

# Role of Higher Education to Adjust the Impulse Eating-Buying Behavior. A Systematic Literature Review and Bibliometric Analysis

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## Abstract

Individual traits as impulsivity, used as emotion regulation or reward, trigger the increased consumption of unhealthy food, which affects the academic performance. The aim of this paper is to provide an overview of research published on impulsive eating and buying that helps enhance the higher education learning environments, to provide direction to the scientific knowledge to deliver a better understanding of impulsive actions and self-regulation. Three databases on literature related to the two terms from 1962 to June 2020, drawn from Scopus and WoS, were reviewed. The methodology is based on co-citation and cluster analysis, using two analytic tools: VOSviewer and CitNetExplorer. Main authors, keywords, affiliations, and sources on this research area are determined. Co-citation and coupling analysis show up a closer relationship between the two fields. As a result of clustering, six research streams are identified: (1) cognitive and trait influences on impulsiveness, (2) children and habits, (3) adolescents, (4) consumer behavior, (5) emotion control, and (6) personality and reward. Finally, a research agenda is proposed. The findings of this research highlight the importance of the role that education institutions are playing in order to promote healthy eating and access to healthy food consumption in their communities.

**Keywords:** higher education; impulsive eating; impulsive buying; bibliometric review

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## 1. Introduction

The individual has developed a so-called self-regulatory system, where he or she decides what goals to pursue and plans how to do so. Part of this self-regulation process is veiled by self-control mechanisms; the individual's behaviors are thus managed with the aim of achieving long-term goals and overcoming the temptations that arise along the way, and which can be responded to through impulses (Fujita, 2011; Hoch & Loewenstein, 1991).

Strack, Werth, and Deutsch (2006) defines the two forces that determinate behavior: the reflective system and the impulsive system. Self-regulatory resources are the energy for the reflective system, as they represent self-guides, policies, and other rules that push up the individual behavior to stick to a plan (Vohs, K. D., 2006). Increasing the knowledge about how to control the impulsive system, and how to enhance the self-regulatory resources in the individual will empower consumers and students on their decision making and their healthy choices. In turn, healthy food choices and a healthy lifestyle led to better academic results.

Although research scholars have paid attention to impulsive traits and their relation to healthy consumption, to the best of our knowledge the different inner motivations that trigger impulsivity have been studied separately. Hence, the existing literature makes lower description about how the individual can improve their knowledge on impulse buying and impulse eating, so they can enhance their behavior and develop better learning strategies that raises their standard of living (Erfanian, Lee, & Omar, 2022).

The current study is focused on analyzing the further production of research on impulsivity in the areas of food and buying, in which people are more prone to yield to temptation (Friese & Hofmann, 2009; Verplanken, Herabadi, Perry, & Silvera, 2005). Accordingly, the aims of this review are: 1) To set out the research relationships between impulse buying and impulse eating in terms of scientific production, 2) To design which are their main clusters of references, and thus their primary research streams, and 3) To develop a research agenda in order to focus future research to prepare the consumer as an individual in terms of an academic health-oriented lifestyle.

The methodology for this literature review is based on a bibliometric citation analysis which allows a parallelism between the literature on “impulse buying” and “impulse eating” to be established. The systematic literature review is based on two powerful tools – VOSviewer and CitNetExplorer – and a clustering exploration on direct citation relations (van Eck & Waltman, 2017). VOSviewer is more related to authors, since it clusters them, allowing its co-occurrence and co-citation analysis to be identified. CitNetExplorer is a more specialized tool not based primarily on authors, but on the visualization of the citation networks of publications. This tool generates the “genealogy” of a research

field from the links to the core publications (Bahoo, Alon, & Paltrinieri, 2020; Fernandez-Pinedo & Muñoz, 2019). CitNetExplorer, contrary to VOSviewer, can only manage data from the WoS. In this sense, it is more limited to databases derived only from this source.

The structure of the paper is as follows. First, the data collection method is overviewed. Then, there is a discussion of results. Finally, conclusions and the research agenda are proposed.

## **2. Theoretical Framework**

Rook (1987) defines impulse buying as “a consumer experiences a sudden, often powerful and persistent urge to buy something immediately”. This urge to buy is related to the trait of impulsivity, which is the tendency to perform actions quickly and unplanned, pursuing a desire to behave in a certain way and which brings immediate gratification (Dholakia, 2000; Sengupta & Zhou, 2007).

Several authors across disciplines support the coexistence of two systems in the decision-making process. From the perspective of consumer behavior, authors such as Shiv and Federokhin (1999) define two processes that occur when the individual is exposed to the selection of alternatives. The first is an automatic process related to impulsive behavior, and the second is related to a cognitive and deliberate process.

Therefore, the individual can present the trait of impulsivity (Dholakia, 2000; Sengupta & Zhou, 2007) and specifically in impulsive consumption, products will exert a greater or lesser impulsive effect depending on the affective level perceived by the individual (Federokhin & Patrick, 2010; Ahn & Kwon, 2020).), making it clear that impulsivity in consumption is not originated by the product, but rather by the impulsive individual, activated by external stimuli (Friese & Hofmann, 2009; Vohs & Faber, 2007). Dholakia (2000) contextualizes the duality of the affective-cognitive systems of Shiv and Federokhin (1999) and defines a model of impulsive consumption that can be applied to all types of products including food consumption.

