

# Investigation of the psychometric properties of the Toronto Alexithymia Scale in men with and without compulsive sexual behavior

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## Abstract

**Background:** Previous studies have provided initial evidence supporting the association between compulsive sexual behavior (CSB) and alexithymia, but these studies did not investigate the psychometric property of a measure of alexithymia in individuals with CSB, which is necessary.

**Aim:** This study investigated the factor analysis, reliability, and construct validity of the Toronto Alexithymia Scale (TAS) in men with CSB and control individuals.

**Methods:** This cross-sectional study included 418 participants (304 individuals with CSB and 114 control individuals) who underwent a semi-structured psychiatric interview and completed the following instruments: the Sexual Compulsivity Scale, Hypersexual Disorder Screening Inventory, Beck Anxiety Inventory, Beck Depression Inventory, TAS, and Barratt Impulsiveness Scale. The eligible participants were men 18 years of age or older who were literate and residing in Brazil. Individuals who met the diagnostic criteria for Goodman's criteria for sex addiction were subsequently assessed for the excessive sexual drive (International Classification of Diseases–Tenth Revision F52.7) criteria. Those who met this second criteria were considered individuals with CSB. Participants who did not reach this point were considered control individuals. We conducted factor analysis, reliability analysis (internal consistency and temporal stability), and discriminant and construct validity analyses.

**Outcomes:** The outcomes included the TAS total score and scores on TAS factors 1, 2, 3, and 4.

**Results:** The extracted factors explained 44% of the variance in the TAS. Factor 1 explained 21%, but 3 items (items 2, 9, and 21) did not load onto this factor. The Cronbach's alpha was 0.83, and the reproducibility (intraclass correlation coefficient) was 0.70. The TAS can differentiate between individuals with CSB and control individuals. The different forms of validity were demonstrated through correlations between factors 1 to 4 and the total score, as well as with impulsivity, hypersexuality, sexual compulsivity, and depression. Surprisingly, anxiety was only weakly correlated with factors 1 and 2. Moreover, the TAS-4 score was not correlated with impulsivity.

**Clinical Implications:** The TAS can be used in clinical practice to identify men with difficulties in recognizing subjective experiences, and proper interventions can subsequently be provided to these patients to increase their treatment efficacy.

**Strengths and Limitations:** Various dimensions of alexithymia covary with other key psychopathological symptoms of CSB. This study examined a convenience sample. The results cannot be generalized to the broader population. Factors 3 and 4 presented low internal consistency (0.50).

**Conclusion:** In general, TAS presented good psychometric properties in a sample mainly composed of individuals with CSB.

**Keywords:** alexithymia; affective symptoms; emotional regulation; sexual behavior; impulsive behavior; compulsive behavior.

## Introduction

Alexithymia is characterized by deficits in both cognitive processing and emotional regulation.<sup>1</sup> These deficits inhibit cognitive-experiential responses, thus leading to difficulty in developing subjective awareness and the verbal reporting of feelings.<sup>2,3</sup> Nemiah<sup>4</sup> and Sifneos et al<sup>4</sup> reported that certain alexithymia patients have contraindications for brief psychotherapy, as they are unable to talk about their emotional state. Additional characteristics of alexithymia include (1) difficulty identifying and describing feelings, (2) difficulty

distinguishing feelings from bodily sensations, (3) restricted imaginary capacity, and (4) concrete thinking that is focused on external events.<sup>2,3,5–9</sup>

Compulsive sexual behavior disorder (CSBD) was recently classified in the International Classification of Diseases–Eleventh Revision (ICD-11)<sup>10</sup> as an impulse control disorder that is characterized by a persistent pattern of failure to control repetitive sexual impulses and intense impulses, resulting in repetitive sexual behavior manifested over a long period. CSBD can cause marked distress or significant

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impairments in one's personal, family, social, and occupational life. However, moral incongruity, which refers to suffering related to moral judgments and disapproval of the sexual behaviors experienced by a person, is not enough to justify reaching diagnostic criteria.<sup>11,12</sup>

Before the inclusion of CSBD in the ICD-11, there was a massive body of knowledge in which different terms were used, such as sexual addiction, excessive sexual drive, and hypersexual disorder.<sup>13,14</sup> Similar to Grubbs et al,<sup>15</sup> we use the term "compulsive sexual behavior" (CSB) herein to refer to all nonparaphilic, out-of-control, or dysregulated sexual behavior patterns. However, we recognize the conceptual differences between those terms.

