



## Development of a multidomain gender norm attitude scale for youth in Bangladesh

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### ABSTRACT

**Objective:** Gender norms shape individuals' perceptions and behaviours, particularly concerning health outcomes. However, the lack of comprehensive gender norm attitude measures in low- and middle-income countries, including Bangladesh, impedes gender-transformative efforts. This study introduces the Multidomain Gender Norm Attitude Scale (M-GNAS) to evaluate gender norm attitudes among Bangladeshi youths.

**Method:** Three sequential studies were conducted in Bangladesh in 2022 to develop the M-GNAS. Study 1 engaged 124 participants in focus group discussions, generating a 40-item pool reflecting prevalent gender norms. Study 2 involved 1374 youths (mean age 26.82, SD 5.50) to finalise the M-GNAS items and explore its latent structure through exploratory factor analysis (EFA). Study 3, with 1416 participants of similar age, used confirmatory factor analysis (CFA) to assess structural validity and structural equation modelling to evaluate measurement invariance (MI) across genders.

**Results:** EFA identified a four-domain solution with 13 items: gender-appropriate behaviour, family financial decisions, family responsibility, and career choice. CFA supported this four-domain solution ( $CFI=0.96$ ,  $TLI=0.95$ ;  $RMSEA=0.07$ ;  $SRMR=0.04$ ). MI across gender was well established ( $CFI$  &  $TLI>0.95$ ,  $RMSEA\leq 0.06$ ,  $SRMR<0.6$ ). Higher education was associated with more egalitarian attitudes ( $F(5, 1408) = 7.25$ ,  $p < 0.001$ ), supporting the scale's construct validity.

**Conclusion:** The M-GNAS is a psychometrically robust tool for assessing youths' attitudes toward prevalent gender norm domains in Bangladesh. It holds the potential for contributing to gender-transformative programmes and could be applied in similar initiatives across developing nations, contingent upon appropriate validation.

### 1. Introduction

Gender inequality is a widespread issue that varies in intensity across nations, presenting a significant obstacle to the realisation of human rights and overall well-being (Du et al., 2021; Heise et al., 2019). Recognising its importance, the United Nations Sustainable Development Goal 5 has set the ambitious target of achieving gender equality by 2030 (United Nations, 2015). Consequently, numerous gender-transformative programmes have been implemented (Ministry of Education, 2016; UNFPA Bangladesh, 2017), with a particular focus on low- and middle-income countries (LMICs). One of the key goals of these programmes is to modify gender norms, primarily for adolescents and youth populations (Blum, 2020; Lundgren et al., 2013; Moreau et al., 2019).

Change in gender norms requires a change in attitudes towards those norms. However, there is a lack of quantitative and scalable measures for assessing the attitudes towards gender norms, especially in LMICs such as Bangladesh, forcing researchers to rely on qualitative data or ad hoc measures (Baird et al., 2019; Gupta et al., 2020). This study aims to fill this gap by introducing a comprehensive scale to measure gender norm attitudes among youth in Bangladesh.

Gender norms are rules that pertain to the socially constructed roles assigned to individuals based on gender. These norms are created and perpetuated through an individual's actions and are reinforced by those in positions of power who benefit from people conforming to these norms (Cislaghi and Heise, 2020). Gender norms dictate the expectations and behaviours associated with social constructs such as being

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male, female, or gender minorities rather than functioning as a biological formation. In a society, gender is the key concept that forms waves of social networks and interpersonal relationships (Ridgeway, 2009). It guides how people perceive themselves and others (Deaux and LaFrance, 1998). We can consider gender norms to be rules that keep the social construct—gender intact—learned in childhood through social interactions, family, peers, the workplace, religion, media, institutions, policy regulations, and decision-making processes (Deaux and LaFrance, 1998).

Studies on gender norms have consistently revealed the presence of inequitable gender norms that reinforce unequal power dynamics, often resulting in disadvantages for women (Cislaghi and Heise, 2020; Connell and Pearse, 2014; Lazar, 2005). The movement to achieve gender norm equity was instigated by the report of Sen et al. (2007) for the World Health Organization Commission on Social Determinants of Health 2007, which contains substantial evidence of the adverse influence of gender norm inequity on health for all people, especially women, and girls. Since gender norms are active agents of how we perceive ourselves, others, and the world (Deaux and LaFrance, 1998) and have the potential to exert adverse effects on mental health (Juster et al., 2016), it is essential that we have a scalable estimate of the attitudes towards gender norms in a given society to design adequate programmes to address those issues.

Several quantitative measures have been developed to capture gender norms and related constructs. One of the earliest efforts was the Conformity to Masculine Norms Inventory (CMNI, Mahalik et al., 2003) and the Conformity to Feminine Norms Inventory (CFNI, Mahalik et al., 2005). Shortened versions of these scales are also available (Parent and Moradi, 2009, 2010). Gender Equitable Men (GEM) is another widely used scale measuring attitudes toward gender norms among young men (Pulerwitz and Barker, 2008). In 2013, the Male Role Norms Inventory—Short Form (MRNI-SF, Levant et al., 2013) was developed to quantify men's conformity to typical male social norms. García-Cueto et al. (2015) developed a 20-item gender role attitudes scale (GRAS) among young Spanish people. The GRAS assesses whether youth exhibit transcendent or sexist attitudes towards gender roles. Moreau et al. (2021) measured the perception of gender norms among adolescents in three areas: (i) the sexual double standard (SDS), (ii) gender stereotype traits (GSTs), and (iii) gender stereotype roles (GSRs). Recently, Sedlander et al. (2022) developed a gender norms scale (G-NORM) in India.

Existing scales exhibit several limitations. Firstly, they often focus exclusively on either man (e.g., GEM, CMNI, MRNI-SF) or woman (e.g., CFNI, G-NORM) perspectives, with no comprehensive tool available to assess gender norm attitudes applicable to both genders, which is crucial for cost-effective, gender-transformative initiatives. Secondly, many scales are incompatible with Bangladeshi youth due to their unique focus. For example, half of the GEM scale items were related to sexual behaviour, which is a remote aspect of the gender discourse in Bangladesh. Thirdly, some scales do not directly measure gender norms attitudes, instead addressing related aspects such as gender roles (e.g., MRNI-SF, GRAS), stereotypes (e.g., GSRs), sexual standards (e.g., SDS), and traits (e.g., GSTs). Finally, existing scales focused little on the youth's family system and socioeconomic conditions. Gender-related issues in collective societies like Bangladesh are deeply rooted in the family system, where sharing family responsibilities often becomes a central point of conflict. Violence against women, dowry expectations, and early marriage, all linked to the lack of women's empowerment in decision-making, highlight the unique cultural factors influencing gender norms in Bangladesh (Islam et al., 2021a; Islam et al., 2021b; Yount et al., 2016). These gaps underscore the necessity for a new, culturally sensitive scale to measure gender norm attitudes among Bangladeshi youth.

