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TRANSLATION, ADAPTATION, AND PSYCHOMETRIC VALIDATION OF MUSCLE APPEARANCE SATISFACTION SCALE

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ABSTRACT

Objectives: *The study designed to translate, adapt, and psychometrically validate the Muscle Appearance Satisfaction Scale (MASS) into the Urdu language for use among male bodybuilders of Pakistan.*

Design of study: *Correlational research design.*

Place and duration of study: *March 2022 - August 2023, Rawalpindi-Pakistan.*

Sample and method: *150 male bodybuilders of age 14 to 42 years (M=26.58, SD=5.11) participated through purposive sampling method.*

Results and conclusion: *The Urdu version of MASS showed acceptable reliability, with Cronbach's alpha values ranging from .73 to .78 for the subscales and .81 for the total scale. Test–retest reliability was significant (r = .76 - .83) and the cross-language validity indicated strong correlations between the original, forward, and backward versions. Subscales also showed significant associations, including a negative correlation between Bodybuilding Dependence and Muscle Satisfaction. Exploratory factor analysis confirmed a five-factor structure, with loadings ranging from .69 to .78 across all sub-scales, supporting the construct validity of the Urdu Mass. Confirmatory factor analysis supported the five-factor model, χ^2 (142) = 268.42, χ^2/df = 1.89, CFI = .94, TLI = .92, RMSEA = .07, SRMR = .05, while the one-factor model demonstrated poor fit, χ^2 (152) = 612.15, χ^2/df = 4.03, CFI = .71, TLI = .68, RMSEA = .14, SRMR = .11. Hence, the MASS-U has been found a suitable tool for Pakistani population.*

Keywords: *Muscle Appearance Satisfaction Scale, Urdu translation, Adaption*

INTRODUCTION

Body image has become an important focus of research in recent decades, as cultural ideals surrounding physical appearance continuously evolving globally. Body image concerns were once primarily associated with females; however, growing evidence indicates that males also experience substantial pressure to meet appearance-related standards, specially, regarding muscularity (Griffiths et al., 2022). This growing emphasis on muscular ideals has contributed to the recognition of muscle dysmorphia, a condition in which individuals are preoccupied with the belief that their body is insufficiently lean or muscular, despite having adequate physique. Muscle dysmorphia is a subtype of body dysmorphic disorder which is characterized by excessive exercise, dietary restriction, supplement or steroid use, and distress when unable to train (American Psychiatric Association, 2013). Psychological implications of muscle dysmorphia may be quite severe, and they are depression, anxiety, social withdrawal, and poor quality of life (Cunningham et al., 2019). In this regard, researchers and clinicians have been placing more and more importance on the necessity of developing reliable and culturally sensitive measures to evaluate muscle-related body image issues.

Muscle Appearance Satisfaction Scale (MASS), which was first created by Mayville (2002), is one of the most popular scales to measure cognitive, affective, and behavioral aspects of muscle dysmorphia. It has five subscales; Bodybuilding Dependence, Muscle Checking, Substance Use, Injury, and Muscle Satisfaction which makes it one of the most inclusive measures in pinpointing issues specific to muscularity. The MASS has been shown to possess effective psychometrics in Western population groups (Cafri et al., 2005; Olivardia et al., 2000), although there is little evidence about its use in non-Western populations. The tools of psychological assessment must be cultural adapted because even such constructs as body image and appearance satisfaction might be construed differently across cultural groups (Hambleton & Zenisky, 2011). The social concept of masculinity, health, and fitness among South Asian societies and Pakistan are highly influenced by the societal standards, media, and religion (Ali et al., 2021). Unless translated and validated, Western-based instruments might not capture these cultural peculiarities.

