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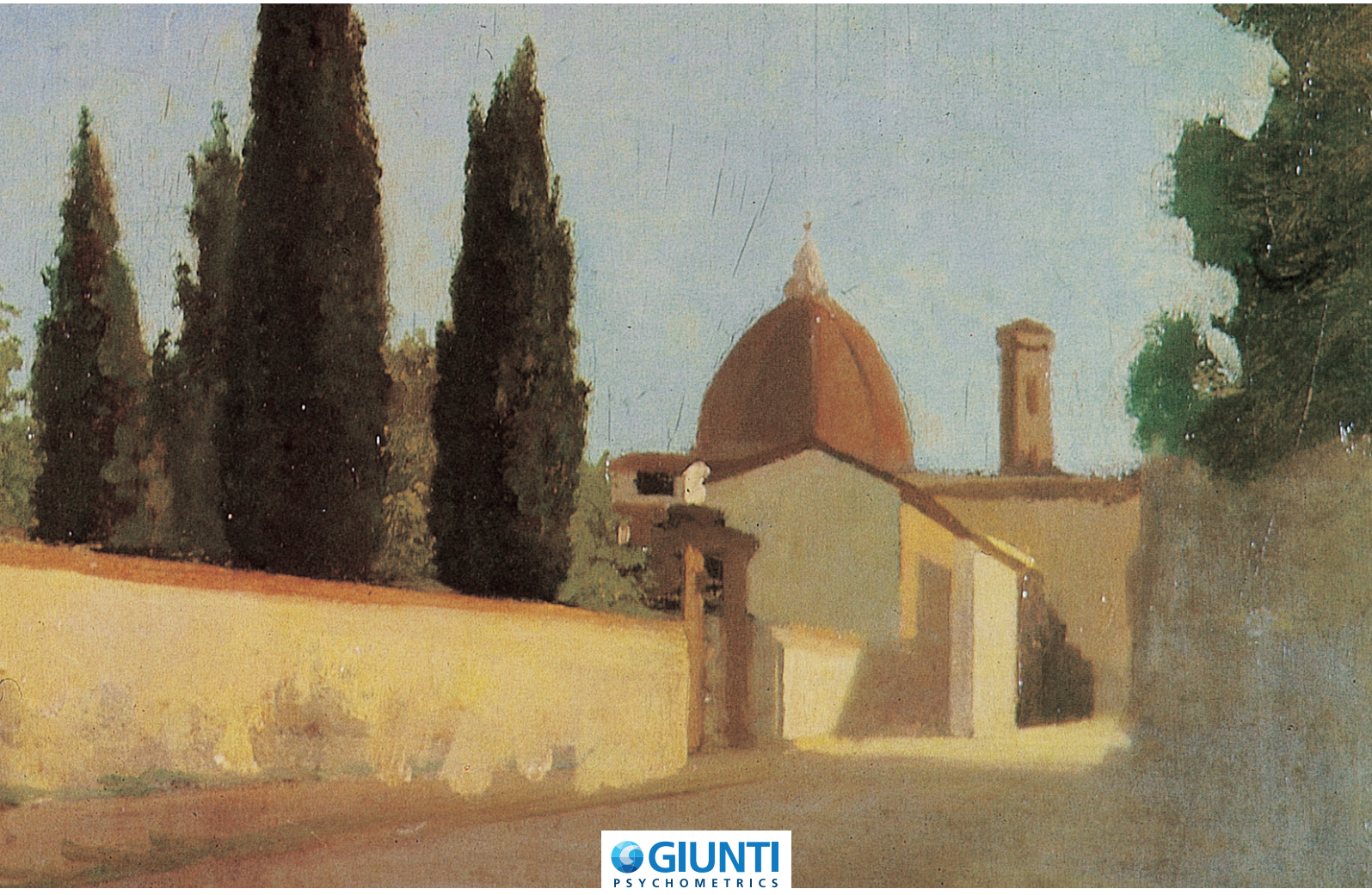

GIUNTI PSYCHOMETRICS

CONTENTS

⬢ Research

The visual perception of volume: Judgment and fixations for objects 2
Negar Sammaknejad, Donald Hoffman, Amy Escobar, Pete Foley, Julie Kwak

Validation of the Italian version of the Need for Cognition Scale – Short Version 18
Antonio Aquino, Laura Picconi, Francesca Romana Alparone

Clinical characteristics of the subtypes of trichotillomania:
The Italian Milwaukee Inventory for the Subtypes of Trichotillomania –
Adult Version (MIST-A) 30
Andrea Pozza, Douglas W. Woods, Davide Dèttore

▲ Experiences & Tools

Shared leadership: The Italian version of an overall cumulative scale 46
Salvatore Zappalà, Ferdinando Toscano, Simone Donati, Alessandro Malinconico, Ilaria Papola

Factorial validity of the Italian version of the Contextual Sensation
Seeking Questionnaire for Skiing and Snowboarding (CSSQ-S) 56
Claudia Marino, Sergio Agnoli, Luca Scacchi, Maria Grazia Monaci

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Clinical characteristics of the subtypes of trichotillomania: The Italian Milwaukee Inventory for the Subtypes of Trichotillomania – Adult Version (MIST-A)

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ABSTRACT. Il *Milwaukee Inventory for the Subtypes of Trichotillomania – Adult Version* (MIST-A) indaga due sottotipi di tricotillomania. Il primo, definito Automatico, è lo strappamento di peli o capelli messo in atto in modo inconsapevole nel corso di attività sedentarie, quali la lettura. Il secondo, definito Focalizzato, viene messo in atto come strategia di regolazione emotiva. Il presente studio ha indagato la struttura fattoriale della versione italiana, la consistenza interna e validità concorrente/divergente con misure di dermatillomania, sensibilità all'ansia, esperienze dissociative, difficoltà di regolazione emotiva, evitamento esperienziale su 1142 adulti della popolazione generale (età media = 38,41, 60% femmine). La versione italiana del MIST-A dimostra solide proprietà psicometriche: il sottotipo Focalizzato sembra associato a sensibilità all'ansia ed evitamento esperienziale in misura maggiore di quello Automatico.

