

**This item is the archived peer-reviewed author-version of:**

Identity processes and clusters in individuals with and without pathological buying

**Reference:**

Claes Laurence, Luyckx Koen, Vogel Birte, Verschueren Margaux, Mueller Astrid.- Identity processes and clusters in individuals with and without pathological buying  
Psychiatry research - ISSN 0165-1781 - 267(2018), p. 467-472  
Full text (Publisher's DOI): <https://doi.org/10.1016/J.PSYCHRES.2018.06.003>  
To cite this reference: <https://hdl.handle.net/10067/1548010151162165141>

## Accepted Manuscript

Identity Processes and Clusters in Individuals with and without Pathological Buying

Laurence Claes , Koen Luyckx , Birte Vogel ,  
Margaux Verschueren , Astrid Müller

PII: S0165-1781(18)30132-X  
DOI: [10.1016/j.psychres.2018.06.003](https://doi.org/10.1016/j.psychres.2018.06.003)  
Reference: PSY 11477



To appear in: *Psychiatry Research*

Received date: 19 January 2018  
Revised date: 24 May 2018  
Accepted date: 3 June 2018

Please cite this article as: Laurence Claes , Koen Luyckx , Birte Vogel , Margaux Verschueren , Astrid Müller , Identity Processes and Clusters in Individuals with and without Pathological Buying, *Psychiatry Research* (2018), doi: [10.1016/j.psychres.2018.06.003](https://doi.org/10.1016/j.psychres.2018.06.003)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**highlights**

- Pathological buying (PB) is driven by identity-related and emotional motives
- Based on identity dimensions we could identify four identity clusters
- Patients with PB were most prevalent in the troubled diffusion cluster
- Patients with PB in the troubled diffusion cluster reported more comorbid pathology
- Identity-related issues need to be considered during treatment of PB

ACCEPTED MANUSCRIPT

**Identity Processes and Clusters in Individuals with and without Pathological Buying**Laurence Claes<sup>a,b,1\*</sup>, Koen Luyckx<sup>a</sup>, Birte Vogel<sup>c</sup>, Margaux Verschueren<sup>a</sup>, & Astrid Müller<sup>c</sup><sup>a</sup>Faculty of Psychology and Educational Sciences, KU Leuven, Leuven, Belgium<sup>b</sup>Faculty of Medicine and Health Sciences, University Antwerp, Antwerp, Belgium<sup>c</sup>Department of Psychosomatic Medicine and Psychotherapy, Hannover Medical School, Hannover,  
Germany

---

<sup>1\*</sup> Correspondence to: Faculty of Psychology and Educational Sciences, Tiensestraat 102, box 3720, 3000 Leuven, Belgium. E-mail address: [laurence.claes@kuleuven.be](mailto:laurence.claes@kuleuven.be) (L. Claes)

## Abstract

The present study investigated the association between pathological buying (PB) and identity processes and clusters. Forty-one patients with PB and 41 gender/age-matched controls (73% females) filled out the Dimensions of Identity Development Scale (DIDS), the Pathological Buying Screener, and self-report questionnaires to assess comorbid psychopathology, such as depressive symptoms, pathological internet shopping, and hoarding (excluding acquisition). Patients with PB reported significantly higher scores on ruminative exploration and lower scores on identity commitment processes compared to healthy controls. In the total sample, as well as in the PB sample, we identified four identity clusters: troubled diffusion, moratorium, foreclosure, and achievement, similar to Marcia's identity statuses. Patients with PB were overrepresented in the troubled diffusion cluster and less represented in the foreclosure and achievement clusters. Patients with PB in the troubled diffusion cluster scored significantly higher on PB, pathological internet shopping, hoarding, and depressive symptoms as compared to patients with PB in the other clusters. Based on these findings, we can conclude that patients with identity diffusion report more severe PB and related comorbid symptomatology. PB and related symptoms may be considered as coping strategies to deal with identity-related issues.

## Keywords

Identity processes; identity clusters; pathological buying; hoarding; depression

## 1. Introduction

Pathological buying (PB) is defined as an extreme preoccupation with buying or the experience of irresistible, intrusive, and senseless impulses to buy. PB is associated with adverse emotional, social, and financial problems (Faber & O'Guinn, 1992; McElroy et al., 1994) and occurs offline as well as online (Pahlevan Sharif and Khanekharab, 2017; Rose and Dhandayudham, 2014; Trotzke et al., 2015). Based on a meta-analysis of Maraz et al. (2016), the pooled prevalence rate of PB in the populations studied is estimated around 5%. PB often goes along with materialistic value endorsement and hoarding, that is, the acquisition of, and failure to discard, a large number of possessions that appear to be useless or of limited value (Frost and Hartl, 1996). Furthermore, PB is also associated with high rates of psychiatric disorders, such as anxiety disorders (including the obsessive-compulsive disorder), binge eating disorder, substance abuse (Christenson et al., 1994), and depressive disorder (Black et al., 1998; in Mitchell et al., 2006) as well as personality disorders, most frequently the obsessive-compulsive personality disorder (prevalence rates ranging from 22% to 27%) (Müller et al., 2009; Schlosser et al., 1994).