In Pakistan, the muscular bodies have been on the rise, especially among the young men who consider bodybuilding as a means of gaining confidence,

respect, and social acceptance (Younas & Qureshi, 2020). Fitness centers and gyms are gaining more and more popularity, and social networks tend to encourage unrealistic standards of power and size. Such a setting can potentially led to discontent with self-image, excessive training habits, and unsafe supplement consumption patterns that are consistent with the symptoms of muscle dysmorphia (Tod et al., 2019). There is an urgent need to have reliable assessment instruments like the Urdu version of the MASS that can identify people at risk. The cross-cultural translation carries with it more than linguistic equivalence, it involves a set of securing conceptual and semantic similarity of the versions (Beaton et al., 2000). The guidelines given by the World Health Organization (2017) are standardized, which suggests forward-translation, review by expert committees, backward-translation, and pre-testing to determine cultural appropriateness. By following these guidelines, validity of translated tools is enhanced, bias is minimized, and constructs are evaluated at the same level across languages.

It is also important to psychometrically validate the translation of the scale. A scale should be able to show reliability such as internal consistency and test-retest stability to show a reliable measurement of a variable over time. It also has to exhibit validity especially construct validity and factorial validity to establish that the tool is measuring what it is intended to measure. One of the most popular methods of assessing the similarity between the original and translated version of a scale is the confirmatory factor analysis (Kline, 2016). Devoid of such validation, there are chances of such translation tools being misunderstood and undermining the quality of research results.

Researchers point out that the translation of body image measures into other languages has been successful (as of recent). To illustrate, the Drive for Muscularity Scale was validated in Arabic by Moussa et al. (2017), thus proving that issues related to muscularity are cross-cultural issues. On the same note, Swami et al. (2021) discovered that the translated Body Appreciation Scale remained valid in both European and Asian samples. These results indicate that appearance related measures can remain psychometrically sound across cultures so long as they are translated in a way that preserves their originality.

It is seen that there are very few available validated measures to be used to measure muscle dysmorphia or other constructs within the Pakistani context. Although other scales have been translated to measure body image and eating disorders, the gap in culturally adapted scales to elicit muscularity has not been

filled. The Urdu MASS fills this intelligence gap by providing a validated, context-specific instrument to Pakistani researchers and practitioners. The tool will be applicable to study the prevalence of muscle dysmorphia, evaluate the impact of sociocultural factors, and come up with interventions that enhance more healthy views on fitness and body image.

Therefore, the current research was aimed at translating, adapting and psychometrically testing MASS to use in Pakistan. In particular, it aimed at (a) the translation of the MASS into Urdu, preserving conceptual equivalence, (b) cross-language validation, and (c) testing psychometric quality, such as reliability and factor structure, of the Urdu version of the MASS. In that way, the current study will add to the local and the international body image evaluation literature, providing a valuable tool useful in preventing, diagnosing, and treating the muscle dysmorphia in Pakistan.

METHOD

Participants

The two sets of populations were used to draw the sample. For the cross-language validation of the scales, 25 male participants (the age group of 14-42 years, M=24.36, SD=4.82) were selected using purposeful sampling approach and tested and re-tested in three separate slots on alternate days to remove the practice effect of the administration of original scale, forward translated version, and backward translated version. Confirmatory factor analysis (CFA) was conducted on another sample i.e., n=150 male bodybuilders, aged 14 to 42 years (M=26.58, SD=5.11) using a purposive sampling method, to determine model fit indices, as well as to estimate the factor loading of each object in the scales that were translated.

Inclusion criteria

- Participants of age 14 to 42 years were included.
- Only male bodybuilders who were attending the gym for at least once a week.
- Only those who were able to read and understand Urdu language were added.

- Only those were included who showed willingness to participate voluntarily in the study.

Exclusion Criteria

- Those under the age of 14 or above 42 years were not included as participants.
- Those participants who could not read Urdu were not included.
- Participants who engaged in exercise due to health conditions or on medical advice were not included.

Measures

Demographic Form

A self-developed demographic form was used to collect information, including age, education, marital status, employment status, duration of gym membership, and average daily workout hours.

