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## Measuring Youth Empowerment

Kerry L. D. MacQuarrie

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DHS Working Papers No. 179

## **Measuring Youth Empowerment**

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Rockville, Maryland, USA

September 2021

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## ABSTRACT

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Despite advances in the measurement of women's empowerment, its demonstrated relevance for a range of demographic, social, and health outcomes, and salience of empowerment in young women's lives, the study of the empowerment among youth has been stymied by the lack of validated quantitative measures and widely available data. The present study aims to fill this gap by exploring the feasibility of developing a measure of youth empowerment using data from Demographic and Health Surveys (DHS).

This study uses data from 10 phase 7 DHS surveys in Africa, Asia, and the Caribbean to develop and validate a Youth Empowerment (YE) Scale. We used principal components analysis on an initial pool of 41 candidate items. We performed first exploratory (EFA) and then confirmatory factor analysis (CFA) on a pooled sample of 104,248 women age 15-29. To test the robustness and applicability of the resulting YE Scale across a range of youth subpopulations, we performed CFA on 10 separate survey subsamples and pooled and separate country subsamples disaggregated by age group, marital status, and school-going status. We examined the factor structure and item loading patterns across these subsamples and estimated pairwise correlations among factor scores.

A 22-item, six-factor YE Scale emerged with an eigenvalue of 1.07 that explained 62% of the variance among items. An overall Cronbach's alpha of  $\alpha=0.7260$  indicates strong internal reliability. We labeled the six factors as: 1. Violence attitudes, 2. Digital connectedness: Banking and internet, 3. Work and earnings, 4. Health facility access, 5. Major asset ownership, and 6. Reproductive health knowledge. Except for reproductive health knowledge, each subscale also demonstrated good internal reliability ( $\alpha=0.7095-0.8821$ ). CFAs revealed a consistent factor structure and item loading pattern across separate country samples and age, marital status, and school status disaggregated subsamples. Internal reliability was consistently high for the overall YE scale and the first five subscales. Cronbach's alpha for the reproductive health knowledge factor ranged from  $\alpha=0.0320-0.5324$ , showing mostly poor internal reliability. Pairwise correlations among factor scores were consistently significant but not sizable, suggesting that the six factors capture related but separate constructs.

This study finds that it is possible to measure youth empowerment with existing available data in the DHS. The YE Scale is robust across multiple countries and valid for young women, regardless of whether they are married or unmarried, in school or out of school, or age 15-19, 20-24, or 25-29. With its wide applicability, this YE Scale can facilitate new analyses into relationships between youth empowerment and life outcomes for young women.

**Key words:** youth, empowerment, measurement, factor analysis



## ACRONYMS AND ABBREVIATIONS

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CFA	confirmatory factor analysis
DHS	Demographic and Health Survey
EFA	exploratory factor analysis
FEMI	Female Empowerment Index
GEM	Gender-equitable Men scale
PCA	principal components analysis
SDG	sustainable development goal
SWPER	survey-based women's empowerment index
WAS-61	Women's Agency Scale
WEE	Women's Economic Empowerment index
WGE-SRH	Women and Girls' Empowerment index
WEIA	Women's Empowerment in Agriculture index
YE	youth empowerment scale



# 1 BACKGROUND

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## 1.1 Introduction

There have been many recent advances in the conceptualization and measurement of women's empowerment. Empirical research has demonstrated the relevance of women's empowerment to numerous demographic, social, and health outcomes. Despite the salience of these relationships for young women as well as adult women, the study of the empowerment among youth has been stymied by the lack of validated quantitative measures and widely available data. The present study aims to fill this gap by exploring the feasibility of developing a measure of youth empowerment using data from Demographic and Health Surveys (DHS).

## 1.2 Background

The field of demography has increasingly incorporated the study of women's empowerment. Beginning with a desire to understand how women make decisions to use or not use contraception as well as couple studies, it is clear that reproductive behaviors are seldom the product of women's aspirations alone (Derose and Ezeh 2005; DeRose, Dodoo, and Patil 2002; Edmeades et al. 2012; MacQuarrie and Edmeades 2015). Women's empowerment is linked with a range of reproductive health behaviors and outcomes.

Women's empowerment has found to be associated with smaller ideal number of children or lowered fertility desires (Atake and Ali 2019; Kritz, Makinwa-Adebusoye, and Gurak 2000; Moursund and Kravdal 2003; Upadhyay and Karasek 2012; Woldemicael 2009) and ability to achieve desired family size (Al-Riyami and Afifi 2003; Mason and Smith 2000; Upadhyay and Karasek 2012), lower fertility (Bhattacharya 2006; Hindin 2000; Kabir et al. 2005; Upadhyay, Gipson, et al. 2014), and longer birth intervals (Al-Riyami and Afifi 2003; Upadhyay and Hindin 2005). It is also associated with lower rates of unintended pregnancy (Abada and Tenkorang 2012; Pallitto and O'Campo 2005; Rahman 2012; Williams, Sobieszczyk, and Perez 2000), greater use of contraception or less unmet need (DeRose and Ezeh 2010; Juan, Allen, and MacQuarrie 2020; Kishor 2000b; Leon 2012; Loll et al. 2019; MacQuarrie and Aziz 2021; Schuler and Hashemi 1994; Upadhyay, Gipson, et al. 2014), and future intention to use contraception (Babalola et al. 2015; Hamid, Stephenson, and Rubenson 2011). Finally, it is associated with positive maternal and child health outcomes, including care-seeking (Bloom, Wypij, and Das Gupta 2001; Ewerling et al. 2021; Ewerling, Lynch, et al. 2020; Kishor 2000a; Mallick et al. 2020).