In addition, the antagonistic concept of impulsivity is self-control, which is related to healthy habits. Some authors demonstrate that retailers, through the management of in-store marketing levels, can influence shopping behaviors, therefore, it can influence the consumption of unhealthy food (Grandi, Cardinali, & Bellini, 2020).

According with Redine, A., Deshpande, S., Jebarajakirthy, C., & Surachartkumtonkun, J. (2023), the growth of impulse buying production over the years is palpable. In the last decade the

growth is more than notorious, with a total of 33 articles in 2021 alone, mention it as a continuous exponential growth of impulse buying literature.

Eating and appetite control is a broad topic of research. The literature review identifies overeating as the main cause for the development of obesity in the individual. Also, several authors support that the origin of overeating (binge eating) and spontaneous food craving comes mainly from impulsive eating (Strien & Frijters, 1986). It can be stated that impulse eaters feel impulsivity towards food consumption. Such impulses are activated through the automatic system and in turn related to the affective element, especially in food rich in fats and sugars (Dholakia, 2000; Federokhin & Patrick, 2010; Sengupta & Zhou, 2007). In fact, a lower inhibitory control is associated with overeating, (Guerrieri, R., Nederkoorn, C., Stankiewicz, K., Alberts, H., Geschwind, N., Martijn, C., & Jansen, A., 2007), including external impulse eating (overeating in response to external food cues) and emotional impulse eating (overeating in response to negative emotional states), which leads to overweight and obesity. Both consequences are controversial as they lead to large financial and social costs, due to the high number of health problems they are associated with (Dohle, S., Diel, K., & Hofmann, W., 2018; Lehr, E. J., Schag, K., Vogel, J., Dresler, T., Zipfel, S., Fallgatter, A. J., & Giel, K. E., 2023).

Finally, situational factors highlighted by the literature coincide both in impulsive and impulse eating, such as high stress and low self-esteem (Honkanen, Olsen, Verplanken, & Tuu, 2012).

Several assessments tools of measure are being proposed by scientist, but the most widely used by research (Polivy, J., Herman, C. P., & Mills, J. S., 2020), are the Herman and Polivy Restraint Scale (Herman & Polivy, 1980), Three Factor Eating Questionnaire (TFEQ) (Stunkard & Messick, 1985) and the Dutch Eating Behavior Questionnaire (DEBQ) (Van Strien, Frijters, Bergers, & Defares, 1986).

It is noteworthy that there are numerous studies that aim to analyse different aspects of impulsivity in consumption, and for this purpose they use selection tasks between foods that have different arousal and affective levels, i.e., comparing chocolate, cake or potato chips with other types of products or more neutral foods, such as salad or fruits (Friese & Hofmann, 2009; Sengupta & Zhou, 2007; Verplanken, Herabadi, Perry, & Silvera, 2005; Vohs & Faber, 2007). The working basis of much of this research focuses on the measurement of time of latency or reaction time that arise from stimulus presentation until reaction occurs, as it is considered a measurement that reflects the invisible processes of the mind.

A recent meta-analytic review of impulse buying (Iyer, Blut, Xiao, & Grewal, 2020) highlights moderators and situational factors that increase or minimise the impulsive effect. In addition, the antagonistic concept of impulsivity is self-control, which is related to healthy habits. Some authors demonstrate that retailers, through the management of in-store marketing levels, can influence shopping

behaviors, therefore, it can influence the consumption of unhealthy food (Grandi, Cardinali, & Bellini, 2020).

Health-oriented lifestyle behaviours are among the important factors that may predict and formulate academic performance of students (Moradi, F., Sabet, S. A., & Soufi, S., 2022). Despite the fact that higher education institutions have traditionally been responsible to design beneficial activities for the overall learning and Universities play a key role on the achievement of sustainable human development (Hussain, I., 2007; Llopis-Albert, C., Rubio, F., Zeng, S., Grima-Olmedo, J., & Grima-Olmedo, C., 2022), students are autonomous, critical and reflective, and those who are in better health have better academic performance and learn more (Erfanian et al., 2022; Llopis-Albert, C., & Rubio, F. (2021)).

### **3. Data Collection Method**

For a bibliometric analysis, this research was conducted using Scopus and Web of Science (WoS) Core Collection data. The restrictions on the search on the databases are published articles from 1962 to June 2020, research that should be extrapolated to the whole population and studies carried out in Europe and/or countries with similar characteristics in terms of demographic composition and development.

A previous literature review was initially held to identify main topics and keywords. Further, the data collection was based on the following keywords: “impuls\* AND buying” OR “impuls\* AND eating” on Scopus. A bibliographic dataset of 508 articles was obtained from Scopus (Scopus#508). This dataset was obtained on June 06<sup>th</sup>, 2020. Moreover, WoS keywords were separated in two main topics. First, “impulse buying” and “impulse buying trait”, excluding those investigations that are related to compulsivity (considered as a disease or pathology), such as gambling, smoking, or compulsive tendencies. Thus, we obtain a database of 144 records that we will call #WoS144. In addition, second round of keywords based on research around “impuls\* eating” has a wide scope, so it was reduced to “external eating” and “restrained eating”. A total of 75 articles were found in Web of Science Core collection and called #WoS75. These two datasets were obtained on January 11<sup>th</sup>, 2020.