CSB is highly comorbid with other mental health conditions, especially anxiety and depression. Previous research has indicated that individuals with CSB have greater levels of anxiety and depression than non-CSB individuals,<sup>16</sup> with a prevalence of 46.5% for anxiety disorders and 36.1% for mood disorders.<sup>17</sup>

A longitudinal study by Grov et al<sup>18</sup> revealed that negative affect (fear, sadness, anger, and disgust) plays a key role in CSB. For example, in a study of 50 men with CSB and 40 control individuals from Hannover Medical School, Germany, it was observed that men with CSB reported a greater frequency of adverse childhood experiences (eg, emotional abuse, neglect, and sexual abuse), dysfunctional emotional regulation strategies, reduced perception of negative emotional stimuli, and more severe alexithymia than did control individuals.<sup>19</sup>

The Toronto Alexithymia Scale (TAS) was created in 1985 by Taylor et al.<sup>8</sup> The TAS has been shown to have good internal consistency and test-retest accuracy over durations ranging from 1 week to 3 months. Factor analysis revealed 4 factors consistent with the theoretical construct of alexithymia.<sup>5,20</sup> The TAS could be used in clinical screening and assessment to help guide treatment with a more didactic psychotherapeutic approach, thus helping patients recognize and name their emotions and feelings.<sup>8</sup> Although research indicates a connection between alexithymia and lack of control over sexual behavior, a literature review revealed that no study has examined the psychometric properties of the TAS in individuals with CSB. Despite the consensus regarding the diagnostic criteria for CSBD, there is a lack of criteria regarding changes in emotional processing.<sup>21</sup> The TAS can encourage research that will provide more evidence about the role of alexithymia in diagnosing CSBD.

Yoshida<sup>5</sup> was a pioneer in developing the Portuguese version of the 26-item Toronto Alexithymia Scale (TAS-26) in Brazil using a sample of 581 university students, 394 women and 187 men, between 17 and 52 years of age. According to the psychometric property, the scale has a reliable and valid measurement.<sup>5</sup>

People with CSB have low adherence to treatment, including psychotherapy.<sup>22</sup> Screening for alexithymia would help to identify participants with greater difficulties engaging in psychotherapy approaches that demand stronger cognitive and emotional elaboration work. Therefore, we decided to investigate the psychometric properties of the TAS in a sample composed mainly of individuals with CSB. Because most of the participants were men, we focused this study on males. The following research questions are answered at the end of this study: "In a sample mainly comprising individuals with CSB, will the TAS maintain a similar factor structure to that of Yoshida's study, which investigated it in Brazil with university students and those who did not present mental disorders?";

"Will the TAS present good internal consistency and temporal reliability?"; "Can the TAS differentiate between individuals with and without CSB (discriminant validity)?"; and "Is the TAS correlated with theoretically related constructs, such as impulsivity, sexual compulsivity, hypersexuality, anxiety, and depression (construct validity)?" The present study investigated the factor structure, reliability, and construct validity of the TAS in a sample mostly composed of men with CSB.

