**Measurement of Women's Agency in Egypt: A National Validation Study**

Kathryn M. Yount, Ph.D.*
Asa Griggs Candler Chair of Global Health
Hubert Department of Global Health and Department of Sociology
Emory University
1518 Clifton Rd. NE, Atlanta, GA 30322
Email: kyount@emory.edu; Tel: 404-727-8511; Fax: 404-727-4590

Kristin E. VanderEnde, Ph.D
Post-Doctoral Fellow
Hubert Department of Global Health
Emory University
1518 Clifton Rd. NE, Atlanta, GA 30322

Sylvie Dodell, B.S.
Research Associate and MPH Candidate
Hubert Department of Global Health and Department of Epidemiology
Emory University
1518 Clifton Rd. NE, Atlanta, GA 30322

Yuk Fai Cheong, Ph.D.
Department of Educational Studies
Emory University
N. Decatur Building, Suite 258
1784 N. Decatur Rd. Atlanta, Georgia 30322

Acknowledgements: *Corresponding author. This work was supported by research grant 1 R03 HD076368-01 from the National Institutes of Health (PI Dr. Kathryn Yount). We thank Dr. Ragui Assaad for methodological guidance, Dr. Rania Salem for comments during the drafting of this paper, and Ms. Caroline Krafft for her patient responses to our data queries. The Economic Research Forum and the Palestinian Bureau of Statistics granted the researchers access to relevant data, after subjecting data to processing aiming to preserve the confidentiality of individual data. The researchers are solely responsible for the conclusions and inferences drawn upon available data.

**ABSTRACT**

Despite widespread assumptions about women's empowerment and agency in the Arab Middle East, psychometric research of these constructs is limited. Using national data from 6,214 married women ages 16 – 49 who took part in the 2006 Egypt Labor Market Panel Survey (ELMPS), we applied factor analysis to explore and then to test the factor structure of women's agency. We then used Multiple Indicator Multiple Cause (MIMIC) structural equations models to test for differential item functioning (DIF) by women's age at first marriage, a noted potential resource for women's agency. Our results confirm that women's agency in Egypt is multi-dimensional and comprised of their (1) influence in family decisions, including those reserved for men, (2) freedom of movement in public spaces, and (3) attitudes about gender, specifically violence against wives. These dimensions confirm those explored previously in selected rural areas of Egypt and South Asia. Yet, three items showed significant uniform DIF by women's categorical age at first marriage, with and without a control for women's age in years. Models adjusting for DIF and women's age in years showed that women's older age at first marriage was positively associated with the factor means for family decision-making and gender-violence attitudes, but not freedom of movement. Our findings reveal the value of our analytical strategy for research on the dimensions and determinants of women's agency. Our approach offers a promising model to discern "hierarchies of evidence" for social policies and programs to enhance women's empowerment.

Keywords: Egypt, Egypt Labor Market Panel Survey, measurement invariance, women's empowerment, women's agency

## INTRODUCTION

*Women's empowerment* is the process by which women acquire *enabling resources*, such as schooling, materials assets, and extra-familial support, which in turn, may enhance women's *agency*, or ability to "define their own life-choices," even with opposition from others (Kabeer 1999:438). Scholarship on women's agency, or related constructs, emerged in the 1960s with a focus on wealthier settings (e.g., Blood and Wolfe 1960; Safilios-Rothschild 1970) and some years later with a focus on poorer settings (e.g., Dixon 1976; Mason 1986; Ward 1984; Whyte 1978; Young, Fort, and Danner 1994). According to feminist scholars, women's agency is an important end in itself; whereas, instrumentalists see women's agency as a useful means to other ends, such as improved child health (Hossain et al. 2007; Malhotra and Schuler 2005; Shroff et al. 2009; Shroff et al. 2011). Irrespective of the underlying interest in women's agency, articulating its dimensions in local contexts and standardizing approaches to its measurement are priorities for international research and policy (e.g., Ghuman, Lee, and Smith, 2006; Author et al. nd).

Most scholars agree that women's agency is multi-dimensional and context-specific (e.g., Kabeer 1999; Kishor 1995, 2000; Malhotra and Schuler 2005; Mason 1986, 2005; Author 2005). With some exceptions (e.g., Kishor 2000; Author et al. nd; Author 2005), efforts to measure women's agency or its dimensions have focused on settings in South Asia (e.g., Agarwala and Lynch 2006; Allendorf 2012; Ghuman et al. 2006; Jejeebhoy 2000; Mahmud et al. 2012). Also, most research on women's agency has relied on secondary data from multi-purpose surveys, which are constrained in the number of agency-related items they can include (Kishor and Subaiya 2008). Many efforts to operationalize women's agency have been ad hoc, with the choice of included items atheoretical and data-driven. Not surprisingly, findings on the health-related correlates of women's agency are discrepant (e.g., Abada and Tenkorang 2012; Hadley, Brewis, and Pike 2010; Story and Burgard 2012). Therefore, systematic and theoretically grounded approaches are needed to

operationalize and to measure women's agency in local contexts (Ghuman et al., 2006; Sandberg and Rafail 2013; Author et al. nd). Here, we extend our research agenda to measure women's agency in the Arab Middle East, a region lacking in rigorous studies of this kind. Using national data from 6,214 married women ages 16 – 49 who took part in wave two of the Egypt Labor Market Panel Survey in 2006 (ELMPS), we applied factor analysis to explore and then to test the factor structure of women's agency. We then used Multiple Indicator Multiple Causes (MIMIC) structural equations models (Jöreskog and Goldberger 1975) to test for differential item functioning (DIF) by women's (later) age at first marriage and to evaluate whether this potential resource for women's agency (Malhotra 1997) may introduce construct-irrelevant variance into the scales. An item displays uniform DIF when the statistical relationship between item response and group is constant over the continuum of the latent women's agency construct (Hanson 1998). With its focus on women's resources and agency, the ELMPS permits an extension of our exploratory work measuring women's agency in rural areas of one Egyptian governorate (Author et al. nd).