The analysis was conducted in five stages. First, to map the situation on the three databases selected, there is an overview on main sources, affiliations, authors, and keywords. Second, VOSViewer tool is used to define clusters of keywords and authors. The third stage is based on co-

citation analysis, to define similarities through citations. The strength of the relationship is given by the number of references, and how frequently two authors are cited together, so these authors share commonalities in theory, topic, methodology, or context. Fourth, bibliographic coupling with the aim of establishing similarities and relationships due to the strength between publications is determined by the number of cited references shared by the articles (Rakas & Hain, 2019). Hence, this technique allows to define clusters without the citation criteria, and the time lapse barriers. Finally, CitNetExplorer is used to visualize a genealogy of authors in the two WoS databases.

## **4. Discussion and Results**

As a previous result, based on the number of publications per year from the Scopus#508 database, it can be stated that the important increase in the number of publications is especially evident from 2009 – with 19 publications. In 10 years, production increased to 45 publications in 2019. This fact denotes an upward trend in scientific production in both impulse buying and impulse eating. It also points out an increase of scholars' interests probably due to the impact of the topic on contemporary society.

### **4.1 Authors and co-citation analysis**

A comparison between the three databases in terms of sources is shown in Table 1. The most prominent journal is *Appetite* with 61 articles in Scopus#508, being also the main journal in WoS#75 with 18 publications. In WoS#144, journals such as *Advances in Consumer Research* with 10, and *Journal of Business Research* with 7 publications are the more prominent. It is worth highlighting that *British Food Journal* is also an important source in WoS#144, with 3 publications.

**Table 1.** Main Sources

Scopus#508		Wos#144		Wos#75	
Journal	publication	Journal	publication	Journal	publication
Appetite	61	Advances in Consumer Research	10	Appetite	18
Eating Behaviors	16	Journal of Business Research	7	Eating and Weight Disorders St.on Anorexia N. and Obesity	6
Journal of Retailing and Consumer Services	11	Journal of Consumer Psychology	5	International Journal of Eating Disorders	4
Int. Journal of Retail and Distr. Management	10	Journal of Retailing	4	Eating Behaviors	3
Personality and Individual Differences	10	British Food Journal	3	Addictive Behaviors	2
Physiology and Behavior	9	Internet Research	3	International J. of Obesity	2
International J. of Obesity	7	Social Beh. & Personality	3	Healhtmed	2

Regarding authors' productivity, the number of documents by author is shown in Table 2. The main author is Van Strien with 16 publications in WoS#75, followed by the authors that published Scopus#508: Jansen with 12 publications, Nederkoon with 10; and Friese and Meule with 8. In the case of WoS#144, more restricted in the number of papers, authors do not surpass 10 publications, Sharma, Sivakuraman, and Zhang being the most prominent authors in this database with 4 publications.

**Table 2.** Documents by author

Scopus#508		Wos#144		Wos#75	
Author	Total	Author	Total	Author	Total
Jansen, A.	12	Sharma, P.	4	Van Strien, T.	16
Nederkoon, C.	10	Sivakumaran, B.	4	Engels, R.C.M.E.	6
Friese, M.	8	Zhang, Y.L.	4	Braet, C.	5
Meule, A.	8	Beatty, S.E.	3	Cebolla, A.	4
Blechert, J.	7	Dittmar, H.	3	Elfhag, K.	4
Hofmann, W.	7	Akram, U.	2	Lee, K.	4
Houben, K.	7	Beattie, J.	2	Sung, J.	4
Aarts, H.	6	Chen, Y.H.	2	Song, Y.M	4
Epstein, L.H.	5	Baumgartner, H.	2	Brouwer, I.A.	3
Guerrieri, R.	5	Chu, C.H.	2	Penninx,	3

VOSviewer helps to define clusters and similarities from the two topics being analyzed (impulse buying and impulse eating) using author criteria, based on co-citation analysis. Figure 1 shows the link between the four clusters that gather authors with similarities in topics or methodologies. As a result of this clustering analysis, four authors obtain the maximum representation on each cluster: Jansen, Baumeister, Hofmann, Rook, and Herman.