SUMMARY. Trichotillomania (TTM), is characterized by recurrent pulling out of hair. Current evidence suggests that it has different subtypes with distinct characteristics. Automatic pulling occurs out of awareness and includes situations where pulling is engaged in sedentary activities. Focused pulling occurs in response to negative emotions. The Milwaukee Inventory for the Subtypes of Trichotillomania – Adult Version (MIST-A) measures the TTM subtypes. In Italy, TTM is still under-recognized by clinicians and researchers. The current study investigated the factor structure, the reliability of the Italian MIST-A and its concurrent/divergent validity with measures of skin picking, anxiety sensitivity, dissociative experiences, difficulties in emotion regulation, psychological inflexibility and experiential avoidance in Italian community individuals. A large group of 1142 adults from the general population (Mean age = 38,41, SD = 14.67, females 60%) completed the MIST-A. Theoretical explanations, implications for practice and research are discussed.

Keywords: *Air pulling, Body-focused behaviours, Assessment, Emotion regulation, Factor structure*

INTRODUCTION

Trichotillomania (TTM), also referred to as hair pulling, is a psychiatric condition characterized by recurrent pulling out of hair, resulting in noticeable hair loss (American Psychiatric Association, 2012). Individuals typically experience an increasing sense of tension prior to or when attempting to resist pulling and relief or pleasure when pulling. This repetitive behaviour results in clinically significant distress or impairment and is not better accounted for by another mental health or medical condition (American Psychiatric Association, 2012). Hair pullers typically tend to report increased levels of shame, self-blame, and frustration from pre- to post-pulling, and lower levels of calmness after hair pulling episodes, while experiencing higher relief across the pulling cycle (Bottesi, Cerea, Ouimet, Sica & Ghisi, 2016).

Current evidence and various models of TTM suggest that the disorder may have different subtypes with distinct phenomenological and functional characteristics (e.g., Diefenbach, Mouton-Odum & Stanley, 2002). In a group of 60 adults diagnosed with TTM, Christenson, Mackenzie e Mitchell (1991) reported that 5% of participants endorsed hair pulling completely out of awareness, 15% reported pulling in which the focus of attention was directly on hair pulling, but the majority of participants (80%) reported pulling that ranged from complete to incomplete awareness of the behaviour. This research led to the identification of two pulling subtypes referred to as *automatic* and *focused* pulling (Christenson & Mackenzie, 1994). Automatic pulling is characterized by pulling episodes that occur primarily out of an individual's awareness and may include situations in which he/she pulls hair while engaging in sedentary activities (e.g., watching television, or reading a book), but he/she is unaware of pulling until after the pulling episode is complete. Focused pulling is characterized by pulling with an almost compulsive quality and includes situations in which the individual pulls in response to negative cognitive emotional states (e.g., anxiety, sadness, anger or boredom, an intense thought or urge, or in an attempt to establish symmetry). Research suggested that focused pulling may represent an attempt to decrease levels of unpleasant private experiences (Woods, Wetterneck & Flessner, 2006).

This conceptualization of the TTM phenomenology led to the suggestion that different clinical presentations may warrant different treatment strategies (Franklin, Tolin & Diefenbach, 2006; Woods et al., 2006). Accordingly, assessment instruments that evaluate the severity of different pulling subtypes may enhance treatment tailoring and the optimization of clinical care.

The *Milwaukee Inventory for Subtypes of Trichotillomania – Adult Version* (*MIST-A*; Flessner et al., 2008) is an instrument designed to assess subtypes of hair pulling. Overall, it is composed by 15 items, that measure focused (10 items) and automatic (5 items) pulling. In the original validation study, exploratory and confirmatory factor analyses provided evidence for a structure including the two uncorrelated factors. Both the focused pulling (Cronbach's alpha = .77) and automatic pulling (Cronbach's alpha = .73) scales demonstrated acceptable internal consistency (Flessner et al., 2008).

Despite this preliminary evidence in support of the MIST-A's psychometric properties, more recent research suggests that the original two-factor structure may not optimally capture TTM phenomenology. In a replication sample of 193 clinically characterized hair pullers, Keuthen and colleagues (2015) evaluated the MIST-A using exploratory factor analysis. Results suggested a two-factor solution composed by 13 items overall, divided into an 8-item *Intention* scale and a 5-item *Emotion* scale. More recently, the notions of automatic and focused pulling were challenged and new dimensions of TTM were proposed to study the factor structure of the MIST-A. In a treatment-seeking sample with TTM, Alexander, Houghton, Bauer, Lench & Woods (2018) reported a different two-factor solution for the MIST-A. The first factor, defined as *Awareness of pulling*, consisted of 5 items that measured the degree to which pulling is done with awareness. The second factor consisted of 8 items and was defined as an *Internal-regulated pulling* factor that measured the degree to which pulling is done to regulate internal stimuli (e.g., emotions, cognitions and urges). A limitation of the current studies was that two out of three studies used only exploratory factor analysis to test the structure. A systematic overview of the previous studies on the MIST-A is provided in Table 1.