In search for psychological mechanisms that constitute a vulnerability factor for PB, Belk (1988) spoke of "extending the self" through ownership of material objects. Similarly, Wicklund and Gollwitzer's (1982) self-completion theory considers consumer goods as a mean to acquire and express a sense of self-identity (Dittmar and Drury, 2000). Cushman's empty-self theory (1990, 1995) assumes that individuals with a poorly defined sense of identity attempt to gain fulfillment and a more complete identity by the acquisition of non-essential objects (Reeves et al., 2012). Finally, also the "two-factor" model of off- and online PB of Dittmar and colleagues (Dittmar, 2005a,b; Dittmar et al., 1996; 2007) considers PB as identity-seeking behavior with PB being driven by materialistic values and discrepancies between the actual and ideal sense of self (Moulding et al., 2017). PB can be considered as a mean to move closer to the ideal self and to a more integrated identity (Claes et al., 2016; Moulding et al., 2017). Also the comorbidity between PB and personality disorders (such as the

obsessive-compulsive personality disorder) links PB to identity issues, given that the alternative model of personality disorders according to DSM-5 (2013), Section III considers identity issues (Criterion A) as an important feature of all personality disorders.

According to Erikson (1968), during adolescence and young adulthood individuals are confronted with an identity crisis. They need to find out “who they are” and which goals they want to pursue during their life. Most individuals are able to solve these identity issues and reach a state of identity synthesis. However, adolescents who fail in the search for an identity will experience self-doubt and identity diffusion, and may indulge in self-destructive one-sided pre-occupation or activity. The adolescent may withdraw, over-identify with others (e.g., idols, heroes) or turn to drugs, alcohol or other means to relieve the anxiety that identity diffusion creates (Erikson, 1968). Also in our previous studies, we have shown how adolescents may divert their attention from this diffused sense of self through means such as material consumption (Claes et al., 2016), overeating (Verschuere et al., 2017), or non-suicidal self-injury (Claes et al., 2014).

Building on Erikson (1968), Marcia’s (1966) identity status paradigm defined how identity formation can be described along two processes of exploration and commitment to life choices. Luyckx et al. (2008) expanded this paradigm and described three exploration processes (exploration in breadth and in depth, ruminative exploration) and two commitment processes (commitment making, identification with commitment). When identity formation develops fluently, individuals gather information about different identity alternatives (exploration in breadth) before making important life decisions (commitment making). Subsequently, individuals evaluate the degree to which these decisions correspond with internal standards (exploration in depth) and become integrated as part of one’s identity (identification with commitment). Besides these four adaptive identity formation processes, Luyckx et al. (2008) captured a maladaptive process of ruminative exploration, in which individuals repeatedly reformulate the same identity questions and get stuck in

a vicious circle. Such ruminative exploration can cause distress and prevents individuals from making commitments (Luyckx et al., 2008; Verschueren et al., 2017).

Luyckx et al. (2008) performed cluster analysis on these five identity processes and found evidence for different identity clusters, of which four are very similar to Marcia's (1966) original clusters, being achievement, moratorium, foreclosure and diffusion. *Achievement* is characterized by high scores on all identity processes except for ruminative exploration, it is the most mature identity cluster and resembles Erikson's notion of identity synthesis. Individuals in *foreclosure* score high on commitment making and identification with commitment, but low on the three exploration processes. They make commitments based mainly on familial/societal beliefs with little or no exploration. In *moratorium*, people score high on the three exploration processes but low on both commitment processes. They continue to explore identity alternatives but do not make real commitments, and remain in a state of identity-crisis, often related to distress and psychopathology (Verschueren et al., 2017). Finally, Luyckx et al. (2008) found evidence for two diffusion clusters: carefree and troubled diffusion. Individuals in *troubled diffusion* score high on ruminative exploration and relatively low on all other identity processes. They somewhat resemble individuals who belong to the moratorium cluster, but they generally experience more distress/psychopathology than individuals in the moratorium cluster (Schwartz et al., 2011; Verschueren et al., 2017). Individuals in *carefree diffusion* also score low on the adaptive identity processes but also quite low on ruminative exploration: they seem quite unmotivated to engage in identity formation and live 'from day to day' (Luyckx et al., 2008; Verschueren et al., 2017).

In the present study, we examined identity processes/clusters among patients with PB and gender/age-matched controls using the identity model of Luyckx et al. (2008). First, we compared patients with PB and healthy controls on the five identity processes. We hypothesized that patients with PB would score higher on ruminative exploration and lower on the four adaptive identity processes. Second, we used cluster-analysis on the five identity processes to identify identity clusters



in the combined sample of patients with PB and controls to: (a) replicate previously described identity clusters, and (b) examine whether patients and controls are differentially distributed among these clusters. We hypothesized to find more patients with PB in the moratorium and diffusion clusters; whereas we expected more controls in the achievement and foreclosure clusters. Finally, as an exploratory analysis, we investigated associations between identity clusters and clinical symptomatology in patients with PB. We hypothesized to find more psychopathology in patients who were in moratorium and troubled diffusion, which are characterized by ruminative identity exploration (Schwartz et al., 2011).

