



# Development and validation of the Male Post-coital Affect Scale for heterosexual men

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## Original Article

**Cite this article:** Pérez M, Hoppe J, Landau AM, and Winterdahl M. (2023) Development and validation of the Male Post-coital Affect Scale for heterosexual men. *Acta Neuropsychiatrica* 35:241–246.  
doi: [10.1017/neu.2023.12](https://doi.org/10.1017/neu.2023.12)

Received: 1 September 2022  
Revised: 25 January 2023  
Accepted: 27 January 2023  
First published online: 15 February 2023

**Key words:**  
psychological assessment; sexual satisfaction; sexual distress; sexual communication; male sexual dysfunction

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### Abstract

**Objective:** The aim of this study was to examine the reliability and validity of the Male Post-coital Affect Scale (MPAS), which was developed to assess positive post-coital feelings in men. **Methods:** After a pilot study, we validated our scale on a sample of American heterosexual men, who answered our questionnaire on the internet through Amazon Mechanical Turk. We tested the reliability using internal consistency. The validity was examined by assessing content, face and construct validity by testing the association between our scale, the Experience in Close Relationships Scale and other instruments. **Results:** A total of 484 volunteers were included in the study. Cronbach's  $\alpha$  for the scale was 0.83. Our scale was negatively correlated with attachment avoidance,  $r(482) = -0.36$ ,  $p < 0.001$  and Perceived Stress Scale,  $r(482) = -0.18$ ,  $p < 0.001$ , and positively correlated with sexual satisfaction,  $r(482) = 0.18$ ,  $p < 0.001$ . **Conclusion:** The MPAS is a reliable and valid tool to assess positive post-coital feelings in men.

### Significant outcomes

- Large and diverse sample of participants
- Excellent internal consistency within the questionnaire
- Novel tool for measuring male post-coital affect

### Limitations

- Not representative of non-heterosexual men
- Lack of relevant instrument for comparison to our instrument
- Symptoms of post-coital dysphoria not probed

## Introduction

Often perceived as the peak of the sexual experience and the desired outcome of the sex act itself (Lavie-Ajayi and Joffe, 2009), orgasm has been defined as a transient peak sensation of intense pleasure creating an altered state of consciousness, usually inducing long-lasting feelings of languor, well-being and contentment in the participants (Levin, 2011). Orgasms are associated with emotions that lead to bonding and intimacy (Sadock and Sadock, 2008; Sewell, 2006), with both men and women indicating a desire to engage in affectionate behaviour such as cuddling, caressing and shared intimacy with their partner after sex (Hughes and Kruger, 2011; Kruger and Hughes, 2011). Furthermore, orgasm has been associated with higher sexual satisfaction and, in turn, higher relationship satisfaction (Muise *et al.*, 2014).

Although existing literature explores this experience (Kruger and Hughes, 2011; Maczkowiack and Schweitzer, 2019; Muise *et al.*, 2014), we have not yet found a specific instrument that measures positive post-coital affect in men. Some articles present subjective reports to open-ended questions with responses clearly associated with emotion, participants commonly reported feeling happy after orgasm, often reporting feelings of love for their partner and increased levels of intimacy and closeness (Opperman *et al.*, 2014). Others focus primarily on the unexpected negative emotions experienced after sex or post-coital dysphoria by both women (Schweitzer *et al.*, 2015) and men (Maczkowiack and Schweitzer, 2019). Other instruments are used to measure a broader experience outside of the period immediately following orgasm, for example, the Relationship Assessment Scale (Hendrick, 1988) or the Sexual Satisfaction Scale for Women (Meston and Trapnell, 2005).

Here, we suggest the need for the Male Post-coital Affect Scale (MPAS) a questionnaire that reflects the participant's positive post-orgasmic feelings, including contentment, emotional closeness, relaxation and satisfaction. The development and initial validation of the MPAS are the objective of the present study.

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## Methods

We developed and validated the MPAS, a novel measure of the male post-coital affect, through a three step procedure: 1) the initial work of an expert committee, phrasing relevant questions, 2) a Danish pilot study to establish feasibility and get feedback from participants and 3) a full-size English online study, aimed to establish content and criterion-related validity and to identify essential facets through exploratory factor analysis. Steps are outlined below.

