

Quantitative Measure of Self-Perceived Gender Relations in Young Women in the Mekong Delta of Vietnam

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Abstract

Background: The conceptualization and measurement of gender-based relations and equity are still challenging to researchers worldwide. Given a growing number of health studies which want to take into account the roles of gender relations, there is a need for quantitative measures of this determinant.

Objectives: Based on the theory of gender and power and results from our previous qualitative work, this analysis aims to examine the applicability, reliability, and validity of a set of self-perceived gender-relation measures in the Mekong delta of Vietnam.

Methods: Data came from a cross-sectional survey of 1181 undergraduate female students from two universities. Second-order latent variable modeling was used to examine applicability of theoretical structures and validity of measuring items. Single-factor modeling was employed to screen for the most relevant dimensions of self-perceived gender relations.

Results: The second-order modeling showed good fit, suggesting that the theory well explained self-perceptions of gender relations. The consistency of models across 500 hypothetical bootstrapping samples further substantiated factorial validity of measures. Students who ever had a boyfriend held slightly different perceptions of gender relations compared to those who never had a boyfriend.

Conclusions: The final parsimonious set of measures which had best loadings onto perceived subordination consisted of ten dimensions; this provides a practical application to measure self-perceived gender relations in other health research.

Keywords: Gender Relations, Gender Equity, Confirmatory Factor Analysis, Latent Variable Modeling, Women, Vietnam

1. Background

Gender relations are imperative social determinants in many fields including health. A growing number of health-related studies have examined the influence of gender equity on health outcomes (1-5). Nevertheless, the conceptualization and operationalization of abstract social concepts like women's power or gender inequity are still a challenge to researchers in Vietnam and worldwide (1, 6-10). Macro socio-economic gender indicators limit understanding of women's own ways of perceiving and internalizing gender relations, and hence provide little utility in research which investigates the influence of gender equity as an individual self-perceived socio-psychological determinant on health outcomes. Peer-review published studies dealing with the concept of self-perceived gender relations, which were conducted in Vietnam or which are applicable to Vietnam, are very few and are often atheoretical (4, 11). The lack of a guiding theory has limited conceptualization issues and may subsequently have contributed

to the paucity of dimensions in measurement. Reliability and validity of measures have rarely been reported and discussed (11). In our previous qualitative work to explore dimensions of perceived gender relations among female undergraduate students in the Mekong Delta of Vietnam (4), we found several salient context-specific dimensions of perceived gender relations which were grounded in the theory of gender and power (TGP) and which would potentially serve as appropriate quantitative measures. Given the qualitative nature of our previous study, it was uncertain whether these dimensions were accounted for by the proposed theoretical structures and whether they best reflected perceived gender relations in a larger population of students.

2. Objectives

The purpose of this quantitative analysis was to examine the reliability and validity of a set of perceived gender-

relation measures. Additionally, it aimed to identify a parsimonious set of the most relevant dimensions of gender relations, which can be practically used to measure perceived gender relations in other health studies.

3. Methods

3.1. Guiding Theory

As stated in our previous qualitative study (4), we grounded our work in the theory of gender and power (12) which includes three critical structures of gender relations: the sexual division of labor, the sexual division of power, and cathexis. In brief, the division of labor involves social rules to allocate particular types of work to a particular gender (e.g. unpaid housework and child-care for women), segregation of men's jobs and women's jobs, and allocation of women to high demand/low control or docile working positions. The division of power comprises authority, hierarchies, coercion and control over resources at different levels: national, organizational, familial, and interpersonal. Cathexis depicts social and sexual relationships between people, including emotional links between men and women, social sexualization, prohibitions or incitements, beliefs, standards, and expectations. These structures are not independent of each other-rather, they integrate and interweave in explaining the social dynamic of gender.