## 2. Method

### 2.1. Participants and procedure

The PB group consisted of 41 consecutive outpatients (73% female). PB was the primary diagnosis of all patients and the reason for seeking treatment. Comorbid psychiatric disorders have not been systematically assessed in the current study. Whereas PB patients and controls were exactly matched for gender, a deviation of  $\pm 1$  year was allowed around age. Patients with PB were contacted through treatment and self-help groups in the Hannover Medical School (n=34), the Department of General Psychology Duisburg (n=2), the Department of Psychiatry of the University of Basel (n=7), and the salus Klinik Friedrichsdorf (n=3). Healthy control participants were recruited via advertisement (see also Vogel et al., 2018). Exclusion criteria for both groups were learning or developmental disorders, psychosis, mental retardation, current substance abuse (except tobacco), acute suicidal ideations, and sensory impairments. Inclusion criteria for both groups were age  $\geq 18$  years and sufficient German language skills. Inclusion criteria for the PB group were a current diagnosis of PB, while the healthy control group consisted of individuals without PB. The presence or absence of PB was diagnosed using a clinical interview in accordance with the diagnostic criteria for PB proposed by Mc Elroy et al. (1994). Additionally, a score of  $\geq 29$  on the Pathological Buying Screener (PBS; Müller et al., 2015) was required to be diagnosed with PB. Healthy control

participants needed a score of  $<29$  on the PBS (Müller et al., 2015). Assessment of PB lasted one session and was conducted by a trained MD student (third author) who was regularly supervised by the main investigator (last author). Diagnoses of PB were confirmed by an experienced psychotherapist at the respective study centers. Self-report data other than the PBS were assessed in a separate session. The study was approved by the medical ethical committee of the Hannover Medical School. All participants signed an informed consent before participating in the study.

Due to multivariate outliers on the identity processes, two patients of the PB group needed to be excluded (Garson, 2014), leaving us with 39 patients with PB and 41 healthy controls. The sociodemographic and clinical characteristics of both groups are displayed in Table 1. We did not find significant differences between both groups (HC vs. PB) with respect to gender, age, occupation and net income/month (in Euro); however, HC reported significant more years of education than patients with PB. Finally, patients with PB scored significantly higher on all clinical measures compared to HC.

## 2.2. Instruments

The *Dimensions of Identity Development Scale* (DIDS; Luyckx et al., 2008) is a reliable and valid measure to assess the five identity processes. The DIDS consists of 25 items rated on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). Each of the five DIDS dimensions consists of five items: exploration in breadth ( $\alpha=.85$ ), exploration in depth ( $\alpha=.55$ ), ruminative exploration ( $\alpha=.87$ ), commitment making ( $\alpha=.94$ ) and identification with commitment ( $\alpha=.90$  in the total sample of the present study). Although the internal consistency of the exploration in depth scale was rather low, the corrected item-total correlations were positive and ranged from  $r = .14$  to  $r = .53$ , and the correlations among the items varied between  $r = .03$  and  $r = .61$ .

Pathological buying was assessed by means of the *Pathological Buying Screener* (PBS; Müller et al., 2015). The PBS consists of 13 items to be assessed on a 5-point Likert scale ranging from 1 (never) to 5 (very frequently). A cut-off score of  $\geq 29$  is considered indicative for Buying Disorder. The PBS has proven to be a reliable and valid instrument. The alpha coefficient was .98.

Depressive symptoms were assessed by means of the *Patient Health Questionnaire-9 Depression Screener* (PHQ-9; Pfizer ©, Spitzer et al., 1999). The PHQ-9 is the nine-item depression scale of the Patient Health Questionnaire. The PHQ-9 consists of each of the nine DSM-IV criteria for depression and is scored on a four-point rating scale, ranging from 0 (not at all) to 3 (nearly every day). The alpha coefficient was .92.

The *short-Internet Addiction Test* (s-IAT; Palikowski et al., 2013) modified for online shopping sites was used to assess subjective symptoms in everyday life due to internet/online buying. The questionnaire consists of 12 items to be assessed on a 5-point Likert scale ranging from 1 (Never) to 5 (Very often). The alpha coefficient was .97

The 19-item German version (Müller et al., 2009) of the *Saving Inventory-Revised* (SI-R; Frost et al., 2004) was used to assess symptoms of hoarding. Items are rated on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). The SI-R has three subscales: problems due to acquisition (5 items,  $\alpha = .95$ ), difficulty discarding (7 items,  $\alpha = .96$ ) and clutter (7 items,  $\alpha = .94$ ). In the present study, we removed the acquisition scale from the total SI-R scale to reach an optimal difference between PB and hoarding. The alpha coefficient of the “difficulty discarding + clutter scale” (14 items) was .96.

### 2.3. Analyses

A profile analysis or repeated measures or mixed ANOVA was performed to investigate differences in mean scores on the five identity processes scales between PB patients and age-matched controls (Greenhouse & Geisser, 1959). A two-step procedure was used for cluster analysis on the five identity processes in the combined sample (Gore, 2000). In a first step, we conducted a hierarchical cluster analysis using Ward’s method based on squared Euclidian distances. In a second step, the initial cluster centers were used as non-random starting points in an iterative k-means clustering procedure. Finally, we used the Chi-Square test statistic to investigate the association between patients/controls status and identity cluster membership. Additionally, in the patient

sample, clusters were derived based on the final cluster centers obtained in the combined sample (using the classify option in k-means clustering; see also Verschueren et al., 2017). ANOVAs were used to explore differences in age and clinical symptomatology between identity clusters in patients with PB.