Despite multiple studies on the MIST-A, several issues require further study. First, there is concern about low internal consistency. If one considers the Nunnally and Bernstein criteria (1994), in which Cronbach's alpha values higher than .80 and .90 suggest good and excellent reliability, then the MIST-A internal consistency is only acceptable, but not good to excellent (see Table 1). Second, the available evidence about the relations between each TTM

Table 1 – Comparison of the factor structures and Cronbach's alphas of the MIST-A in previous studies, data analysis, populations, and concurrent/divergent validity measures

Alexander et al. (2016)					Flessner et al. (2008)					Keuthen et al. (2015)				
Items, factor structure, and Cronbach's alphas		**Data analysis strategy**	**Study population**	**Concurrent/ divergent validity measures**	**Items, factor structure, and Cronbach's alphas**		**Data analysis strategy**	**Study population**	**Concurrent/ divergent validity measures**	**Items, factor structure, and Cronbach's alpha**		**Data analysis strategy**	**Study population**	**Concurrent/ divergent validity measures**
Awareness of pulling	Internal-regulated pulling	Exploratory Factor Analysis	Clinical sample with TTM (n = 91)	MGH-HS NIMHT-SSS BAI BDI-II	Focused pulling	Automatic pulling	Exploratory Factor Analysis (n = 848) + Confirmatory Factor Analysis (n = 849)	Clinical sample with TTM	TIS DASS-21	Intention pulling	Emotion	Exploratory Factor Analysis	Clinical sample with TTM (n = 193)	NIMHT-SSS TIS DASS-21
4	1				4	1				1	8			
8	2				5	2				2	10			
9	5®				6	3				4®	11			
10	7				8	7				5®	13			
11	12				9	12				6®	14			
13					10					7	15			
14					11					9®				
15					13					12				
					14									
					15									
Alpha .74	Alpha .80				Alpha .77	Alpha .73				Alpha .78	Alpha .75			

Legenda. ® = reverse item. BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-II; DASS-21 = Depression Anxiety Stress Scales-21; MGH-HS = Massachusetts General Hospital - Hairpulling Scale; NIMHT-SSS = National Institute of Mental Health Trichotillomania Severity; TTM = Trichotillomania; TIS = Trichotillomania Impact Survey.

subtype and other clinical variables remains inconclusive. Several relationships may be worthy of further exploration, including the relationships between pulling style, comorbid body-focused repetitive behaviours, experiential avoidance, emotional dysregulation, dissociation, and anxiety sensitivity. Although co-occurrence of hair pulling and skin picking behaviours is quite frequent (Snorrason, Belleau & Woods, 2012), no study examined this relationship using measures of subtypes. Only one study investigated the relationship between the MIST-A subscales and psychological inflexibility/experiential avoidance (Alexander et al., 2018), which showed a moderate association between psychological inflexibility/experiential avoidance and MIST-A Internal-Regulated pulling, but no relation with MIST-A Awareness of pulling (Alexander et al., 2018). Since hair pulling, particularly the focused subtype, is hypothesized to be done in response to negative emotions (Woods et al., 2006), further evidence about this relationship is required. In addition, although emotion regulation deficits are hypothesized to be associated with TTM, particularly the focused subtype (Woods et al., 2006) and similarly also with focused skin picking (Pozza, Giaquinta & Dèttore, 2017), construct validity studies on the MIST-A did not investigate the relation between the two subtypes and emotion dysregulation. In addition, no study investigated concurrent validity of the MIST-A with dissociative experiences, despite the fact that nearly 20% of adults with TTM experience significant dissociative experiences (Carlson & Putnam, 1993), which may relate to pulling without awareness. Moreover, dissociative experiences could be related also to focused pulling since it could be used by the individual as a strategy of emotional regulation or control. Another clinical construct in need of further investigation is anxiety sensitivity, a cognitive dimension consisting of physical concerns (e.g., the belief that normal body sensations, such as an increase in heartbeat, lead to death), social concerns (e.g., the belief that publicly observable anxiety reactions will elicit social refusal), and cognitive concerns (e.g., the belief that cognitive difficulties lead to insanity). Anxiety sensitivity is believed to be central to the development of anxiety disorders (Taylor et al., 2007), and given the high comorbidity between TTM and anxiety (Flessner et al., 2008), one might expect correlations to emerge between this factor and focused pulling. A systematic comparison of the measures used to investigate concurrent and divergent validity in previous studies is provided in Table 1.

Finally, it seems important to look at how focused and automatic pulling may or may not occur across different cultures, since the questionnaire has not been validated in other languages than English. In the Italian context, hair pulling is still an under-recognized condition by clinicians and a very small number of studies was conducted. Recently, in the first epidemiologic contribution Ghisi, Bottesi, Sica, Ouimet & Sanavio (2013) reported prevalence rates ranging from about 2.1% to 16.5%, depending on the stringency of the TTM criteria used. However, to date no instrument is available with well-established psychometric properties to assess the subtypes of TTM during clinical practice or for research purposes. Starting from these considerations, the aims of the current study were to provide further evidence about the clinical characteristics of TTM subtypes, specifically:

1. investigating the psychometric properties, particularly the factor structure and the reliability of the MIST-A, in the Italian community (Study 1);
2. examining its concurrent and divergent validity with measures of skin picking, anxiety sensitivity, anxiety, dissociative experiences, difficulties in emotion regulation, psychological inflexibility and experiential avoidance (Study 2).

STUDY 1: FACTOR STRUCTURE AND RELIABILITY OF THE MIST-A

Participants

A large group of 1142 adults were recruited from the general population [Mean age (years) = 38,41, *SD* = 14.67, *range* = 18-75, percentage of females = 60%]. Data were collected from October 2012 to July 2017. Through convenience sampling, participants were recruited in a variety of public settings in several cities located in the Northern, Mid or Southern Italy. Psychologists approached participants in public settings, including high schools, universities, railway stations, libraries, malls, sports or volunteering associations. When approached, each participant was provided with a brief overview of the study, provided a description of hair pulling behaviours, and specifically asked whether they reported doing this behaviour, they were invited to participate. The fact that pulling behaviours tend to occur also in the general

population was highlighted. If interested, each participant was taken aside to complete the questionnaires individually. In accordance with the *Ethical Principles of Psychologists and Code of Conduct* (American Psychological Association, 2012), all the participants who were recruited, provided written informed consent to participate after having received a detailed description of the study aims. Participants' identities remained anonymous and participation was entirely volunteer and uncompensated. Contact information of the study coordinator (AP) was provided if participants had further questions or concerns regarding their participation. Participants were considered eligible for the study if they stated that they engaged in hair pulling behaviours to some degree and if they provided written informed consent to participate. An overview of demographics of the participants in study 1 is provided in Table 2.

