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Article

Preliminary Validation of Cosmetic Addiction Scale (CAS)

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Abstract

Background/Objectives: Similarities have been identified between the dependence on psychoactive substances and the patterns of use of cosmetic products. However, there is no specific scale for identifying a substance-related disorders in cosmetic addiction. In this way, the aim of this study was to conduct a preliminary validation of Cosmetic Addiction Scale (CAS) in order to identify signs of addiction to cosmetic products, describing its prevalence and analysing their concordance with a modified version Cut down, Annoyed, Guilty, Eye-opener test (mCAGE). **Methods:** A cross-sectional study was conducted with sample of 224 university students (80 % women, age range 19-68 years). The mCAGE and the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) criteria were modified to evaluate participants for a substance-related disorder in cosmetic addiction. Sociodemographic characteristics and cosmetics use were evaluated. **Results:** Results showed a 16.1 % met modified CAGE criteria, 38 % met modified DSM-V criteria, 7% of serious nature and with differences related by gender, being more prevalent in women. No differences by age were found. A 12.1 % of the subjects were detected as putative addicts in both scales. Results from both instruments were significantly associated ($\rho = 0.51, p < 0.001$). Modified DSM-V criteria obtained a robust validity and intern coherence of 0.77 for the detection of cosmetic addiction. **Conclusions:** A type of symptomatology involving cosmetic addiction is pointed out. CAS showed as an useful and adequate psychometric tool for detecting cosmetic usage as a type of substance-related disorder.

Keywords: behavioral addictions; usage patterns; cosmetics; addiction; cosmetic addiction

1. Introduction

Behavioural or non-substance addictions are a complex and constantly evolving social phenomenon. According to the American Psychological Association (APA), these addictions activate reward pathways similar to those of drugs of abuse, with comparable behavioural symptoms. Behavioural addictions are characterised by the need and/or compulsive pursuit of behaviours that cause personal distress and affect emotional well-being, social relationships and family relationships[1].

The use of cosmetic products refers to the application of substances or mixtures that are applied to the surface of the human body (epidermis, hair and hair system, nails, lips and external genital organs) or to the teeth and oral mucosa, for the sole or main purpose of cleaning, perfuming or correcting body odours, protecting them, keeping them in good condition, modifying them or changing their appearance (Royal Decree 1599/1997, October 17th, on cosmetic products, published in the BOE number 261, October 31st, 1997) [2].

It is well-documented that the use of cosmetics has the potential to have a detrimental effect on health of chemical substances [3]. Overcorrection or excessive treatment with this type of cosmetic product can cause both physical and emotional damage [4][5]. In addition, they could turn into the highly recognized and, accepted by the scientific community, cosmetic surgery addiction. This addiction to cosmetic procedures also could have an origin in a need for obtaining confidence in social media [6].

Currently there is no separate formal diagnosis in psychiatric manuals for “cosmetic addiction”, although in clinical practice, various dermatology experts refer to patients with compulsive use of cosmetic products, motivated by an obsession with maintaining a ‘perfect’ appearance from a very early age, such as adolescence [7]. This suggests a disproportionate need to apply make-up, creams, treatments or other beauty products, under the belief that their self-esteem and happiness depends on it [8].

Furthermore, there has recently been an ethical call to action to professionals who support, neglect, or fail to recognise addiction in cosmetic dermatology in their patients. In addition, there is a call for the creation of personalised detection tools for addiction in the cosmetic field, with a view to preserving the long-term psychological well-being of patients [4]. Above all, there is cause for alarm among the paediatric population, who receive messages on social media that lead them to try to achieve an unattainable or unrealistic image through unhealthy methods and, in some cases, dangerous cosmetic applications [8]. The utilisation of toxic chemicals has been associated with a multitude of chronic diseases, including cancer, respiratory conditions, neurological disorders, and endocrine disruptions, but also skin sensitivity, allergies, and reproductive problems [9].