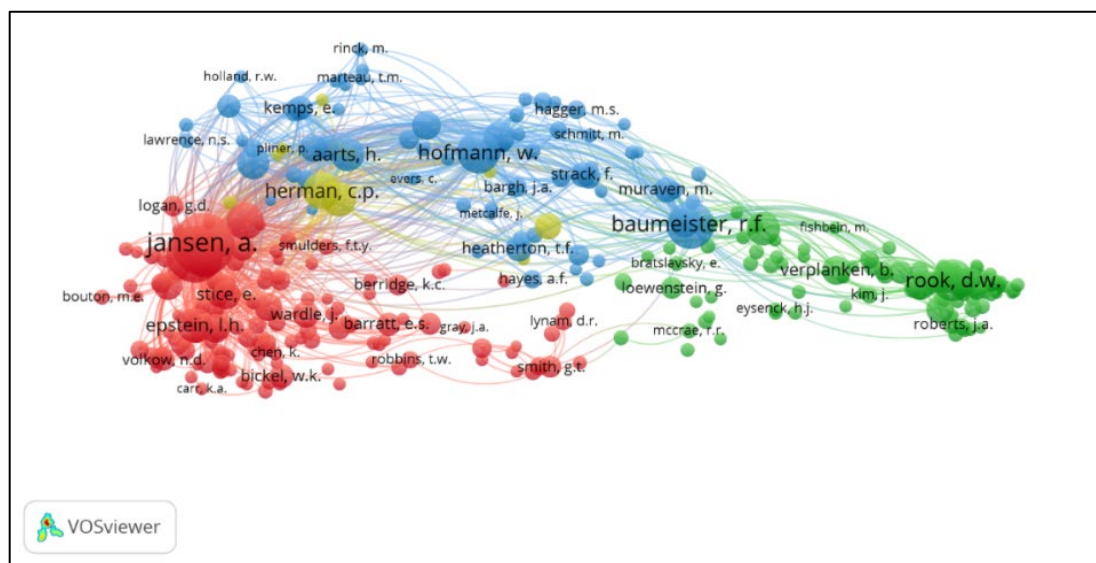
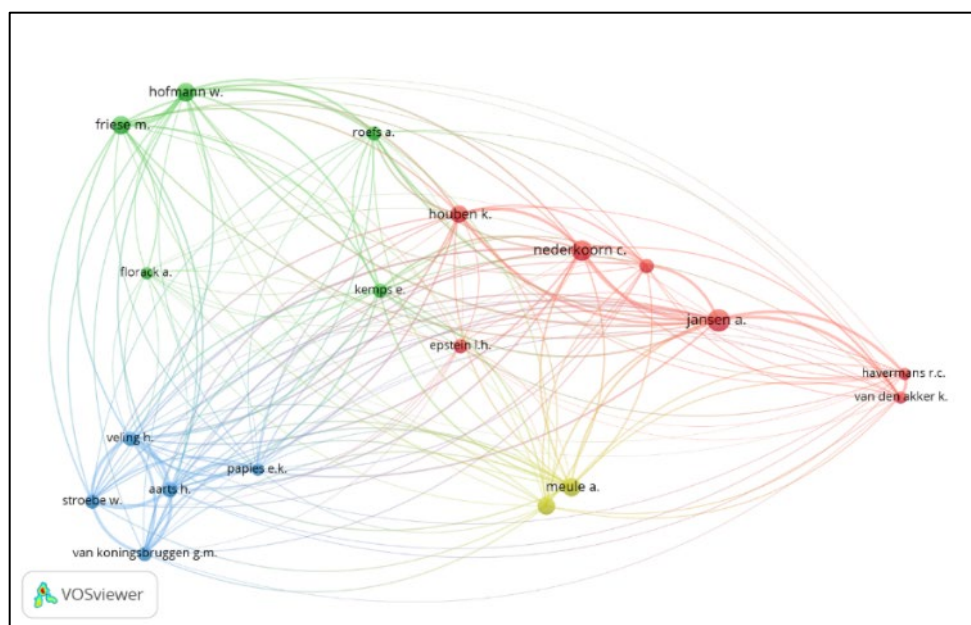


Figure 1. Co-citation author relationships

To exhibit the relationship between impulse buying and impulse eating, the bibliographic coupling analysis in Figure 2 shows four clusters of authors, and how they are related to each other based on their common references. The visual analysis denotes how authors linked, obtaining the same cited reference. This reveals that authors are influenced by the same articles, which means the same knowledge base. It is important to highlight that the Scopus#504 database has articles from the two strong fields of research.





**Figure 2.** Bibliographic coupling – clusters of authors

The affiliation of authors is compiled in Table 3. The most important institutions, by number of researchers, in the Scopus#508 are Maastricht University, Utrecht University, and Universiteit van Amsterdam. Due to the similarities of these results with WoS#75, we can infer that institutions from the Netherlands are very prominent in publishing on this field.

**Table 3.** Documents by affiliation

Scopus#508		Wos#144		Wos#75	
Affiliation	#publications	Affiliation	#publications	Affiliation	#publications
Maastricht University	22	PCSHS Pennsylvania Commonwealth System of Higher Education	3	Radboud University Nijmegen	18
Utrecht University	14	Pennsylvania State University University Park	3	Vrije Universiteit Amsterdam	6
Universiteit van Amsterdam	11	Pennsylvania State University	3	Ghent University	5
Julius-Maximilians-Universitat	10	University of Alabama System	3	INJE University	4
Vrije Universiteit Amsterdam	9	University of Alabama TUSCALOOSA	3	Krolinska Institute	4

University of Minnesota Twin Cities	9	University of Sussex	3	Samsung Medical Center	4
Universitat Salzburg	8	University of Texas System	3	Seoul National University	4
Radboud University Nijmegen	8	Washington State University	3	Sungkyunkwan University	4
The University of Georgia	8	Beijing University of Posts Telecommunications	3	Universitat Jaume I	4
Florida State University	7	Hong Kong Polytechnic University	3	Samsung	3
Wageningen University & Research	7	California State University System	2	University of Bristol	3
University of Groningen	7	Beijing Technology Business University	2	University of Valencia	3

The most cited papers in Scopus and WoS are shown and ranked in Table 4. The table presents a citing ranking compiling research results in both databases. Some articles are indexed in only one database or in both Scopus and WoS, so the number of citations is differentiated per database.

