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

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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 6214 married women ages 16–49 who took part in the 2006 Egypt Labor Market Panel Survey, we applied factor analysis to explore and then to test the factor structure of women's agency. We then used multiple indicator multiple cause structural equations models to test for differential item functioning (DIF) by women's age at first marriage, a 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

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1 Introduction

Women's empowerment is the process by which women acquire *enabling resources*, such as schooling, material 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 1960 s mainly in wealthier settings (e.g., Blood and Wolfe 1960; Safilios-Rothschild 1970) and some years later in poorer settings (e.g., Dixon 1976; Mason 1986; Ward 1984; Whyte 1978; Young et al. 1994). Feminist scholars see women's agency is an important end in itself; whereas, instrumentalists see it as a useful means to other ends, such as improved child health (Hossain et al. 2007; Malhotra and Schuler 2005; Shroff et al. 2009, 2011). Regardless of the interest in women's agency, articulating its dimensions in local contexts and standardizing rigorous approaches to its measurement are priorities for global research and policy (Ghuman et al. 2006; VanderEnde et al. n.d.).

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; Yount 2005). With some exceptions (e.g., Kishor 2000; VanderEnde et al. nd; Yount 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; Mishra 2014). Also, most research on women's agency has relied on secondary data from multi-purpose surveys, which include a limited number of agency-related items (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. As a result, findings on the health-related correlates of women's agency are discrepant (e.g., Abada and Tenkorang 2012; Hadley et al. 2010; Story and Burgard 2012), and 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; VanderEnde et al. n.d.). 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 6214 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 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 assess whether this potential resource for women's agency (Malhotra 1997) may introduce construct-irrelevant variance into the scales. An item displays uniform DIF when its measurement properties differ across age-at-first marriage groups, and the statistical relationship between item response and group is constant over the continuum of the matching 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 Minya, Egypt (VanderEnde et al. n.d.).

2 Background

2.1 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; VanderEnde et al. n.d.). 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, 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; VanderEnde et al. n.d.). 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; Yount 2005). We conceptualize women's agency as arising in three domains (Sandberg and Rafail 2013; VanderEnde et al. n.d.): 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 in public spaces is less constrained (VanderEnde et al. n.d.).

2.2 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

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

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; VanderEnde et al. nd; Williams 2005; Yount 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 et al. 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 *needs*, *opportunities*, and *values* reflected in later marriage (Spierings et al. 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 freedom of movement and influence in the family (Desai and 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, clouding interpretation of observed differences in agency.

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

In Western settings, measurement non-invariance across groups has been observed with various scales (e.g., Cauffman and MacIntosh 2006; Edelen et al. 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 DIF may lead to biased scores for domains of agency (Reise et al. 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.

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

2.3.1 Agency Under Systems of Classic Patriarchy—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 et al. 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 (VanderEnde et al. n.d.). 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.

2.3.2 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; VanderEnde et al. nd; Yount 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; Yount 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; VanderEnde et al. n.d.). 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; VanderEnde et al. n.d.).

2.3.3 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 (Yount 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.

2.4 Hypotheses and Implications

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. A thorough assessment of the psychometric properties of a measure for women's agency in 2006 provides the basis to use this measure appropriately in subsequent longitudinal analyses of data from the EMPLS to assess the adjusted influence of women's age at first marriage on their agency in 2006 and 2012, analyses that would not be possible using cross-sectional data from the Egypt Demographic and Health Surveys,

3 Methods

3.1 Sample

The ELMPS is a 14-year national household panel, which originally enrolled in 1998 a probability sample of 4816 households, in which 4825 women 15–54 years were living. About 80 % of these households, as well as ones that split from them and a refresher sample of 2500 households were (re)interviewed in 2006, for a total of 8349 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 = 3062) OR identified in the national probability refresher sample in 2006 (n = 3153) and having complete data on women's age at first marriage, for a total sample size of 6214.

3.2 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 (VanderEnde et al. n.d.). 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.

3.3 Analyses

3.3.1 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.

3.3.2 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 $N_1 = 2072$ for the EFA and $N_2 = 4142$ for the CFA. Results of t-tests, Chi-square tests, and Kruskal–Wallis tests revealed significant (p 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).

Using EFA, we examined the data to assess scale dimensionality and item 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 (Yount 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 ($N_2 = 4142$) 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.

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[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.

3.3.3 Tests for Differential Item Functioning Across Women's Age at First Marriage—After assessing the CFA model, we used the same random split sample ($N_2 = 4142$), 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 [ref], 16–29, 30–42 years) for women's age at first marriage to test for the invariance of indicator 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 0.05) and improved model fit (p 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 = 3357), (2) with a subset of women derived from selecting one woman per household (N = 3852), and (3) not accounting for stratification and clustering at the primary sampling unit (PSU) level (N = 4142). 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).