## BACKGROUND

### Definitions of Women's Agency

Definitions of women's agency and related concepts have evolved since the 1970s (Dixon 1975; Dyson and Moore 1983; Kabeer 1999; Mahmud 1994; Mason 1986; Malhotra and Schuler 2005; Author et al. nd). Terms like *women's status, gender equality*, and *women's autonomy* have referred to related, but contested, constructs. Historically, *women's status* was aligned with interests in women's (absolute) education as a means to accelerate fertility decline (Mahmud 1994). Some scholars have viewed this term as being static, imprecise, and non-relational, lacking reference to women's accrued influence in decisions customarily reserved for men (Mahmud 1994). The term *gender (in)equality* emerged to reflect women's disadvantage vis-à-vis men in human rights,[1] private relations, education,

[1] Human rights include basic needs and civil rights.

and the economy (Dixon 1976; Mason 1986; Young et al. 1994). Some scholars have critiqued these concepts and measures for being based on Western capitalist views of equality (Young et al. 1994). The term *women's autonomy*, or the capacity for individual decision, retains widespread use in demography and public health; yet, some scholars question its application to settings where women's social relations are salient aspects of their identities (Joseph 1993; Kabeer 2011).

*Women's agency* refers to their ability to make strategic life choices under historically evolving constraints (Kabeer 1999; Author et al. nd). Gaining access to enabling human, economic, and social resources may facilitate a woman's agency, which in turn, may enhance her *achievements* (Kabeer 1999; Mahmud et al. 2012). Women's agency arises at the individual cognitive and attitudinal level, as well as at the relational and collective societal levels (e.g., Kabeer 1999, 2011; Malhotra and Schuler 2005). Our focus is on conceptualizing and measuring women's individual and relational agency.

Women's agency is viewed widely as a multidimensional construct (Kabeer 1999; Malhotra and Schuler 2005; Mogford 2011; Author 2005). We conceptualize women's agency as arising in three domains (Sandberg and Rafail 2013; Author et al. nd): economic and other decisions in the family, especially those reserved for men; freedom of movement in public spaces; and the vocalization of personal views favoring more equitable roles and rights vis-à-vis men. Furthermore, we agree with others that women's agency is context-specific (Mahmud 2003; Mason 1986; Ghuman et al. 2006; Smith et al. 2011). An Egyptian woman, for instance, who travels without a male guardian's permission may be agentic; whereas, this action would be less agentic in settings where women's movement is less constrained (Author et al. nd).

**Measurement of Women's Agency**

Agreement on the *multidimensionality* and *context specificity* of women's agency reveals some operational weaknesses in the measurement literature. First, many researchers have not captured the multiple, inter-correlated dimensions of women's agency. Some have depicted women's agency as

the sum of theoretically distinct items (Nawar et al. 1995), and others have used selected dimensions as proxies for women's overall agency (Bloom et al. 2001; Kantor 2003; Lee-Rife 2010; Leon 2013; Mistry et al. 2009; Upadhyay and Hindin 2005). Second, the common use of summative scales to measure women's agency ignores the possibilities of measurement error and the unequal weighting of observed items (Steele and Goldstein 2006). Third, the items in summary measures of women's agency often differ across studies without theoretical, empirical, or contextual justification (Malhotra and Schuler 2005). Finally, most of this research has been undertaken outside the Arab Middle East. As a result, little is known about women's agency in this region, despite frequent references to Arab women's disempowerment (e.g., Caldwell 1986; United Nations Development Programme and Arab Fund for Economic and Social Development 2002).

Thus, with some exceptions (Agarwala and Lynch 2006; Ghuman et al. 2006; Sandberg and Rafail 2013; Steele and Goldstein 2006; Author et al. nd; Williams 2005; Author 2005), few scholars have applied advanced statistical methods to explore and to test the latent structure of women's agency, including the number of factors, the loadings of contextually relevant items on specific factors, and the inter-correlations of factors, accounting for measurement error. As a result, researchers still use weak measures of women's agency, diluting inferences about its determinants and effects (Abada and Tenkorang 2012; Hadley, Brewis, and Pike 2010; Story and Burgard 2012).

Another common assumption of research on women's agency is that of measurement invariance, or the equivalence of measurement properties, across groups. One aspect of the non-equivalence of measurement scales is statistical item bias or *differential item functioning* (DIF). DIF refers to the distinct measurement properties of a scale item for different subgroups, accounting for overall differences between the subgroups on the construct being measured (Holland and Wainer 1993). An item shows DIF if people from two or more distinct groups who have equivalent levels of the underlying construct have different probabilities of endorsing each response category for an item

(Mellenbergh 1989). For example, compared to women who first married at *younger ages*, such as before 16[2] (United Nations Population Division 2011), women who first married at *older ages* (16 – 29) and *much older ages* (30 or older)[3] (El-Zanaty and Way 2009) should, in theory, have higher agency because of real differences in individual and household *needs*, *opportunities*, and *values* reflected in later marriage (Spierings, Smits, and Verlos 2010). Namely, women who first marry at older ages may have (1) fewer children (El-Zanaty and Way 2009) and lower *needs* for childcare, (2) more *opportunities* for schooling, market work, and skills enhancement before marriage, and (3) birth and marital families that *value* women's mobility and influence in the family (Desai & Andrist 2010; Spierings et al. 2010). That said, women with different ages at first marriage also may interpret specific agency items differently or have divergent motivations for choosing certain response categories. As a result, women who first marry at younger versus older or much older ages may respond systematically differently to the same agency-related item, even when their underlying levels of agency are the same.

In Western settings, measurement non-invariance across groups has been observed with various scales (e.g., Cauffman and MacIntosh 2006; Edelen, McCaffrey, Marshall, and Jaycox 2009; Fletcher and Hattie 2005; Gelin and Zumbo 2003). Elsewhere, researchers have reported differences in women's agency without assessing the scale for DIF across theoretically relevant groups (Mahmud et al. 2012). Ignoring imbalances in DIF may lead to biased scores for domains of agency (Reise, Widaman, and Pugh 1993), confounding interpretation of observed group differences in one or more domains. Identifying the sources and extent of non-invariance can (1) improve the accuracy of measurement by removing items with DIF or adjusting for measurement bias and (2) clarify how individuals may interpret or respond to items differently because of group membership.