3.2. Data Collection

Data for our analyses came from a cross-sectional survey which was conducted among third-year female students in Can Tho University and An Giang University-the two largest universities in the Mekong Delta, Vietnam. Details of this survey have been described elsewhere (5). In brief, we used random cluster sampling method. In each university, classes were the primary sampling units (i.e., cluster), each of which consisted of 30 - 50 students of both sexes. We obtained a list of all third-year classes of all majors from each university. Based on the lists, we randomly selected about one fourth of classes in Can Tho University and one third of classes in An Giang University; and we invited all female students in the selected classes to participate. The final sample size was 1181 respondents (881 in Can Tho University and 300 in An Giang University). Informed consent was obtained from each student. Students self-administered an anonymous questionnaire, which took approximately 30 minutes to complete. Universities' faculty and staff were not present at the time of questionnaire administration to ensure the confidentiality of students' responses. No information that could identify students was collected in the questionnaire. Upon completing the

survey, each student placed her survey into a white envelope and then into a large box located in the corner of the classroom. The study was approved by the boards of rectors in the two universities and by the Institutional Review Board from the University of Texas-health science center at Houston (HSC-SPH-08-0548). Data were collected from March to April 2009. The participation rate in Can Tho University was 94% and in An Giang University was 99%.

3.3. Measures

Based on salient gender-relation dimensions resulted from our qualitative exploration (4), we developed items measuring perceived gender relations for the survey. Although the qualitative data suggested numerous dimensions of gender relations, we selected those which generated different levels of agreement and different levels of acceptance (e.g. the view of housework as women's responsibility). Items were operationalized by asking students a generic question, How much do you agree with these statements? The Likert-type response format consisted of a seven-point scale ranging from 1 = absolutely disagree to 7 = absolutely agree. The instrument was developed in Vietnamese. It was first reviewed by nine Vietnamese gender researchers and practitioners and then was pre-tested with a group of 25 female students in order to help ensure the face and content validity.

3.4. Data Screening and Preparation and Analytical Strategy

After all participants in each selected class submitted their questionnaires, a researcher checked all questionnaires for completion. Twenty seven questionnaires that had more than 10 unanswered questions were discarded and these cases were not counted in the final sample size. Three researchers manually entered participants' responses on papers into a dataset using the IBM SPSS Statistics. These researchers also randomly cross-checked the data of some cases (about 10%) that were entered by the other researchers. Appropriate descriptive statistics (e.g., frequency, examining outliers, cross-tabulation) were used to detect and clean errors during data entry.

In this analysis, we started with an a priori theory-the TGP-with a view to evaluating how well the data fit the theory. When a hypothesized data structure is based on an existing theoretical model, use of a confirmatory procedure is acceptable (13, 14). This use was additionally supported by the resemblance between previous qualitative data and the TGP theoretical dimensions, as well as satisfactory results from preceding exploratory factor analyses. To achieve our purposes for this analysis, we employed latent variable modeling with the aid of the analysis of moment

structures (AMOS) 16.0.1 software (Amos development corporation, Spring house, PA, USA, 2007). In order to provide additional means for assessing construct validity, we used t-tests to examine mean differences between average scale scores for the three theoretical structures across subgroups of participants who had ever had a boyfriend (ever partnered) versus those who had never had a boyfriend (never partnered), females who reported religious beliefs versus those who reported no religious beliefs, and females who mostly lived in an urban area versus those who lived in a rural area for the past ten years.

Of the 26 items used in the models, 19 had one to four missing values. We imputed these with series medians. The use of latent variable modeling based on the maximum likelihood method requires the satisfaction of two critical assumptions: continuous scale in measures and multivariate normal distribution. Treating categorical variables with four or more categories as continuous variables is an accepted practice, particularly when covariance versus a correlation matrix is used in maximum likelihood estimation (13). By utilizing seven-point scales for our measures and a covariance matrix for analyses, issues related to the use of non-continuous scales were minimal. Examination of absolute skew and kurtosis values indicated that univariate normality was satisfactory. It should be noted that univariate normality does not completely guarantee multivariate normality. To handle this potential problem as well as to enhance the reliability of our results, we performed bootstrapping to confirm statistical significances of parameters of interest in final models.

Before searching for a parsimonious set of measure, we examined whether the underlying structure(s) of the data could be conceptualized by the structure of the theory in a second-order factor model. We first performed several oblique first-order measurement models with three latent variables: inequity in labor, unequal power, and cathexis. During this process, we screened for items' validity in measuring a certain latent structure, especially for items (i.e. dimensions) which suggested an interrelation between structures according to the TGP (see Connell (12) and Bui (4) for discussion and tabulations regarding the arrangement of items into the primary structure). Next, we tested a second-order model, in which the three first-order structures were explained by a single second-order factor named 'perceived subordination'. Finally, we utilized a single-factor model to identify a parsimonious subset of items to serve as crucial measures for 'perceived subordination'.