4 Results

4.1 Characteristics of the Sample

Table 2 shows the distributions of our sample according to demographic attributes and 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 % of women's husbands were illiterate, and 50 % 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 3 months.[6] A majority were living in the same location since birth (73 %). A minority first married a first cousin (20 %), and

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[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 vs. 16–29; <16 vs. 30–42 years) suggesting nonlinearity.
[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.

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.

4.2 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 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).

4.3 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 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).

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 showed 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 (0.189–0.127) 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.

4.4 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.

5 Discussion

Using rich data on women's agency from a national sample of 6214 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 confirm 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 (VanderEnde et al. n.d.). 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 offer much more nuance than the single summative index derived from early work in Egypt (Nawar et al. 1995), confirm exploratory work in rural Minya, Egypt (VanderEnde et al. n.d.), and corroborate qualitative research with Egyptian women (Drolet 2011; Henry 2011; Hoodfar 1997). Our elimination of attitudinal items reflecting women's general roles and rights departed somewhat from our prior work in rural Minya (VanderEnde et al. n.d.) 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 exploratory findings from rural Minya (VanderEnde et al. n.d.) 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 (0.189–0.126) 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 or sensitivity 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 permit 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, which may inform changes in wording to eliminate DIF. 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 systematically in other populations. Our approach offers a promising model to discern "hierarchies of evidence" regarding the measurement of women's agency; its determinants, such as women's religious affiliation, age at first marriage, schooling attainment, and engagement in market work; and the effects of women's empowerment, including on the health and well-being of women and their children. More rigorous evidence along these lines would provide insights about the social policies most likely to empowerment women to have cascading benefits on health and well-being. Developing causal models of these relationships with psychometrically sound measures of agency presented here is the next important step in this research.

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Table 1

Indicators of Women's Agency Used in Analysis, 6214 Married Women Ages 16–49 Years in Egypt, 2006

Decision making (DM)	Item	Response categories[a]				N[e]
		SOE[b] (1)	Respondent and SOE[c] (2)	Respondent Alone (3)		
Who in your family usually has the final say on the following decisions?						
Making large household purchases	DM_01	0.54	0.38	0.08		6178
Making household purchases for daily needs	DM_02	0.25	0.14	0.60		6204
Visits to friends, family or other relatives	DM_03	0.29	0.52	0.19		6200
What food should be cooked each day	DM_04	0.18	0.26	0.56		6208
Getting medical treatment or advice for yourself	DM_05	0.23	0.50	0.27		6159
Buying clothes for herself	DM_06	0.22	0.43	0.35		6189
Freedom of movement (FM)		I cannot go alone (1)	I need permission (2)	Tell them only that I am going (3)	Without permission (4)	N
If you want to go to any of the following places, can you go						
The market	FM_01	0.05	0.30	0.36	0.29	5504
Going to the doctor/health unit for treatment	FM_02	0.27	0.44	0.22	0.07	6144
Taking children to the health unit–doctor	FM_03	0.24	0.40	0.27	0.09	5029
The house of relatives–friends–neighbors	FM_04	0.17	0.62	0.16	0.06	6049
Gender violence attitudes (GVA)			Yes (0)	No (1)		N
In your opinion is a husband justified in hitting his wife in each of the following situations:						
When she burns the food	GVA_01		0.10	0.90		6214
When she neglects the children	GVA_02		0.25	0.75		6214
When she argues with him	GVA_03		0.35	0.65		6214
When she talks to other men	GVA_04		0.27	0.73		6213
Gender attitudes (GA)		Yes	No			N
When she wastes his money	GVA_05	0.23	0.77			6213
When she refuses him sex	GVA_06	0.24	0.76			6210

Decision making (DM)

Decision making (DM)	Item	Response categories[a]					N[e]
		SOE[b] (1)	Respondent and SOE[c] (2)	Respondent Alone (3)			
Are you often or generally afraid of disagreeing with your husband (father or/& brothers) or other males in your household?	GA_01	0.61	0.39				6210
		Strongly Disagree (1)	Disagree (2)	Indifferent (3)	Agree (4)	Strongly Agree (5)	N
What do you think about the following statements:							
A woman's place is not only in the household but she should be allowed to work	GA_02	0.03	0.08	0.05	0.47	0.38	6214
If the wife has a job outside the house then the husband should help her with the children	GA_03	0.04	0.14	0.04	0.49	0.29	6212
If the wife has a job outside the house then the husband should help her in household chores	GA_04	0.09	0.29	0.06	0.36	0.20	6214
A 30 year old woman who has a good job but is not yet married is to be pitied[d]	GA_05	0.06	0.20	0.08	0.31	0.35	6213
Girls should go to school to prepare for jobs not just to make them good mothers and wives	GA_06	0.10	0.31	0.04	0.30	0.25	6214
A woman who has a full-time job cannot be a good mother[d]	GA_07	0.26	0.53	0.05	0.10	0.06	6212
For a woman's financial autonomy, she must work and have earnings	GA_08	0.09	0.27	0.09	0.33	0.22	6214
Having a full-time job always interferes with a woman's ability to keep a good life with her husband[d]	GA_09	0.23	0.51	0.06	0.14	0.06	6214
Women should continue to occupy leadership positions in society	GA_10	0.02	0.07	0.14	0.42	0.35	6214
Boys and girls should get the same amount of schooling	GA_11	0.00	0.01	0.02	0.37	0.60	6214
Boys and girls should be treated equally	GA_12	0.01	0.01	0.01	0.32	0.64	6214