## Studies of Women's Agency in the Arab Middle East and Egypt

### *Agency under Systems of Classic Patriarchy*

[2] Sixteen years is the minimum legal age of marriage for women in Egypt.
[3] At ages 30 – 34, less than 7.0 percent of Egyptian women remain never-married (El-Zanaty and Way 2009).

Other, contextual considerations arise when measuring women's agency in Arab Middle Eastern settings. In Egypt, familial and kin relations share certain features with the ideal-type model of *classic patriarchy* (Kandiyoti 1988). Understanding how classic patriarchy manifests locally is central to understanding women's agency in this context. Under this model, family and household arrangements are organized along an age–gender hierarchy, with ultimate authority vested in a senior male head. As such, descent and property are transferred through men (Kabeer 2011). Moreover, through the practice of early and patrilocal marriage, new brides leave their natal homes to become part of their husband's family. A woman's position in her marital family hinges on bearing children and especially sons, who will continue the family name and inherit the family's property. The rules of exchange governing familial gender relations dictate that women obey men, who in turn, "must" offer financial support and protection (Cain, Khanam, and Nahar 1979). Defining women as a *protected group* effectively restricts their movement and social interaction in public space. Today in Egypt, the symbolic and practical restriction of women's interactions with unrelated men manifests through veiling and women-only sections on public transport (Author et al. nd). For many, women's adherence to gender segregation signifies feminine respectability, which in turn, preserves the honor of women's male kin (Macleod 1991). These constraints limit women's access to material resources and their social interactions mainly to marital and natal kin. As a result, women are dependent for much of their lives on male kin, with guardianship passing from their father (and brothers) to their husband, and finally to a son. This enduring reliance on men for "protection" renders women vulnerable to *patriarchal risk* (Cain et al. 1979), or the chance of marked and lasting declines in economic welfare and social status from terminating ties with male guardians. This risk induces women to comply with male dominance and to exhort men's duties of maintenance and protection to enhance their life chances. Thus, while the contours of classic patriarchy disempower women, the promised benefits and averted risks of compliance urge women to sustain the status quo.

### *Salient Dimensions of Agency for Egyptian Women*

Given the contours of classic patriarchy in Egypt, scholars have identified women's participation in family decisions (especially those reserved for men), freedom of movement in public spaces, and vocalization of views favoring more equitable gender roles and rights as salient aspects of their agency in Egypt (Govindasamy and Malhotra 1996; Kishor 1995, 2000; Nawar et al. 1995; Author et al. nd; Author 2005). Ethnographic research in Egypt confirms that these three dimensions of agency matter to women. For instance, some Egyptian women protect their relegated authority over children because it affords them some influence in the family (Henry 2011; Author 2005). Among micro-credit recipients in Cairo, many women have described their expanded freedom of movement as enhancing their capacity to pursue their wishes (Drolet 2011; Author et al. nd). Women working outside the home have described their spatial mobility in more dramatic terms than have home-based working women (Sholkamy 2012). Women also have identified the internet as a way to learn new ideas about gender relations (Wheeler 2007), and women's efforts to raise their children to value gender equity has enabled women to change gender norms intergenerationally (Henry 2011; Author et al. nd).

### *Quantitative Measurement of Women's Agency in Egypt*

A few researchers have measured quantitatively one or more dimensions of women's agency in Egypt. Some researchers have measured women's agency with a single summative index (Nawar et al. 1995). Others have created summative indices for multiple domains of women's agency (Govindasamy and Malhotra 1996; Kishor 1995). Scholars also have used factor analysis to construct scales capturing women's influence in family decisions that typically are relegated to women or reserved for men (Author 2005). To our knowledge, only one study outside of our work (Kishor 2000) has used factor analysis to explore the multi-dimensionality of a construct similar to women's agency in Egypt. Kishor (2000) explored the factor structure of what she called *women's empowerment*, reducing 32 indicators into 10 dimensions capturing financial autonomy, participation in the modern

sector, lifetime exposure to employment, sharing of roles and decision-making, family structure amenable to empowerment, equality in marriage, devaluation of women, women's emancipation, marital advantage, and traditional marriage. The limitations of efforts to measure women's agency in general also apply to research in Egypt, including some tendency to ignore multi-dimensionality and measurement error, as well as measurement models that warrant more theoretical grounding.

**Hypotheses**

This review spurs two hypotheses. First, women's agency in Egypt will be a multi-dimensional construct with correlated domains related to their influence in family decisions (including those often reserved for men) (Hoodfar 1997), freedom of movement in public space, and the expression of views favoring more equitable roles and rights for women vis-à-vis men. Second, there will be minimal differential item functioning across women who first married at younger (<16 years) versus older (16 – 29 years) and much older (30 – 42 years) ages.

**METHOD**

**Sample**

The ELMPS, a 14-year national household panel, originally enrolled in 1998 a probability sample of 4,816 households in which 4,825 women 15–54 years were living. About 80% of these households, as well as ones that split from them and a refresher sample of 2,500 households were (re)interviewed in 2006, for a total of 8,349 households. The sample for this analysis includes married women ages 16 – 49 in the 2006 survey round who were (1) originally interviewed in 1998 (n = 3,062) OR identified in the national probability refresher sample in 2006 (n=3,153) and having complete data on women's age at first marriage, for a total sample size of 6,214.

**Data**

The ELMPS collects detailed, comparable data across waves for household members ages 6 years or older on their employment, unemployment, and underemployment; as well as their job

attributes, mobility, wages, and earnings. Other data on households pertain to assets, amenities, family enterprises, and remittances, as well as each member's health status, demographics, life events, and parental and sibling background. The ELMPS also collects detailed, comparable data across waves on women members' time allocation to domestic and subsistence labor, influence in family economic decisions (15 years or older), women's fertility histories (ever-married women 16 years or older), and assets brought to marriage (married women 16 years or older). A community questionnaire gathered data in 2006 on access to services and work opportunities in sampled localities.