Muscle Appearance Satisfaction Scale (MASS; Mayville, 2002)

The MASS is a self-report measure which consists of 19 items and measures various dimensions of muscle dysmorphia including cognitive, affective, and behavioral domains. It consists of five subscales, Bodybuilding Dependence, Muscle Checking, Substance Use, Injury, and Muscle Satisfaction. The internal consistency of the original English version was good, with alpha coefficients of Cronbach ranging between .76 and .87. In this research, the scale had been translated and modified to Urdu using standardized principles.

Procedure

The study was conducted in three stages, as recommended by the World Health Organization (2017) for translation and adaptation of research instruments.

Phase-I: Translation of the Questionnaire into Urdu Language

Step-1 Forward translation. The MASS was translated into Urdu by five bilingual professionals who had a PhD or MS degree in Clinical Psychology. They were also advised to employ an understandable and culturally friendly

language to make them accessible to participants of different degrees of education.

Step-2 Committee approach: The translations were examined by a panel of professionals who interpreted the translations, clarified any differences and chose the most suitable wording. The review focused on conceptual similarity and cultural appropriateness.

Step-3 Backward translation: Five independent bilingual experts, who were unfamiliar with the original instrument, translated the Urdu version back into English. This process ensured that the translated items retained fidelity to the original content.

Step-4 Committee approach: A second expert panel compared the back-translated items with the original English MASS, identifying and revising any inconsistencies.

Step-5 Pre-testing and cognitive interviewing: The pre-final Urdu version of MASS was administered to 25 male bodybuilders. Participants provided feedback on the clarity, comprehensibility, and cultural appropriateness of items. Suggestions were documented, and ambiguous terms were rephrased. During pre-testing of the Urdu MASS, several modifications were made based on participant feedback. In item # 1, Muscle size was added in Urdu version which was later omitted because they can understand the word 'size' in Urdu writing. Muscles in English was omitted from items as they can understand muscles written in Urdu language. In item # 7, لت was changed to پکی عادت/لت because some participants found difficulty because لت is purely Punjabi word. In item # 10 'sore' was omitted because the term made statement difficulty for the participants. In item # 10, بقایا دوسرے was changed to دوسرے only because they are same words. In item # 13, big/muscular was changed to 'muscular' only because participants find big as ambiguous word. In item # 15 'focused' was added with term مرکوز because when focused was added, they understood the statement easily. In item # 16 'big/muscular' was changed to 'muscular' only. In item # 17کچھ بھی طرح کسی بھی مجھے کر کے/ کچھ بھی was changed to کچھ بھی کر کے مجھے only, because they are same in meaning. Lastly Item # 19 was rephrased from اپنے مسلز کے سائز پاتی ہوں /کو جانچنے سے اکثر خود کو روکنے میں دقت پاتا to اپنے مسلز کے سائز پاتی ہوں/سائز کو جانچنے سے میں اکثر خود کو روکنے میں دقت پاتا

When Urdu version of ORTO-15 was administered, following suggestions were given by participants; In item # 2, English word 'confusion' was omitted as it was making difficulty for the participants. In item # 4 مشروط was changed to جڑے/منسلک because participants find the term difficult. In item # 8 and 13, term 'transgressions' was omitted. In item # 10, 'conviction' was omitted and عقیدہ was changed to عقیدہ/ یقین because the term relates to religious point of view. In item # 11 'frequency' was omitted. In item # 13 بر خلاف was rephrased to خلاف ورزی because it was confusing according to participants.

Overall, the pre-testing and cognitive interviewing demonstrated that, apart from these specific revisions, the vocabulary and instructions of the MASS were clear, culturally appropriate, and easily comprehensible for the target population.

Step-6 Expert panel/Committee approach: The panel reconvened to incorporate participant feedback and finalize wording adjustments, ensuring the scale was both comprehensible and culturally suitable.

Step-7 Final Version: After incorporating revisions, the final Urdu version of the MASS was produced for use in subsequent phases.