Per recommendations from Kline (15) and Hu and Bentler (16), we considered that the presentation of a set of fit statistics, including model chi-square, goodness-of-fit index (GFI), Tucker-Lewis index (TLI), comparative fit index

(CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) would be appropriate and sufficient to evaluate model fit in our analyses. The chi-square statistic assesses divergence of a covariance matrix created by a theorized model and the observed covariance matrix. A non-significant or high probability value appended with the chi-square indicates that the model adequately fits the observed data. Nevertheless, when the sample size is large, a trivial difference between observed and predicted covariances may result in a statistically significant value of model chi-square. In order to address this sensitivity of chi-square to sample size, researchers suggest a value called the normed chi-square, which results from dividing the chi-square value by the degrees of freedom (15). Reasonable model fit is indicated by a normed chi-square value of less than 2.0 or 3.0. Values of GFI, TLI, and CFI greater than .90 indicate reasonably good fit and those greater than .95 indicate superior fit (15). For RMSEA and SRMR, values < 0.06 are evidence of well-fitting models (16). When these statistics independently corroborate the goodness of fit, a model's well-fitting is more reliable. For the purpose of comparison between or among models, we reported Consistent Akaike's information criterion (CAIC). The smaller the value of CAIC, the better the model's fit.

4. Results

Details regarding participants' demographic characteristics are reported elsewhere (5). In brief, the average age of participants was 21.6 years (range = 19 - 27, SD = 1.0). They represented 37 areas of study, including both the natural and social sciences. Seventy-two percent (n = 852) had ever had a boyfriend(s) (ever-partnered). Two-thirds of participants had mostly lived in rural areas. Sixty percent had no religious beliefs, 25% were Buddhist, 5% were Catholic, and 10% had other religious beliefs (e.g., Cao Dai, Hoa Hao). The majority of participants (95%) were Kinh ethnicity. [Table 1](#) displays the distributions of original items measuring perceived gender relations.

The first-order measurement models (model 1, to assess how well questions directly measured a latent structure such as unequal power) suggested evidence of considerable misspecification for a number of items (for brevity, only key points are reported here; statistical results are available upon request). Large values for the modification indices (MIs) advised potential error correlations between items Q12 and Q11, and between item Q14 and Q16. These error correlations suggested possible redundancies in the items' content (13). In another set of extremely large MI values, it was evident that the error terms of three items (Q3, Q5, and Q6) were correlated with each other. We believed

Table 1. Mean and Standard Deviations for Items^a

Items	Description	Mean	Standard Deviations
Q1	Housework is the duty of women.	3.00	1.74
Q2	A mother has more responsibility in childcare and bringing up children than a father does.	3.30	2.02
Q3	In my field of study, it is more difficult for a female than a male to get a job, despite their equal competence.	2.71	1.92
Q4	After marriage, a woman should not do too much paid work but she should attach special importance to running her household life.	2.32	1.50
Q5	In my profession, women are less likely to receive as high an education as men.	2.76	1.68
Q6	In my profession, women are less likely to get a promotion than men.	2.74	1.71
Q7	Some majors, such as land management, physical education, and rural development, are men's fields.	3.33	1.76
Q8	For matters related to social relations, men do them better than women.	3.13	1.76
Q9	It is acceptable for a woman to earn little money and to be provided for by her husband.	3.51	1.80
Q10	It is better to let the man be the head of the family.	4.72	1.78
Q11	It is more appropriate for men than women to participate in leadership positions in governmental or policy-making structures.	2.92	1.48
Q12	Women are not suitable for management or supervision positions.	1.98	1.13
Q13	Valuable properties in the household (e.g. house, land, motorbike) should be in the man's name.	2.29	1.45
Q14	For large matters of household spending, men should be the ones to make decisions.	2.56	1.55
Q15	The female is the weaker gender.	3.41	1.74
Q16	Men should have the final say for important things in a family.	3.30	1.85
Q17	A wife should not have education higher than her husband's.	3.05	1.62
Q18	After marriage, a wife must reside in her husband's house.	3.15	1.73
Q19	It is almost impossible for a non-virgin woman to get married (including first-time marriage or re-marriage).	3.33	1.93
Q20	If a female takes the initiative to leave her boyfriend, she will be vilified (e.g. to leave an old thing for a new one).	1.93	1.25
Q21	Men should have extensive relationships, including with people of the opposite sex, but women should not.	1.88	1.15
Q22	A woman should always sacrifice her own education and career so that her husband can advance in his.	3.57	1.84
Q23	A wife should always make concessions to her husband in order to maintain a harmonious relationship in the family.	3.05	1.74
Q24	A woman must be meek and obedient.	4.07	1.83
Q25	It is hard to resist such family or social thoughts as son preference and to value men above women.	3.11	1.59
Q26 ^b	A female can take the initiative in declaring her love to a male.	4.97	1.50