In 2006, the focal year for this analysis, detailed data were collected on the three domains of agency that we identified previously in an exploratory factor analysis of data from rural Minya, Egypt (Author et al. nd). Interviewers in the ELMPS asked about 28 questions pertaining to women's agency, including six items about their influence in family (economic) decisions (DM_01-DM_06), four items about their freedom of movement (FM_01-FM_04), and 18 items about their attitudes regarding violence against wives (GVA_01-GVA_06) and gender relations (GA_01-GA_12). Table 1 shows, by domain of agency, the frequency distributions of items we initially considered.

[Table 1]

**Analyses**

***Descriptive Analyses***

The data for the main analysis come from survey responses to all items on women's influence in family decisions, freedom of movement, and attitudes about gender roles and rights vis-à-vis men (Table 1). All items were retained for the main analysis because women's responses to all items showed sufficient variability for inclusion. Three attitudinal items with a negative valence were reverse coded, so that 5 indicated *strong disagreement* and 1 indicated *strong agreement* with the *unfavorable* statement about gender equity. The relative frequencies of all items were estimated to assess their completeness and distributions. Given the binary or ordinal response options for each item,

polychoric correlations were estimated in random split samples (see below) to assess the level of bivariate association between any two items (Bandalos and Finney, 2010). These correlation matrices were the basis for exploratory and confirmatory factor analyses.

***Exploratory and Confirmatory Factor Analyses***

Exploratory factor analysis (EFA) is recommended to identify the factor structure for a set of items when a measure has received little study (Bandalos and Finney, 2010). In EFA, items are not constrained to load on specific factors, so the factor structure for a set of items may be identified. When the sample size allows, confirmatory factor analysis (CFA) can be estimated on a randomly selected, independent subsample to test the factor structure identified in the EFA (Bandalos and Finney, 2010). Because our total sample size exceeded the size needed for random split-sample analyses (Bandalos and Finney, 2010), we performed the EFA on a randomly selected one-third subsample, and the subsequent CFA on a randomly selected two-thirds subsample. Excluding from the CFA subsample one participant with missing data for age at first marriage yielded final split samples of $N_1$=2,072 for the EFA and $N_2$=4,142 for the CFA. T-tests, chi-square tests, and Kruskal Wallis tests revealed significant ($p \leq 0.05$) differences in only three attributes of the two subsamples: the number of live births, DM_01 (*making large household purchases*), and FM_03 (*ability to take children to the local health center or doctor*). Otherwise, these subsamples were similar on all observed attributes (Tables 1 – 2).

[Table 2]

Using EFA, we examined the data to assess scale dimensionality and item factor loadings. We ran sequential one- to five-factor EFA models on all items, examining the model fit indices (Root Mean Square Error of Approximation, RMSEA; Comparative Fit Index, CFI; and Tucker-Lewis Index, TLI) and interpreting the findings after GEOMIN or oblique rotation (Muthén and Muthén, 1998-2012). Initially, at each estimation, we removed items that were weakly related to a single

underlying construct (had a negative loading, a loading < 0.300, or a significant cross-loading > |0.300| on a second factor). The resulting 3-factor, 24-item model had poor fit to the data,[4] and was difficult to interpret from theory. As a next step, we ran an EFA model with 16 items, keeping all items pertaining to decision making and freedom of movement, but retaining only the six items related to gender attitudes about violence against wives (GVA_01-GVA_06) and dropping the more general gender attitudes items (GA_01 – GA_12). This approach corroborates the work of others (e.g. Agarwala and Lynch, 2006; Sandberg and Rafail 2013) and our own (Author et al. 2014) using questions on the justification of violence against wives to measure dimensions of women's agency or related constructs. After removing one item with a significant cross-loading on a second factor (FM_01), we chose a final, 15-item, three-factor model over other factor models based on factor loadings, model fit indices (RMSEA *close to* 0.060 or less; CFI *close to* 0.950 or greater; TLI *close to* 0.950 or greater) (Brown, 2006; Harrington, 2008), and theoretical interpretation.

We then used the other random split sample ($N_2$=4,142) to test the factor structure of the final 15-item, three-factor EFA model. We assessed the factor loadings of the CFA model for comparability with those of the final EFA model and assessed the fit of the CFA model using similar criteria for fit indices as those described above.

***Tests for Differential Item Functioning across Women's Age at First Marriage***

After assessing the CFA model, we used the same random split sample ($N_2$=4,142), and estimated a Multiple Indicator Multiple Cause (MIMIC) structural equation model to test the agency measurement model for differential item functioning (DIF) by women's age at first marriage. To do so, we added to CFA models for women's agency a categorical measure (<16 years [ref], 16 – 29 years, 30 – 42 years) for women's age at first marriage to test for the invariance of indicator

[4] An EFA model estimated with the 'indifferent" category of gender attitudes items GA_02 – GA_12 recoded as missing also resulted in a 3-factor, 24-item model with poor model fit.

thresholds and factor means.[5] After accounting for factor mean differences in the three dimensions of agency (DM, FM, and GVA) by women's age at first marriage, we assessed modification indices (estimated improvements in model fit) for allowing direct effects of women's age at first marriage on the agency items to be estimated freely. We added the direct effect with the largest modification index and retained this effect if it was significant ($p \leq 0.05$) and improved model fit ($p \leq 0.05$ for Chi-square test for difference). Iterations continued until adding direct effects of women's age at first marriage on single agency items no longer improved model fit. Next, we tested this final "DIF" model for potential confounding by adjusting for factor mean differences in the three dimensions of women's agency by women's age in years, a demographic variable that is likely to be correlated with women's age at first marriage and with their agency.

Finally, in sensitivity analyses, we re-estimated the final MIMIC model (1) with a subset of women drawn from the CFA random-split half sample with non-missing data for FM_03 (N=3,357), (2) with a subset of women derived from selecting one woman per household (N=3,852), and (3) not accounting for stratification and clustering at the primary sampling unit (PSU) level (N=4,142). The results of all sensitivity analyses corroborated those for the final MIMIC model, lending support to the robustness of our findings (available on request). All models were estimated in Mplus7 (Muthén and Muthén 1998-2012) using an estimation approach suitable for models with binary or ordinal data (mean and variance-adjusted weighted least squares, WLSMV) and accounting for the complex sampling design (Muthén and Muthén 1998-2012).