### 3. Results

The profile analysis or repeated measures ANOVA with group (patients with PB vs. controls) as between subjects factor and the identity processes as within subjects factors and their interaction showed no significant main effect of group [ $F(1, 78) = .47, p = .50, \eta^2 = .01$ ], a significant main effect of identity processes [Wilks' Lambda = .447,  $F(4, 75) = 23.20, p < .001, \eta^2 = .55$ ] and a significant interaction effect [Wilks' Lambda = .777,  $F(4, 75) = 5.37, p < .01, \eta^2 = .22$ ]. Given the significant interaction effect, we did not interpret the main effect of identity processes. Concerning the interaction effect, patients with PB scored significantly higher on ruminative exploration ( $p < .001$ ) and significantly lower on commitment making ( $p < .01$ ) and identification with commitment ( $p < .07$ ) compared to controls (see Figure 1).

Based on the cluster analysis on the total sample ( $N=80$ ), we retained four identity clusters based on the five identity processes of Luyckx et al. (2008). Cluster 1 ( $N=11, 13.75\%$ ) was labelled Moratorium, characterized by high scores on exploration in breadth and depth and moderately high scores on the other three identity processes. Cluster 2 ( $N=19, 23.75\%$ ) was named Troubled Diffusion, with high scores on ruminative exploration, and low scores on the commitment processes. Cluster 3 ( $N=26, 32.50\%$ ) was labelled Foreclosure, with moderately high scores on both commitment processes and low scores on the three exploration based processes. Finally, Cluster 4 ( $N=24, 30.00\%$ ) was named Achievement with low scores on ruminative exploration, and moderately high scores on exploration in breadth, commitment making and identification with commitment (see Figure 2). As visualized in Table 2, patients with PB and age-matched controls were differently distributed among these clusters [ $\chi^2_{(3)}=21.78, p < .001$ ]. The troubled diffusion cluster consisted for 95% of patients with

PB, whereas the Foreclosure and the Achievement clusters, respectively, consisted for 31% and 33% of patients with PB.

The results of the cluster analysis on the five identity processes among patients with PB ( $N=39$ ) identified similar clusters as described before: Moratorium ( $N=5$ , 12.8%), Troubled Diffusion ( $N=18$ , 46.2%), Foreclosure ( $N=8$ , 20.5%), and Achievement ( $N=8$ , 20.5%). We did not find significant gender [ $\chi^2_{(3)}=3.86$ , *ns*], nor age differences [ $F(3,35)=0.30$ , *ns*] among these different identity clusters.

The results of the ANOVAs with identity clusters within the PB sample as independent variable, and comorbid psychopathology scales as dependent variables are shown in Table 3. Patients in Troubled Diffusion reported significantly more PB symptomatology than patients in Achievement. Additionally, patients with PB in Troubled Diffusion scored significantly higher on internet buying (s-IAT) compared to patients with PB in Moratorium and Achievement. Finally, patients with PB in Troubled Diffusion showed significantly higher scores on hoarding (SI-R) and depressive symptoms (PHQ-9) compared to patients with PB in Moratorium, Foreclosure and Achievement.

The results of the cluster analysis on the five identity processes among controls identified similar clusters as described in the total and patient sample. However, we had very small numbers of observations in the Moratorium ( $N=6$ ) and the Diffusion ( $N=1$ ) clusters. Given these very small numbers of observations in these two clusters and given the impossibility to perform post-hoc tests to compare clusters given  $N=1$  (Diffusion cluster), we decided not to include this solution in the manuscript (for more information see Appendix A, supplementary materials).

## Discussion

We investigated associations between identity processes/clusters and pathological buying (PB) in a clinical and a control group. With respect to identity processes, patients with PB score significantly higher on ruminative exploration and lower on commitment making/identification with commitment compared to healthy controls. With respect to the cluster analysis, we retained four identity clusters in the total sample: Troubled Diffusion, Moratorium, Foreclosure and Achievement.

Patients with PB were overrepresented in Troubled Diffusion, characterized by ruminative exploration, and less represented in Foreclosure and Achievement.

Additionally, in the patient sample only, we found the highest number of patients in the Troubled Diffusion cluster. Patients in Troubled Diffusion reported significantly more symptoms of offline and online pathological buying, hoarding, and depressive symptoms compared to patients in Achievement. The associations between identity diffusion and PB/depressive symptoms are in line with Dittmar's (2007) two-factor theory of PB, in which she states that PB is related to identity-related and emotional motives. Individuals who experience difficulties in defining themselves (identity diffusion) strive for alternative indicators for self-definition (i.e., the possession of material goods) that can be considered a substitute for identity shortcomings (Moulding et al., 2017). However, as the effect of buying does not lead to lasting adaptive changes in one's identity, the individual continues to buy and experience negative emotions (Moulding et al., 2017). To regulate or repair these emotions, individuals shop and buy to improve their mood (Dittmar, 2007). These findings are also in line with studies, in which clear associations were found between identity diffusion, internalizing symptomatology, and PB both offline (Claes et al., 2016) and online (Pahlevan Sharif and Khanekharab, 2017). A similar theory was forwarded in the domain of hoarding. Several studies argued that individuals who experience uncertainty about the self, may attempt to restore their identities by viewing their material goods as expression of "who they are" (Frost et al., 1996; 2007; Rios Morrison and Johnson, 2011). The discarding of their possessions often feels like losing a part of their identity, so they continue hoarding to avoid negative feelings (Frost et al., 1996; 2007; Rios Morrison and Johnson, 2011). Hence, our findings suggest that patients with identity diffusion report higher levels of PB offline and/or online buying, hoarding behaviors and negative affect compared to patients with less identity-related issues. Therefore, psychological interventions that increase identity clarity may be useful to buffer against the negative effect of identity diffusion and related negative affect within patients with PB.