Our key aim was to construct a scale that measures attitudes towards the most pressing gender norm domains among Bangladeshi youths. We set three specific objectives and conducted three studies to achieve them. The *first objective* was to develop a comprehensive item pool from

various gender norm domains generated through the lived experience of the target population, expert consultation, and a literature review (Study 1—a qualitative study). The *second objective* was to explore the latent domains of the proposed scale (Study 2—a quantitative study). The *third objective* was to assess the scale's psychometric performance—dimensionality, internal consistency, nomological validity, and measurement invariance of the scale by gender (Study 3—quantitative study).

## 2. Study 1: Item pool generation

To develop a comprehensive item pool for M-GNAS, we conducted eight focus group discussions (FGDs) with 124 Bangladeshi youths (50.81 % female) aged between 18 and 35 (ISDV, 2019) who could read and write Bangla. Participants were from Dhaka ( $n = 23$ ), Narshingdi ( $n = 27$ ), Bogra ( $n = 36$ ), and Cumilla ( $n = 38$ ), with diverse educational backgrounds, ranging from university students to illiterate individuals from slum areas. The FGDs covered various domains, such as gender-wise wages, gender-based violence, economic decision-making, family and child-rearing, higher education, politics, governance, and sexual and reproductive health.

### 2.1. Procedure

This paper is part of a project conducted by BRAC that examines gender norms of Bangladeshi youths. BRAC's local and regional offices facilitated participant recruitment. The project obtained ethical clearance from the Institutional Review Board of the Institute of Health Economics of the University of Dhaka (IHE/IRB/DU/01/2022/Final). It was clearly communicated that participation was voluntary and that participants could withdraw from the study without being penalised. Upon ensuring written consent, we conducted each FGD session following a guideline (Supplementary material 1). All FGDs were tape-recorded and transcribed verbatim.

### 2.2. Analysis and findings

Qualitative thematic analysis was performed to analyse the FGD verbatim (Braun and Clarke, 2006). Three researchers independently coded the verbatims, without using a priori codes, into concepts or ideas with similar meanings (e.g., relationship, finance, health, security). Next, we collated the codes from three coders. Disagreements were fixed through the discussion. All the codes were transformed into declarative statements, each painting a gender norm scenario that the target population could easily comprehend. For example, for the code "women's need for job," we developed the statement: "If the husband earns sufficient, the wife needs not to earn."

A total of 80 statements reflecting gender roles, responsibilities, and behaviours rooted in Bangladeshi culture emerged (Supplementary material 2). The research team reviewed each item and discarded duplicate, incomplete, or irrelevant statements. Forty-four of the original statements were eliminated through this process. Next, a workshop with 12 individuals working in gender-transformative programmes was conducted to thoroughly examine the items' contents and the appropriateness of the remaining 36 statements for capturing Bangladeshi gender norms. The workshop resulted in minor language corrections, retaining all 36 items. We then sent those items to three professors at Dhaka University and one journalist of a national daily for evaluation. We asked them to check each item's relevancy, clarity, and representativeness of the gender norms. The experts approved all 36 items. The experts also suggested including four additional items that reflected primarily the behavioural and emotional aspects of gender norms. The final 40 statements formed the provisional Multidomain Gender Norms Attitude Scale (M-GNAS, Supplementary Table 1).

### 3. Study 2: Exploring the latent domain

The 40-item M–GNAS consists of various gender norm domains. In this study, we explored those latent domains using exploratory factor analysis.

#### 3.1. Method

##### 3.1.1. Sample and sampling

Following a multistage random sampling method, we recruited a nationally representative sample of 1374 youths (50.70 % female, mean age 26.82, SD 5.50). The sampling involves area, household, and individual selection. The administrative divisions in Bangladesh were treated as individual strata, with districts selected through systematic random sampling. Two to five districts were chosen as the primary sampling units from each division. Two upazilas were then selected from each district as the secondary sampling units. A smaller subdivision was randomly selected as the tertiary sampling unit from each upazila. The tertiary sampling unit was divided into 3–4 starting points. The first house was selected using the current date method. In the date method, the current date is utilised to select the first household from the starting point. For single-digit dates, the house corresponding to that digit is chosen. For two-digit dates, the sum of the two digits determines the first house number. The succeeding houses were selected using the right-hand method with a fixed gap (5 fixed gaps for urban areas and two fixed gaps for rural areas). The participant eligibility criteria were similar to those of Study 1. Eligible respondents were identified within selected households and listed in descending order by age, and one respondent from each household was randomly chosen using a random number generation technique. Nonresponse participants were managed through systematic selection attempts and follow-up calls. Most of our participants were Muslim (91.33 %), had grown up in rural areas (70.31 %), and were married (73.27 %, see Table 1).

##### 3.1.2. Procedure

Ethical clearance for this study was obtained together with that of the first study. It was explicitly stated that participation in the study was voluntary, and participants had the freedom to withdraw at any point. To avoid biased responses or nonresponses to gender-sensitive questions, we matched participants' genders with those of the interviewers. The survey was conducted in person and took approximately 20 to 30 min. Participants received no honorarium or any other benefits.

##### 3.1.3. Measures

**3.1.3.1. Multidomain gender norm attitude scale (M–GNAS).** The M–GNAS items were designed in a five-point Likert-type response format. With respect to gender egalitarianism, we assigned the highest value when a person showed total disagreement with a gender unequal item (i.e., totally disagree = 5; totally agree = 1 for item “Wife’s income should be under the husband’s control”). Items 10, 24, 28, and 39 reflected gender equality and thus were reverse coded (i.e., totally disagree = 1; totally agree = 5). The total score is the sum of all the item scores. A higher score indicates a more equitable attitude towards gender norms.