## Methods

### Participants

A cross-sectional study was performed at Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient Unit, Institute of Psychiatry, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo (AISEP). Some of the participants sought treatment for CSB naturally at AISEP between 2011 and 2021 because the unit provides treatment and is demanded by many treatment seekers. Other participants attended an appointment interview after seeing advertisements for research recruitment through the media and posters on the walls inside the hospital. They received financial compensation for transport and food needs. Eligible participants were men who met the diagnostic criteria for excessive sexual drive according to the International Classification of Diseases—Tenth Revision (ICD-10) (F52.7)<sup>23</sup> as well as Goodman's criteria for sex addiction.<sup>14</sup>

The procedure starts with the assessment of Goodman's criteria. Those who met the criteria were subsequently evaluated according to the ICD-10 criteria (F52.7) for excessive sexual drive. Those who also met this second criterion were considered to present CSB. Those who did not reach this point were considered control individuals.

Additional inclusion criteria were as follows: 18 years of age or older; literate; residing in Brazil; not presenting with paraphilia (ICD-10 F65), gender identity disorder (ICD-10 F64), schizophrenia, schizotypal or delusional disorder (ICD-10 F20-F29), current hypomanic or manic episode (ICD-10 F30.0, F31.0, F31.1, F31.2), and other mental disorders due to brain injury and dysfunction and physical illness (ICD-10 F06). After applying the eligibility criteria, 418 men who completed baseline assessments were enrolled in the study, including 304 individuals with CSB and 114 control individuals.

### Procedures

Participants completed standardized self-report measures over 2 hours, filled out a sociodemographic questionnaire with the support of a research assistant, and underwent a psychiatric diagnostic interview conducted by a psychiatrist trained in the field of CSB to assess their eligibility criteria. Participants completed the questionnaires and psychiatric interviews prior to receiving treatment for compulsive sexual behavior. This study was approved by the Ethics Committee of the Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo, Brazil, and the participants provided their consent to participate by signing the form to participate in the research.

### Measures

#### *Sociodemographic data*

Participants were asked to report their age, sex, legal marital status, race, professional situation, and sexual orientation.

### Sexual compulsivity

The Sexual Compulsivity Scale (SCS) is a 10-item instrument that assesses tendencies toward sexual preoccupation and sexual behavior.<sup>24</sup> Sample items include, “My sexual thoughts and behaviors are causing problems in my life.” The items are scored on a 4-point Likert scale, with item responses ranging from 1 (does not apply to me at all) to 4 (applies to me a lot). Possible scores range from 10 to 40, with higher scores indicating greater severity of sexual compulsivity. The Brazilian version of the SCS had a Cronbach’s alpha of 0.95.<sup>25</sup>

### Hypersexual disorder

The Hypersexual Disorder Screening Inventory (HDSI) is a dimensional (the sum of scores represents the increasing proportion of symptoms manifested)<sup>26</sup> and diagnostic screening measure for hypersexual disorders that investigates sexual reactions, sexual impulses, and sexual behavior. The HDSI includes seven items (5 A and 2 B criteria). An example item from criterion A is as follows: “During the last 6 months, I dedicated a large part of my time to sexual fantasies and impulses, as well as planning or practicing sexual behaviors.” Each item is scored on a scale ranging from 0 (never true) to 4 (almost always true), and the scores of each item are summed to obtain a total score. The total scores range from 0 to 28, and the average score of individuals with CSB was 21 in a clinical study.<sup>25</sup> Higher scores indicate greater severity of hypersexuality. The Brazilian version of the HDSI had a Cronbach’s alpha of 0.96.<sup>25</sup>

### Anxiety

The Beck Anxiety Inventory (BAI) is a 21-item scale that assesses the severity of anxiety symptoms (eg, fear of losing control, difficulty breathing, fear of the worst happening). Anxiety symptoms are scored from 0 (not at all bothersome) to 3 (bothered me a lot), with higher scores indicating greater severity of anxiety symptoms. The Brazilian version of the BAI had a Cronbach’s alpha of 0.76.<sup>27</sup>

### Depression

The Beck Depression Inventory is a self-report scale containing 21 items that evaluate the intensity of depression symptoms. An example item is as follows: “I’m so sad and unhappy that can’t take it.” The Cronbach’s alpha of the Brazilian version is 0.81.<sup>28</sup>