Measures: MIST-A

Participants completed the Italian translation of the MIST-A (Flessner et al., 2008). The measure, consisting of 15 items on a 10-point Likert-type response format (Not true of any of my hair pulling = 0, True for all of my hair pulling = 9), showed acceptable internal consistency (Cronbach's alpha = .77 for the *Focused* subscale, alpha = .73 for the *Automatic* one). Higher scores indicate more intense hair pulling behaviours. The process of translation in Italian followed a protocol according to international standards (Behling & Law, 2000). This process includes a translation from English into Italian, and a subsequent independent translation from Italian into English. The first translation was conducted independently by two native Italian clinical psychologists with excellent knowledge of English and double-checked by an Italian professional translator. Later, this version was translated back in English by a bilingual professional translator, who was unfamiliar with the original items. A final comparison between the latter translation and the original English version conducted to the generation of the Italian version of the scale. This Italian pilot version of the MIST-A was administered to ten Italian individuals in the community, and interviews were conducted by a psychologist in order to verify the semantic equivalence, the comprehensibility and content validity. Since this version was found to be valid in terms of comprehensibility, it was used for the current study.

Statistical analyses

In order to test the factor structure, a confirmatory factor analysis (CFA) was carried out using structural equations modelling on the whole community group (n = 1142). The distributional properties of the items were examined by conducting the Kolmogorov-Smirnov test and the inspection of the ratio between kurtosis and skewness and their standard errors.

First, a model with two uncorrelated factors was tested, as showed in Flessner and colleagues (2008). A second model including two correlated factors and a third model with a higher-order factor and two lower-order factors were also tested. Finally, a two-factor model was also tested without item 3 ("I am in an almost 'trance-like' state when I pull my hair") or item 11 ("I have a strange sensation just before I pull my hair"). This model was tested following the results reported in Keuthen and colleagues (2015), where items 3 and 11 were removed. Of added note, item 3 had subthreshold loadings values on both the factors (the *Intention* and the *Emotion* factors), and alpha values for the *Emotion* scale increased to .78 without item 3.

In order to evaluate the model's goodness of fit to the data, the following indices were used (Hu & Bentler, 1999): the Bentler-Bonett Normed Fit Index (NFI), the Bollen's Relative Fit Index (RFI), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI). For these indices, values between .95 and 1 represent a good fit, values between .90 and .95 acceptable fit. In addition, the Root Mean Square Error of Approximation (RMSEA) was used as index of fit. For the RMSEA, values less than .08 represent acceptable fit, and values less than .05 represent good fit. Reliability was evaluated as internal consistency using Cronbach's alpha coefficients calculated on the total sample. Reliability coefficients were evaluated according to Nunnally and Bernstein (1994) (alpha>.70 = acceptable; alpha>.80 = good; alpha>.90 = excellent). Further, reliability was verified as three-month-temporal stability using Pearson's correlation test-retest coefficients in a subsample (n = 97) of the total sample.

In order to collect three-month temporal stability data, all the participants were asked to give their e-mail addresses, so investigators could contact them. A subset (n = 30) agreed to participate in a second administration when contacted by study personnel. A psychologist reached each of the participants who accepted to complete the MIST-A in this second phase of the study. One-way ANOVA analyses have been performed, in order to compare scores between males

Table 2 – Demographics of study 1 (n = 1142), study 2 (n = 355)

	Study 1 group (*n* = 1142)	**Study 2 group (*n* = 355)**
	M (SD; range)/ n (%)	M (SD; range) n (%)
Age (years)	38.41 (14.67; 18-75)	40.83 (15.54; 18-75)
Female gender	685 (60)	202 (57)
Marital status		
Single	604 (53)	169 (47.6)
Married	374 (32.7)	159 (44.8)
Separated/Divorced	151 (13.3)	22 (6.2)
Widowed	13 (1)	5 (1.4)
School license		
Elementary school license	17 (1.5)	7 (2)
Middle school license	201 (17.6)	53 (15)
High school license	463 (40.5)	176 (49.6)
Degree	324 (28.4)	104 (29.3)
Post-graduate specialization	128 (11.2)	14 (4)
Ph.D.	9 (0.8)	1 (0.3)
Employment status		
Students	263 (22.8)	59 (16.6)
Employed	550 (48.2)	233 (65.6)
Unemployed	269 (25.6)	33 (9.3)
Retired	44 (3.9)	10 (2.8)

and females in the total scores and in the subscales scores. Reliability calculations were conducted with SPSS software version 21.00. Reliability was assessed as internal consistency and temporal stability. Internal consistency was calculated through Cronbach's alpha coefficients and assessed according to the criteria provided by Nunnally and Bernstein (1994) (alpha>.70 = acceptable; alpha>.80 = good; alpha>.90 = excellent). The CFA and internal consistency analyses were conducted through the Amos and the SPSS 21.00 version software.

Results

The scores on all the MIST-A items did not fit a normal distribution, since the ratio between skewness and kurtosis and the corresponding standard errors resulted out of the chosen range between -1 and +1. To correct for skewness, a logarithmic transformation to the scores on all the MIST-A items was applied. Results of CFA indicated that a model including two correlated factors had the best fit as compared with a model including two uncorrelated factors, a model with two uncorrelated factors without items 3 and 11 as in Keuthen et al. (2015), or a model with a higher-order and two lower-order factors. An overview of the fit indices across the models is presented in Table 3. The final items used for the Italian version of the MIST-A, their distribution and standardized coefficients in the two factors are presented in Table 4.

Internal consistency was excellent for the total scores of the MIST-A (Cronbach's alpha = .92) according to Nunnally and Bernstein (1994). Corrected item-total correlations were ranged from .10 and .85 and alpha values ranged between .90 and .92, when each of the items was deleted. Cronbach alpha values were .88 and .90 for the Focused and the *Automatic* subscales, respectively, suggesting good and excellent internal consistency (Nunnally & Bernstein, 1994). For the Focused subscale, alpha values ranged between .83 and .87, when each of the items was deleted; for the *Automatic* subscale, alpha values ranged between .86 and .89, when each of the items was deleted.