Phase-II: Cross Language Validation of Translated version of the Scale

In this phase, the three versions of the scale i.e., original, Urdu and English versions were administered on the sample (n=150) at three different slots in order to evaluate the equivalence of Urdu translated version to the original scale.

Phase-III: Psychometric testing of the translated version of the scale

Reliability and the confirmatory factor analysis were done through SPSS-26 and AMOS-20.0 respectively. Descriptive statistics (means, standard deviations, skewness, and kurtosis) were computed to assess data normality and correlations between subscales were also examined.

Scoring and Statistical Analysis

Data were analyzed using SPSS Version 25.0. Internal consistency was established through Chronbach's Alpha, yielding acceptable reliability for the sub-scales (.73 - .78) and strong reliability for the total scale (.81). Test-retest reliability over a two-week interval showed significant stability (r= .76 - .83).

cross language validity demonstrated strong correlations among the original, forward translated, backward translated versions (r+ .83 - .86, p < .01). Construct validity was supported through exploratory factor analysis, which confirmed a five-factor structure with loadings from .69 to .78. confirmatory factor analysis further validated this model, showing good fit indices X^2 (142) = 268.42, X^2/df = 1.89, CFI = .94, TLI = .92, RMSEA = .07, SRMR = .05. The one factor model showed poor fit, confirming the superiority of the five factor solution. Convergent validity was evidenced by expected inter sub-scale relationships, including a significant negative correlation between bodybuilding dependence and muscle satisfaction (r= -.38, p< .01).

RESULTS

Table 1

Intercorrelations of the Original, Forward and Backward Translated Versions of the MASS (N=30)

Version	*1*	*2*	*3*
1. Original (English)	-	.86**	.83**
2. Forward Translation		-	.84**
3. Backward Translation			-

Table 1 values represent Pearson product–moment correlations. p < .001 for all coefficients. High intercorrelations demonstrate conceptual and linguistic equivalence between the original version and forward and backward translated versions of the MASS.

Table 2

Intercorrelations of the Original, Forward and Backward Translated Versions of the Sub-Scales of MASS (N=30)

Scale/Subscale	*Original–Forward*	*Original–Backward*	*Forward–Backward*
Bodybuilding Dependence (BD)	.84**	.82**	.80**
Muscle Checking (MC)	.79**	.77**	.76**
Substance Use (SU)	.82**	.80**	.78**
Injury (IN)	.76**	.74**	.73**
Muscle Satisfaction (MS)	.81**	.79**	.77**

Table 2 values represent Pearson product–moment correlations. $p < .001$ for all coefficients. Strong correlations across original, forward, and backward versions demonstrate equivalence of the Urdu translation with the original English scale.

Table 3

Correlations among MASS Subscales (N = 150)

Subscale	*BD*	*MC*	*SU*	*IN*	*MS*
BD	-	.29**	.34**	.41**	–.38**
MC		-	.43**	.30**	–.06
SU			-	.21*	–.11
IN				-	–.22*
MS					-

Note. BD = Bodybuilding Dependence, MC = Muscle Checking, SU = Substance Use, IN = Injury, MS = Muscle Satisfaction. $p < .05$, $p < .01$.

The correlation matrix shows that Bodybuilding Dependence was positively related to Muscle Checking, Substance Use, and Injury, but negatively related to Muscle Satisfaction. Other subscales also showed significant positive or negative associations in theoretically expected directions.

Table 4

Reliability Coefficients for Urdu MASS and Subscales (N = 150)

Scale/Subscale	*Items*	*α*	*Test–Retest r*
Bodybuilding Dependence (BD)	5	.73	.78**
Muscle Checking (MC)	4	.77	.80**
Substance Use (SU)	4	.77	.82**
Injury (IN)	3	.75	.76**
Muscle Satisfaction (MS)	3	.78	.79**
Total MASS	19	.81	.83

The reliability analysis indicated that all MASS subscales demonstrated acceptable internal consistency (α = .73–.78) and strong test–retest reliability (r = .76–.83). The total scale also showed high reliability (α = .81, r = .83).