[a] All items coded so that higher values representing higher levels of women's agency

[b] Husband or someone else, others

[c] You and husband jointly; you and someone else jointly

[d] Reverse coded items (Strongly Agree = 1, Agree = 2, Indifferent = 3, Disagree = 4, Strongly Disagree = 5)

[e] Non-applicable answers were treated as missing

Table 2

Descriptive variables in full sample (N = 6214), exploratory factor analysis (EFA) split sample (N_1 = 2072), and confirmatory factor analysis split sample (CFA) (N_2 = 4142), married women ages 16–49 years in Egypt, 2006

	Sample						
	Full	N[a]	EFA	N_1[a]	CFA	N_2[a]	p[b]
Demographic attributes							
Woman's age in years	32.59	6214	32.79	2072	32.48	4142	0.236
Number of live births	2.79	6214	2.86	2072	2.75	4142	0.044
Husband's age in years	39.70	5864	39.86	1953	39.63	3911	0.449
Husband's schooling completed							
Illiterate	0.24	5863	0.24	1952	0.24	3911	0.488
Read and write	0.09	5863	0.09	1952	0.09	3911	
Less than secondary school	0.17	5863	0.17	1952	0.17	3911	
Secondary school[c]	0.29	5863	0.29	1952	0.29	3911	
Higher than secondary school	0.05	5863	0.04	1952	0.05	3911	
University	0.15	5863	0.15	1952	0.15	3911	
Post-graduate	0.01	5863	0.01	1952	0.01	3911	
Household wealth index	−0.01	6214	−0.02	2072	0.00	4142	0.661
Quintiles of household wealth							
1st	0.19	6214	0.19	2072	0.19	4142	0.868
2nd	0.22	6214	0.22	2072	0.21	4142	
3rd	0.22	6214	0.22	2072	0.21	4142	
4th	0.20	6214	0.19	2072	0.20	4142	
5th	0.18	6214	0.18	2072	0.18	4142	
Women's enabling resources							
Human resources: schooling completed							
Illiterate	0.38	6212	0.38	2070	0.38	4142	0.611
Read and write	0.04	6212	0.05	2070	0.04	4142	
Less than secondary school	0.13	6212	0.13	2070	0.13	4142	
Secondary school	0.30	6212	0.31	2070	0.30	4142	
Higher than secondary school	0.03	6212	0.03	2070	0.04	4142	

	Sample							
	Full	**N**[a]	**EFA**	**N₁**[a]	**CFA**	**N₂**[a]	**p**[b]	
University	0.11	6212	0.10	2070	0.11	4142		
Post-graduate	0.00	6212	0.00	2070	0.00	4142		
Economic resources: engaged in market work during past 3 months (ref: no)[d]	0.26	6214	0.27	2072	0.25	4142	0.281	
Social resources: woman lived in same location since birth (ref: no)[e]	0.73	6212	0.73	2071	0.72	4141	0.650	
Social resources: first husband a first cousin (ref: no)[f]	0.20	6211	0.21	2071	0.19	4140	0.174	
Social resources: age at first marriage in years	20.43	6213	20.35	2071	20.47	4142	0.385	
Social resources: age at first marriage (years)								
< 16	0.07	6213	0.07	2071	0.07	4142	0.764	
16–29	0.90	6213	0.90	2071	0.90	4142		
30–42	0.03	6213	0.02	2071	0.03	4142		

[a] The sample size for characteristics of the husband is lower because some women had missing information for the line number of their spouse (an ID variable), precluding a merge with the husband's data

[b] Estimate for EFA versus CFA sample

[c] Includes technical or general secondary school

[d] Captures whether the woman reported either participating in any employment or performing any of 13 economic activities in the past three months

[e] Location defined as a combination of governate and city/town or village/hamlet

[f] First cousin defined as the son of her mother or father's sibling

Table 3

Geomin rotated loadings for an EFA (n = 2072) and CFA factor loadings (n = 4142) with three common factors of women's agency, married women ages 16–49 years in Egypt, 2006