### Toronto Alexithymia Scale

The self-reported TAS<sup>8</sup> assesses the degree of alexithymia. The TAS includes 4 factors: factor 1 (difficulty identifying and describing feelings and distinguishing feelings of bodily sensations), factor 2 (difficulty fantasizing), factor 3 (focusing on external events rather than internal experiences), and factor 4 (difficulty communicating feelings to other people). The items are scored on a 5-point Likert scale, with responses to items ranging from 1 (completely disagree) to 5 (completely agree). Higher scores indicate more severe alexithymia.<sup>5</sup> The cutoff point for alexithymia is 74.<sup>9</sup> The Cronbach’s alpha is 0.71.<sup>5</sup>

#### Barratt Impulsiveness Scale

The Barratt Impulsiveness Scale (BIS-11)<sup>29</sup> assesses impulsivity across 3 factors: unplanned impulsivity (present-oriented behaviors), motor impulsivity (rapid behavioral reactions and restlessness), and attentional impulsivity (quick

decision making). The BIS-11 is a 30-item, self-reported instrument scored on a 4-point Likert scale, with responses to items ranging from 1 (rarely) to 4 (always). Higher scores indicate greater impulsivity. An example item is “I don’t pay attention.” The Cronbach’s alpha of the Brazilian version is 0.62.<sup>30,31</sup>

### Statistical analysis

Because of the current debate in the field regarding the role of emotional dysregulation in CSB manifestations, we performed exploratory factor analysis of the TAS using principal component extraction with orthogonal rotation (varimax method) instead of confirmatory factor analysis because this was the first study to analyze a sample mostly composed of CSB individuals. We decided to conduct exploratory factor analysis in the same way that Yoshida<sup>6</sup> conducted the first study investigating the psychometric properties of the TAS in Brazil, with orthogonal rotation instead of oblique rotation. We used Cattell’s scree test to determine the number of factors in the analyses. We retained those with eigenvalues larger than 1.

The items with loadings of 0.30 or more were included in a factor. The internal consistency was assessed by Cronbach’s alpha. Reliability over time was evaluated using the Wilcoxon test and the intraclass correlation coefficient. Construct validity was assessed using correlations between the TAS score and the scores of scales that are theoretically potentially correlated, such as the Beck Depression Inventory, Beck Anxiety Inventory, Sexual Compulsivity Scale, Hypersexual Disorder Screening Inventory and Barratt Impulsivity Scale (Pearson’s correlation analysis was used in the case of normal distributions, and Spearman’s correlation analysis was used in the case of nonnormal distributions). A correlation coefficient of |0.10| was considered weak, |0.30| was considered moderate, and |0.50| was considered strong.<sup>32</sup> Discriminant validity was assessed by comparing scores between patients and control individuals. Cohen’s *d* classified effect sizes as small ( $d = 0.2$ ), medium ( $d = 0.5$ ), or large ( $d \geq 0.8$ ). We used Cohen’s *d* to estimate the effect size for variables with a normal distribution and used the Glass effect size for variables with a non-normal distribution.<sup>33</sup> In this analysis, we used Student’s *t* test (if the distribution was normal) or the Mann-Whitney test (if the distribution was not normal), and we hypothesized that patients would have higher mean scores than control individuals. Statistical analyses were performed using STATA 15 (StataCorp),<sup>34</sup> and  $P < .05$  indicated statistical significance.

### Results

Sociodemographic characteristics are described in Table 1. Considering the 304 men with CSB and the 114 men without CSB enrolled in the study, more patients with CSB reported being gay or bisexual ( $P < .001$ ), White ( $P = .026$ ), and unemployed ( $P = .008$ ) than control individuals.