Temporal stability was good for the total MIST-A scores (Pearson's r = .85) and for scores on both the *Automatic* (Pearson's r = .86) and the *Focused* subscale (Pearson's r = .79), as strong values in the bivariate correlation coefficients were observed.

STUDY 2: CONCURRENT AND DIVERGENT VALIDITY OF THE MIST-A

Participants

A subgroup of 355 individuals from the total community group, who gave their consent to participate in a further assessment, completed also other self-report measures in addition to the MIST-A, in order to investigate its concurrent and divergent validity. All the participants in the subgroup stated that they engaged in hair pulling behaviours to some degree. This subgroup was created on the basis of the participant's consent to complete further questionnaires. An overview of socio-demographic characteristics of this subgroup is shown in Table 1.

Table 3 – Fit indices of tested models of the Italian MIST-A (n = 1142)

Tested models	χ^2	df	p-value	TLI	CFI	NFI	RFI	RMSEA
2 uncorrelated factors as in Flessner et al. (2008)	3878.92	90	.0001	.62	.68	.61	.61	.192
2 correlated factors as in Flessner et al. (2008)	2772.73	89	.0001	.73	.77	.77	.72	.163
2 correlated factors and modification indices as in Flessner et al. (2008)	552.75	78	.001	.95	.95	.96	.94	.075
2 uncorrelated factors without items 3 and 11 as in Keuthen et al. (2015)	3449.46	65	.0001	.59	.65	.65	.58	.214
2 correlated factors as in Alexander et al. (2016)	1737.28	64	.0001	.79	.82	.82	.78	.155
1 higher-order factor and 2 lower-order factors	3549.01	91	.0001	.66	.70	.70	.65	.182

Legenda. df = degree of freedom; TLI = Tucker-Lewis Indez; CFI = Comparative Fit Index; NFI = Bentler-Bonnett Normed Fit Index; RFI = Bollen's Relative Fit Index; RMSEA = Root Mean Square Error of Approximation.

Table 4 – Distribution and standardized coefficients of the items in the Italian MIST-A across the two factors

	Focused factor	Automatic factor
1. I pull my hair when I am concentrating on another activity.		.79
2. I pull my hair when I am thinking about something unrelated to hair pulling.		.80
3. I am in an almost "trance-like" state when I pull my hair.		.82
4. I have thoughts about wanting to pull my hair before I actually pull.	.50	
5. I use tweezers or some other device other than my fingers to pull my hair.	.22	
6. I pull my hair while I am looking in the mirror.	.27	
7. I am usually not aware of pulling my hair during a pulling episode.		.71
8. I pull my hair when I am anxious or upset.	.85	
9. I intentionally start pulling my hair.	.54	
10. I pull my hair when I am experiencing a negative emotion, such as stress, anger, frustration, or sadness.	.87	
11. I have a "strange" sensation just before I pull my hair.	.62	
12. I don't notice that I have pulled my hair until after it's happened.		.73
13. I pull my hair because of something that has happened to me during the day.	.82	
14. I pull my hair to get rid of an unpleasant urge, feeling, or thought.	.76	
15. I pull my hair to control how I feel.	.62	

Note. Scoring: the score on each of the two subscales is calculated by summing the raw scores on all the corresponding items.

Measures

The *Milwaukee Inventory for the Dimensions of Adult Skin Picking* (*MIDAS*; Walther, Flessner, Conelea & Woods, 2009) is a 12-item self-report measure that assesses pathological skin picking. Each item of the MIDAS is rated from 1 = not true for any of my behaviours of skin picking, to 5 = true for all my behaviours of skin picking. The MIDAS is the only instrument designed to evaluate subtypes of skin picking: a focused subtype, which typically concerns specific areas of the body and occurs in response to negative emotions (such as anger or anxiety), or bodily sensations, and an automatic subtype, which occurs without awareness during activities not related to the picking behaviours. The MIDAS items were modelled based on those of the MIST-A. The validation study (Walther et al., 2009) was conducted through an online survey on a sample of 92 participants, who reported repetitive body-focused behaviours, including skin picking and trichotillomania. The validation study of the Italian version of the measure suggested three factors, assessing a focused, automatic, and mixed subtype, respectively (Pozza, Mazzoni et al., 2016).

The *Beck Anxiety Inventory* (*BAI*; Beck, Epstein, Brown & Steer, 1988), a 21-item questionnaire, was used to assess

anxious symptoms. Items are rated from 0 to 3 scores, which can range from 0 to 63 with higher scores indicating greater anxiety severity. The measure showed very good internal consistency (Beck et al., 1988). The Italian translation (Sica & Ghisi, 2007) showed excellent internal consistency for student and clinical samples.

The *Anxiety Sensitivity Index-3* (*ASI-3*; Taylor et al., 2007) is an 18-item self-report questionnaire on a 5-point Likert-type scale (0 = very little; 4 = very much). The ASI-3 is used to measure the three dimensions of anxiety sensitivity: Physical concerns (e.g., "When I feel pain in my chest, I worry that I'm going to have a heart attack"), Cognitive concerns (e.g., "When I cannot keep my mind on a task, I worry that I might be going crazy"), and Social concerns (e.g., "I worry that other people will notice my anxiety"). The measure showed to have good to excellent internal consistency in both clinical and non-clinical samples from different countries (Taylor et al., 2007). The Italian version (Pozza & Dèttore, 2015) showed good to excellent internal consistency in both non-clinical and clinical samples.

The *Dissociative Experiences Scale – II* (*DES-II*; Carlson & Putnam, 1993), a 28-item questionnaire on a 11-point scale, was used as a measure of dissociative experiences. Scores are calculated by dividing the total by 28, leaving a potential *range* from 0 to 100. Two subscales are calculated: *Compartmentalization and Detachment*. Higher scores on the two subscales indicate a higher degree of dissociative experiences.