**Table 4.** Most 40 cited papers in Scopus and WoS

Article	Year	SCOPUS	WoS
Loewenstein, G. (1996). Out of control: Visceral influences on behavior. <i>Organizational behavior and human decision processes</i> , 65(3), 272-292.	1996	1552	
Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. <i>Current directions in psychological science</i> , 16(6), 351-355.	2007	1546	1445
Gormally, J. I. M., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating severity among obese persons. <i>Addictive behaviors</i> , 7(1), 47-55.	1982	1259	
Rook, D. W. (1987). The buying impulse. <i>Journal of consumer research</i> , 14(2), 189-199.	1987	1987	737
Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. <i>Perspectives on psychological science</i> , 4(2), 162-176.	2009	664	
Cyders, M. A., & Smith, G. T. (2008). Emotion-based dispositions to rash action: positive and negative urgency. <i>Psychological bulletin</i> , 134(6), 807.	2008	662	
Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it!. <i>Journal of personality and social psychology</i> , 80(1), 53.	2001		633
Rook, D. W., & Fisher, R. J. (1995). Normative influences on impulsive buying behavior. <i>Journal of consumer research</i> , 22(3), 305-313.	1995		628
Beatty, S. E., & Ferrell, M. E. (1998). Impulse buying: Modeling its precursors. <i>Journal of retailing</i> , 74(2), 169-191.	1998	607	552
Vohs, K. D., & Faber, R. J. (2007). Spent resources: Self-regulatory resource availability affects impulse buying. <i>Journal of consumer research</i> , 33(4), 537-547.	2007	496	456

Mattila, A. S., & Wirtz, J. (2001). Congruency of scent and music as a driver of in-store evaluations and behavior. <i>Journal of retailing</i> , 77(2), 273-289.	2001		492
Kain, Z. N., Mayes, L. C., O'Connor, T. Z., & Cicchetti, D. V. (1996). Preoperative anxiety in children: predictors and outcomes. <i>Archives of pediatrics &amp; adolescent medicine</i> , 150(12), 1238-1245.	1996	438	
Kacen, J. J., & Lee, J. A. (2002). The influence of culture on consumer impulsive buying behavior. <i>Journal of consumer psychology</i> , 12(2), 163-176.	2002	286	389
Parboteeah, D. V., Valacich, J. S., & Wells, J. D. (2009). The influence of website characteristics on a consumer's urge to buy impulsively. <i>Information systems research</i> , 20(1), 60-78.	2009	376	297
Weller, R. E., Cook III, E. W., Avsar, K. B., & Cox, J. E. (2008). Obese women show greater delay discounting than healthy-weight women. <i>Appetite</i> , 51(3), 563-569.	2008		349
Hofmann, W., Rauch, W., & Gawronski, B. (2007). And deplete us not into temptation: Automatic attitudes, dietary restraint, and self-regulatory resources as determinants of eating behavior. <i>Journal of Experimental Social Psychology</i> , 43(3), 497-504.	2007	314	286
Hausman, A. (2000). A multi-method investigation of consumer motivations in impulse buying behavior. <i>Journal of consumer marketing</i> .	2000	295	
Cruwys, T., Bevelander, K. E., & Hermans, R. C. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. <i>Appetite</i> , 86, 3-18.	2015	291	
Friese, M., Hofmann, W., & Wänke, M. (2008). When impulses take over: Moderated predictive validity of explicit and implicit attitude measures in predicting food choice and consumption behaviour. <i>British Journal of Social Psychology</i> , 47(3), 397-419.	2008	278	
Nederkoorn, C., Houben, K., Hofmann, W., Roefs, A., & Jansen, A. (2010). Control yourself or just eat what you like? Weight gain over a year is predicted by an interactive effect of response inhibition and implicit preference for snack foods. <i>Health Psychology</i> , 29(4), 389.	2010	250	
Boswell, R. G., & Kober, H. (2016). Food cue reactivity and craving predict eating and weight gain: a meta-analytic review. <i>Obesity Reviews</i> , 17(2), 159-177.	2016	223	
Houben, K., & Jansen, A. (2011). Training inhibitory control. A recipe for resisting sweet temptations. <i>Appetite</i> , 56(2), 345-349.	2011		213
Verhagen, T., & Van Dolen, W. (2011). The influence of online store beliefs on consumer online impulse buying: A model and empirical application. <i>Information &amp; Management</i> , 48(8), 320-327.	2011	213	178
Stice, E., Spoor, S., Ng, J., & Zald, D. H. (2009). Relation of obesity to consummatory and anticipatory food reward. <i>Physiology &amp; behavior</i> , 97(5), 551-560.	2009	202	
Weinberg, P., & Gottwald, W. (1982). Impulsive consumer buying as a result of emotions. <i>Journal of Business research</i> , 10(1), 43-57.	1982	195	169
Verplanken, B., & Herabadi, A. (2001). Individual differences in impulse buying tendency: Feeling and no thinking. <i>European Journal of personality</i> , 15(1_suppl), S71-S83.	2001		192