##### 3.1.4. Analytic strategies

We used the R (version 4.1.2, R Core Team, 2023) and psych (Revelle, 2022) package for descriptive statistics and exploratory factor analysis (EFA). A sample of 250–300 for EFA is recommended (Comrey and Lee, 1992; Schönbrodt and Perugini, 2013). Our sample size exceeded this recommendation. First, we estimated the descriptive statistics and conducted an initial item analysis of M–GNAS in our sample. We identified the items with poor corrected item-total correlations (<0.40) and excluded them from the analysis. To explore the latent factor

**Table 1**

Descriptive statistics of the youth from various locations in Bangladesh, 2022.

Variable	Attributes	EFA Sample (n = 1374)		CFA Sample (n = 1416)		
		n	%	n	%	
Sex	Female	677	49.27	700	49.44	
	Male	697	50.73	716	50.56	
Religion	Hindu	117	8.52	114	8.05	
	Islam	1254	91.33	1299	91.74	
	Christianity	0	0.00	1	0.07	
	Buddhist	2	0.15	2	0.14	
Raised before 16 years	Urban areas	408	29.69	390	27.54	
	Rural areas	966	70.31	1026	72.46	
Division	Dhaka	310	22.56	324	22.88	
	Chittagong	283	20.60	276	19.49	
	Barisal	102	7.42	86	6.07	
	Khulna	167	12.15	179	12.64	
	Rajshahi	164	11.94	192	13.56	
	Sylhet	86	6.26	91	6.43	
	Rangpur	164	11.94	156	11.02	
	Mymensingh	98	7.13	112	7.91	
	Marital status	Unmarried	353	25.71	388	27.42
		Married	1006	73.27	1015	71.73
		Divorced/Separated/ Widowed	14	1.02	12	0.85
Education status	No schooling	68	4.95	66	4.67	
	Primary or equivalent (1–5 years)	249	18.10	240	16.97	
	SSC or equivalent (6–10 years)	542	39.45	531	37.55	
	HSC or equivalent (11–12 years)	348	25.30	398	28.15	
	Bachelor or equivalent Master’s or equivalent	125	9.10	130	9.19	
Medium of study	Bangla	42	3.06	49	3.47	
	Arabic/Madrasha	1260	96.77	0	0.00	
	English	39	3.00	1298	96.65	
Current profession	Engage in income- generating work	3	0.23	42	3.13	
	Engage in voluntary work	537	39.08	3	0.22	
	Doing nothing	416	30.28	551	38.91	
		421	30.64	443	31.29	

structure, we conducted an EFA using the ‘principal axis’ factor extraction method (Watkins, 2020). Before EFA, we checked for necessary assumptions (Bartlett’s test of sphericity, and post-hoc sampling adequacy). The number of required domains was identified using parallel analysis (Watkins, 2020). In the EFA, we followed these guidelines for item retention: (i) no domains with fewer than three items, (ii) no items that cross-loaded greater than 0.3 across domains, (iii) no items with communality less than 0.3, and (iv) no items with a factor loading < 0.4 (Child, 2006; Mulaik, 2009; Watkins, 2020). We will estimate the McDonald’s  $\omega_t$  coefficient to assess internal consistency reliability;  $\omega_t > 0.70$  is considered satisfactory (Dunn et al., 2014).

### 3.2. Results

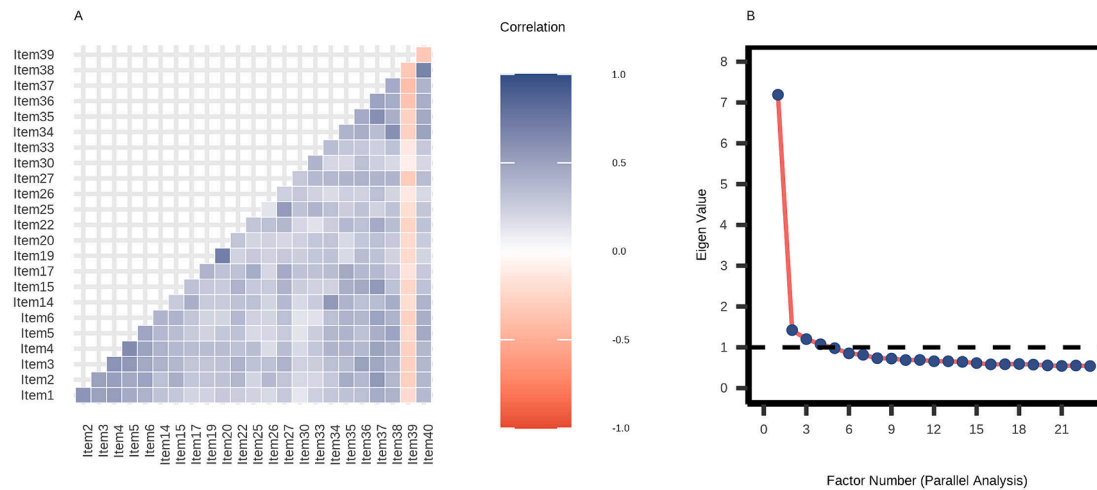
#### 3.2.1. Descriptive statistics and item analysis

Sixteen items had corrected item-total correlations < 0.40 and were thus discarded (Supplementary Table 2).

#### 3.2.2. Exploratory factor analysis

Bartlett’s test of sphericity (Bartlett, 1954),  $\chi^2(276) = 10682.34$ ,  $p < 0.001$  indicated that the inter-item correlations were suitable for EFA. Kaiser–Meyer–Olkin (KMO, Kaiser, 1974) value was 0.92, indicating an adequate sample (Kaiser, 1974). Since our data was ordinal, we used a polychoric correlation matrix while conducting the EFA (Watkins, 2020). Twenty percent of the inter-item correlation coefficients were > |0.30|.

Fig. 1 and Supplementary Table 1 present the interitem correlation coefficients of M–GNAS. Parallel analysis with 500 iterations indicated a 4-factor solution (Fig. 1B).



**Fig. 1.** (A) Inter-item polychoric correlation matrix of the 24 items. Inter-item correlations range between  $-0.40$  and  $0.70$ . (B) Horn's parallel analysis indicated a four-factor solution. Data were collected from 1374 youth of Bangladesh in 2022.