^aThe stem question for these items was How much do you agree with these statements? Responses were on 7-point scale: 1 = completely disagree, 2 = disagree, 3 = slightly disagree, 4 = indifferent, 5 = slightly agree, 6 = agree, and 7 = completely agree.

^bThe item score afterward was reserved for further analyses.

that these error correlations were systematic and related to the nature of the questions. Our study subjects were third-year students so they might have had limited experience regarding employment opportunities and promotion. Given the adequacy of numbers of items in defining latent structures in our study, one way to improve the models' fit was to drop these items to reduce redundancies (17). Thus, we removed five items - Q3, Q5, Q6, Q12, and Q14 - from further analyses. Finally, for some items that potentially measured two or three latent structures equally (e.g. Q10, Q11, Q17, Q18, Q24, Q25; see Bui (2012a) for tabulations and discussion regarding the about rationale for these), we sequentially specified the item's loading paths on different latent structures (i.e., we examined which latent structure each item measured better). For most of these items, path coefficients did not vastly differ; thus, we retained them with their primary latent structures according to the TGP or according to our best judgment based on the qualitative findings. For item Q18, which had much better loadings on cathexis than on unequal power probably due to

its inherence of socially-expected affective attachment, we specified it to be a measure the structure of cathexis.

The second-order model (model 2) assesses how well questions (i.e., items) measured the latent construct of perceived subordination through the three first-order latent structures of inequity in labor, unequal power, and cathexis. Before testing the model 2, it was noted that the higher order portion of the model with three first-order factors was just-identified. Thus, it was critical to address this identification issue by imposing at least one constraint on parameters. We ran exploratory model estimation with a selection of critical ratio difference methods (see Byrne 2001, page 123-130 for details on this technique). Outputs indicated that residual variances of inequity in labor ($r_L = 0.11$) and of cathexis ($r_C = 0.07$) were not statistically different in the population (critical ratio = $0.74 < 1.96$). Thus, we placed an equality constraint on r_L , and r_C . These constraints granted one more degree of freedom for model estimation.

This respecified second-order model with the remain-

ing 21 items had marginal fit (model 2a in Table 2). Seven large MIs with values ranging from 11.64 to 16.98 signified error covariances between seven pairs of items (see model 2). Error covariances implied that items in each pair were subject to similar measurement errors in item responses, which might result from respondents' characteristics (e.g. perceived social desirability) or items' characteristics (e.g. perceived overlap in item content) (13). Although allowing correlations between error terms is a way to improve the model fit, this practice must be based on substantive justification and interpretation (13). Indeed, correlated errors between and among items in our study were predictable because of the inter-dependent nature of latent structures and dimensions in the TGP. When error covariances between seven pairs of items were specified as free parameters, the respecified model became well-fitting (model 2b in Table 2). All parameters (shown In Table 3) were significant at $P < 0.001$, except $r_P = 0.53$ ($P = 0.235$). For this final second-order model, we re-estimated the internal consistency reliability of scores. The Cronbach's coefficient alpha values were .62 (95% CI: 0.59 - 0.66) for inequity in labor, .71 (95% CI: 0.68 - 0.76) for unequal power, and .59 (95% CI: 0.55 - 0.62) for cathexis.