The exploratory factor analysis revealed that factor 1 (difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations)<sup>1,7,9,11,13,16,19,21,22,25,35</sup> accounted for 21.28% of the variance, factor 2 (difficulty fantasizing)<sup>4,14,15,17</sup> accounted for 9.61% of the variance, factor 3 (focusing on external events instead of internal experiences)<sup>7,11,13,19,24</sup> accounted for 7.01% of the variance, and factor 4 (difficulty communicating feelings to other people)<sup>3,5</sup> accounted for 5.95% of the variance. The 4 factors

**Table 1.** Sociodemographic characteristics of participants seeking treatment at the Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP) between 2011 and 2021 (n = 418).

Variable	Sexually compulsive individuals (n = 304)	Control individuals (n = 114)	P value
Sexual orientation			<.001
Heterosexual	168 (55.26)	93 (81.58)	
Gay/bisexual	136 (44.74)	21 (18.42)	
Race			.026
Black and Brown	30 (9.87)	22 (19.30)	
White	191 (62.83)	68 (59.65)	
Other	83 (27.30)	24 (21.05)	
Marital status			.67
Married/stable union	131 (43.09)	46 (40.35)	
Divorced/separated	35 (11.51)	11 (9.65)	
Single	138 (45.39)	57 (50)	
Professional situation			.008
Employee	232 (76.32)	91 (79.82)	
Unemployed	30 (9.87)	3 (2.63)	
Student	27 (8.88)	18 (15.79)	
Retired	15 (4.93)	2 (1.75)	
Age	37 (30-43)	34 (27-46)	.41
Income (Brazilian reais)	4750 (2400-7000)	4100 (3000-8000)	.54

Source: Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP). Md = median. IIQ = Interquartile Range. \* $p < .05$ . Values are n (%) or median (interquartile range).

accounted for a total of 43.84% of the variance. Three items<sup>2,8,20</sup> did not load onto a factor (Table 2).

The Cronbach's alpha for factor 1 was 0.88, for factor 2 was 0.76, for factor 3 was 0.50, and for factor 4 was 0.50, and for the TAS 23 was 0.83. Forty-five participants were retested after 15 to 20 days. The time 1 and 2 scores presented similar means and good intraclass correlation coefficients, except for factor 3 (Table 3).

Table 4 shows that patients had significantly different scores for all factors and total scores than did control individuals. Regarding TAS factor 1, the sexually compulsive group presented higher median scores than did the control group, which indicates greater difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations. Regarding the TAS-2 score, the sexually compulsive participants had lower median scores than did the control individuals, which means that they had less capacity for fantasizing. Regarding TAS factor 3, the sexually compulsive group presented higher mean scores than did the control group, which indicates a greater propensity to focus on external events instead of internal experiences. Regarding the TAS-4 score, the participants in the sexually compulsive group had higher median scores than did the control individuals, which indicates greater difficulty communicating feelings to other people.

Table 5 shows that factor 1 was significantly correlated with all other factors and similar scales. The correlation coefficients, in general, were moderate to strong. Factor 2 was significantly correlated with all the similar scales but not with the other factors. Nevertheless, the correlation coefficients were weak. Factor 3 was significantly correlated with the TAS total score and all similar scales. The coefficients were weak. Factor 4 was correlated with the TAS total score and the measures of hypersexuality, sexual compulsivity, and depression. The correlation coefficients were generally weak. Only the TAS factors 1 and 2 were correlated with anxiety, and the coefficients were weak.

