AM has edited journals and journal sections, has given academic lectures in clinical or scientific venues, and has generated book chapters for publishers of mental health texts.

CRediT authorship contribution statement

Annika Brandtner: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Matthias Brand:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Astrid Müller:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data of the whole research unit will be made publicly available after an embargo.

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