We conducted an iterative EFA in which, on each round, we identified items with poor psychometric properties (factor loading  $< 0.4$ , cross-loading  $> 0.3$ , communality  $< 0.3$ ) and discarded them. Four iterations of EFA were required to obtain a clean and parsimonious four-factor structure that retained 13 items. Each factor explained 16 %, 15 %, 13 %, and 12 % of the total variance (Table 2). The root mean square of the residual (RMSR) of the fitted model was 0.02, which was satisfactory (Watkins, 2020, p. 90). The internal consistency reliability for

each factor was satisfactory ( $>0.70$ ; McDonald's  $\omega_i$  for each factor: 0.78, 0.82, 0.78, and 0.74). An inspection of the items corresponding to each factor suggested that each represents a major gender norm domain. Specifically, factor 1 was concentrated on gender-appropriate behaviour (Domain 1), factor 2 was concentrated on family financial decisions (Domain 2), factor 3 was concentrated on family responsibility (Domain 3), and factor 4 was concentrated on career choice (Domain 4). All four domains were moderately correlated with each other (all inter-domain

**Table 2**  
Gender norms domains from exploratory factor analysis with retained thirteen items (Bangladesh, 2022).

No.	Item	Gender norm domains				Communality
		Gender appropriate behaviour	Family financial decisions	Family responsibility	Career choice	
M-GNAS 37	Girls should not speak loudly	0.90				0.75
M-GNAS 35	Men fit better in politics than women	0.68				0.54
M-GNAS 15	Women get raped and assaulted due to their clothing	0.63				0.43
M-GNAS 22	Crying does not suit boys; it reflects their weakness	0.41				0.32
M-GNAS 38	A man should have the final words for large family expenses		0.89			0.77
M-GNAS 40	A man should have the final words for everyday family expenses		0.72			0.59
M-GNAS 34	Whoever gets a loan, a man should have the final words for its usage		0.62			0.48
M-GNAS 4	Women's primary responsibility is to cook and take care of the family			0.68		0.59
M-GNAS 3	If the husband earns sufficient, the wife needs not to earn			0.68		0.57
M-GNAS 1	Wife's income should be under the husband's control			0.67		0.48
M-GNAS 25	A girl's higher education can be considered only she is meritorious				0.86	0.58
M-GNAS 27	A family should have the final words for girls' higher education				0.63	0.54
M-GNAS 17	As a business employee, a man outperforms a woman				0.49	0.41
Reliability (McDonald's $\omega_i$ )		0.78	0.82	0.78	0.74	
% of variance explained		16 %	15 %	13 %	12 %	
Inter-domain Correlation						
		Gender appropriate behaviour	Family financial decision	Family responsibility	Career	
	Family financial decisions	0.60	1.00	0.58	0.55	
	Family responsibility	0.65	0.58	1.00	0.52	
	Career choice	0.65	0.55	0.52	1.00	

correlations > 0.50; Table 4).

### 4. Study 3: Gathering validity and reliability

In this study, we first validated the four domains of the M–GNAS obtained in Study 2 on another sample, thus providing structural validity evidence. Second, we tested the measurement invariance (MI) of the M–GNAS across genders to determine the suitability of the scale while comparing the results. Third, we estimated the reliability of the newly developed M–GNAS scale. Fourth, we sought to accumulate construct validity evidence for the M–GNAS by investigating its association with educational qualifications. Studies have shown that education brings egalitarian attitudes (Du et al., 2021). Thus, we anticipate that higher-education participants will exhibit more egalitarian attitudes.

#### 4.1. Method

##### 4.1.1. Participants and data collection

Following similar inclusion criteria and sampling methods used in Study 2, we recruited 1416 Bangladeshi youths (50.60 % female, mean age 26.39, SD 5.42). Participants’ educational level was assessed using Bangladesh’s mainstream educational system (e.g., non-formal, primary [up to 5 years of schooling], secondary [up to 10 years], higher secondary [up to 12 years], bachelor’s [up to 15 years], and master’s [above 15 years]).

##### 4.1.2. Analytic strategy

We used R (version 4.1.2, R Core Team, 2023) and the *lavaan* package (Rosseel, 2012) for confirmatory factor analysis (CFA) and MI, respectively.

**Sampling adequacy.** For the CFA, we followed the N:q criteria, where at least 10–20 participants per parameter are required (Worthington and Whittaker, 2006). The four-factor latent structure of M–GNAS had 71 parameters (calculated using the *lavaan* package), indicating that we would need at least 710–1420 participants. Our sample size closely approaches the upper ceiling of the recommendation ( $n = 1416$ ).

**Structural validity and measurement invariance.** The weighted least square with mean and variance adjusted (WLSMV) estimator was used to conduct the CFA. Model fit was assessed according to the suggestions of Hu and Bentler (1999): Comparative fit index (CFI) and the Tucker Lewis index (TLI) (good fit  $\geq 0.95$ , acceptable fit  $\geq 0.90$ ); the root mean square error of approximation (RMSEA): good fit  $< 0.06$ , acceptable fit  $< 0.08$ ; and the standardized root mean square (SRMR): good fit  $< 0.08$ , acceptable fit  $< 0.10$ . MI across genders was analysed by using the multigroup CFA technique. In the MI analysis, we consecutively fitted four nested invariance models: configural (least restrictive), metric, scalar, and residual (most restrictive). We followed the aforementioned guidelines of Hu and Bentler (1999) to assess the model fit of the nested models.

**Reliability and Construct Validity** We tested the tau equivalence assumption—the factor loading of each item was assumed to be equal (Novick and Lewis, 1967)—and reported Cronbach’s alpha if the assumption was fulfilled; otherwise, we reported McDonald’s omega. To gather construct validity evidence, we inspected if the mean M–GNAS scores varied with education level through a one-way variance analysis.

#### 4.2. Results

##### 4.2.1. Structural validity and measurement invariance

The CFA indicated that the fitted four-domain structure exhibited a satisfactory fit ( $CFI=0.96$ ,  $TLI=0.95$ ;  $RMSEA=0.07$ ;  $SRMR=0.04$ ;  $\chi^2 = 529.64$ ,  $p < 0.001$ ). All loadings were significant ( $p < 0.001$ ) and ranged between 0.60 and 0.86 (Table 3). MI analysis of M–GNAS across genders indicated that all the models had satisfactory model fit ( $CFI$  &

**Table 3**

Factor loadings obtained in the CFA analysis: Four-factor latent structure with 13 items (Bangladesh, 2022).