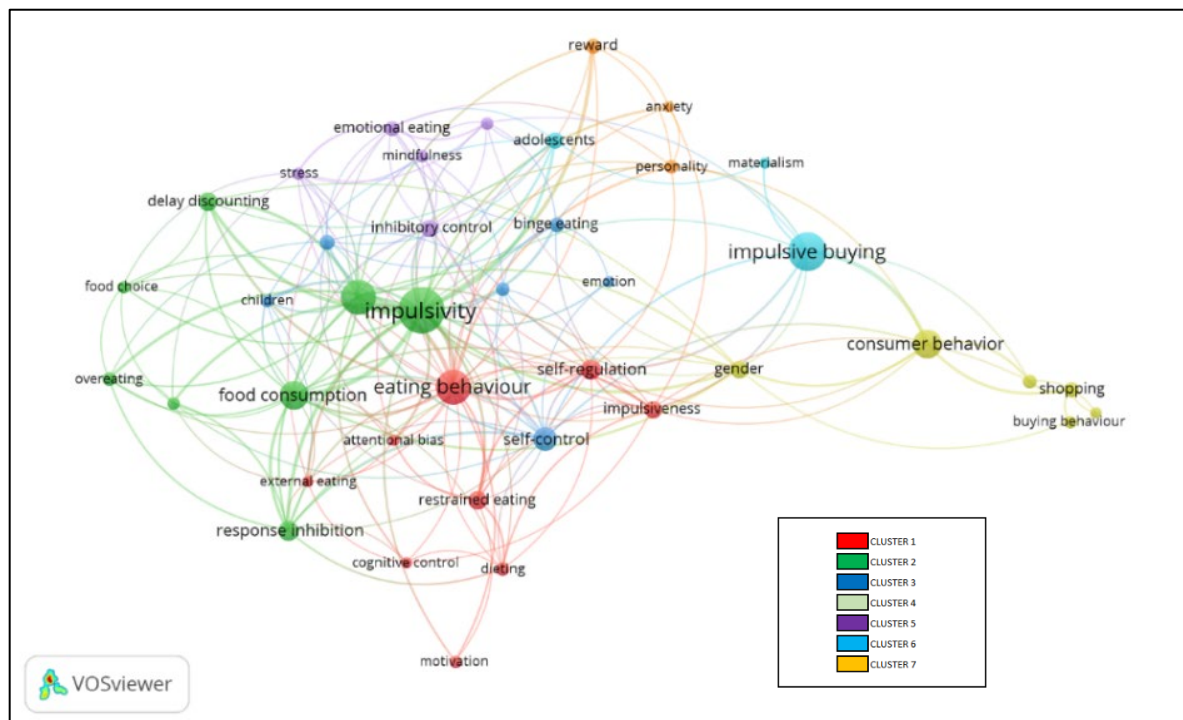
Hofmann, W., Friese, M., & Roefs, A. (2009). Three ways to resist temptation: The independent contributions of executive attention, inhibitory control, and affect regulation to the impulse control of eating behavior. <i>Journal of Experimental Social Psychology</i> , 45(2), 431-435.	2009	188	184
Luo, X. (2005). How does shopping with others influence impulsive purchasing?. <i>Journal of Consumer psychology</i> , 15(4), 288-294.	2005		174
Narasimhan, C., Neslin, S. A., & Sen, S. K. (1996). Promotional elasticities and category characteristics. <i>Journal of marketing</i> , 60(2), 17-30.	1996	177	
Peck, J., & Childers, T. L. (2006). If I touch it I have to have it: Individual and environmental influences on impulse purchasing. <i>Journal of business research</i> , 59(6), 765-769.	2006	176	167
Galla, B. M., & Duckworth, A. L. (2015). More than resisting temptation: Beneficial habits mediate the relationship between self-control and positive life outcomes. <i>Journal of personality and social psychology</i> , 109(3), 508.	2015	168	
Jasinska, A. J., Yasuda, M., Burant, C. F., Gregor, N., Khatri, S., Sweet, M., & Falk, E. B. (2012). Impulsivity and inhibitory control deficits are associated with unhealthy eating in young adults. <i>Appetite</i> , 59(3), 738-747.	2012	163	
Guerrieri, R., Nederkoorn, C., & Jansen, A. (2008). The interaction between impulsivity and a varied food environment: its influence on food intake and overweight. <i>International journal of obesity</i> , 32(4), 708-714.	2008	155	
Cohen, D. A., & Babey, S. H. (2012). Contextual influences on eating behaviours: heuristic processing and dietary choices. <i>Obesity Reviews</i> , 13(9), 766-779.	2012	153	
Jones, M. A., Reynolds, K. E., Weun, S., & Beatty, S. E. (2003). The product-specific nature of impulse buying tendency. <i>Journal of business research</i> , 56(7), 505-511.	2003		149
Wells, J. D., Parboteeah, V., & Valacich, J. S. (2011). Online impulse buying: understanding the interplay between consumer impulsiveness and website quality. <i>Journal of the Association for Information Systems</i> , 12(1), 3.	2011	148	118
The impact of brand equity and the hedonic level of products on consumer stock-out reactions	2005	148	
Personality traits and eating behavior in the obese: Poor self-control in emotional and external eating but personality assets in restrained eating	2008	144	
Sharma, P., Sivakumaran, B., & Marshall, R. (2010). Impulse buying and variety seeking: A trait-correlates perspective. <i>Journal of Business Research</i> , 63(3), 276-283.	2010		140
Floh, A., & Madlberger, M. (2013). The role of atmospheric cues in online impulse-buying behavior. <i>Electronic Commerce Research and Applications</i> , 12(6), 425-439.	2013	138	122

\*Data from April 24<sup>th</sup>, 2021

#### 4.2 Keyword and visual analysis

Seven clusters were built by the analysis done by VOSViewer. The relationship between the seven clusters is shown in Figure 1. Each cluster has been represented by a different color

and the bigger the circle, the higher number of mentions of this keyword on this database. Table 5 complements this figure showing the keywords associated in the different clusters.