## RESULTS

### Characteristics of the Sample

Table 2 shows the distributions of our sample according to demographic attributes and

[5] We also explored DIF in MIMIC models with age at first marriage as a continuous covariate (available upon request). We retained age at first marriage as a categorical covariate in final models because: (1) the theoretical relevance of the classification and (2) some items displayed DIF in only one of the two possible pairwise comparisons (<16 years vs. 16 – 29 years; <16 years vs. 30 – 42 years) suggesting nonlinearity.

enabling resources that have been associated with women's agency in the literature. On average, women were 33 years old and had had about three children. Women's husbands were almost 40 years old, on average. About 24 percent of women's husbands were illiterate, and 50 percent had completed at least secondary school. By contrast, women more often were illiterate (38%), and less often (44%) had completed at least secondary school. About one fourth of women had engaged in market work in the past three months.[6] A majority were living in the same location since birth (73%). A minority first married a first cousin (20%), and women's mean age at first marriage was 20.4 years. Most women (90%) were married between the ages of 16 and 19, with 7% of women married before age 16 and 3% of women married at ages 30 – 42 years.

**Descriptive Statistics for Indicators of Women's Agency**

A majority of women reported having the final say alone in decisions typically relegated to women, including household purchases for daily needs (60%) and what food should be cooked that day (56%) (Table 1). Women reported less often having the final say alone in decisions about buying clothes for themselves (35%), getting medical treatment or advice for themselves (27%), visits to friends, family, or other relatives (19%), and making large household purchases (8%). Instead, a majority of women made decisions jointly with someone else about visits to friends, family, or relatives (52%) and getting medical treatment or advice for themselves (50%), and for a majority of women, others made decisions about large household purchases (54%) (Table 1).

For all four freedom of movement items, a substantial minority of women reported they could go without permission to the market (29%), but very small minorities of women reported they could go without permission to the local health unit or doctor (7%), the local health unit or doctor for children (9%), and the house of relatives, friends, or neighbors (6%). To visit the doctor or relatives/friends/neighbors, women most often needed permission (40% - 62%), but in a plurality

[6] Engagement in market work captured whether the woman reported either participating in any employment, or performing any of 13 economic activities in the past three months.

of cases (36%), women who were going to the market only needed to inform others. Women rarely stated that they were never able to go alone to the market (5%).

A majority of women consistently felt that a husband is not justified in beating his wife if she burns the food (90%), wastes his money (77%), refuses to have sex with him (76%), neglects the children (75%), talks with other men (73%), and argues with her husband (65%). A majority of women, however, were afraid of disagreeing with their husband (father or brother) or other men in the household (39%) (GA_01). A majority of women agreed with the attitudinal items reflecting greater gender equity (GA_02 – GA_04, GA_06, GA_08, GA_10 – GA_12), and a majority disagreed with the attitudinal items reflecting less gender equity (GA_05, GA_07, GA_09) (Table 1).

**Factor Analyses and MIMIC Models of Women's Agency**

Table 3 shows the results of (1) the geomin-rotated factor loadings (pattern matrix) for the final three-factor EFA model, (2) the three-factor CFA model, (3) the baseline MIMIC model that adjusts only for factor mean differences by women's age at first marriage, (4) a MIMIC model that adjusts for significant direct effects of women's age at first marriage on the agency items (DIF), and (5) the final MIMIC model that adjusts also for factor mean differences by women's age in years.

In the final three-factor EFA model, all six DM items had significant ($p \leq 0.05$) factor loadings equal to or exceeding 0.498 on the first factor (Table 3, Model 1). Based on the pattern of factor loadings, we refer to the first factor as the *decision making factor*. Three FM items had significant factor loadings of sizeable magnitude (0.634 – 0.887) on the second factor (*freedom of movement factor*). Six GVA items had significant and high factor loadings (0.831 – 0.925) on the third factor (*gender violence attitudes factor*). All of these items measured women's justification of IPV (GVA_01 – GVA_06). The fit indices for this three-factor EFA model suggested a good fit with the data (RMSEA = 0.053; CFI = 0.967; TLI = 0.946).

[Table 3]

In general, the pattern matrices are similar across the EFA and CFA models. The results of the CFA confirmed significant and high (≥ 0.300) loadings for the dimensions of decision-making (0.480–0.791), freedom of movement (0.634 – 0.905), and gender violence attitudes (0.805 – 0.901). The CFA model also had a good fit with the data (RMSEA = 0.033, CFI = 0.982, TLI = 0.978).

The baseline MIMIC model (Table 3, Model 3) showed that, compared to women first married before age 16, the factor mean differences in dimensions of women's agency for women first married at older and much older ages were positive and significant for decision-making (age at first marriage [AFM] 16 – 29 years 0.189; AFM 30 – 42 years 0.553) and for gender violence attitudes (AFM 16 – 29 years 0.200; AFM 30 – 49 years 0.719), but not significant for freedom of movement. Estimates in the subsequent and final MIMIC models show that the association of women's age at first marriage with women's agency, controlling for uniform DIF (Model 4) as well as for uniform DIF and women's age in years (Model 5). Three items showed uniform DIF across one pairwise comparison with the reference category of AFM ≤ 16 years (FM_04 on AFM 30 – 42 years, DM_01 on AFM 16 – 29 years, DM_06 on AFM 16 – 29 years; Model 4). Controlling for uniform DIF, the indirect association of AFM 16 – 29 years with decision-making became non-significant (0.189 to 0.127) and the indirect association of AFM 30 – 42 years with freedom of movement became less negative (-0.163 to -0.063), but remained non-significant. All other indirect associations remained consistent with the baseline model (Model 3). After adding a control for women's age in years in the final MIMIC model (Model 5) the indirect association of age at first marriage 16 – 29 years with decision-making was, again, positive and significant (0.244), while the other indirect and direct associations (uniform DIF) remained consistent with Model 4.