Despite the strengths of the study, it is not without limitations. First, we used a relatively small sample of patients with PB and gender/age-matched controls. Second, all variables were assessed using self-report scales, which could increase associations among variables due to shared method variance. Third, the reliability of the 'Exploration in Depth scale' was rather low in the present study. However, this finding is in line with previous studies (Skhirtladze et al., 2016; Zimmerman et al., 2015) and emphasizes the need for optimizing the measurement of this dimension. Fourth, the important study variables were all assessed by means of self-report measures, which could increase social desirability as well as increase the associations between variables due to shared method variance. Therefore, future studies should make use of multi-method and/or multi-informant approaches to assess identity and psychopathology. Finally, the study was cross-sectional in nature, which makes it difficult to speak about directionality of effects. In a recent paper by Klimstra and Denissen (2017) seven models were put forward regarding the directionality of identity-psychopathology linkages. Whereas some models consider identity issues as a precursor of psychopathology (e.g., the vulnerability model: identity diffusion as a vulnerability factor for PB), other models consider a third factor responsible for the association between identity and psychopathology (e.g., common cause model: traumatic experiences as a common factor for PB and identity issues). Finally, the last group of models considers psychopathology as a precursor of identity issues (e.g., scar model: PB could lead to identity loss) (Klimstra and Denissen, 2017). To deal with these issues, future studies should replicate these findings in longitudinal studies with a larger sample of patients with PB and controls and check the directionality of effects.

Notwithstanding these shortcomings, this was the first study to investigate the relationship between identity processes/clusters, PB, and comorbid psychopathology in patients and healthy controls.

## Acknowledgement

We kindly thank Giulia Schäfer (Hannover Medical School, Germany), Jana Stenger (University of Basel, Switzerland), Nadja Tahmassebi (salus Clinic Friedrichsdorf, Germany), and Patrick Trotzke (University of Duisburg-Essen, Germany) for data collection.

ACCEPTED MANUSCRIPT



## References

- American Psychiatric Association, 2013. *Diagnostic and statistical manual for mental disorders, fifth edition (DSM-5)*. Arlington, American Psychiatric Association.
- Belk, R.W., 1988. Possessions and the extended self. *J Consum Res.* 15, 139-168.  
<https://doi.org/10.1086/209154>
- Black, D. W., Repertinger, S., Gaffney, G. R., Gable, J., 1998. Family history and psychiatric comorbidity in persons with compulsive buying: Preliminary findings. *Am J Psychiat.* 155, 960–963. <https://doi.org/10.1176/ajp.155.7.960>
- Christenson, G. A., Faber, R. J., de Zwaan, M., Raymond, N., Specker, S. M., Ekern, M., et al., 1994. Compulsive buying: Descriptive characteristics and psychiatric comorbidity. *J Clin Psychiat.* 55, 5–11.
- Claes, L., Luyckx, K., Bijttebier, P., 2014. Non-suicidal self-injury in adolescents: Prevalence and associations with identity formation above and beyond depression. *Pers Individ Differ.* 61-62, 101-104. <https://doi.org/10.1016/j.paid.2013.12.019>
- Claes, L., Müller, A., Luyckx, K., 2016. Compulsive buying and hoarding as identity substitutes: The role of materialistic value endorsement and depression. *Compr Psychiat.* 68, 65-71.  
<https://doi.org/10.1016/j.comppsy.2016.04.005>
- Cushman, P., 1990. Why the self is empty: toward a historically situated psychology. *Am Psychol.* 45, 599-611.
- Cushman, P., 1995. *Constructing the self, constructing America: a cultural history of psychotherapy*. Addison-Wesley, Reading, MA.
- Dittmar, H., 2005a. Compulsive buying—a growing concern? An examination of gender, age, and endorsement of materialistic values as predictors. *Br J Psychol.* 96, 467–491.  
<https://doi.org/10.1348/000712605X53533>
- Dittmar, H., 2005b. A new look at “compulsive buying”: Self–discrepancies and materialistic values as predictors of compulsive buying tendency. *J Soc Clin Psychol.* 24, 832–859.  
<https://doi.org/10.1521/jscp.2005.24.6.832>
- Dittmar, H., Beattie, J., Friese, S., 1996. Objects, decision considerations and self- image in men’s and women’s impulse purchases. *Acta Psychol.* 93, 187–206.