## Discussion

This is the first study to investigate the psychometric properties of an instrument that measures alexithymia in a sample mainly composed of individuals with CSB. The factor analysis revealed that 23 out of the 26 items on the TAS were retained in this sample of 304 individuals with CSB and 114 control individuals. The items were loaded into 4 factors, consistent with previous studies. When comparing the original study with that of university students,<sup>5</sup> we observed that 2 items were loaded on different factors. Item 12, "I am able to describe my feelings easily," was retained in factor 1 (difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations), as it is aligned with the theoretical construct that this factor represents. In addition, item 15, "I use my imagination a lot," was retained in factor 2 (difficulty in fantasizing), which is also aligned with the theoretical construct that this factor represents. Items 2, 9, and 21 were not retained in this study. These differences do not decrease the interpretability of the original scale construct, as each of these items is responsible for only a small proportion of the variance of the TAS.<sup>36</sup> In a previous study of 294 patients hospitalized with different pathologies, the TAS had 22 items.<sup>36</sup>

Conversely, the proportion of variance accounted for by these items (44%) was greater than the proportions reported in previous studies in Brazil (39.67%)<sup>5</sup> and in the Uruguayan version (41%).<sup>37</sup>

The internal consistency (0.83) obtained herein was greater than that of the original study (0.71),<sup>5</sup> as well as the studies of Taylor et al (0.79)<sup>8</sup> Rodrigo et al (0.78),<sup>37</sup> and Yoshida (0.72).<sup>36</sup> The stability over time (0.71) was similar to that of the original study (0.72)<sup>5</sup> and of the clinical sample from Yoshida's research (0.72)<sup>36</sup> but was lower than that of the study by Rodrigo et al (0.83).<sup>37</sup>

We did not find previous studies that examined discriminant validity among individuals with sexual compulsion and control individuals. However, our results are consistent with

**Table 2.** Exploratory factor analysis of the TAS.

Scale item	TAS factor 1	TAS factor 2	TAS factor 3	TAS factor 4
1	0.3839	a	a	a
2	a	a	a	a
3	a	a	a	0.8050
4	0.7318	a	a	a
5	a	0.7504	a	a
6	a	a	a	0.6230
7	a	a	0.0353	a
8	0.7130	a	a	a
9	a	a	a	a
10	0.5725	a	a	a
11	a	a	0.7521	a
12	0.5814	a	a	a
13	a	a	0.6357	a
14	0.7508	a	a	a
15	a	0.6312	a	a
16	a	0.7972	a	a
17	0.5493	a	a	a
18	a	0.7991	a	a
19	a	a	0.6029	a
20	0.8076	a	a	a
21	a	a	a	a
22	0.7140	a	a	a
23	0.4676	a	a	a
24	a	a	0.5400	a
25	0.8153	a	a	a
26	0.6823	a	a	a

Source: Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP). TAS factor 1 was “difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations,” TAS factor 2 was “difficulty fantasizing,” TAS factor 3 was “focusing on external events instead of internal experiences,” TAS factor 4 was “difficulty communicating feelings to other people.” Abbreviation: TAS, Toronto Alexithymia Scale. <sup>a</sup>Item load was <0.30.

**Table 3.** Test-retest reliability of the TAS (n = 44).

TAS factor	Test-retest reliability					z	P value	ICC
	Time 1		Time 2					
	Mean	SD	Mean	SD				
1	38.52	8.90	38.25	9.10	0.691	0.489	0.836 <sup>a</sup>	
2	9.13	3.42	9.11	3.57	-0.083	0.934	0.672 <sup>a</sup>	
3	13.40	2.63	13.29	2.63	0.459	0.646	0.303 <sup>b</sup>	
4	6.65	2.07	6.84	2.18	-1.340	0.180	0.712 <sup>a</sup>	
Total score	67.72	9.93	67.5	10.26	0.041	0.967	0.702 <sup>a</sup>	

Source: Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP). TAS factor 1 was “difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations,” TAS factor 2 was “difficulty fantasizing,” TAS factor 3 was “focusing on external events instead of internal experiences,” TAS factor 4 was “difficulty communicating feelings to other people.” Abbreviations: ICC, intraclass correlation coefficient; TAS, Toronto Alexithymia Scale. <sup>a</sup>P < .001. <sup>b</sup>P < .01.

**Table 4.** Discriminant validity according to the severity of alexithymia in participants sexually compulsive and control individuals between 2011 and 2021 (n = 418).