Table 5
Descriptive Statistics for Urdu MASS and Subscales (N = 150)

Scale/Subscale	*M*	*SD*	*Range (Observed)*	*Skewness*	*Kurtosis*
Bodybuilding Dependence (BD)	17.40	3.55	9–25	0.12	–0.44
Muscle Checking (MC)	10.81	3.62	4–19	0.08	–0.59
Substance Use (SU)	9.85	3.70	4–20	0.36	–0.35
Injury (IN)	11.10	2.79	3–15	–0.41	–0.39
Muscle Satisfaction (MS)	6.71	2.76	3–15	0.55	–0.21
Total MASS	55.90	9.40	31–80	0.05	0.25

Descriptive statistics revealed that the subscales and total MASS had balanced distributions, with means and standard deviations reflecting moderate

endorsement of the constructs. Skewness and kurtosis values fell within acceptable ranges, supporting normality of the data.

Table 6

Exploratory Factor Analysis (EFA) Results for the Urdu MASS (N = 150)

Item	*Bodybuilding Dependence (BD)*	*Muscle Checking (MC)*	*Substance Use (SU)*	*Injury (IN)*	*Muscle Satisfaction (MS)*
BD1	.72	-	-	-	-
BD2	.75	-	-	-	-
BD3	.69	-	-	-	-
BD4	.74	-	-	-	-
BD5	.71	-	-	-	-
MC1	-	.73	-	-	-
MC2	-	.76	-	-	-
MC3	-	.71	-	-	-
MC4	-	.70	-	-	-
SU1	-	-	.75	-	-
SU2	-	-	.73	-	-
SU3	-	-	.78	-	-
SU4	-	-	.71	-	-
IN1	-	-	-	.72	-

IN2	-	-	-	.74	-
IN3	-	-	-	.70	-
MS1	-	-	-	-	.74
MS2	-	-	-	-	.77

Note. BD = Bodybuilding Dependence, MC = Muscle Checking, SU = Substance Use, IN = Injury, MS = Muscle Satisfaction. $p < .05$, $p < .01$.

The exploratory factor analysis supported a five-factor solution consistent with the original MASS structure. All items loaded strongly on their respective factors (ranging from .69 to .78), confirming the construct validity of the MASS Urdu version

Table 7

Confirmatory Factor Analysis (CFA) Fit Indices for the Urdu MASS (N = 150)

Model	χ^2	*Df*	χ^2/df	*CFI*	*TLI*	*RMSEA*	*SRMR*
Five-Factor Model (Original)	268.42	142	1.89	.94	.92	.07	.05
One-Factor Model (Unidimensional)	612.15	152	4.03	.71	.68	.14	.11

Results of confirmatory factor analysis supported the five-factor structure of the Urdu MASS demonstrated good fit indices. In contrast, the one-factor model showed poor fit, indicating that the scale is multidimensional rather than unidimensional.

Table 8

Standardized Factor Loadings for the Urdu MASS Confirmatory Factor Analysis (N = 150)

Item	Bodybuilding Dependence (BD)	Muscle Checking (MC)	Substance Use (SU)	Injury (IN)	Muscle Satisfaction (MS)
BD1	.71	-	-	-	-
BD2	.75	-	-	-	-
BD3	.68	-	-	-	-
BD4	.73	-	-	-	-
BD5	.70	-	-	-	-
MC1	-	.74	-	-	-
MC2	-	.77	-	-	-
MC3	-	.72	-	-	-
MC4	-	.70	-	-	-
SU1	-	-	.76	-	-
SU2	-	-	.79	-	-
SU3	-	-	.74	-	-
SU4	-	-	.72	-	-
IN1	-	-	-	.71	-
IN2	-	-	-	.74	-

IN3	-	-	-	.69	-
MS1	-	-	-	-	.73
MS2	-	-	-	-	.76

Note. BD = Bodybuilding Dependence, MC = Muscle Checking, SU = Substance Use, IN = Injury, MS = Muscle Satisfaction. $p < .05$, $p < .01$.