- Dittmar H, Drury J., 2000. Self-image - is it in the bag? A qualitative comparison between "ordinary" and "excessive" consumers. *J Econ Psychol.* 21, 109-142. [https://doi.org/10.1016/S0167-4870\(99\)00039-2](https://doi.org/10.1016/S0167-4870(99)00039-2)
- Dittmar, H., Long, K., Bond, R., 2007. When a better self is only a button click away: associations between materialistic values, emotional and identity-related buying motives, and compulsive buying tendency online. *J Soc Clin Psychol.* 26, 334-361. <https://doi.org/10.1521/jscp.2007.26.3.334>
- Erikson, E.H., 1968. *Identity: Youth and crisis.* Norton, New York.
- Frost, R.O., Hartl, T.L., 1996. A cognitive behavioral model of compulsive hoarding. *Behav Res Ther.* 34, 341-350.
- Frost, R.O., Kyrios, M., McCarthy, K.D., Matthews, Y., 2007. Self-ambivalence and attachment to possessions. *J Cogn Psychoth.* 21, 232-242. <https://doi.org/10.1891/088983907781494582>
- Faber, R.J., O'Guinn, T.C., 1992. A clinical screener for compulsive buying. *J Consum Res.* 19, 459-469.
- Frost, R.O., Steketee, G., Grisham, J., 2004. Measurement of compulsive hoarding: saving inventory-revised. *Behav Res Ther.* 42, 1163-1182. <https://doi.org/10.1016/j.brat.2003.07.006>
- Garson, G. D., 2014. *Cluster analysis.* Statistical Associates Publishers, Asheboro.
- Gore, P. A. J., 2000. Cluster analysis. In: Tinsley H. E. A., Brown, S. D. (Eds.), *Handbook of applied multivariate statistics and mathematical modeling.* Academic Press, San Diego, pp. 297–321.
- Greenhouse, S.W., & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika,* 24, 95-112.
- Klimstra, T.A., & Denissen, J.J.A., 2017. A theoretical framework for the associations between identity and psychopathology. *Dev Psychol.* 53, 2052-2065. <http://dx.doi.org/10.1037/dev0000356>
- Luyckx, K., Schwartz, S. J., Berzonsky, M. D., Soenens, B., Vansteenkiste, M., Smits, I., et al., 2008. Capturing ruminative exploration: Extending the four-dimensional model of identity formation in late adolescence. *J Res Pers.* 42, 58–82. <https://doi.org/10.1016/j.jrp.2007.04.004>
- Maraz, A., Griffiths, M.D., Demetrovics, Z., 2016. The prevalence of compulsive buying : a meta-analysis. *Addiction.* 111, 408-419. <https://doi.org/10.1111/add.13223>

- Marcia, J., 1966. Development and validation of ego-identity status. *J Pers Soc Psychol.* 3, 551–558.
- McElroy, S.L., Keck, Jr. P.E., Pope, Jr. H.G., Smith, J.M., Strakowski, S.M., 1994. Compulsive buying: a report of 20 cases. *J Clin Psychiat.* 55, 242-248.
- Mitchell, J.E., Burgard, M., Faber, R., Crosby, R.D., de Zwaan, M., 2016. Cognitive behavioral therapy for compulsive buying disorder. *Beh Res Ther.* 44, 1859-1865.  
<https://doi.org/10.1016/j.brat.2005.12.009>
- Moulding, R., Duong, A., Nedeljkovic, M., Kyrios, M., 2017. Do you think that money can buy happiness? A review of the role of mood, materialism, self, and cognitions in compulsive buying. *Current Addictive Reports.* 4, 254-261.
- Müller, A., Crosby, R.D., Frost, R.O., Bleich, S., Glaesmer, H., Osen, B., Leidel, B., de Zwaan, M., 2009. Fragebogen zum zwanghaften Horten (FZH) – Validierung der deutschen Version des Saving Inventory-Revised. [German Compulsive Hoarding Inventory (FZH) - Evaluation of the German of the Saving Inventory-Revised]. *Verhaltenstherapie.* 19, 243-250.
- Mueller, A., Mühlhans, B., Müller, U., Mertens, C., Horbach, T., Michell, J.E. et al., 2009. Compulsive buying and psychiatric comorbidity. *Psychotherapie Psychosomatik Medizinische Psychologie.* 59, 291-299.
- Müller, A., Trotzke, P., Mitchell, J.E., de Zwaan, M., Brand, M., 2015. The Pathological Buying Screener: Development and psychometric properties of a new screening instrument for the assessment of pathological buying symptoms. *PLoS ONE* 10(10):e0141094.  
<https://doi.org/10.1371/journal.pone.0141094>
- Pahlevan Sharif, S., Khanekharab, J., 2017. Identity confusion and materialism mediate the relationship between excessive social network usage and online compulsive buying. *Cyberpsychology, Behavior, and Social Networking.* 20, 494-500.  
<https://doi.org/10.1089/cyber.2017.0162>