Table 4 shows the average scores of theoretical structures across socio-demographic subgroups. Those who ever partnered had slightly higher mean scores in all three structures compared to those who never partnered. Cathexis scores significantly varied across subgroups.

Analyses were conducted to examine whether a more parsimonious subset of items could be identified to simplify future analyses and research practice. In other words, given the inter-dependent nature of the three structures in the TGP, could we identify critical items which adequately measured perceived subordination in lieu of using all 21 items? We employed a single-factor model in which all 21 items were loaded onto one latent construct of perceived subordination. Based on the results, we removed items Q20, Q25, and Q26 because of their low standardized coefficients (< 0.30). We also omitted items Q20, Q22, and Q26 which were particular to a population (e.g. students who were interested in higher education) or to a stage of sexual relationships (e.g. dating only). Finally, based upon an item's correlated errors, which also signified possible redundancy in items' content, we excluded items for which content was covered by another item. As a result, items Q2, Q4, Q7, Q8, Q9, Q17, and Q18 were removed. When the ten remaining items were treated as single measures of perceived subordination, the Cronbach's alpha was .71 (95% CI: 0.68 - 0.74). This alpha coefficient was improved over the three alpha coefficients of the three separate structures in the final second-order model. The single-factor model with these 10 items (model 3) also had a highly superior fit com-

pared to the final second-order model. For the single-factor model, all path coefficients parameters were significant at the 0.05 level across 500 hypothetical bootstrapping samples (results not shown, available upon request).

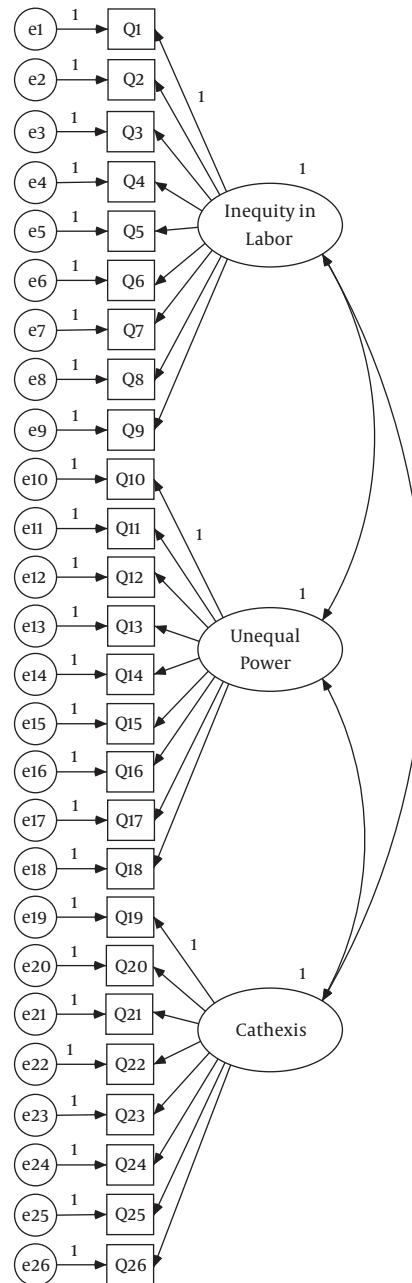


Figure 1. Model 1

Table 2. Model Goodness-of-Fit Indices

Model	CMIN				GFI	TLI	CFI	RMSEA		SRMR	CAIC
	χ^2	df	P	CMIN/df				RMSEA	90% CI		
2a	501.92	187	< 0.001	2.68	0.960	0.875	0.889	0.038	0.034 - 0.042	0.037	857.18
2b	392.91	180	< 0.001	2.18	0.969	0.912	0.925	0.032	0.027 - 0.036	0.033	804.69
3	86.72	35	< 0.001	2.48	0.985	0.945	0.957	0.035	0.026 - 0.045	0.026	248.20

Abbreviations: CMIN, minimum discrepancy; df, degrees of freedom; P, probability value; GFI, goodness-of-fit index; TLI, tucker-lewis index; CFI, comparative fit index; RMSEA, root mean square error of approximation; 90% CI, 90% confident interval; SRM, standardized root mean square residual; CAIC, consistent Akaike's information criterion.