**Figure 3.** Keywords and relationship between clusters

**Table 5.** Clusters of keywords

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
attentional bias	childhood obesity	binge eating	buying behavior	emotion regulation	adolescents	anxiety
cognitive control	delay discounting	body mass index	consumer behavior	emotional eating	impulsive buying	personality
dieting	food choice	children	gender	mindfulness	materialism	reward
eating behavior	food consumption	emotion	impulse purchases	stress		
impulsiveness	impulsivity	overweight	retailing			
motivation	obesity	self-control	shopping			
restrained eating	overeating					
self-regulation	response inhibition					
external eating						

Hence, as a result, six research areas are identified:

1. Cognitive and trait influence on impulsiveness; cognitive control, self-regulation and impulsivity, and its relationship with eating (restrained eating, external eating, and emotional eating) and consumer behavior (impulse consumption occurs with a lack of control).
2. Children's' eating behavior: coincidence with keywords clusters 2 and 3. Eating behavior is a response to educational and family eating habits (cluster 2) and its relationship with emotion and self-control (cluster 3). This branch focuses on exploring these aspects in children and we decide to consider "children" as a whole research stream.
3. Consumer behavior: more focus on the impulsivity trait, impulsive buying and consumer behavior, which includes shopping and consumption.
4. Emotion control: studies that reflect the importance of emotion and mood on impulsivity are compiled on this stream.
5. Adolescents: considering that youngsters are more prone to impulsivity, studies around them constitute its own research stream.
6. Personality and reward; studies on eating behavior which have inner focus on personality from an anxiety perspective, which consider food or shopping as a reward and mood deflection.

A visual analysis with CitNetExplorer is then run. Figure 4 depicts the main lines on impulse buying. Stern (1962) and Bellenger (1978) could be considered as the precursors of impulse buying. In addition, Rook (1987) designed the first scale. Nevertheless, although those were the pioneering references, the most popular are Rook (1995) and Beatty & Ferrell (1987), being the most cited authors. Rook (1995) proposed the Buying Impulsiveness Scale, with nine items identifying people with this impulsivity. Beatty & Ferrell (1987) proposed the Beatty's scale based on Impulse Buying Tendency (negative and positive affect).



## 5. Conclusions and Research Agenda

The consequences of impulsive behavior have both social and individual costs. Impulse eaters have a higher Body Mass Index (BMI), obesity, overeating, and suffer binge eating, which have a high relation with diseases such as heart attack and diabetes. Impulse eating is triggered by emotion, restraint eating, social models, stress and habits (Goossens, Braet, Van Vlierberghe, & Mels, 2009a, 2009b; Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008). In addition, impulsive consumers have financial challenges, lower academic achievement, great difficulty achieving long-term plans and financial problems (Friese & Hofmann, 2009; Metcalfe & Mischel, 1999; Tangney, Baumeister, & Boone, 2004).

The more information people have about the stimuli and traits that influence their decisions and consumption, the better they can react and prepare themselves. This review examines the academic production and demonstrates the research agenda that might facilitate a change in how to manage obesity and unhealthy eating, to avoid compulsive behaviors, and to buy wisely.

Furthermore, it is important to prevent and develop conscious individuals that can work on their own self-regulation. Due to new ways of learning, such as virtual learning, students and the higher education community have increased their concerns about learning at home. To meet the objectives, the research relations between impulse buying and impulse eating and its academic production have been demonstrating throughout exposed along the analysis, showing strong evidence that both fields are taking similar paths, and share authors, keywords, and sources.

Six research streams are identified. Firstly, there are cognitive, and trait influences on impulsiveness; literature about cognitive control, self-regulation and impulsivity, and its relationship with eating (restraint eating, external eating, and emotional eating) and consumer behavior (impulsive consumption occurs with a lack of control). Secondly, there is children's eating behavior; coinciding with keyword clusters 2 and 3, eating behavior is a response to educational and family eating habits (cluster 2) and its relationship with emotion and self-control (cluster 3). This branch focuses on exploring these aspects on children; we decided to consider "children" as a whole research stream. Thirdly, there is consumer behavior; more focus on impulsivity traits, impulsive buying and consumer behavior which include shopping and



consumption. Fourthly, there is emotion control; studies that reflect the importance of emotion and mood on impulsivity are compiled on this stream. Fifthly, there are adolescents; considering that impulsivity is more prone in youngsters, studies around them constitute their own research stream. Finally, there are personality and reward – studies on eating behavior that have inner focus on personality from an anxiety perspective, that consider food or shopping as a reward and mood deflection. None of these trends includes the dimension of online vs. offline. Moreover, there has been growing interest in the analysis of buying behavior, especially in the consumer behavior dimension.

Furthermore, we define the research agenda. On Table 6, we compile future research questions from several main papers, that identify which are the main recommendations and questions proposed by the authors' main papers themselves, that highlights the principal concerns for further investigation.