### Expert committee

The expert committee consisted of experienced general practitioners and a professor of sexology. Their role was to identify the most important aspects of male post-coital affect. Their aim was to create a short questionnaire as to avoid practical problems associated with lengthy questionnaires such as participant frustration, careless responding, drop-out and reluctance to take part in future studies (Donnellan *et al.*, 2006; Schmidt *et al.*, 2003). The committee further reviewed the pilot data, feedback from participants, translation from Danish to English and reached consensus on any discrepancies, consolidating the final questionnaire.

### Pilot study

The scale was initially developed in Danish, for which 12 items were phrased to assess feelings of relaxation, satisfaction, well-being and closeness right after orgasm. A preliminary pilot test was carried out by handing out paper questionnaires to volunteers by general practitioners in Copenhagen, Denmark. Each item had to be answered on a Likert four-point scale, indicating whether participants had experienced certain feelings right after ejaculation during intercourse with a partner, ranging from (1) 'Not at all' to (4) 'Yes, a lot of the time'. One hundred and forty-eight men completed the questionnaire and provided feedback on the relevance of the 12 items.

### Measures

After this pilot study, we started the process of translation by native English and Danish speakers, overlooked and reviewed by our expert committee, while also adjusting some items based on the preliminary results of the pilot study and feedback of the respondents. The answer options were changed into an odd 9-point Likert Scale of frequency, giving the respondents an option to answer neutrally while also obtaining a greater range of variability in the answers. Additionally, items 10 and 11 were negatively phrased with the aim of reducing the Acquiescence Bias (where participants tend to agree with all statements) and Extreme Response Bias (where participants provide all high or all low ratings) (Wetzel *et al.*, 2016). The resulting 12 items of the MPAS are shown in Table 1.

Alongside our scale, participants had to answer socio-demographic questions as well as other instruments that were administered to obtain additional information on the validity of the questionnaire: the Experiences in Close Relationships Scale-R (Fraley *et al.*, 2000) measuring attachment avoidance and anxiety ('When I show my feelings for romantic partners, I'm afraid they will not feel the same about me') and the Perceived Stress Scale (PSS-10) ('In the last month, how often have you been angered because of things that were outside of your control?') (Cohen *et al.*, 1983) which is made up of 10 items assessing experienced

**Table 1.** The heterosexual Male Post-coital Affect Scale. Instructions: Please answer the questions below, in relation to how you generally feel right after an orgasm when you have had intercourse

Item	Question
1	I feel relaxed
2	I feel emptied of thoughts
3	I have a sense of calm inside
4	I experience pleasure
5	I have a sense of closeness
6	I have happy feelings
7	I am more sympathetic towards her
8	I feel like my body has collapsed
9	I have a feeling of satisfaction
10	I feel the weight of daily problems (R)
11	I feel nervous (R)
12	I get sleepy

Each item is rated on an odd 9-point Likert scale ranging from (1) 'Not at all' to (9) 'Yes, a lot of the times'

levels of stress over the last month. Finally, participants had to answer an item about sexual satisfaction ('Are you satisfied with your sexual life?').

### Procedure

Participants completed an online survey using the TurkPrime interface between September and December of 2017. TurkPrime is a research platform linked with Mechanical Turk (MTurk) and supports tasks that are common to the social and behavioural sciences (Litman *et al.*, 2017). MTurk respondents are a subset of individuals who decide to complete a given task; hence, participation is voluntary (Stewart *et al.*, 2017), and participants were compensated for their time. Data were collected as part of a larger study (Miani *et al.*, 2020). However, only data from heterosexual men 18 years or older living in the USA were included in the present study.

### Data analysis

Data analysis was performed in Jamovi (Version 2.3). Firstly, items 10 and 11 were reverse scored since they were negatively phrased. Quantile-Quantile (QQ) plots were used to determine if the single items and the sum could be approximated by a normal distribution. To assure the MPAS' reliability, we tested its internal consistency by calculating Cronbach's alpha (Cronbach, 1951). This estimate reflects the extent to which the questionnaire items are inter-correlated, meaning they are measuring the same construct. To test the validity, we assessed content, construct and face validity. Content validity refers to the degree to which an assessment instrument is relevant to, and representative of, the targeted construct it is designed to measure (Schultz and Whitney, 2005). Construct validity refers to the extent to which a questionnaire accurately assesses a construct that is not directly observable. For this, a correlation matrix between the MPAS and other instruments was constructed. It has been suggested that correlation coefficients of 0.1 can be considered as small, 0.3 as moderate and 0.5 as large (Cohen, 1988). Face validity refers to the ability

**Table 2.** Demographic characteristics of participants

Ethnicity	Total sample (N = 484)	
	N	%
White	369	76.2
Hispanic or Latino	36	7.4
Black or African American	36	7.4
Asian/ Pacific Islander	32	6.6
Native American or American Indian	4	0.8
Others	2	0.4
Missing	5	1.0
Education		
Bachelor	224	46.3
High school	193	39.9
Master	41	8.5
Technical	17	3.5
More than one master	4	0.8
Primary	3	0.6
PhD	2	0.4
Relationship		
Yes	273	56.6
No	209	43.4

of an instrument to be understandable and relevant to the targeted population, which we assessed with the feedback of the respondents.