**Factor Correlation Matrices of the Dimensions of Women's Agency**

Table 4 shows the geomin factor correlations between the three dimensions of women's agency for the final, three-factor EFA model, the three-factor CFA model, and the final MIMIC

model with controls for women's age in years and DIF in the agency items by women's age at first marriage. In all models, the decision-making factor was significantly positively correlated with the freedom of movement and gender-violence-attitudes factor. The stronger of these two correlations was that between the decision-making factor and the freedom of movement factor (0.388 for the EFA, 0.393 for the CFA, and 0.373 for the MIMIC). In all models, the gender-violence-attitudes factor was not significantly correlated with the freedom-of-movement factor.

[Table 4]

## DISCUSSION

Using rich data on women's agency from a national sample of 6,214 married women ages 16 – 49, we performed to our knowledge the most comprehensive, methodologically rigorous, and theoretically grounded assessment of women's agency in an Arab Middle Eastern setting. This analysis extends prior quantitative research on "women's empowerment" in Egypt (Govindasamy and Malhotra 1996; Kishor 1995, 2000; Nawar et al. 1995) by relying on subsequent theory and ethnographic evidence (see review, above) and by assessing systematically the factor structure of women's agency and differential item functioning across an important potential determinant– women's age at first marriage. This analysis also complements the more extensive research on women's agency in South Asia. Finally, our analytical strategy offers a useful model for measuring women's agency and for interpreting studies of its determinants and effects for social policy.

This analysis, in general, lends strong support for our initial hypotheses. First, our results show that women's agency in Egypt is a multidimensional construct. Our final, 15-item model captured three factors reflecting women's influence mainly in financial decisions in the family (some relegated to women; others, such as large purchases, reserved for men, Hoodfar 1997), freedom of movement in public spaces, and vocalization of views favoring more equity in the roles and rights of women vis-à-vis men, especially related to violence against wives (Author et al. nd). Each of these

dimensions corresponded to a well-theorized aspect of women's agency. The dimensions of agency explored and confirmed in this national analysis corroborate those derived from early work in Egypt (Nawar 1995), those explored quantitatively in rural Minya, Egypt (Author et al. nd), and in qualitative research with Egyptian women (Drolet 2011; Henry 2011; Hoodfar 1997). Our elimination of attitudinal items reflecting women's general roles and rights departed slightly from our prior work in rural Minya (Author et al. nd) but corroborated other work in South Asia (Agarwala and Lynch 2006). Focused cognitive interviewing and further psychometric testing of these attitudinal items is warranted for the Egyptian context.

Likewise, two of the three dimensions of women's agency were significantly and positively correlated, corroborating the idea that women's agency is multi-dimensional. The lack of a significant correlation between women's gender-violence attitudes and freedom of movement contradicts our findings from rural Minya (Author et al. nd) but corroborates research in South Asia showing weak or non-significant correlations between gender-violence attitudes and other dimensions of women's agency (Agarwala and Lynch 2006). More research is needed, in the Arab Middle East and elsewhere, to explore the correlations between dimensions of women's agency, particularly gender-violence attitudes.

Second, our analysis identified uniform DIF for three items, one freedom-of-movement item and two decision-making items. The group difference associated with women first married between ages 16 – 29 versus those first married before age 16 became non-significant after adjustment for the presence of DIF. Including a control for women's age did not attenuate the direct effects of women's age at first marriage on the agency items, suggesting that adjusting for DIF in latent structural models of the determinants of women's agency is warranted, even with the inclusion of selected control variables. After accounting for uniform DIF across these three items, the standardized factor mean difference for decision-making was 33 % lower (0.189 to 0.126) for

women first married between ages 16 – 29 versus those first married before age 16, and the standardized factor mean difference for freedom of movement was 61% higher (-0.163 to -0.063) for women married at age 30 or older compared to those married before age 16. These changes highlight the value of identifying and accounting for measurement non-invariance in women's agency in studies of its determinants or effects.

Some reflection on the three items showing uniform DIF may clarify the ways in which women who differ in their age at first marriage may interpret or respond to these items differently. Compared to women who first married before age 16, those who first married at ages 30 – 42 had lower-than-expected scores for their responses to the item about visiting the houses of relatives, friends, or neighbors (FM_04). In our sample, 55% of women who first married at ages 30 – 42 had lived in the same location since birth, compared to 72% of those who first married at ages 16 -29, and 81% of those who first married before age 16 ($p = 0.00$). Thus, the item about visits to relatives, friends or neighbors may have held a different meaning for these women. Reasons are less clear for the higher-than-expected scores for decisions about large purchases (DM_01) and buying clothes for herself (DM_06) for women first married at ages 16 – 29 versus those married before age 16. The composition of our sample (married women ages 16 – 49) did not allow for comparison of agency scores for unmarried women, and even after adding women's age in years as a control, DIF for these items remained. Future qualitative research may help to explain the reasons that these items showed DIF by age at first marriage. Future psychometric research should assess whether these items show DIF in the Arab Middle East and elsewhere. For items consistently showing DIF, modifying question wording, dropping these items, or adjusting for DIF in factor-mean comparisons may be warranted.

Our findings have important implications for research, programs, and social policies focused on women's empowerment and agency in Egypt and beyond. Although women's agency, and empowerment more broadly, have been a focus of research, programs, and policies for decades,

rigorous psychometric evaluation of this construct has been limited, especially in the Arab Middle East. Our findings support the conceptualization of women's agency in Egypt as a multi-dimensional construct, for which two of its three domains are positively associated with women's older age at first marriage after adjustment for uniform DIF and women's age in years. Our systematic approach to the validation of a measurement model for women's agency in a national sample of Egyptian women should be replicated in other populations. Our approach offers a promising model to discern "hierarchies of evidence" regarding the measurement of women's agency, as well as its determinants and effects, to inform social policies on women's empowerment. Developing causal models of this relationship with the psychometrically sound measures of agency presented here is the next important step in research.

**REFERENCES**


Abada, T., & Tenkorang, E. Y. (2012). Women's autonomy and unintended pregnancies in the Philippines. *Journal of Biosocial Science*, 44(6), 703-718.

Agarwala, R., & S. M. Lynch. (2006). Refining the measurement of women's autonomy: An international application of a multi-dimensional construct. *Social Forces*, 84(4), 2077-98.