The *Difficulties in Emotion Regulation Scale* (*DERS*; Gratz & Roemer, 2004) was used to assess self-reported emotion regulation difficulties. Six subscale scores can be computed from the 36 items, namely Non-acceptance of emotions (6 items; e.g., "When I'm upset, I feel guilty for feeling that way"), Difficulties engaging in goal-directed behaviour when distressed (5 items; e.g., "When I'm upset, I have difficulty concentrating"), Impulse control difficulties (6 items; e.g., "When I'm upset, I become out of control"), Lack of emotional awareness (6 items; e.g., "I pay attention to how I feel" [reversed]), Limited access to emotion regulation strategies (8 items; "When I'm upset, it takes me a long time to feel better") and Lack of emotional clarity (5 items; "I am confused about how I feel"). Participants rate each item on a scale from 1 (almost never, 0- 10%) to 5 (almost always, 91-100%). The authors describe good psychometric properties for all subscales, e.g., adequate to good internal consistencies (Cronbach's alpha values >.80). The Italian version showed acceptable to excellent internal consistency across all the subscales (Sighinolfi et al., 2010).

The AAQ-II (Bond et al., 2011) was used to assess psychological inflexibility and experiential avoidance. The AAQ-II is a revised version of the original AAQ (Hayes et al., 2004). The AAQ-II is a seven-item self-report measure that uses a 7-point Likert scale (1 = never true; 7 = always true). Sample items include "I am afraid of my feelings" and "Emotions cause problems in my life".

The AAQ-II exhibits a single-factor structure, good internal consistency and good test-retest reliability. The Italian version showed good internal consistency (Pennato, Berrocal, Bernini & Rivas, 2013).

Statistical analyses

To evaluate convergent validity, Pearson's bivariate correlation coefficients were calculated between scores on the MIST-A and scores on the MIDAS, BAI, ASI-3, AAQ-II, DES-II, and DERS. Values of correlation coefficients were interpreted as follows: $0<r<|.30|$ = weak, $|.30|<r<|.50|$ = moderate, $|.50|<r<\pm|.70|$ = strong, $r<\pm|.70|$ = very strong (Cohen, Cohen, West & Aiken, 1998). Power calculations were run for this analysis. For a medium effect size, 80% power, and significance set at the level described above, the required sample size for bivariate correlations was at least 82. To compare the magnitude of Pearson' correlation coefficients between scores on the MIST-A with scores on the measures used to assess concurrent and divergent validity, Fisher's z coefficients for dependent samples were calculated. The bivariate correlations were conducted with SPSS software version 21.00. Power calculations were performed using the GPower 3.1.7 software.

Results

Scores on the MIST-A Focused subscale strongly and positively correlated with scores on the MIST-A *Automatic* subscale. Pearson's bivariate correlations with Fisher's *z* coefficients between scores on the MIST-A and scores on the MIDAS are presented in Table 5.

Scores on the MIST-A *Focused* subscale weakly and positively correlated with scores on ASI-3 Physical concerns, DES-II subscales and AAQ-II and moderately with scores on ASI-3 Cognitive and Social concerns and BAI. Scores

Table 5 – Pearson's bivariate correlations (Fisher's z coefficients) between scores on the MIST-A and the MIDAS (n = 355)

	1.	2.	3.	4.	5.
1. MIST-A Focused	1	.71**	.40** (1.95*)	.43** (.82)	.44** (3.24**)
2. MIST-A Automatic			.47**	.40**	.32**
3. MIDAS Automatic				.72**	.51**
4. MIDAS Focused					.51**
5. MIDAS Mixed					1
Mean	8.42	5.32	7.53	4.89	5.70
SD	13.13	9.26	4.01	2.99	2.69

Legenda. MIDAS = Milwaukee Inventory for the Dimensions of Adult Skin picking.
Note. *p<.05**, p<.001.

on the MIST-A *Automatic* subscale weakly and positively correlated with scores on all the ASI-3, BAI, DES-II and AAQ-II subscales. Significant differences between scores on the MIST-A *Focused* and *Automatic* subscales were found in the magnitudes of the correlations with scores on the ASI-3 Physical (Fisher's z = 2.49, p<.01) and Cognitive concerns (Fisher's z = 3.40, p<.01), BAI (Fisher's z = 2.38, p<.01) and AAQ-II (Fisher's z = 2.02, p<.05): scores on the MIST-A *Focused* subscale more strongly correlated with scores on these subscales than those on the MIST-A *Automatic*. Pearson's bivariate correlations with Fisher's z coefficients between scores on the MIST-A and scores on the ASI-3, BAI, DES-II and AAQ-II are presented in Table 6.

Scores on the MIST-A *Focused* and *Automatic* subscales weakly and positively correlated with scores on all the DERS subscales, except for those on the DERS Lack of emotional awareness, with which correlations were negative. No difference between scores on the MIST-A *Focused* and *Automatic* subscales was found in the magnitudes of the correlations with scores on the DERS subscales, as indicated by Fisher's z coefficients. Pearson's bivariate correlations with Fisher's z coefficients between scores on the MIST-A and scores on the DERS are presented in Table 7.

GENERAL DISCUSSION

Recent clinical models of TTM have conceptualized the disorder as a multidimensional condition composed of different subtypes. However, inconclusive and inconsistent evidence has been produced about its dimensionality. The current study expanded the present knowledge on the clinical characteristics of TTM subtypes investigating further the psychometric properties of the MIST-A in a large group of individuals recruited from the community, who stated that they engaged in hair pulling. In comparison with previous studies, a strength of the current one was the use of confirmatory factor analysis. The study investigated concurrent and divergent validity with unexplored clinical variables, such as measures of skin picking, anxiety sensitivity, dissociative experiences, and difficulties in emotion regulation. An original element of the study was the calculation of Fisher' s z coefficients that allowed comparing the differential magnitudes of the intercorrelations between the two TTM subtypes and the clinical variables.