To this end and following previous procedures for the scientific recognition of other behavioural addictions, an assessment has been carried out to detect and screen for an uncontrollable compulsive pattern of use of these substances with considerable distress over a 12-month period, following the DSM-V diagnostic criteria for substance addiction modified to evaluate subjects with possible cosmetic use disorder. In addition, the CAGE modified for cosmetics, which has previously been used in the detection of possible alcohol use disorders [10] [11].

Among the symptoms that an individual with this type of addiction for facial cosmetics might present, the following stand out:

Tolerance: the need to apply each time more cosmetic products to achieve the desired results, as the initial quantities are insufficient.

Abstinence: an uncontrollable urge to apply cosmetics when you have not done so for a while, or a feeling of nervousness or irritability when the subject attempts to reduce or quit the usage of facial cosmetics.

Self-control difficulty: the subject performs frequent efforts, although futile, to reduce or quit the applications, which usually are more frequent and with a higher quantity.

Obsession: the subject constantly has intrusive thoughts about a future application or an already performed application, with a strong desire for its usage.

Usually, the subject feels unrest, depressed, guilty or anxious, regardless whether the applications performed beforehand or related with any personal issues. In addition, the subject lies or deceives in order to hide his implications with the cosmetic applications.

The use of cosmetics frequently jeopardises or directly causes the loss of important relationships (family, friends, social), causes problems at work, and affects academic or professional activity. Important social, occupational, or recreational activities are reduced or abandoned.

In addition to clinical symptoms, those diagnosed with cosmetic addiction would have neurobiological profiles, heritability, and treatment options similar to other addictions [12].

For all that, the aim of this study was a preliminary validation of Cosmetic Addiction Scale (CAS) to identify signs of addiction towards use of product cosmetics and describe its prevalence; and to analyze its agreement with a modified version Cut down, Annoyed, Guilty, Eye-opener test (mCAGE).

2. Materials and Methods

2.1. Design and participants

A cross-sectional study was designed to analyse the relationship between usage patterns of cosmetic products, and sociodemographic variables in university students. The study participants were university students and postgraduates at the Catholic University of Murcia (Spain) during the 2023/2024 academic year. Dates were collected online, with no compensation provided for participation. Those students who voluntarily agreed to participate were included. Students who did not adequately complete the questionnaires and those with health problems requiring chronic medication were excluded. From all the students, 224 Caucasian students participated in the study (179 women and 45 men, with a mean range age of 29 to 38). The survey was conducted with prior written authorization from the Ethics Committee of the Catholic University of Murcia (Code: CE042008) and in compliance with the Declaration of Helsinki. Participants were informed about the study design both orally and in writing. The research was also explained, including the objective, the need for confidentiality and anonymity of the data.

2.2. Data analysed

2.2.1. Demographics and Habits Dates

The information about these variables was collected using an ad hoc questionnaire specifically designed for this study. The questions were designed to determine conscience and use of cosmetic products and demographics dates. It included sociodemographic (gender, age) and behavioural variables, with questions about frequency of cosmetics use, usage patterns and other related considerations. In the text of administered survey, it is explicitly stated that, according to the Royal Decree 1599/1997, of 17 October, on cosmetic products, published in the Official State Gazette (BOE) Number 261, of 31 October 1997, a cosmetic product is any substance or mixture applied to the external parts of the human body (epidermis, hair system, nails, lips, and external genital organs) or to the teeth and oral mucosa, with the sole or main purpose of cleaning, perfuming, or correcting body odours, protecting them, keeping them in good condition, modifying them, or changing their appearance [2] (Figure S1).

2.2.2. Cut down, Annoyed, Guilty, Eye-opener Questionnaire [13]

To evaluate the potential dependence modified CAGE (mCAGE) was administered. Consists of 4 questions used for alcoholism screening. Two or more affirmative responses to questions on the mCAGE during the 12-month period were tabulated as risk of cosmetic use disorder. Its Cronbach's alpha is 0.58, below acceptable levels but within expectations given the brevity of the scale. The American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, Five Edition (DSM-V) diagnostic criteria were modified to evaluate subjects with possible cosmetic use disorder with a 0.76 Cronbach's alpha.