Item No.	Gender norm domains			
	Gender appropriate behaviour	Family financial decision	Family responsibility	Career choice
M–GNAS37	0.76*			
M–GNAS 35	0.72*			
M–GNAS 15	0.63*			
M–GNAS 22	0.60*			
M–GNAS 38		0.86*		
M–GNAS 40		0.77*		
M–GNAS 34		0.68*		
M–GNAS 4			0.78*	
M–GNAS 3			0.73*	
M–GNAS 1			0.69*	
M–GNAS 25				0.67*
M–GNAS 27				0.74*
M–GNAS 17				0.65*

\* $p < 0.001$ .

**Table 4**

Measurement invariance analysis across genders (CFA sample;  $n = 1416$ ; 700 males and 716 females, Bangladesh 2022).

Models	$\chi^2$	df	CFI	TLI	RMSEA (90 % CI)	SRMR
Configural	415.16	118*	0.99	0.98	0.05(0.04–0.05)	0.04
Metric	470.58	127*	0.98	0.97	0.06(0.05–0.06)	0.05
Scalar	516.34	136*	0.97	0.97	0.06(0.05–0.06)	0.06
Residual	577.32	149*	0.97	0.97	0.06(0.05–0.06)	0.06

\* $p < 0.001$ ; df=degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker–Lewis Index; RMSEA=root mean square error of approximation; SRMR=standardized root mean square residual; a = Metric vs Configural; b = Scalar vs Metric; c = Residual vs Scalar; df1 = df of model comparison.

$TLI > 0.95$ ,  $RMSEA \leq 0.06$ ,  $SRMR < 0.6$ ; Table 4); hence, we accepted the highest MI model: the residual model.

##### 4.2.2. Reliability and validity

All four domains violated the tau-equivalence assumption (Gender Appropriate Behaviour:  $F_{robust} = 7.26$ ,  $p < 0.001$ ; Family Financial Decisions:  $F_{robust} = 7.50$ ,  $p < 0.001$ ; Family Responsibility:  $F_{robust} = 6.69$ ,  $p < 0.001$ ; Career choice:  $F_{robust} = 17.80$ ,  $p < 0.001$ ). The reliability of the four domains was McDonald’s  $\omega_t = 0.72$ , 0.76, 0.71, and 0.68, respectively. As for the validity evidence, we inspected if the mean M–GNAS scores varied with educational level. Results showed that higher educational attainment was associated with higher M–GNAS scores ( $F(5, 1408) = 7.25$ ,  $p < 0.001$ ,  $\eta^2 = 0.03$ ). However, post-hoc analysis revealed that the increment of M–GNAS scores was only statistically significant when participants completed higher secondary (i.e., 12 years of schooling) education. Replicating this analysis for each domain showed that the effect size was slightly better for the *Family Responsibility* domain than for other domains.

### 5. Discussion

Capturing attitudes towards gender norms, particularly within LMICs, holds the utmost significance in promoting physical and mental well-being (Santos Silva and Klasen, 2021). This paper presents a

scalable and innovative solution for understanding attitudes towards the prevalent gender norms among the Bangladeshi youth. Three sequential studies were conducted to realise this aim, resulting in a 13-item scale with four highly interpretable latent domains (Gender Appropriate Behaviour, Family Financial Decision, Family Responsibility, and Career Choice). These four domains emerged as dominant areas concerning Bangladeshi youths' gender norms.

The gender-appropriate behaviour domain of M–GNAS investigates youths' presumed generic propensity to use biological sex in person perception (e.g., girls should not speak loudly). During any social interaction, biological sex is one of the first things to be noticed and used to categorise people's expected behaviours when males and females are expected to differ (Skitka and Maslach, 1990). The emergence of such a domain in measuring gender norms is supported by the gender schema theory (Bem, 1984). According to this theory, certain individuals are more inclined to use biological sex as their primary basis for categorising people, which subsequently shapes their expectations and attitudes towards others.

The family financial decisions domain of M–GNAS investigates the phenomenon of family members specialising in distinct household financial roles. Traditionally, in patriarchy, financial matters have been predominantly associated with men, leading to the assignment of “money chores,” such as financial planning and investing, to the male spouse (Guiso and Zaccaria, 2023). This discrepancy in financial roles based on gender can be well explained by gender schema theory (Bem, 1984). Accepting females in nonmajor roles in family financial decisions is rooted in the cognitive structure of individuals, which is guided by sex typing-assuming roles and behaviours that are aligned with gender. The emergence of this factor is consistent with Bangladeshi literature that often identifies protective roles of decision-making in family finances (Miedema et al., 2021; Schuler et al., 2017; VanderEnde et al., 2015).

The third domain of M–GNAS – family responsibility, delves into allocating responsibilities among female spouses within the household. It is well-established that gender norms often influence the division of tasks within a family. Becker's groundbreaking research emphasised that family members tend to specialise in specific activities (Becker, 1974; Friedman and Becker, 1993). Furthermore, early childhood socialisation and the development of gender-based schemas often influence this division of responsibilities. As a result, women in each society are expected to conform to certain social norms regarding their roles and contributions to the family. This interplay of social expectations and gender roles can significantly impact how female spouses distribute and perform household responsibilities.

The fourth domain of M–GNAS- career choice, investigates the attitudes of family members towards females' education and work skills. Attitudes towards women's roles have a profound influence on women's careers and education (Betz and Fitzgerald, 1987). Often, a society with nonequity hinders the growth of education and the careers of its female counterparts (Morinaga et al., 1993). It is essential to understand the extent of inequity to introduce an intervention. The fourth factor, career, is adequate for providing us with scalable insight into career role inequality.