Allendorf, K. (2012). Women's agency and the quality of family relationships in India. *Population Research and Policy Review*, 31(2), 187 – 206.

Author et al. (nd). (under review).

Author. (2005). *Journal of Marriage and Family*.

Author et al. (2014). *Demography*.

Bandalos, D. L., & Finney, S. J. (2010). Factor analysis: Exploratory and confirmatory. In G. R. Hancock & R. O. Mueller (Eds.), *The reviewer's guide to quantitative methods in the social sciences* (pp. 93–114). New York and London: Routledge.

Blood, R. O. Jr., & Wolfe, D. M. (1960). *Husbands and wives: The dynamics of married living*. New York: The Free Press.

Bloom, S. S., Wypij, D., & das Gupta, M. (2001). Dimensions of women's autonomy and the influence on maternal health care utilization in a North Indian City. *Demography*, 38(1), 67-78.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Cain, M., Khanam, S. R., & Nahar, S. (1979). Class, patriarchy and women's work in Bangladesh. *Population and Development Review*, 5(3), 405–438.

Caldwell, J. C. (1986). Routes to low mortality in poor countries. *Population and Development Review*, 12(2), 171 – 220.

Cauffman, E., & MacIntosh, R. (2006). A Rasch differential item functioning analysis of the Massachusetts Youth Screening Instrument: Identifying race and gender differential item

functioning among juvenile offenders. *Educational and Psychological Measurement*, 66, 502–521.

Dixon, R. B. (1975). Women's rights and fertility. *Reports on Population/Family Planning*, 17, 1–20.

Dixon, R. B. (1976). Measuring equality between the sexes. *Journal of Social Issues*, 32, 19 – 32.

Drolet, J. (2011). Women, microcredit and empowerment in Cairo, Egypt. *International Social Work,* 54(5), 629–645.

Dyson, T., & Moore, M. (1983). On kinship structure, female autonomy, and demographic behavior in India. *Population and Development Review*, 9(1), 35–60.

Edelen, M. O., McCaffrey, D. F., Marshall, G. N., & Jaycox, L. H. (2009). Measurement of teen dating violence attitudes: An Item Response Theory evaluation of differential item functioning according to gender. *Journal of Interpersonal Violence*, 24(8), 1243–1263.

El-Zanaty, R. & Way, A. (2009). *Egypt demographic and health survey 2008*. Cairo, Egypt: Ministry of Health, El-Zanaty and Associates, and Macro International.

Fletcher, R., & Hattie, J. (2005). Gender differences in physical self-concept: A multidimensional differential item functioning analysis. *Educational and Psychological Measurement*, 65, 657-667.

Gelin, M. N., & Zumbo, B. D. (2003). Differential item functioning results may change depending on how an item is scored: An illustration with the center for epidemiologic studies depression scale. *Educational and Psychological Measurement*, 63, 65–74.

Ghuman, S. J., Lee, H. J., & Smith, H. L. (2006). Measurement of women's autonomy according to women and their husbands: Results from five Asian countries. *Social Science Research*, 35, 1–28.

Govindasamy, P., & Malhotra, A. (1996). Women's position and family planning in Egypt. *Studies in Family Planning* , 27(6), 328–340.

Hadley, C., Brewis, A., & Pike, I. (2010). Does less autonomy erode women's health? yes. no. maybe. *American Journal of Human Biology*, 22(1), 103–110.

Hanson, B. A. (1998). Uniform DIF ad DIF defined by differences in item response functions.

*Journal of educational and behavioral statistics, 23*(3), 244-253.

Harrington, D. (2008). *Confirmatory Factor Analysis*. Oxford: Oxford University Press.

Henry, H. M. (2011). Egyptian Women and Empowerment: A Cultural Perspective. *Women's Studies International Forum*, 34(3), 251–259.

Holland, P. W., & Wainer, H. (1993). *Differential Item Functioning*. Hillsdale, NJ: Lawrence Erlbaum.

Hoodfar, H. (1997). *Between marriage and the market: Intimate politics and survival in Cairo*. Berkeley: University of California Press.

Hossain, M. B. , Phillips, J. F. & Pence, B. (2007). The effect of women's status on infant and child mortality in four rural areas of Bangladesh. *Journal of Biosocial Science*, 39(3), 355–366.

Jejeebhoy, S. J. (2000). Women's autonomy in rural India: Its dimensions, determinants, and the influence of context. In H. Presser & G. Sen (Eds.), *Women's empowerment and demographic processes: Moving beyond Cairo* (pp. 204 – 238). New York: Oxford University Press.

Jöreskog, K. G. & Goldberger, A. S. (1975). Estimation of a model with multiple indicator, multiple causes of a single latent variable. *Journal of the American Statistical Association*, 70, 631 – 639.

Joseph, S. (1993). Connectivity and patriarchy among urban working-class women in Lebanon. *Ethos*, 21(4), 452-484.

Kabeer, N. (1998). 'Education is my daughter's future' (testimonies of Bangladeshi women). *Index of Censorship*, 27(3), 154-160.

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change*, 30(3), 435-464.

Kabeer, N. (2011). Between affiliation and autonomy: Navigating pathways of women's empowerment and gender justice in rural Bangladesh. *Development and Change,* 42(2), 499–528.

Kandiyoti, D. (1988). Bargaining with patriarchy. *Gender and Society*, 2(3), 274–90.

Kantor, P. (2003). Women's empowerment through home-based work: Evidence from India.

*Development and Change*, 34(3), 425-45.

Kishor, S. (1995). Autonomy and Egyptian women: Findings from the 1988 Egypt Demographic and Health Survey. *Occasional papers 2, Demographic and Health Surveys.* Calverton, Maryland, USA: MACRO International.

Kishor, S. (2000). Empowerment of women in Egypt and links to the survival and health of their infants. In H. Presser & G. Sen (Eds.), *Women's empowerment and demographic processes: Moving beyond Cairo* (pp. 119 – 156). New York: Oxford University Press.