Different from the initial validation study (Flessner et al., 2008), where the two subtypes were uncorrelated (Pearson's r = .01), in the current study a model in which the focused and

Table 6 – Pearson's bivariate correlations (Fisher's z coefficients) between scores on the MIST-A, ASI-3, BAI, DES-II and AAQ-II (n = 355)

	3.	4.	5.	6.	7.	8.	9.
1. MIST-A Focused	.19* (2.49**)	.37* (3.40**)	.35* (1.31)	.38* (2.38**)	.27* (1.27)	.25* (1.01)	.25* (2.02***)
2. MIST-A Automatic	.09	.24*	.30*	.29*	.22*	.21*	.17*
3. ASI-3 Physical concerns		.63*	.47*	.42*	.16*	.09	.26*
4. ASI-3 Cognitive concerns			.58*	.52*	.28*	.29*	.37*
5. ASI-3 Social concerns				.37*	.22*	.21*	.32*
6. BAI					.36*	.31*	.29*
7. DES-II Compartmentalization						.73*	.25*
8. DES-II Detachment							.24*
9. AAQ-II							1
Mean	5.32	3.61	7.03	11.06	318.44*	54.37	20.72
SD	4.61	4.01	4.65	8.82	240.62*	73.49	6.14

Legenda. ASI-3 = Anxiety Sensitivity Index-3; BAI = Beck Anxiety Inventory; DES-II = Dissociative Experiences Scale-II; AAQ-II = Acceptance and Action Questionnaire-II version.

Note. *p<.001, **p<.01, ***p<.05.

the automatic subtypes were strongly intercorrelated, yielded a better fit (Pearson's r = .71). The inclusion of covariances between residuals of some items was necessary to improve the model fit. When the covariances were introduced, values on all the fit indices were acceptable on the TLI, CFI, NFI, as they were equal or higher than 0.95. The RMSEA value also became acceptable. Thus, the factor structure reported in Flessner and colleagues (2008) was preferred also since it was supported by more robust methods, such as both exploratory and confirmatory factor analyses conducted on two large independent samples (n = 848 and n = 849, for exploratory and confirmatory factor analysis, respectively). The factor structures reported in Keuthen et al. (2015) and Alexander et al. (2018) were based only on exploratory analyses and were tested in relatively small samples: n = 193 for Keuthen et al. (2015), n = 91 for Alexander et al. (2018). However, it should be noted that a limitation of the current data was that the RMSEA value resulted lower than the threshold of .08, indicating acceptable fit, but it was higher than .06, that is the threshold for good fit. The current evidence about the intercorrelation between the two TTM subtypes was not consistent with the original theoretical model of the TTM subtypes proposed by Flessner and colleagues (2008), where the two subtypes were hypothesized being uncorrelated. From a clinical point of view, however, a model with two intercorrelated subtypes may be more consistent with clinical research and practice with individuals reporting body-focused repetitive behaviours (Arnold, Auchenbach & McElroy, 2001; Pozza, 2018). The subtypes of body-focused repetitive behaviours often present with common clinical characteristics related to personality and emotion regulation (Pozza, Giaquinta & Dèttore, 2016). Indeed, in clinical practice individuals with TTM typically

Table 7 – Pearson's bivariate correlations (Fisher's z coefficients) between scores on the MIST-A and the DERS (n = 355)

	3.	4.	5.	6.	7.	8.
1. MIST-A Focused	.12* (1.48)	.27** (.76)	.16** 1.24)	.27** (1.53)	.01 (.24)	−.20** (−1)
2. MIST-A Automatic	.06	.24**	.11*	.21**	.02	−.16**
3. DERS Non-acceptance of emotional responses		.55**	.50**	.47**	.35**	−.06
4. DERS Difficulties engaging in goal directed behaviour			.54**	.64**	.29**	−.15**
5. DERS Limited access to emotion regulation strategies				.61**	.44**	.06
6. DERS Impulse control difficulties					.29**	−.14**
7. DERS Lack of emotional clarity						.33**
8. DERS Lack of emotional awareness						1
Mean	11.10	12.04	16.53	11.01	10.35	6.71
SD	4.61	4.44	5.13	4.39	3.52	2.82

Legenda. DERS = Difficulties in Emotion Regulation Scale.

Note. *p<.001, **p<.01.

report both the subtypes when they get in contact with clinicians; alternatively, at the time of the clinical evaluation, they show a specific subtype while having suffered from the other subtype in the past, before seeking help from a clinician. Therefore, a model with two intercorrelated subtypes may confirm that the subtypes belong to a TTM syndrome and they are not just distinct symptoms. In addition, this model may have clinical implications and prognostic utility, since it may suggest that clinicians should be aware about the possibility that hair-pullers have the characteristics of both the subtypes despite apparently showing only one subtype or may develop also the other subtype in the future. In clinical practice, individuals with TTM frequently show the characteristics of a subtype for a certain period and the characteristics of the other subtype for another period.

The Italian MIST-A had excellent internal consistency for the total scale and the *Automatic* subscale. Internal consistency was good for the Focused subscale. These values were substantially higher than those reported in the initial validation study (Flessner et al., 2008), where the *Focused* and the *Automatic* subscale showed Cronbach's alpha values of .77 and .78, respectively.