Our analysis revealed that the obtained latent structure demonstrated the highest level of measurement invariance. These findings indicate that the scores obtained on a test are comparable among subgroups with similar scores on the underlying construct, i.e., gender. In other words, measurement invariance ensures that the test accurately assesses the construct regardless of the gender of the individuals being assessed. This finding adds robustness and validity to our results, bolstering the reliability of the measurement instrument used in our study. The M–GNAS was also linked to education. With increased education, participants tend to hold egalitarian attitudes, particularly for sharing family responsibility, supporting the role of education in attitude changes (Du et al., 2021). We, however, noticed that for this change to be noticed meaningfully, one should have at least 12 years of education. In other words, primary or secondary education, which is

compulsory in Bangladesh, does not make any difference in gender norm attitudes.

We also noted that M–GNAS shares some commonalities with existing scales. For instance, items such as “A woman's most important role is to take care of her home and cook for her family,” “A man should have the final word about decisions in his home” (GEM Scale), and “Taking care of children is only the woman's job” (G-NORM Scale) resemble with some of the M–GNAS items, reflecting similar themes of traditional gender roles across cultures. However, the M–GNAS is unique in its culturally driven four domains, which are tailored to the specific socio-cultural context of Bangladesh. Overall, the M–GNAS exhibits robustness through its substantial, structural, and external validity (Simms, 2008), ensuring acceptable reliability in assessing attitudes toward gender norms. Moreover, its development benefited from a large, systematically selected sample of youths, enhancing its representativeness and credibility. The concise item set makes it suitable for large-scale surveys and programme evaluations, effectively tapping into culturally relevant domains of gender norms. The emerging domains appear to be closely intertwined with the local cultural context. For instance, gender-based violence can frequently stem from conflicts arising due to the handling of family finances (e.g., dowry issues) or the allocation of family responsibilities (e.g., determining who should care for children and elderly family members; Rahman et al., 2011) in Bangladesh.

One limitation is the relatively little validity evidence was provided in the current study. Future researchers could investigate whether M–GNAS scores are associated with socioeconomic hierarchy and intimate partner violence perpetration. Additionally, while the identified domains are crucial, they may not cover the entire spectrum of gender norms, such as attitudes toward LGBTQ individuals. Gender norms related to sexual behaviour may be underrepresented due to cultural factors limiting public discourse in Bangladesh. Furthermore, the fourth domain was found to have low reliability. Since it is above 0.50, considering this scale's developmental phase, we can accept this domain, but future work is needed to improve the domain by adding more relevant items (Dall'Oglio et al., 2010; Nunnally, 1975).

Despite limitations, the M–GNAS provides valuable insights into Bangladeshi youths' attitudes towards gender norms, guiding the development of appropriate action plans. For instance, addressing inequitable attitudes toward family financial decisions could mitigate intimate partner violence. The scale holds potential for research and gender-transformative programmes like Generation Breakthrough and GEMS (Ministry of Education, 2016; UNFPA Bangladesh, 2017), aiding in programme design and evaluation. Mental health counsellors may also benefit from the M–GNAS in understanding clients' gender-related attitudes. Future research should explore the scale's predictive validity and its applicability to other age groups after validation studies.

## 6. IRB clearance

The protocol of this study was reviewed and approved by the Research Ethics Committee of the Institute of Health Economics of Dhaka University (IHE/IRB/DU/01/2022/Final).

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## CRedit authorship contribution statement

**Azharul Islam:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation,

Conceptualization. **Musfiqul Anwar Siraji:** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Formal analysis. **Mahjabeen Haque:** Supervision, Funding acquisition, Data curation, Conceptualization. **Mohammad Salim Chowdhury:** Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Data availability

The data presented in this paper are part of an ongoing project and, therefore, are not publicly available. However, the data can be shared with interested individuals upon reasonable request.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2024.102848>.