Standardized factor loadings showed that all items loaded strongly onto their respective subscales, with values ranging from .68 to .79. This gives support to the Urdu MASS construct validity.

DISCUSSION

The purpose of the present study was to translate, adapt and psychometrically validate the Muscle Appearance Satisfaction Scale (Mayville, 2002) in Urdu to use with Pakistani male bodybuilders. The results showed that the Urdu translation of the MASS had a high conceptual equivalence with the original English version and produced high psychometric characteristics. The findings of cross-language validity showed the high and significant correlations between the original, forward and backward translated versions of the MASS, which implies that Urdu translation was effective in producing desired meaning of items. This finding supports previous studies that note that linguistic and cultural faithfulness of psychological scales are maximized by careful forward-backward translation and review by a committee (Beaton et al., 2000; Hambleton & Zenisky, 2011). Other research that has been carried out on body image and eating-related variables to translate to non-western settings have also achieved good cross-language agreement but have confirmed that underlying constructs are universally applicable (Moussa et al., 2017).

Reliability analysis indicated that there was acceptable internal consistency in all subscales, with Cronbach alpha values similar to the ones found by Mayville (2002). The stability of the Urdu MASS over time was also further supported by the test-retest reliability coefficients. These results align with the psychometric research on translated measures of appearance-related concerns carried out previously which reported reliability coefficients exceeding the traditional predictability marker of .70 (Grieve & Shackelford, 2009; Thomas et al., 2018).

Further, the EFA supported the five-factor structure of the Urdu MASS, with all items loading strongly on their respective sub-scales. These findings are consistent with the original validation study and provide preliminary evidence of the scale's construct validity in Urdu-speaking population. The CFA revealed that the five-factor model fitted the data better than unidimensional model, thus supporting the multidimensional composition of the construct which is consistent with the original validation study and the findings of Mayville (2002) who found that muscle dysmorphia related attitudes as well as behaviors are multidimensional (Cafri et al., 2005; Olivardia et al., 2000).

Overall, the findings contribute to the mounting literature on cross-cultural adaptation of psychological tools. They emphasize the need of translating the scale into other languages in a culturally sensitive manner provide proper measurement and justify use of the Urdu MASS in research and practical settings.

Conclusion

Translation, adaptation and validation of the Muscle Appearance Satisfaction Scale (MASS) as a tool for the Pakistani male bodybuilders was done in the current study. The Urdu version was proven to be highly cross-linguistically valid, internally consistent, and temporally stable. Confirmatory factor analysis further supported the original five-factor structure, indicating that the translated scale captures the multidimensional nature of muscle appearance satisfaction. These findings stated the MASS-U as a psychometrically sound tool for assessing appearance related concerns in the Pakistani context. By providing a culturally adapted tool, this study contributed in local research as well as in clinical practice, offering an avenue for early identification of body-image disturbances and for early intervention as well as prevention in at risk population.

Limitations and Recommendations

While the study demonstrated strong evidence for the reliability and validity of the Urdu version of the MASS, there has been some limitations noted. First, the use of purposive sampling restricted the diversity of participants, as data was drawn primarily from male bodybuilders in urban settings. The inclusion of other populations, such as female bodybuilders, or individuals

exercising for recreational, or health reasons may contribute greatly. Second, reliance on self-report measures may have introduced social desirability bias, as the participants might under or overreport certain behaviors and attitudes. Lastly, convergent and discriminant validity was not the objective of current study that could be the value addition to the existing knowledge.

Some recommendations are offered for the future research, to recruit more diverse and representative samples, including women and individuals from rural settings in order to enhance the external validity of the scale. Incorporating multiple methods of assessment, such as interviews or observational measures, could also help reduce reliance on self-reports and provide a more comprehensive understanding. Finally, to establish convergent and discriminant validity, future studies should include related measures.

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