Exploratory factor analysis using the maximum likelihood method was conducted to examine sampling adequacy and factorability of the MPAS items using the Kaiser–Meyer–Olkin (KMO) test (Kaiser, 1970) and Bartlett's test (Bartlett, 1951) of sphericity, which tests whether a correlation matrix is significantly different from an identity matrix. A KMO value over 0.6 and a significance level for the Bartlett's test below 0.05 suggest that there is substantial correlation in the data and that it is suitable for factor analysis (Dziuban and Shirkey, 1974). The number of factors was extracted based on a visual inspection of a Scree plot. Promax oblique rotation was used, allowing factors to be correlated.

Finally, the adequacy of the two-factor solution was tested via confirmatory factor analysis (CFA). Several indices of fit were used, and evaluation was based on convergence among findings (Bentler, 1990; Byrne, 2013; Tomarken and Waller, 2005). First, the chi-square statistic was evaluated as the initial indicator of model fit, specifically whether the observed chi-square value was less than two times the model degrees of freedom. Second, the root mean square error of approximation (RMSEA) with 90% confidence intervals was evaluated. Established guidelines suggest that RMSEA values of less than 0.05 indicate close fit, less than 0.08 reasonable fit, and less than 0.10 mediocre fit. Finally, the goodness-of-fit index (GFI; close fit > 0.95, good fit > 0.90) and comparative fit index (adequate fit > 0.90) were examined.

## Results

A total of 484 men participated in our study. All participants were 18 years or older and from the USA. The sample had an average age

**Table 3.** Factor loadings

Questions	Factor		Uniqueness
	1	2	
MPAS 9	<b>0.867</b>	−0.03327	0.257
MPAS 6	<b>0.846</b>	0.03570	0.273
MPAS 1	<b>0.846</b>	−0.01965	0.289
MPAS 4	<b>0.798</b>	−0.00751	0.366
MPAS 3	<b>0.771</b>	0.11315	0.363
MPAS 5	<b>0.689</b>	0.20721	0.434
MPAS 8	0.126	<b>0.60497</b>	0.592
MPAS 2	0.147	<b>0.52131</b>	0.681
MPAS 10	−0.343	<b>0.51618</b>	0.676
MPAS 11	−0.424	<b>0.50698</b>	0.636
MPAS 12	0.140	<b>0.43686</b>	0.769
MPAS 7	0.349	<b>0.40605</b>	0.666

'Maximum likelihood' extraction method was used in combination with a 'promax' rotation. Items are sorted by loading size. The bolded values in the item list indicate which factor of the two-factor model the item belongs to.

of 33.7 years (SD = 8.9), calculated as the mean ± the standard deviation. Demographics are summarised in Table 2.

The MPAS showed an excellent internal consistency, with a Cronbach's alpha of 0.83. According to the correlation values of the MPAS with other instruments, it seems that it measures emotional closeness to a greater extent than it measures other constructs, since attachment avoidance showed a moderate negative correlation with the MPAS,  $r(482) = -0.36$ ,  $p < 0.001$ , compared to the smaller correlations of the MPAS with the PSS,  $r(482) = -0.18$ ,  $p < 0.001$ , and sexual satisfaction,  $r(482) = 0.18$ ,  $p < 0.001$ .