The last questionnaire applied evaluated during the 12-month period was tabulated as risk of cosmetic dependence disorder. A score of 2-3 was defined as mild severity, 4-5 as moderate, and 6 or more as severe.

2.3. Statistical Analysis

Frequency and other descriptive statistics were calculated for sociodemographic variables and for the other variables included in the analysis. The Pearson chi-square test was performed to assess the association between mCAGE and mDSM-V results, and other associations. To compare whether there were differences in the means between the groups based on different variables, the Mann-Whitney U test and one-way ANOVA were used. In addition, to determine the reliability of the scale, an internal consistency analysis was performed using Cronbach's alpha and a correlation between

one half and the other half. To analyse criterion validity, a correlation was performed between the CAS instrument and its items, and a total reference measure (sum of mCAGE items). In addition, a linear regression was performed in which severe symptoms of cosmetic addiction were introduced as the dependent variable and the modified DSM-V items as the independent variable to see to what extent they could predict the severity of symptoms, and which were the most representative for determining it. Data analyses were performed using SPSS software, version 27.0 (IBM SPSS Statistics, Armonk, NY, USA).

3. Results

The sample included 80% Caucasian women, with an average age of 30. Regarding questions about cosmetic awareness and frequency of use, we see how this population begins to use cosmetics chosen by themselves at 18.5 ± 5.82 years of age; 4% believe that cosmetics are not necessary, 63% believe that they are necessary, and 33% believe that only some are necessary.

Cosmetics used daily are hygiene products such as toothpaste and shampoo (97.3%), followed by facial care products - moisturisers, moisturising cleansers (71%); make-up products (35.3%), body care products such as moisturisers, anti-cellulite creams, anti-stretch mark creams, etc. (33.5%), nail makeup such as nail polish and nail protectors (8.9%), and hair treatments such as hair dye and hair loss treatments (5.4%).

Among those interviewed, the majority spend between 30 and 45 minutes a day on personal care (grooming, applying make-up, skin and hair care, etc.). The time spent per day correlates with a possible addiction $\rho = 0.17$ ($p < 0.009$) or diagnosis $\rho = 0.24$ ($p < 0.001$).

When asked whether they consider that they use more cosmetics than they really need, 84% answered No and 16.1% answered Yes. This question correlates significantly with the symptoms assessed using the modified and adapted criteria of the DSM-V, $\rho = 0.197$ ($p = 0.003$) and with a possible addiction according to the mCAGE $\rho = 0.28$ ($p < 0.001$). Furthermore, in this question, we see that 6.7% of those who say yes have a possible addiction and 9.8% have a possible diagnosis.

In terms of expenditure, 73.7% spend less than €50, 24.1% spend between €50 and €100, and 2.2% spend more than €100 per month. This variable correlates significantly with greater symptomatology according to DSM-V criteria $\rho = 0.18$ ($p = 0.005$) and possible addiction according to modified CAGE criteria $\rho = 0.19$ ($p = 0.004$).

Finally, when asked whether they believe continued use could be harmful to health, 61.2% believe it is, and 38.8% believe it is not. There is no positive correlation between those who may be addicted or diagnosed and awareness of the potential harm.

In terms of age and cosmetic addiction, we found no significant differences across age ranges evaluated between 19 and 68 years of age in diagnosis ($p = 0.34$), symptomatology ($p = 0.15$), or possible addiction ($p = 0.97$).

With the modified DSM-V criteria, we found a diagnosis rate of 37.9% with differences by gender ($p < 0.001$), with women accounting for 35.7%. In terms of the severity of symptoms related to cosmetic addiction, we found 25.4% with mild symptoms, 7.6% with moderate symptoms, and 6.7% with severe symptoms.

The mean score for the modified DSM-V criteria is 1.79 ± 2.18 , on a scale of 0-11.