Variable	Sexually compulsive individuals (n = 304)	Control individuals (n = 114)	Effect size	P value
TAS factor 1	37 (30-42)	25 (21-34)	1.02 <sup>a</sup>	<.001
TAS factor 2	9 (7-12)	11 (8-14)	0.47 <sup>a</sup>	<.001
TAS factor 3	13.8 ± 2.4	12.9 ± 2.4	0.37 <sup>b</sup>	<.001
TAS factor 4	6.3 ± 2.1	5.4 ± 1.8	0.46 <sup>b</sup>	<.001
TAS total score	66.0 ± 10.0	56.7 ± 10.9	0.88 <sup>b</sup>	<.001

Values are median (interquartile range) or mean ± SD. Source: Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP). TAS factor 1 was “difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations,” TAS factor 2 was “difficulty fantasizing,” TAS factor 3 was “focusing on external events instead of internal experiences,” TAS factor 4 was “difficulty communicating feelings to other people.” Abbreviation: TAS, Toronto Alexithymia Scale. <sup>a</sup>Glass’s delta. <sup>b</sup>Cohen’s d.

a previous study in which men with CSB had higher scores on the TAS than control individuals did.<sup>19</sup>

Various dimensions of alexithymia covary with other key psychopathological symptoms of the CSB (impulsivity, sexual

**Table 5.** Correlation matrix involving alexithymia and symptoms of impulsivity, sexual compulsivity, depression and anxiety in participants who sought at the Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP) between 2011 and 2021 (n = 418).

Scale	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13
1. TAS factor 1	—												
2. TAS factor 2	-0.25 <sup>a</sup>	—											
3. TAS factor 3	0.19 <sup>a</sup>	0.01	—										
4. TAS factor 4	0.36 <sup>a</sup>	0.00	0.11 <sup>c</sup>	—									
5. TAS total score	0.89 <sup>a</sup>	0.05	0.39 <sup>a</sup>	0.53 <sup>a</sup>	—								
6. Attentional impulsivity (BIS-11)	0.44 <sup>a</sup>	-0.14 <sup>b</sup>	0.19 <sup>a</sup>	0.09	0.39 <sup>a</sup>	—							
7. Motor impulsivity (BIS-11)	0.44 <sup>a</sup>	-0.24 <sup>a</sup>	0.19 <sup>a</sup>	0.07	0.37 <sup>a</sup>	0.67 <sup>a</sup>	—						
8. Unplanned impulsivity (BIS-11)	0.35 <sup>a</sup>	-0.19 <sup>a</sup>	0.21 <sup>a</sup>	0.10	0.31 <sup>a</sup>	0.60 <sup>a</sup>	0.64 <sup>a</sup>	—					
9. General impulsivity (BIS-11)	0.47 <sup>a</sup>	-0.23 <sup>a</sup>	0.22 <sup>a</sup>	0.09	0.40 <sup>a</sup>	0.83 <sup>a</sup>	0.89 <sup>a</sup>	0.86 <sup>a</sup>	—				
10. HDSI	0.36 <sup>a</sup>	-0.24 <sup>a</sup>	0.13 <sup>b</sup>	0.18 <sup>a</sup>	0.31 <sup>a</sup>	0.31 <sup>a</sup>	0.33 <sup>a</sup>	0.38 <sup>a</sup>	0.39 <sup>a</sup>	—			
11. SCS	0.39 <sup>a</sup>	-0.29 <sup>a</sup>	0.12 <sup>c</sup>	0.17 <sup>b</sup>	0.31 <sup>a</sup>	0.33 <sup>a</sup>	0.36 <sup>a</sup>	0.43 <sup>a</sup>	0.43 <sup>a</sup>	0.70 <sup>a</sup>	—		
12. Depression (BDI)	0.57 <sup>a</sup>	-0.29 <sup>a</sup>	0.18 <sup>a</sup>	0.28 <sup>a</sup>	0.50 <sup>a</sup>	0.41 <sup>a</sup>	0.41 <sup>a</sup>	0.43 <sup>a</sup>	0.47 <sup>a</sup>	0.52 <sup>a</sup>	0.54 <sup>a</sup>	—	
13. Anxiety (BAI)	0.14 <sup>b</sup>	0.11 <sup>c</sup>	-0.04	0.01	0.08	0.02	0.01	-0.01	0.01	0.02	-0.02	0.12	—