Exploratory factor analysis using the maximum likelihood method was conducted to examine the internal structure of the 12-item MPAS. Bartlett's test of sphericity indicated that it was appropriate to use the factor analytic model on the items of the MPAS ( $\chi^2(66) = 2794$ ,  $p < .001$ ). The KMO measure of sampling adequacy indicated that the strength of the relationships among variables was high (KMO = 0.87); thus, it was acceptable to proceed with the analysis. A two-factor solution was extracted based on a visual inspection of the scree plot. Promax oblique rotation was used, allowing factors to be correlated. Following rotation, factor one accounted for 36.6% of variance whereas factor two only accounted for 13.4%. Each factor had a minimum of three items loading substantially (0.50 or greater) and univocally on to that factor. The few items that cross-loaded onto more than one factor were assigned to the factor that reflected their highest loading (see Table 3). The pattern of loadings reflected conceptually meaningful groupings; factor one, termed satisfaction (SA), reflected a feeling of satisfaction and happiness. The second factor, termed relaxation (RE), reflected the sensation of the body collapsing and being emptied of thoughts. Each factor had six elements and a high correlation was obtained between the two ( $r(482) = 0.515$ ,  $p < 0.001$ ). The main score of the Satisfaction Factor was 7.03, while the Relaxation Factor showed a main score of 5.93. On the MPAS as a whole, participants had a main score of 6.48.

CFA using chi-square statistic was evaluated as the initial indicator of model fit ( $\chi^2(53) = 151$ ,  $p < 0.001$ ). Although significant, it

was noted that the observed chi-square value was larger than two times the model degrees of freedom. Second, RMSEA was 0.117 and GFI was 0.865, all indicating a less than adequate fit of the two-factor model.

## Discussion

The aim of this study was to develop and validate the MPAS, which assesses positive post-coital feelings in men, for we have not found an existing scale that specifically measures this significant human experience.

With a Cronbach's alpha of 0.8, we can conclude that the MPAS has a great internal consistency. Ideal values for Cronbach's alpha have been suggested to be between 0.70 and 0.90, with values that are too high indicating that some items may be redundant (Nunnally, 1978; Streiner, 2003). The items in the MPAS are inter-correlated and measure the same construct: positive post-coital affect, in which we have included contentment, relaxation, satisfaction and emotional closeness. Although the pattern of loadings reflected conceptually meaningful groupings, the factor intercorrelations mean that in practical use the MPAS can be considered a unidimensional measure.

Avoidant individuals, as identified by Hazan and Shaver's self-report measure of adult attachment (Hazan and Shaver, 1987) and based on Ainsworth's (Ainsworth *et al.*, 1978) three patterns of childhood attachment, report relatively high levels of distress and fears of becoming close to others. Based on the correlation between MPAS and attachment avoidance, it seems that MPAS is measuring emotional closeness to a greater extent than it is measuring other factors, since attachment avoidance showed a moderate-to-large negative correlation with the MPAS. Hence, we can say that those who score higher on the MPAS are more comfortable with intimacy and will consequently feel closer to their partners after orgasm. In addition, they may be more likely to engage in affectionate behaviours than those with a more avoidant attachment style. This is important because of the impact it has on relationships. Shared intimacy after lovemaking has been associated with higher sexual and relationship satisfaction (Muise *et al.*, 2014). Other studies have also shown how insecure attachment styles (anxious and avoidant) affect adult romantic relationships. It has been found that insecure attachment styles in adults are associated with less frequent positive emotions and more frequent negative emotions in the relationship (Simpson, 1990). The avoidant attachment style has been negatively associated with general satisfaction, connectedness and general support in romantic relationships (Li and Chan, 2012). In contrast, a secure attachment style has been associated with greater relationship interdependence, trust, commitment and satisfaction (Simpson, 1990). This highlights the need for a consistent method to measure the experienced post-coital emotional closeness and intimacy, and it can be concluded that the MPAS is a valid instrument. Furthermore, it might be used as a predictor for the other factors that have been associated with intimacy after orgasm.

As for the correlation of the MPAS with the PSS, we found some association between low perceived stress and high positive post-coital affect. Previous studies have found higher self-reported stress in daily life to be associated with lower levels of sexual and relationship satisfaction (Bodenmann *et al.*, 2010). Although significant, the correlation found in the present study is small in terms of construct validity. This does not necessarily mean that our questionnaire is not a good measure of relaxation since the PSS is measuring perceived stress levels over the last month rather than relaxation at

a certain point in time (in the case of the MPAS, right after orgasm). Nevertheless, a tendency for people with high perceived stress to experience fewer positive feelings after orgasm was observed.

Sexual satisfaction also showed a small-to-moderate significant correlation with the MPAS, indicating some association between positive post-coital affect and sexual satisfaction. These results fall in line with the existing literature discussed previously: partners who engage in affectionate behaviour after intercourse experience higher sexual and relationship satisfaction (Muise *et al.*, 2014), and as we have seen, individuals who score higher on the MPAS tend to feel more comfortable with intimacy and would be more likely to engage in shared intimacy after orgasm. Therefore, people who score higher on the MPAS should also present higher values for sexual satisfaction. Considering that the MPAS measures a construct broader than sexual satisfaction, a small-to-moderate correlation value seems adequate to indicate some part of our questionnaire assesses satisfaction.