Validation of the psychometric properties of the CAS

Reliability

The reliability levels were of 0.77 (Cronbach's alpha > 0.70 , Nunnally, 1978), which were adequate. The contribution of each item to the global reliability is shown in Table 1. As it is demonstrated, removing any item would not increase its reliability.

Table 1. Contribution of each item to the global reliability. Data represented the mean, standard deviation, correlation of each element with the others and the Cronbach's alpha.

If the element is discarded				
	Mean	SD	Correlation of each item with the others	Cronbach's alpha
Item 1	0.23	0.42	0.26	0.77
Item 2	0.13	0.34	0.36	0.75
Item 3	0.24	0.43	0.41	0.75
Item 4	0.17	0.38	0.46	0.74
Item 5	0.09	0.29	0.65	0.72
Item 6	0.29	0.45	0.42	0.75
Item 7	0.19	0.39	0.38	0.75
Item 8	0.08	0.28	0.54	0.74
Item 9	0.04	0.20	0.56	0.74
Item 10	0.07	0.25	0.54	0.74
Item 11	0.21	0.41	0.27	0.77

Another measure of internal consistency was the analysis of the correlation between one half and the other half of the CAS scale. Thus, the correlation coefficient between both halves was $r = 0.60$ ($p < 0.001$).

Validity

A possible addiction (using mCAGE) was detected in 16.1% of students, with differences between sexes ($p = 0.005$), where women had a higher prevalence (15.6%) compared to 0.4% of men. This percentage is approximately half of the addicts detected using the modified DSM-V criteria (37.9%), with 12.1% of those diagnosed being shared by both questionnaires, which could indicate an overdiagnosis of the tool.

However, a significant association was found between greater symptomatology assessed with the DSM-V and possible addiction with the mCAGE with a $\rho = 0.51$ ($p < 0.001$). This strong correlation shows us how an increase in one variable accompanies an increase in the other, confirming the criterion validity of the instrument.

A linear regression was performed in which severe symptoms were introduced as the dependent variable in a diagnosis of cosmetic addiction and the modified DSM-V items as the independent variable to see to what extent they could predict the severity of symptoms, and we found that 72%.

By reducing the number of items, we observed that with only five items (items 5, 7, 8, 9, and 10), we could still count on the same predictive capacity with an R^2 of 0.72. Thus, these items could be used to identify a diagnosis of cosmetic addiction in screening.

Table 2. Regression model between severe symptoms and modified items.

Predictor	Estimator	EE	<i>t</i>	<i>p</i>
Constant ^a	-0.03	0.01	-2.96	0.003
item 1:				
1 – 0	0.01	0.02	0.44	0.654
item 2:				
1 – 0	0.03	0.02	1.19	0.233
item 3:				
1 – 0	-0.003	0.02	-0.08	0.935
item 4:				
1 – 0	0.03	0.02	1.34	0.181
item 5:				
1 – 0	0.29	0.04	7.14	<.001
item 6:				
1 – 0	0.03	0.02	1.42	0.155
item 7:				
1 – 0	0.06	0.02	2.63	0.009
item 8:				
1 – 0	0.19	0.03	5.14	<.001
item 9:				
1 – 0	0.29	0.05	5.15	<.001
item 10:				
1 – 0	0.11	0.04	2.48	0.014
item 11:				
1 – 0	0.01	0.02	0.83	0.402

^a Represents the reference level

4. Discussion

The aim of this study was a preliminary validation of Cosmetic Addiction Scale (CAS) to identify signs of addiction towards use of product cosmetics and describe its prevalence; and to analyse its concordance with a modified Cut down, Annoyed, Guilty, Eye-opener test (mCAGE).

This study provides evidence in favour of a robust instrument in Spanish for quantifying symptoms related to mild, moderate and severe cosmetic addiction in young adults. The psychometric properties of the CAS scale have been found to be acceptable, with an internal consistency of 0.77 and a significant correlation between the two halves. Both the mCAGE and the modified DSM-V criteria were positively related, demonstrating criterion validity. Its 11 items are easy to apply and understand in clinical practice. It should be added that no screening test is sufficient to confirm a diagnosis of addiction, which must be accompanied by a clinical interview.