### References

- Baird, S., Bhutta, Z.A., Hamad, B.A., Hicks, J.H., Jones, N., Muz, J., 2019. Do restrictive gender attitudes and norms influence physical and mental health during very young Adolescence? Evidence from Bangladesh and Ethiopia. *SSM - Population Health* 9, 100480. <https://doi.org/10.1016/j.ssmph.2019.100480>.
- UNFPA Bangladesh. (2017). *Gender Equity Movement in Schools (GEMS) Module*. <https://bangladesh.unfpa.org/en/news/generation-breakthrough?fbclid=IwAR2RteF5vAKYJOeFsJEKfjvTdZLFobSOLkiBI4ncrom1WUUpcmBiYJ6xWgM>.
- Bartlett, M., 1954. A note on the multiplying factors for various Chi-square approximations. *J. R. Stat. Soc. B. Methodol.* 16 (2), 296–298.
- Becker, G.S., 1974. A theory of social interactions. *J. Polit. Econ.* 82 (6), 1063–1093. <https://doi.org/10.1086/260265>.
- Bem, S.L., 1984. Androgyny and gender schema theory: A conceptual and empirical integration. In: Rees, H.W. (Ed.), *Advances in Child Development and Behavior*, Vol. 32. Academic Press, pp. 179–226.
- Betz, N.E., Fitzgerald, L.F., 1987. *The career psychology of women*. Academic Press. <https://psycnet.apa.org/record/1987-97913-000>.
- Blum, R.W., 2020. Gender norm transformative programing: Where are we now? Where do we need to be? *J. Adolesc. Health* 66 (2), 135–136. <https://doi.org/10.1016/j.jadohealth.2019.11.299>.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Child, D., 2006. *Essentials of factor analysis* (3rd ed., Vol. 1). New York: Continuum.
- Cislaghi, B., Heise, L., 2020. Gender norms and social norms: differences, similarities and why they matter in prevention science. *Sociol. Health Illn.* 42 (2), 407–422. <https://doi.org/10.1111/1467-9566.13008>.
- Comrey, A.L., Lee, H.B., 1992. *A first course in factor analysis* (2nd ed.). Lawrence Erlbaum Associates. DOI: 10.4324/9781315827506.
- Connell, R., Pearse, R., 2014. Gender norms and stereotypes: A survey of concepts, research, and issues about change. In *UN Women Expert Group Meeting, Envisioning Women's Rights in the Post-2015 Context* (Issue October 2014). UN Women. <http://hdl.handle.net/1885/261220>.
- Dall'Oglio, A.M., Rossiello, B., Coletti, M.F., Caselli, M.C., Ravà, L., Di Ciommo, V., Orzalesi, M., Giannantoni, P., Pasqualetti, P., 2010. Developmental evaluation at age 4: Validity of an Italian parental questionnaire. *J. Paediatr. Child Health* 46 (7–8), 419–426. <https://doi.org/10.1111/j.1440-1754.2010.01748.x>.
- Deaux, K., LaFrance, M., 1998. *Handbook of Social Psychology*. McGraw-Hill, Nueva York.
- Du, H., Xiao, Y., Zhao, L., 2021. Education and gender role attitudes. *J. Popul. Econ.* 34 (2), 475–513. <https://doi.org/10.1007/s00148-020-00793-3>.
- Dunn, T.J., Baguley, T., Brunsden, V., 2014. From alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. *Br. J. Psychol.* 105 (3), 399–412. <https://doi.org/10.1111/bjop.12046>.
- Friedman, D., Becker, G.S., 1993. A treatise on the family. In *Contemporary Sociology* (Vol. 22, Issue 2). DOI: 10.2307/2075766.
- García-Cueto, E., Rodríguez-Díaz, F.J., Bringas-Molleda, C., López-Cepero, J., Paíno-Quesada, S., Rodríguez-Franco, L., 2015. Development of the gender role attitudes scale (GRAS) amongst young Spanish people. *Int. J. Clin. Health Psychol.* 15 (1), 61–68. <https://doi.org/10.1016/j.ijchp.2014.10.004>.
- Guiso, L., Zaccaria, L., 2023. From patriarchy to partnership: gender equality and household finance. *J. Financ. Econ.* 147 (3), 573–595. <https://doi.org/10.1016/j.jfineco.2023.01.002>.
- Gupta, M., Rahman, A., Dutta, N.C., Nambiar, D., Ivers, R., Jagnoor, J., 2020. Opportunities for gender transformative approaches in a community-based drowning reduction program in Bangladesh. *Int. J. Equity Health* 19 (1), 108. <https://doi.org/10.1186/s12939-020-01226-z>.
- Heise, L., Greene, M.E., Opper, N., Stavropoulou, M., Harper, C., Nascimento, M., Zewdie, D., Darmstadt, G.L., Greene, M.E., Hawkes, S., Henry, S., Heymann, J., Klugman, J., Levine, R., Raj, A., Rao Gupta, G., 2019. Gender inequality and restrictive gender norms: framing the challenges to health. *Lancet* 393 (10189), 2440–2454. [https://doi.org/10.1016/S0140-6736\(19\)30652-X](https://doi.org/10.1016/S0140-6736(19)30652-X).
- Hu, L.T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.* 6 (1), 1–55. <https://doi.org/10.1080/10705519909540118>.
- ISDV., 2019. *Country Youth Profile, Bangladesh. February*, 1–12. [https://www.isdb.org/sites/default/files/media/documents/2020-09/Bangladesh\\_Youth.pdf](https://www.isdb.org/sites/default/files/media/documents/2020-09/Bangladesh_Youth.pdf).
- Islam, M.J., Broidy, L., Mazerolle, P., Baird, K., Mazumder, N., 2021a. Exploring intimate partner violence before, during, and after pregnancy in Bangladesh. *J. Interpers. Violence* 36 (7–8), 3584–3612. <https://doi.org/10.1177/0886260518775753>.
- Islam, M.J., Mazerolle, P., Broidy, L., Baird, K., 2021b. Exploring the prevalence and correlates associated with intimate partner violence during pregnancy in Bangladesh. *J. Interpers. Violence* 36 (1–2), 663–690. <https://doi.org/10.1177/0886260517730029>.
- Juster, R.-P., Pruessner, J.C., Desrochers, A.B., Bourdon, O., Durand, N., Wan, N., Tourjman, V., Kouassi, E., Lesage, A., Lupien, S.J., 2016. Sex and gender roles in relation to mental health and allostatic load. *Psychosom. Med.* 78 (7), 788–804. <https://doi.org/10.1097/psy.0000000000000351>.
- Kaiser, H.F., 1974. An index of factorial simplicity. *Psychometrika* 39 (1), 31–36. <https://doi.org/10.1007/BF02291575>.
- Lazar, M.M., 2005. *Feminist critical discourse analysis: Gender, power and ideology in discourse* (ProQuest (ed.)). Palgrave Macmillan. DOI: 10.1057/9780230599901.
- Levant, R.F., Hall, R.J., Rankin, T.J., 2013. Male Role Norms Inventory-Short Form (MRNI-SF): development, confirmatory factor analytic investigation of structure, and measurement invariance across gender. *J. Couns. Psychol.* 60 (2), 228. <https://doi.org/10.1037/a0031545>.
- Lundgren, R., Beckman, M., Chaurasiya, S.P., Subhedi, B., Kerner, B., 2013. Whose turn to do the dishes? Transforming gender attitudes and behaviours among very young adolescents in Nepal. *Gen. Dev.* 21 (1), 127–145. <https://doi.org/10.1080/13552074.2013.767520>.
- Mahalik, J.R., Locke, B.D., Ludlow, L.H., Diemer, M.A., Scott, R.P.J., Gottfried, M., Freitas, G., 2003. Development of the conformity to masculine norms inventory. *Psychol. Men Masculinity* 4 (1), 3–25. <https://doi.org/10.1037/1524-9220.4.1.3>.
- Mahalik, J.R., Morray, E.B., Coonerty-Femiano, A., Ludlow, L.H., Slaterry, S.M., Smiler, A., 2005. Development of the conformity to feminine norms inventory. *Sex Roles* 52 (7–8), 417–435. <https://doi.org/10.1007/s11199-005-3709-7>.
- Miedema, S.S., Hennink, M., Naved, R.T., Talukder, A., Dore, E.C., Yount, K.M., 2021. Women's income-generating activity and experiences of economic intimate partner violence in rural Bangladesh. *Sex Roles* 85 (7–8), 373–390. <https://doi.org/10.1007/s11199-021-01225-6>.
- Ministry of Education, G., 2016. *Generation Breakthrough: A multi-pronged approach to primary prevention of gender-based violence and meeting SRHR needs of adolescents and youth in Bangladesh project*. <https://moedu.gov.bd/site/page/783ba359-8b2f-42de-804c-86d6a88a6c22/জেনারেশন-ব্রেকথ্রু-প্রকল্পের-তথ্য?fbclid=IwAR0k1o14N5sa94pLF905luBzv7VtE-KZzhuNGeaOrT5CWpBZ7gBw8jUaHo>.
- Moreau, C., Li, M., De Meyer, S., Vu Manh, L., Guiella, G., Acharya, R., Bello, B., Maina, B., Mmari, K., 2019. Measuring gender norms about relationships in early adolescence: results from the global early adolescent study. *SSM - Population Health* 7 (October 2018). <https://doi.org/10.1016/j.ssmph.2018.10.014>.
- Moreau, C., Li, M., Ahmed, S., Zuo, X., Cislaghi, B., 2021. Assessing the spectrum of gender norms perceptions in early adolescence: a cross-cultural analysis of the global early adolescent study. *J. Adolesc. Health* 69 (1), S16–S22. <https://doi.org/10.1016/j.jadohealth.2021.03.010>.
- Morinaga, Y., Frieze, I.H., Ferligoj, A., 1993. Career plans and gender-role attitudes of college students in the United States, Japan, and Slovenia. *Sex Roles* 29 (5), 317–334. <https://doi.org/10.1007/BF00289426>.
- Mulaik, S.A., 2009. *Foundations of Factor Analysis Vol. 7*. <https://doi.org/10.1201/b15851>.
- Novick, M.R., Lewis, C., 1967. Coefficient alpha and the reliability of composite measurements. *Psychometrika* 32 (1), 1–13. <https://doi.org/10.1007/BF02289400>.
- Nunnally, J.C., 1975. *Psychometric theory—25 years ago and now*. *Educ. Res.* 4 (10), 7–21.
- Parent, M.C., Moradi, B., 2009. Confirmatory factor analysis of the conformity to masculine norms inventory and development of the conformity to masculine norms inventory-46. *Psychol. Men Masculinity* 10 (3), 175–189. <https://doi.org/10.1037/a0015481>.
- Parent, M.C., Moradi, B., 2010. Confirmatory factor analysis of the conformity to feminine norms inventory and development of an abbreviated version: the CFNI-45.