On the whole of construct validity, we have concluded that the MPAS is a good instrument to assess experienced emotional closeness after orgasm and, to a lesser extent, sexual satisfaction. We believe that our scale is a good measure of post-coital relaxation, but that cannot be concluded from the correlation with the PSS. Moreover, although there is no correlation value to support this, we also believe that our scale is a good assessment of contentment after orgasm.

From the feedback of our expert committee, who were present throughout the process of development of the MPAS, and the feedback of the respondents, we were able to conclude that the MPAS has an adequate content validity and face validity. The scale's items represent positive post-coital affect and are understandable and relevant to the targeted population.

The strength of the conclusions of this study should be tempered by an understanding of its limitations. First, the questionnaire could have included non-heterosexual men to acquire a better understanding of men's post-coital experience. We could have done this by not gendering the questions from a heterosexual perspective and asking about a 'her', but rather referring to a 'partner'. Although a portion of the respondents was queer, they ultimately had to be excluded from the study after reviewing their feedback, which suggested this factor might have skewed their answers.

When conducting surveys on the topic of sexuality, it is essential to be aware of how different cultural groups, with different beliefs and attitudes towards sexuality, may affect how participants interpret and respond to the questions. For example, some cultures may place more or less emphasis on emotional closeness after orgasm. This could lead to overreporting of socially desirable answers that do not accurately reflect participants' true feelings or experiences. Additionally, the language used in the survey may also be a barrier for some participants. For example, some cultures may not have specific words or idioms to describe different sexual orientations, or the words used may have different connotations than in English. Some ideas may indeed be very endemic to a culture and no matter how accurately they are framed in English might not capture the central phenomenon and thus could lead to confusion or inaccuracies in participants' responses. Finally, some cultural groups may also have a greater reluctance to discuss issues related to sexuality, which could lead to a low response rate. In that sense, our sample lacked ethnic diversity, which is expected since MTurk does not reflect the diversity of the US population in its entirety. Nevertheless, MTurk has been found to be a valid and reliable tool

for acquiring data (Litman *et al.*, 2015; Shapiro *et al.*, 2013; Sprouse, 2011) and survey designers should be sensitive to these cultural differences and take steps to minimise bias and confusion when designing and administering surveys on sexuality.

The instruments used to assess construct validity were not measuring the same constructs as the MPAS. However, this is difficult to achieve when developing an instrument for a construct that has not previously been measured. For example, although somewhat helpful, the PSS is not a perfectly adequate assessment to conclude that the MPAS measures relaxation. Although there is not a validated scale that could have been administered to specifically assess relaxation after orgasm, we think the Positive and Negative Affect Schedule (Watson *et al.*, 1988), a scale that measure both positive and negative affect, could have been a better instrument to assess convergent validity.

A final limitation of our study was that participants only completed the online survey once. Had the participants been able to fill in the survey twice, we could have determined the degree to which MPAS produces stable and consistent results. However, this was initially deemed technically impractical and the lack of test–retest reliability data constitutes a significant limitation of our study.

In conclusion, the MPAS, the first questionnaire to measure the post-coital positive affect in a validated and reliable way, will be an essential instrument for future research in heterosexual men. Modified versions for the assessment of this experience in non-heterosexual men and women are warranted.

**Data availability statement.** The data that support the findings of this study are available on request from the corresponding author.

**Acknowledgements.** We thank Alessandro Miani for assistance with data collection and feedback, Professor John Brodersen for encouraging discussions and members of the expert committee.

**Author contributions.** MW initiated the study. MP performed statistical analyses and data interpretation, under the supervision of MW. JH collected pilot data. All authors contributed to the data interpretation. MP wrote the first draft of the manuscript and all authors edited and approved it for publication.

**Funding statement.** MP's salary was supported by the ERASMUS programme at University of La Laguna and data were collected as part of a previous study funded by the Department of Clinical Medicine, Aarhus University.

**Conflict of interest disclosure.** The authors have no conflict of interest to disclose.

**Ethics approval statement for work involving animals or human subjects.** Not required.

**Patient consent statement for work with human subjects.** All participants gave written informed consent.

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