Source: Excessive Sexual Drive and Prevention of Negative Outcome Associated to Sexual Behavior Outpatient (AISEP). TAS factor 1 was “difficulty in identifying and describing feelings and distinguishing feelings from bodily sensations,” TAS factor 2 was “difficulty fantasizing,” TAS factor 3 was “focusing on external events instead of internal experiences,” TAS factor 4 was “difficulty communicating feelings to other people.” Abbreviations: BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory; BIS-11, Barratt Impulsiveness Scale; HDSI, Hypersexual Disorder Screening Inventory; SCS, Sexual Compulsivity Scale; TAS, Toronto Alexithymia Scale. <sup>a</sup> $P < .001$ . <sup>b</sup> $P < .01$ . <sup>c</sup> $P < .05$ .

compulsivity, hypersexuality, and depression), particularly the TAS total score and factor 1, regarding difficulties in identifying, distinguishing feelings, and differentiating them from bodily sensations, given the moderate-to-strong correlation coefficients presented.

The TAS was not correlated with anxiety scores, which is different from the findings of previous studies.<sup>6,38</sup> The BAI predominantly examines physical symptoms of anxiety.<sup>27</sup> It is possible that alexithymia compromises the ability to identify somatic anxiety symptoms. How much anxiety is perceived by individuals with CSB can be critical to their level of engagement in treatment.

The good psychometric properties observed herein indicate that the TAS can be used in clinical practice to identify people with CSB with greater emotional difficulty, thus helping them obtain more assertive treatment that focuses on emotional regulation and control of sexual behavior. In addition, the TAS may be used in future studies that seek to clarify the role of alexithymia in the clinical manifestations of CSBD, as previous studies support the existence of reciprocal influences between the emotional state and the activation of sexual behavior.<sup>1,13,21,39</sup>

The limitations of this study include the use of a convenience sample composed of people who were seeking help for sexual behavior. Therefore, the results cannot be generalized to the broader population because Brazil has inequalities in access to healthcare.<sup>40</sup> In addition, the TAS was validated in the context of CSB in Portuguese, so its generalizability is limited to the context of people with CSB who speak Portuguese in Brazil. Unfortunately, we had to drop out of the study with a female sample (n = 33) to avoid gender-related bias. Given the small number of women in the sample, it was not possible to adjust the analyses by sex, and neither did we run the analyses only for female sex. However, we recognize the relevance of future studies addressing the psychometric investigation of the TAS in representative samples of women and gender differences. We also decided not to perform a confirmatory factor analysis even though the previous exploratory factor analysis was performed.<sup>5,20</sup> However, considering the current debate about the role of emotional dysregulation in CSB manifestations, our results supported most of the previous findings.

Unfortunately, factors 3 and 4 have a Cronbach’s alpha of 0.50. We looked for other papers on the TAS, and they presented only the alpha of the whole measure, compromising our ability to compare the data of those individual domains of the TAS. This limitation should be addressed in future studies, particularly for investigations focused on “focusing on external events instead of internal experiences” (factor 3) or addressing “difficulty communicating feelings to other people” (factor 4). Moreover, the length of a scale influences the value of the alpha. It likely influenced factors 3 (5 items) and 4 (2 items). Therefore, some researchers have indicated that an alpha ranging from 0.5 to 0.7 indicates moderate reliability.<sup>41</sup>

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## Conflicts of interest

None declared.

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