- Pawlikowski, M., Alstötter-Gleich, C., Brand, M., 2013. Validation and psychometric properties of a short version of Young's internet addiction test. *Comput Hum Behav.* 29, 1212-1223.  
<https://doi.org/10.1016/j.chb.2012.10.014>
- Reeves, R.A., Baker, G.A., Truluck, C.S., 2012. Celebrity worship, materialism, compulsive buying, and the empty self. *Psychol Market.* 29, 674-679. <https://doi.org/10.1002/mar.20553>
- Rios Morrison, K, Johnson, C.S., 2011. When what you have is who you are: self-uncertainty leads individuals to see themselves in their possessions. *Pers Soc Psychol.* 37, 639-651.  
<https://doi.org/10.1177/0146167211403158>
- Rose, S., Dhandayudham, A., 2014. Towards an understanding of Internet-based problem shopping behaviour: the concept of online shopping addiction and its proposed predictors. *J Behav Addict.* 3, 83-89. <https://doi.org/10.1556/JBA.3.2014.003>
- Schlosser, S., Black, D.W., Repertinger, S., & Freet, D., 1994. Compulsive buying. demography, phenomenology, and comorbidity in 46 subjects. *Gen Hosp Psychiatry.* 16, 205-212.
- Schwartz, S. J., Beyers, W., Luyckx, K., Soenens, B., Zamboanga, B., Forthun, L., . . . Waterman, A., 2011. Examining the light and dark sides of emerging adults' identity: A study of identity status differences in positive and negative psychosocial functioning. *J Youth Adolescence.* 40, 839–859. <https://doi.org/10.1007/s10964-010-9606-6>
- Skhirtladze, N., Javakhishvili, N., Schwartz, S.J., Beyers, W., Luyck, K., 2016. Identity processes and statuses in post-Soviet Georgia: Exploration processes operate differently. *J Adolescence.* 47, 197-209. <https://doi.org/10.1016/j.adolescence.2015.08.006>
- Spitzer, R.L., Kroenke, K., Williams, J.B.W., 1999. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *J Am Med Assn.* 282, 1737-1744.
- Trotzke, P., Starcke, K., Müller, A., Brand, M., 2015. Pathological buying online as a specific form of Internet addiction: A model-based experimental investigation. *PLoS ONE,* 14;10(10):e0140296. <https://doi.org/10.1371/journal.pone.0140296>

- Verschueren, M., Luyckx, K., Kaufman, E.A., Vansteenkiste, M., Moons, P., Sleuwaegen, E., Berens, A., Schoevaerts, K., Claes, L., 2017. Identity processes and statuses in patients with and without eating disorders. *Eur Eat Disord Rev.* 25, 26-35. <https://doi.org/10.1002/erv.2487>
- Vogel, B., Trotzke, P., Schäfer, G., Löber, S., Stenger, J., Brand, M., de Zwaan, M., Müller, A., 2018. Buying Disorder: An experimental study of addiction-related neurocognitive functions. [Conference paper presented at the 5th International Conference on Behavioral Addictions, Cologne, Germany]. *J Behav Addict.* 7, 159.
- Wicklund, R.A., Gollwitzer, P.M., 1982. *Symbolic self-completion*. Erlbaum, Hillsdale.
- Zimmerman, G., Lannegrand-Willems, L., Safont-Mottay, C., Cannard, C., 2015. Testing new identity models and processes in French-speaking adolescents and merging adult students. *J Youth Adolescence.* 44, 127-141. <https://doi.org/10.1007/s10964-013-0005-7>

**Table 1. Sociodemographic and clinical characteristics of healthy controls and patients with PB.**

	Controls (n=41)		Patients with PB (n=39)		$\chi^2$	
	N	(%)	N	(%)		
Gender					.015	
Female	30	(73.2)	29	(74.4)		
Male	11	(26.8)	10	(25.6)		
Employment					6.19	
No	4	(9.8)	5	(12.8)	(p=.045)	
Yes	35	(85.4)	25	(64.1)		
Retired	2	(4.9)	9	(23.1)		
Own net income/month					1.06	
< 500 Euro	2	(4.9)	2	(5.1)		
< 1500 Euro	10	(24.4)	13	(33.3)		
< 2500 Euro	20	(48.8)	15	(38.5)		
≥ 2500 Euro	9	(22.0)	9	(23.1)		
	<i>M</i>	<i>(SD)</i>	<i>M</i>	<i>(SD)</i>	<i>F</i>	$\eta^2$
Age	44.63	(10.46)	44.97	(10.81)	.02	.00
Years of education	12.46	(1.66)	11.36	(2.13)	6.72*	.08
Duration of PB (years)			15.44	(11.19)		
PBS	19.44	(3.14)	49.34	(9.94)	335.23***	.81
PHQ-9	4.00	(3.02)	12.10	(6.44)	52.66***	.40
s-IAT	14.24	(2.03)	31.08	(13.41)	63.09***	.45
SI-R	6.71	(1.68)	22.74	(1.73)	44.21***	.36

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

PBS = Pathological Buying Screener, PHQ-9 = Patient Health Questionnaire-9 Depression Screener, s-IAT = short-Internet Addiction Test for online shopping sites, SI-R = Saving Inventory-Revised (difficulty discarding + clutter scale), PB = Pathological Buying.