**Table 6.** Future Research Questions and Agenda

Article	Future Research Questions and Agenda
Coley, A., & Burgess, B. (2003).	1) Further research should be conducted which expands this study to include a non-student sample, demographic subcultures, social classes, and lifestyle factors. 2) Explore Impulse Buying within television, internet, telemarketing, direct mail shopping, and other non-store formats. 3) Explore also cultural differences in Impulse Buying Behaviour.
Mohan, G., Sivakumaran, B., & Sharma, P. (2013).	1) Future research may use experimental design to manipulate various environmental cues and study their impact on real impulse buying behaviour and study the impact of other situational variables on impulse buying such as in-store browsing and type of shopping trip. 2) Future research may explore the influence of store environment in others retail categories such as personal products, apparel, accessories, and personal electronics (Jones et al., 2003) 3) Given that store environment drives impulse buying, could it drive variety seeking behavior as well?
Wells, J. D., Parboteeah, V., & Valacich, J. S. (2011).	1) Future investigations should identify the design of websites that stimulate a consumer's urge to buy impulsively.
Guerrieri, R., Nederkoorn, C., & Jansen, A. (2008).	1) The next step should be a longitudinal study to investigate whether increased reward sensitivity early in life predicts weight problems later.
Lawrence, N. S., O'Sullivan, J., Parslow, D., Javaid, M., Adams, R. C., Chambers, C. D., ... & Verbruggen, F. (2015).	1) (BMI) Future studies in unselected samples would clarify which factors moderate training effects and for whom such training is likely to be effective. 2) Future studies could also include additional control conditions matched for food cue exposure (such as passive viewing of the same images presented in the active training task) to control for related processes such as food cue exposure with response prevention. 3) Another potential research avenue is to examine whether combining food no-go training with other interventions (e.g., implementation intentions as in Veling et al., 2014) or adding more explicit instructions/information about hypothesized mechanisms strengthens training effects.

- 4) To examine the effects of personalized training, whereby participants choose or upload their own high energy density food images (that they would like to consume less of) as no-go stimuli and select their own ‘desirable’ low-calorie food images (that they would like to consume more of) as go stimuli.  
5) Continue to examine this in more detail using e.g. the dietary restraint scale (Herman & Polivy, 1980).
- Luo, X. (2005).  
1) Future research may also consider that group influence could indirectly affect impulsive behaviours through other moderators, in addition to the susceptibility to influence studied in this research. Finally, consumers may engage in more or less impulsive.  
2) Future research may need to consider other perspectives about impulsive purchasing in a social group context.
- Vohs, K. D., & Faber, R. J. (2007).  
1) Future research examining nonclinical behaviours should test whether making prudent, regulated consumer choices later leads to weaker self-regulatory abilities in another unrelated domain, a prediction for which we have preliminary support (Vohs et al. 2006)
- Hofmann, W., Friese, M., & Roefs, A. (2009).  
1) The finding that BMI had an independent interaction effect over and above the other factors points to further moderator variables for which BMI may be a proxy to consume high-fat food or stronger facilitating need states among high BMI individuals.  
2) Future research along these lines may contribute to a more fine-grained theoretical understanding of the various processes that enable people to overcome their impulses and may even prove useful for the treatment of impulse-related societal problems such as overeating, over drinking, or risky sexual behaviour.
- Friese, M., & Hofmann, W. (2009).  
1) Future research should start to combine these promising findings with the recent knowledge gained about automatic processes that are involved in self-control (Palfai, 2004).  
2) Interventions may attend to various stages of impulsive behavior determination (Strack & Deutsch, 2004) such as attentional biases (Fadardi & Cox, 2007; Friese, Bargas-Avila, Hofmann, & Wiers, 2009), evaluative associations that form the basis of automatic affective reactions (Gibson, 2008), or automated behavioral motor tendencies (Kawakami, Phills, Steele, & Dovidio, 2007; Wiers, Rinck, Kordts, Houben, & Strack, 2008).
- Houben, K., & Jansen, A. (2011).  
1) Future research should therefore further examine the effectiveness of the training with other types of energy dense food to develop a more comprehensive training program aimed at strengthening inhibition for high calorie food in general.
- Friese, M., Hofmann, W., & Wänke, M. (2008).  
1) For further research, marketers may benefit from theoretical frameworks such as the MODE model or the RIM (Fazio & Towles-Schwen, 1999; Strack & Deutsch, 2004) by gaining further insights into the underlying psychological processes of impulse buying.

Finally, we define key findings based on the in-depth review. First, internal forces within the individual that help manage both eating and impulse buying can be studied together in order to analyze the impact of external stimuli on the individual. These stimuli may be around impulsive consumption of unhealthy products or foods. In addition, current technology could be used to deeply study impulsive traits and emotions in different contexts, so that recommendations on which self-regulatory mechanisms can help control impulses can be obtained.

Second, children and adolescents are two streams in which there is greater interest from scholars because impulsivity has its roots in those ages. Additionally, their particularities raise a real interest given the novelty of the new generation and the social changes that have occurred after COVID-19 that has generated an impact and change in their habits. Given the latter, the digital and online transformation evolves into a new decision-making process, so it is important to study how it affects impulsivity in the online interaction (Coley, A., & Burgess, B., 2003).

Finally, it is important to highlight the role played by higher education institutions both in education on healthy eating and access to healthy food consumption by the university community, as well as in deepening research related to expanding knowledge on how to boost the learning environment through healthy lifestyles. This contributes to create healthier adults who are more aware of what actions they can take to improve their learning.

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