Item	EFA geomin rotated loadings (Model 1)			CFA factor loadings (Model 2)			Baseline MIMIC model (Model 3)			MIMIC model (Model 4)			Final MIMIC model (Model 5)		
	Factor 1 DM	Factor 2 FM	Factor 3GVA	Factor 1 DM	Factor 2 FM	Factor 3GVA	Factor 1 DM	Factor 2 FM	Factor 3GVA	Factor 1 DM	Factor 2 FM	Factor 3GVA	Factor 1 DM	Factor 2 FM	Factor 3GVA
DM_01	0.498*	0.008	−0.004	0.480*			0.480*			0.480*			0.467*		
DM_02	0.759*	−0.015	0.056	0.711*			0.710*			0.710*			0.694*		
DM_03	0.619*	0.144*	−0.021	0.704*			0.703*			0.704*			0.696*		
DM_04	0.735*	−0.065	−0.012	0.645*			0.644*			0.644*			0.629*		
DM_05	0.655*	0.186*	0.007	0.791*			0.788*			0.788*			0.780*		
DM_06	0.621*	0.051	0.024	0.670*			0.669*			0.668*			0.656*		
FM_02	0.027	0.806*	−0.009		0.828*			0.829*			0.829*			0.823*	
FM_03	−0.033	0.887*	0.037		0.905*			0.905*			0.905*			0.906*	
FM_04	0.053	0.634*	−0.031		0.634*			0.636*			0.635*			0.628*	
GVA_01	0.013	0.026	0.835*			0.855*			0.855*			0.855*			0.855*
GVA_02	0.019	−0.006	0.886*			0.901*			0.901*			0.901*			0.901*
GVA_03	−0.048	−0.006	0.925*			0.890*			0.889*			0.889*			0.890*
GVA_04	−0.003	0.036	0.903*			0.890*			0.890*			0.890*			0.890*
GVA_05	−0.015	−0.003	0.918*			0.893*			0.892*			0.892*			0.893*
GVA_06	0.019	−0.028	0.831*			0.805*			0.803*			0.803*			0.804*
Structural regressions (indirect effects)															
AFM 16–29 years (ref: < 16)							0.189*	−0.075	0.200*	0.127	−0.076	0.200*	0.244*	0.000	0.206*
AFM 30–42 years (ref: < 16)							0.553*	−0.163	0.719*	0.553*	−0.063	0.718*	0.455*	−0.135	0.715*
Age in years													0.030*	0.020*	0.001
Direct effects (DIF)															
FM_04 on AFM 30–42 years											−0.322*			−0.330*	
DM_01 on AFM 16–29 years										0.175*			0.190*		
DM_06 on AFM 16–29 years										0.152*			0.169*		

Item	EFA geomin rotated loadings (Model 1)		CFA factor loadings (Model 2)			Baseline MIMIC model (Model 3)			MIMIC model (Model 4)			Final MIMIC model (Model 5)		
	Factor 1 DM	Factor 2 FM	Factor 3 GVA	Factor 1 DM	Factor 2 FM	Factor 3 GVA	Factor 1 DM	Factor 2 FM	Factor 3 GVA	Factor 1 DM	Factor 2 FM	Factor 3 GVA	Factor 1 DM	Factor 2 FM	Factor 3 GVA
Model fit indices															
RMSEA	0.053			0.033			0.030			0.030			0.030	
CFI	0.967			0.982			0.981			0.981			0.979	
TLI	0.946			0.978			0.976			0.976			0.974	

EFA Exploratory factor analysis, *CFA* confirmatory factor analysis, *MIMIC* multiple indicator multiple cause, *DM* decision-making, *FM* freedom of movement, *GVA* gender violence attitudes, *DIF* differential item functioning, *RMSEA* root mean square error of approximation, *CFI* comparative fit index, *TLI* Tucker–Lewis Index

*
Significant at *p* 0.05

Table 4

Factor correlation matrices for three dimensions of women's agency for EFA ($N_1 = 2072$), CFA ($N_2 = 4142$), and final MIMIC model, married women ages 16–49 years in Egypt, 2006

Factor	Factor 1 DM	Factor 2 FM	Factor 3 GVA
EFA factor correlation matrix			
1	1.000		
2	0.388[*]	1.000	
3	0.159[*]	0.008	1.000
CFA factor correlation matrix			
1	1.000		
2	0.393[*]	1.000	
3	0.127[*]	−0.018	1.000
Final MIMIC model			
1	1.000		
2	0.373[*]	1.000	
3	0.122[*]	−0.020	1.000

EFA Exploratory factor analysis, *CFA* confirmatory factor analysis, *MIMIC* multiple indicator multiple cause; *DM* decision-making, *FM* freedom of movement, *GVA* gender violence attitudes

[*] p 0.05