Table 3. Path Estimates of Items^{a,b,c}

	Model 2 (Final)			Model 3 (Final)
	Inequity in Labor	Unequal Power	Cathexis	Perceived Subordination
Perceived Subordination	0.96	1.0	0.94	
i1	0.48			0.47
i2	0.35			
i4	0.41			
i7	0.42			
i8	0.35			
i9	0.37			
i10		0.55		0.53
i11		0.47		0.46
i13		0.47		0.48
i15		0.34		0.36
i16		0.55		0.55
i17		0.46		
i18			0.41	
i19			0.38	0.34
i20			0.25	
i21			0.37	0.36
i22			0.48	
i23			0.41	0.42
i24			0.42	0.45
i25			0.28	
i26a			0.27	
Factor variances				1.0
Factor residuals	0.05*	0.05	0.05*	

^aAll factor loadings were significant at the level of $P < 0.001$ except being noted: * = $P < 0.05$, ** = $P < 0.01$.

^bAll error terms and error covariances were significant at the level of $P < 0.001$.

^cThe item's score was reserved in these analyses.

5. Discussion

Results from final second-order models suggested that the theory of gender and power was useful in explaining the data's structure. Specifically, perceived gender rela-

tions or perceived subordination could be explained by the three structures of inequity in labor, unequal power, and cathexis; and these three structures were satisfactorily measured by specified questions. The mean differences of all three theoretical structures by dating experience sug-

Table 4. Mean Scores (and Standard Deviations) of Structures From the Theory of Gender and Power^a

	Dating Status			Residence			Religious Beliefs		
	Ever Partnered (n = 852)	Never Partnered (n = 325)	Sig.	Urban (n = 308)	Rural (n = 775)	Sig.	Have Religion (n = 467)	No Religion (n = 714)	Sig.
Inequity in labor	3.14 (0.96)	2.99 (1.02)	0.027	3.05 (0.96)	3.11 (0.99)	.322	3.10 (1.02)	3.11 (.95)	0.810
Unequal power	3.33 (1.00)	3.16 (1.01)	0.010	3.28 (1.03)	3.29 (1.00)	.910	3.30 (1.04)	3.27 (.99)	0.587
Cathexis	3.14 (0.83)	3.05 (0.80)	0.054	3.00 (0.77)	3.20 (0.84)	< 0.001	3.20 (.86)	3.07 (.80)	0.008

^aScales range between 1 (completely disagree) and 7 (completely agree).