This is the first time that the presence of substance-related disorder in the use of cosmetics has been investigated. The approximate prevalence of risk of disorder due to cosmetics use reaches 38%, with 7% being severe and more prevalent in women, with no differences by age. This is well above other behavioural addictions such as food addiction (6%) [14], or problematic gambling (1.4%) [15]. In any case, and in line with recent research, the classification scheme used, and cultural factors must

be taken into account when interpreting the prevalence results for addictions. Thus, in the case of social media addiction, the range is between 3% and up to 36% depending on these variables [16].

Given that 12% of participants were found to be potential addicts on both scales, this possible new diagnosis should be considered among behavioural addictions. However, it would be interesting to continue studying possible overdiagnosis, which has already been questioned in the diagnosis of substance addictions in DSM-V with the new criteria [17].

Most young adults surveyed begin choosing their cosmetic products at age 18, products that they mostly consider necessary. They use more hygiene cosmetics, followed by facial treatment, make-up, body treatment, nail and hair dye products. They spend between 30 minutes and 45 minutes a day on their beauty routine, with a monthly expenditure of less than € 50. They use more cosmetics than they need and are aware that continuous use can be harmful to their health. It should be noted that the respondents are postgraduates in health sciences with greater access to this knowledge than in other fields.

It was observed that spending more time per day applying cosmetics, using more than what is considered necessary (even knowing the possibility of adverse effects), and spending money correlate with a possible addiction; an issue that validates the criteria of the scale. It is well known that these are characteristics of addiction.

In short, it appears that a significant number of post-graduates exhibit symptoms consistent with an addiction to cosmetics, seeking pleasure in their use or alleviating their discomfort without being fully aware of a possible problem.

Although the use of cosmetics has been linked to higher self-esteem, or as a means of increasing well-being and confidence [9], we also know that overcorrection through their use can contribute negatively to self-esteem by seeking a sometimes unattainable perfectionism, which can lead to various psychological disorders [18]. It is therefore foreseeable that psychological disorders will be comorbid with a possible diagnosis of cosmetics addiction, mainly related to body dysmorphic disorder, perfectionism, anxiety, low self-esteem [19] and other addictions [12].

It is revealing that this disorder in the pattern of cosmetics use can exist. According to the results of the regression analysis, the characteristics in the pattern of use of these products that could predict more severe symptoms are spending more time applying cosmetics and make-up, even with the intention of reducing it; using them despite knowledge of negative consequences; and social or interpersonal problems due to their use.

The study's limitations should be noted. This is a preliminary study of criteria for diagnosing substance use disorders related to the use of cosmetics. It is a cross-sectional study using self-report instruments, which may limit the generalisation of the results.

As a follow-up to this study, future research and practical applications should focus on creating a more accurate clinical diagnostic assessment tool capable of evaluating more nuances using Likert-type responses for the detection and screening of people with cosmetic addiction; and an assessment of comorbid disorders associated with it in order to address the risks/benefits of cosmetic use. In addition, use a broader sample of the general population where different prevalences can be determined by age range, including adolescence, although as we have seen, adolescents are not the ones who choose the cosmetic products they use.

With all this, it is hoped that a model for detecting cosmetic addiction can be conceptualised that can help different healthcare resources and professionals to identify patients at risk and offer timely information or referral.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/doi/s1>, Figure S1: *Text of Administered Survey To Study Participants*; Figure A2: *Cosmetic Addiction Scale and mCAGE*

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original draft preparation, all authors; writing—review and editing, all authors; visualization, all authors; supervision C.R-G. All authors have read and agreed to the published version of the manuscript.”

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

CAS	Cosmetic Addiction Scale
mCAGE	modified Cut down, Annoyed, Guilty, Eye-opener test
DSM-V	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

Appendix A

Figure S1: Text of Administered Survey to Study Participants

Figure A2. Cosmetic Addiction Scale and mCAGE

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