Evidence of convergent and divergent validity supported that the two TTM subtypes were strongly correlated each other. In addition, both the TTM subtypes measured by the MIST-A were moderately associated with all the subtypes of skin picking assessed by the MIDAS. Significant differences between scores on the MIST-A *Focused* and *Automatic* subscales were found in the magnitudes of the correlations with scores on the MIDAS *Automatic* and *Mixed* subscales: scores on the MIST-A *Automatic* subscale correlated more strongly with scores on the MIDAS *Automatic* subscale than those on the MIST-A *Focused* subscale; scores on the MIST-A Focused correlated more strongly with scores on the MIDAS *Mixed* than those on the MIST-A *Automatic*. This is the first study investigating the intercorrelations between TTM subtypes and skin picking subtypes. The current findings suggested that subtypes of TTM and skin picking can be

highly intercorrelated, have largely overlapping clinical characteristics and similarities in the clinical presentation in accordance with some recent reviews (Snorrason et al., 2012). Overall, these data showed that the co-occurrence of hair-pulling and skin picking is quite frequent. While the focused subtype of TTM was more strongly associated with focused and mixed skin picking than the automatic subtype of TTM; the latter was more strongly associated with the automatic subtype of skin picking than the first one. These results supported good concurrent and divergent validity of the MIST-A, as it demonstrated to be able to discriminate the two specific subtypes of body focused behaviours, regardless the type of body focused behaviours, TTM or skin picking.

The moderate and weak correlations of the focused and the automatic subtypes respectively with anxiety were consistent with the results reported in the initial validation study by Flessner and colleagues (2008). In addition, the focused subtype was associated more strongly with anxiety than the automatic one. This result could support that body focused behaviours are associated with negative emotions; this could be viewed as consistent with previous data, which suggested that focused pulling may represent an attempt to decrease levels of negative affect or regulate aversive feelings, particularly anxiety, resulting in a paradoxical increase of negative feelings (Woods et al., 2006). Consistently, Diefenbach and colleagues (2002) showed that anxiety and tension may serve as triggers and pulling behaviours as negative reinforcers. Conversely, extant research has failed to report a relationship between automatic pulling and negative affect (Diefenbach et al. 2002). A main limitation of the current study was the cross-sectional design, which prevented to draw reliable conclusions about causality.

Focused pulling was moderately and more strongly associated with experiential avoidance and psychological inflexibility than the automatic subtype, which was only weakly related to it. This result appeared consistent with the general observation, obtained also from other measures of TTM than the MIST-A, that focused hair pulling is more strongly associated with experiential avoidance and psychological inflexibility than the automatic one (Norberg, Wetterneck, Woods & Conelea, 2007; Shusterman, Feld, Baer & Keuthen, 2009). The relationship between focused hair pulling and experiential avoidance and psychological inflexibility appeared consistent with previous data, which indicated that those individuals who tended to engage in experiential avoidance also experienced greater frequency and intensity of urges, greater struggle with urges to pull, and increased distress associated with pulling, in comparison to those who tended to be more experientially accepting (Begotka, Woods, & Wetterneck, 2004). In addition, the paradoxical effect of experiencing more frequent and intense urges in relation to high experiential avoidance is consistent with the literature on thought suppression (Purdon & Clark, 2000), which has found that attempts to suppress unwanted thoughts often results in an increased frequency of those thoughts. The evidence that focused hair pulling was more strongly related to experiential avoidance than the automatic pulling one was also consistent with the data on the clinical characteristics of subtypes of skin picking (Walther et al., 2009).

On one hand, focused pulling was moderately correlated with Anxiety sensitivity cognitive and Social concerns, while it was weakly associated with Physical concerns; on the other hand, automatic pulling was weakly associated with all the Anxiety sensitivity dimensions. Focused pulling was more closely associated with Physical and Cognitive concerns than automatic pulling, but this difference did not emerge for Social concerns. The weak association between hair pulling and Social concerns appeared in contrast with previous research indicating a significant association between TTM and social anxiety (Flessner et al., 2008).

Both pulling subtypes were weakly associated with dissociative experiences and no difference emerged in the magnitude of the association between each subtype and dissociative compartmentalization and detachment. This evidence could question the notion that automatic pulling is engaged specifically without awareness and during trance-like states of alteration of consciousness.

Surprisingly, only weak associations were found between both the TTM subtypes and emotion dysregulation dimensions and no difference emerged in the magnitude of the associations between the two subtypes. This outcome appeared in contrast with previous literature reporting that some specific emotion dysregulation dimensions are significant predictors of body focused behaviours, including skin picking (Alexander et al., 2018; Pozza, Giaquinta et al., 2016)

Finally, some limitations should be pointed out. A first one was the lack of a clinical group with a diagnosis of TTM. Future research on the MIST-A should investigate its dimensionality and also concurrent validity in an Italian clinical group diagnosed with TTM. Through ROC analysis, future studies should clarify whether the tool is able to detect patients with primary hair pulling as compared with other

kinds of patients. In addition, a measure of self-reported hair pulling severity was not used, since in the Italian context such a self-report measure has not been yet validated. Moreover, it could be interesting in the future to investigate the relationship between hair pulling behaviours and other emotional feelings than anxiety, such as anger, boredom, guilt, and shame. Another point which needs to be addressed is responsiveness, that is the capacity of the tool to measure changes in pulling behaviours after a specific psychotherapeutic intervention for TTM. In addition, the failure to evidence a relation between the two subtypes and emotion dysregulation could be in part due to the use of self-report measures. Additional research should use observational instruments or experimental tasks to assess more comprehensively this aspect. Another point which requires further investigation regards which clinical characteristics are more specifically associated with the automatic subtype than the focused one, since in the current study no difference in the magnitudes of the correlations was found favouring the first subtype. Thus, more knowledge about the specific features of the automatic pulling is needed.

CONCLUSIONS

Focused hair pulling seems to be a subtype which, different from the automatic one, is characterized by more intense anxiety, stronger anxiety sensitivity (particularly Cognitive and Physical concerns), higher experiential avoidance and psychological inflexibility. Interestingly and different from the literature, the focused pulling subtype and the automatic one seemed to be equally correlated with emotion regulation deficits and dissociative experiences. Therefore, the focused subtype could rely on emotion regulation deficits only related to avoidance of negative emotions, rather than on other kinds of deficits.

In conclusion, the current study provided further evidence about the clinical characteristics of TTM subtypes, supporting a two-factor structure of the MIST-A as a valid and reliable measure, which could be clinically useful to identify different types of clients with TTM, needing for specific tailored interventions.

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