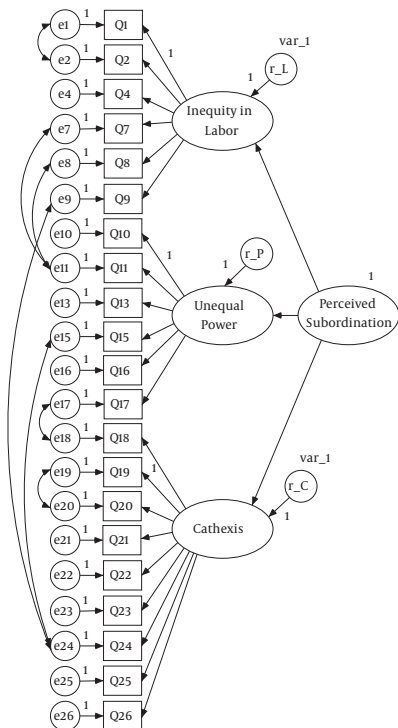


Figure 2. Model 2

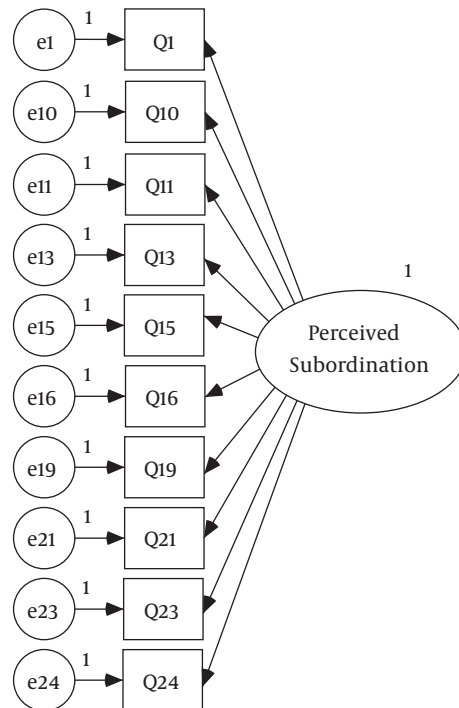


Figure 3. Model 3

gested that those who ever had a boyfriend slightly agreed more with the subordinate status of women in comparison to those who had never been in a dating relationship. The mean differences of cathexis across subgroups demonstrated the potential role of this structure in explaining variations of gender relations in different populations. For example, the TGP acknowledges double standards as one dimension of cathexis; yet the double standards found and examined in our student population in their nuances (e.g. taking initiative in declaring love) were not necessarily similar to double standards in other populations. The stability of estimated parameters across 500 bootstrapping samples suggested that the model was highly reliable across the target population, even though the assumption

of multivariate normality in our study was somewhat uncertain.

The applicability of our full set or the parsimonious set of gender-relation measures based on the TGP may have further utilization in women’s health research and interventions. Gender-based power imbalance has been widely documented to negatively influence women’s health (18). Enhancing gender power or gender pride as a component of interventions has been suggested to improve women’s sexual health outcomes (19, 20). These theory-based dimensions can be applied not only to measure gender-based power or imbalances in health-related studies, but also to guide ideas and practices for promoting self-perceived gender power and self-esteem in young women.

In research practice in which differentiation of the theoretical structures is dispensable, the use of typical dimensions as a key brief measure of self-perceived gender relations may be beneficial. For example, in another piece of our work, we used this brief measure and found that the greater a student's agreement with these 10 dimensions (i.e. perceiving a subordinating status of women to men), the lower her self-efficacy for sexual communication and the lower her actual frequency of discussing safer sex matters and asking her partner to use a condom (5).

Our findings have a number of limitations. The most noticeable limitation was the generalizability or applicability of these dimensions (i.e. items) to other settings or other populations. For the target population of undergraduate female students, since we used random sampling of clusters, our study sample was representative and participants' characteristics were highly comparable to the target population (e.g., age range matched, very diverse majors of study, proportion of Kinh ethnicity mirrored the national prevalence). Therefore, we are highly confident that these results are very generalizable and applicable to undergraduate students in the Mekong Delta. For other women populations, dimensions of gender relations may vary greatly; thus, the use of any set of items needs to be considered with respect to its specificity and context-relevance. For example, the exclusion of items associated with employment opportunities in our target group does not negate its possible importance in other populations. The removal of items based on statistical significance does not necessarily negate an item's practical significance. We did not aim to thoroughly establish a measure of self-perceived gender relations; hence, the application of any set of items should be subjected to reliability and validity rechecks. Similarly, since gender equity is multi-dimensional, some dimensions might have been missing in our measures. Nevertheless, with the guidance of the theory and the results from our preceding qualitative work, we believed that the most explanatory and valid variables were sufficiently included.

Certain limitations should also be noted regarding score reliabilities. Internal consistency reliability is supposed to assess the homogeneity of items in measuring a certain latent construct (21). The internal consistency reliability is high when items are unidimensional or single-factored. Given the nature of the TGP, each main structure is inherently multi-dimensional. In the structure of power, for example, control over household resources is not completely analogous to holding authority in an organization. For this reason, modest reliability estimates in our study were predictable. Instead of utilizing different suggested cut-off points such as 0.70 or 0.05 (21) to state whether the reliability values in our study were good or poor, we en-

courage researchers to review them and decide upon an acceptable value for their particular study and sample. Social desirability bias (i.e., the tendency that students answered questions in conforming to social expectations or in views favored by others) might have also affected measurement reliability and validity.

5.1. Conclusion

Results from these analyses demonstrated that the theory of gender and power played a strong explanatory role for capturing and measuring variation in students' perceptions related to gender relations in the Mekong delta of Vietnam. Our study results suggested enhanced theory-based sets of measures to assess self-perceived gender relations and power in young female's own eyes. We hope that these questions for quantitatively measuring self-perceived gender relations will be useful for future health research which wants to take into account the effect of perceived gender relations or power on health outcomes.

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Footnote

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