- Psychol. Women Q. 34 (1), 97–109. <https://doi.org/10.1111/j.1471-6402.2009.01545.x>.
- Pulerwitz, J., Barker, G., 2008. Measuring attitudes toward gender norms among young men in Brazil: development and psychometric evaluation of the GEM scale. *Men Masculinities* 10 (3), 322–338. <https://doi.org/10.1177/1097184X06298778>.
- R Core Team, 2023. R: a language and environment for statistical computing. R Foundation for Statistical Computing. <https://doi.org/10.4236/oalib.1107821>.
- Rahman, M., Hoque, M.A., Makinoda, S., 2011. Intimate partner violence against women: is women empowerment a reducing factor? A study from a national Bangladeshi sample. *J. Fam. Violence* 26 (5), 411–420. <https://doi.org/10.1007/s10896-011-9375-3>.
- Revel, W., 2022. *psych: Procedures for Psychological, Psychometric, and Personality Research*. <https://cran.r-project.org/package=psych>.
- Ridgeway, C.L., 2009. Framed before we know it: How gender shapes social relations. *Gen. Soc.* 23 (2), 145–160. <https://doi.org/10.1177/0891243208330313>.
- Rosseel, Y., 2012. lavaan: an R package for structural equation modeling. *J. Stat. Softw.* 48 (2), 1–36. <https://doi.org/10.18637/jss.v048.i02>.
- Santos Silva, M., Klasen, S., 2021. Gender inequality as a barrier to economic growth: a review of the theoretical literature. *Rev. Econ. Househ.* 19 (3), 581–614. <https://doi.org/10.1007/s11150-020-09535-6>.
- Schönbrodt, F.D., Perugini, M., 2013. At what sample size do correlations stabilize? *J. Res. Pers.* 47 (5), 609–612. <https://doi.org/10.1016/j.jrp.2013.05.009>.
- Schuler, S.R., Lenzi, R., Badal, S.H., Bates, L.M., 2017. Women's empowerment as a protective factor against intimate partner violence in bangladesh: a qualitative exploration of the process and limitations of its influence. *Violence Against Women* 23 (9), 1100–1121. <https://doi.org/10.1177/1077801216654576>.
- Sedlander, E., Bingenheimer, J.B., Long, M.W., Swain, M., Rimal, R.N., 2022. The G-NORM scale: development and validation of a theory-based gender norms scale. *Sex Roles* 87 (5–6), 350–363. <https://doi.org/10.1007/s11199-022-01319-9>.
- Sen, G., Piroška, O., George, A., 2007. Unequal, unfair, ineffective and inefficient gender inequity in health: why it exists and how we can change it: final report to the WHO commission on social determinants of health. *Arrows for Change* 13 (1), 9.
- Simms, L.J., 2008. Classical and modern methods of psychological scale construction. *Soc. Pers. Psychol. Compass* 2 (1), 414–433. <https://doi.org/10.1111/j.1751-9004.2007.00044.x>.
- Skitka, L.J., Maslach, C., 1990. Gender roles and the categorization of gender-relevant behavior. *Sex Roles* 22 (3–4), 133–150. <https://doi.org/10.1007/BF00288187>.
- United Nations, 2015. *Transforming our world: the 2030 agenda for sustainable development*. United Nations. DOI 10 (5040/9781509934058), 0025.
- VanderEnde, K.E., Sibley, L.M., Cheong, Y.F., Naved, R.T., Yount, K.M., 2015. Community economic status and intimate partner violence against women in bangladesh: compositional or contextual effects? *Violence Against Women* 21 (6), 679–699. <https://doi.org/10.1177/1077801215576938>.
- Watkins, M., 2020. *A Step-by-Step Guide to Exploratory Factor Analysis with R and RStudio*. <https://doi.org/10.4324/9781003120001>.
- Worthington, R.L., Whittaker, T.A., 2006. Scale development research: a content analysis and recommendations for best practices. *Couns. Psychol.* 34 (6), 806–838. <https://doi.org/10.1177/0011000006288127>.
- Yount, K.M., Miedema, S.S., Martin, C.C., Crandall, A.A., Naved, R.T., 2016. Men's coercive control, partner violence perpetration, and life satisfaction in Bangladesh. *Sex Roles* 74 (9–10), 450–463. <https://doi.org/10.1007/s11199-016-0584-3>.