Kishor, S., & Subaiya, L. (2008). Understanding women's empowerment: A comparative analysis of Demographic and Health Surveys (DHS) Data. *DHS comparative reports No. 20.* Calverton, Maryland, USA: MACRO International.

Lee-Rife, S. M. (2010). Women's empowerment and reproductive experiences over the lifecourse. *Social Science & Medicine*, 71(3), 634–642.

Leon, F. R. (2013). Predicting contraceptive use from an egalitarian model of women's overall household power vis-a-vis conventional power models and third variables. *Journal of Biosocial Science*,. 45(4), 497-515.

Macleod, A. E. (1991). *Accommodating protest: Working women, the new veiling, and change in Cairo.* New York: Columbia University Press.

MacIntosh, R. (1998). Global attitude measurement: An assessment of the World Values Survey Source: *American Sociological Review*, 63(3), 452-464.

Mahmud, S. (1994). From women's status to empowerment: The shift in the population policy debate. *The Bangladesh Development Studies,* 22(4), 77-97.

Mahmud, S. (2003). Actually how empowering is microcredit? *Development and Change*, 34(4), 577-605.

Mahmud, S., Shah, N. M., & Becker, S. (2012). Measurement of women's empowerment in rural Bangladesh. *World Development*, 40(3), 610–619.

Malhotra, A. (1997). Gender and the timing of marriage: Rural-urban differences in Java. *Journal of Marriage and the Family*, 59(2), 434 – 450.

Malhotra, A., & Schuler, S. R. (2005). Women's empowerment as a variable in international development. In D. Narayan (Ed.), *Measuring empowerment: Cross-disciplinary perspectives* (pp. 71-88). Washington, D.C.: The World Bank.

Mason, K. O. (1986). The status of women: Conceptual and methodological issues in demographic studies. *Sociological Forum*, 1(2), 284-300.

Mason, K. (2005). Measuring women's empowerment: Learning from cross-national research. In D. Narayan (Ed.), *Measuring empowerment: Cross-disciplinary Perspectives* (pp. 89 – 102). Washington, D.C.: The World Bank.

Mellenbergh, G. J. (1989). Item bias and item response theory. *International Journal of Educational Research*, 13, 127–143.

Mistry, R., Galal, O., & Lu, M. (2009). Women's autonomy and pregnancy care in rural India: A contextual analysis. *Social Science & Medicine*, 69(6), 926–933.

Mogford, E. (2011). When status hurts: Dimensions of women's status and domestic abuse in rural Northern India. *Violence against Women*, 17(7), 835–857.

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide. 7th Edition.* Los Angeles, CA: Muthen & Muthen.

Nawar, L., Lloyd, C., & Ibrahim, B. (1995). Women's autonomy and gender roles in Egyptian families. In C. M. Obermeyer (Ed.), *Family, gender, and population in the Middle East: Policies in context* (pp. 147-178). Cairo, Egypt: American University in Cairo Press.

Reise, S. P., Widaman, K. F., & Pugh, R. H. (1993). Confirmatory factor analysis and item response theory: Two approaches for exploring measurement invariance. *Psychological Bulletin*, 114, 552–566.

Safilios-Rothschild, C. (1970). The study of family power structure: A review 1960-1969. *Journal of*

*Marriage and Family*, 32(4, Decade Review. Part 1), 539-552.

Sandberg, J., & Rafail, P. (2013). Measurement models of women's autonomy using the 1998/1999 India DHS. *Journal of Population Research*, 30(4), 367-381.

Sholkamy, H. (2012). How private lives determine work options: Reflections on poor women's employment in Egypt. In A. Buğra & Y. Özkan (Eds.), *Trajectories of female employment in the Mediterranean* (pp. 114 – 135). London: Palgrave MacMillan.

Shroff, M., Griffiths, P., Adair, L., Suchindran, C. & Bentley, M. (2009). Maternal autonomy is inversely related to child stunting in Andhra Pradesh, India. *Maternal and Child Nutrition*, 5(1), 64 – 74.

Shroff, M., Griffiths, P., Suchindran, C., Nagalla, B., Vazir, S., & Bentley, M. E. (2011). Does maternal autonomy influence feeding practices and infant growth in Rural India? *Social Science & Medicine*, 73(3), 447–455.

Smith, S. N., Fisher, S. D., & Heath, A. (2011). Opportunities and challenges in the expansion of cross-national survey research. *International Journal of Social Research Methodology*, 14(6), 485-502.

Spierings, N., Smits, J., & Verloo, M. (2010). Micro- and macrolevel determinants of women's employment in six arab countries. *Journal of Marriage and Family, 72*(5), 1391-1407.

Steele, F., & Goldstein, H. (2006). A multilevel factor model for mixed binary and ordinal indicators of women's status. *Sociological Methods & Research*, 35(1), 137-153.

Story, W. T., & Burgard, S. A. (2012). Couples' reports of household decision-making and the utilization of maternal health services in Bangladesh. *Social Science & Medicine*, 75(12), 2403-2411.

United Nations Development Programme and Arab Fund for Economic and Social Development (2002). *Arab human development report 2002*. New York: United Nations Development Programme, Regional Bureau for Arab States.

United Nations Population Division, Department of Economic and Social Affairs (2011). *World fertility policies 2011*. New York: United Nations.

Upadhyay, U. D., & Hindin, M. J. (2005). Do higher status and more autonomous women have longer birth intervals? Results from Cebu, Philippines. *Social Science & Medicine*, 60(11), 2641-2655.

Ward, K. B. (1984). *Women in the world system: Its impact on status and fertility*. New York: Praeger.

Wheeler, D. L. (2007). Empowerment zones? Women, internet cafes, and life transformations in Egypt. *Information Technologies and International Development*, 4(2), 89 – 104.

Whyte, M. K. (1978). The status of women in pre-industrial societies. Princeton, NJ: Princeton University Press.

Williams, J. (2005). *Measuring gender and women's empowerment using confirmatory factor analysis.* Boulder, CO: Population Program, Institute of Behavioral Science, University of Colorado.

Young, G. Fort, L., & Danner, M. (1994). Moving from the status of women to gender equality: Conceptualization, social indicators, and an empirical application, *International Sociology*, 9(1), 55–85.