**Table 2. Cross-tabulation of group and identity clusters**

Identity clusters	Controls			Patients with PB			Total
	<i>N</i>	( <i>SR</i> )	%	<i>N</i>	( <i>SR</i> )	%	
Moratorium	6	(0.2)	55	5	(-0.2)	45	11
Troubled Diffusion	1	(-2.8)	5	18	(2.9)	95	19
Foreclosure	18	(1.3)	69	8	(-1.3)	31	26
Achievement	16	(1.1)	67	8	(-1.1)	33	24
Total	41			39			80

*N* = number of participants, *SR* = Standardized Residuals, % = percentage of controls/patients within each cluster, PB = Pathological Buying.

**Table 3. Means (standard deviations) of the co-morbid psychopathology measures for each of the identity clusters in the sample with PB (n=39)**

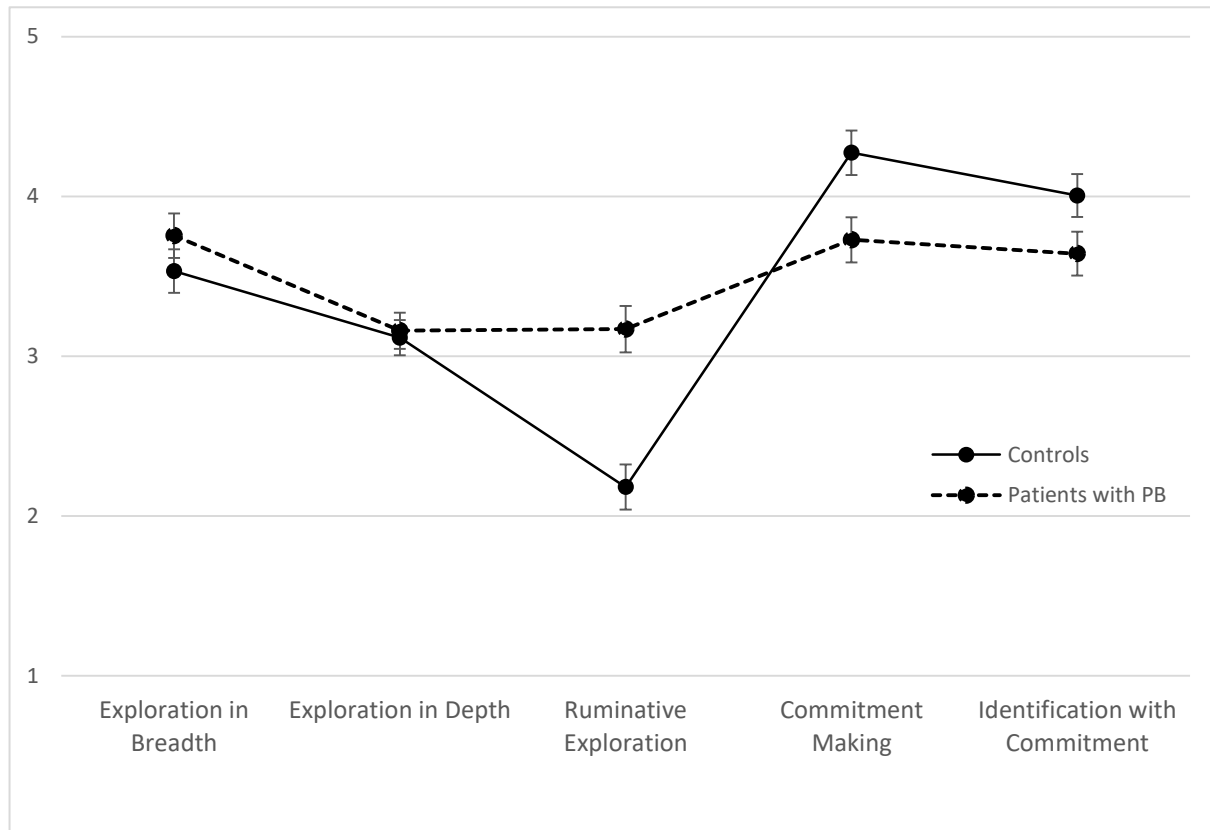
	Moratorium (1) (N=5)		Troubled Diffusion (2) (N=18)		Foreclosure (3) (N=8)		Achievement (4) (N=8)		<i>F</i>	$\eta^2$	Post- hoc Tests
PBS	47.00	(6.20)	54.41	(8.47)	48.63	(12.63)	40.75	(5.06)	4.62*	.29	2>4
s-IAT	22.00	(7.71)	37.61	(13.84)	28.88	(13.69)	24.25	(7.91)	3.54*	.23	2>1, 2>4
SI-R (D+C )	12.60	(13.76)	30.72	(13.80)	18.88	(13.02)	15.00	(10.39)	4.44*	.28	2>1,2> 3, 2>4
PHQ -9	8.40	(4.93)	16.17	(4.77)	8.38	(6.14)	9.00	(6.28)	6.32*	.35	2>1,2> 3, 2>4

\* $p < .05$ , \*\* $p < .01$

PBS = Pathological Buying Screener, s-IAT = Short-Internet Addiction Test, SI-R = Saving Inventory-Revised (Difficulties Discarding + Clutter), PHQ-9 = Patient Health Questionnaire-Depression Screener.



Figure 1. Means (standard errors) of controls and patients with PB on each of the five identity processes.



**Figure 2. Z-scores for the identity processes for the final four-cluster solution in the combined sample (N=80)**