Conceptualizing and measuring empowerment has evolved and improved over recent decades. From the earliest days, education was used as a proxy measure for women's empowerment before direct measures were developed or widely available (Kishor 2000b). Kabeer defines empowerment as "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them" (Kabeer 1999). She defines a process of empowerment resources, agency, and empowerment achievements. Karp et al. emphasize the existence of choices as a prerequisite for the exercise or achievement of choice implicit in Kabeer's framework (Karp et al. 2020). In Kabeer's rubric of resources, agency, and achievements, education would likely be characterized as an empowerment resource.

Kabeer's framing of women's empowerment highlights agency as measures of direct empowerment (Buvinic et al. 2020) and leads to a focus on decision-making (DeRose and Ezeh 2010; Hindin 2000; Rettig,

Fick, and Hijmans 2020; Upadhyay and Karasek 2012; Upadhyay, Gipson, et al. 2014; Woldemicael 2009). DHS surveys routinely include data on household decision-making with regard to several decisions, while decision-making specifically with regards to contraceptive use are more recently standard in DHS surveys.

Malhotra et al. emphasizes the multidimensional nature of women's empowerment, including social and cultural (domestic), economic, civic, legal, and psychological spheres (Malhotra and Schuler 2005). Although linked, women can be more empowered in some areas and less empowered in others. Much effort has been put forth in examining women's empowerment in the domestic (social and cultural) sphere, again emphasizing measures such as household decision-making measures.

Efforts to conceptualize reproductive empowerment emphasize elements of Voice, Choice, & Power, and help situate empowerment in a kind of an ecological model (Edmeades et al. 2018). Development of reproductive empowerment measures often seeks to unpack the process of decision-making around reproductive behaviors and sheds light on the give-and-take negotiation within couples (Edmeades et al. 2018; Hinson et al. 2019; Mandal and Albert 2020; Mandal, Treves-Kagan, and Mejia 2020; MEASURE Evaluation 2020; Paul et al. 2017).

Another scale of reproductive autonomy assesses the capacity for individual-led action over a range of behaviors (Upadhyay, Dworkin, et al. 2014). It comprises dimensions of freedom from coercion, communication, and decision-making. These measures continue to focus on the individual or a dyadic couple as the locus of empowerment behavior. In a systematic review of intervention evaluations, Mandal and colleagues found that the majority of empowerment constructs "operate at the individual and couple level" (Mandal, Muralidharan, and Pappa 2017).

Other measures of women's empowerment are at the collective level, particularly in the civic engagement and political or legal spheres. These include measures of women's representation in legislatures, the existence of women's collectives, or indices based on the legal or regulatory framework around divorce, inheritance, and other legal matters. However, much measurement is at an individual level and includes the types of items that can be collected from household/individual surveys, like the DHS. The Women's Empowerment in Agriculture (WEIA) index, in the agricultural and economic dimensions, measures participation in cooperatives, access to credit, and decision-making around crops and use of agricultural land (Alkire et al. 2013; Malapit et al. 2019). While the DHS does not include measures of group membership and participation like the WEIA, it does include measures regarding control over earnings, house and land ownership and deed-holding, and use of bank accounts.

The SWPER is a major advance in that it offers a standardized and validated measure of women's empowerment across cultural settings with data available from DHS surveys, making it a possibility as a widespread and comparable measure (Ewerling et al. 2017; Ewerling, Raj, et al. 2020).

In contrast, the Women's Agency Scale (WAS-61) offers a more well-rounded measure of women's empowerment with additional measures of instrumental and collective agency (including in economic and political domains) that the SWPER index lacks (Yount et al. 2020). However, this measure requires more onerous data collection that are not widely available and the instrument has not yet been tested outside of Bangladesh.

While much focus has been on adults, women's empowerment is salient for youth (Gage 2000). It has been linked to the timing of union formation and the initiation of childbearing (Chowdhury and Trovato 1994; Dixon-Mueller 2008; MacQuarrie 2016; MacQuarrie 2009; MacQuarrie et al. 2016). It (or rather the lack of it) has been frequently described as a driver of child marriage. The ability to remain in school or pursue an education, to move about and engage in the community, and to engage in livelihood and income-generating activities are all pertinent empowerment outcomes for young women. Life course analysis in India indicates that levels of empowerment as young adults influence levels of empowerment and numerous outcomes later in life (MacQuarrie 2009). Further, as with older women, empowerment can shape their reproductive aspirations and their ability to achieve them.

However, one obstacle to investigating empowerment among youth is that available measures are seldom relevant to youth. These measures typically describe power within dyadic couples and therefore may not apply or even have data available for youth who are not married or in union. For example, household decision-making questions in DHS questionnaires are not asked of unmarried women. In a review of empowerment in family planning intervention evaluations, few studies assessed young women, and those that did either used measures intended for married adults or did not assess empowerment at all (Daniel, Masilamani, and Rahman 2008; Erulkar and Muthengi 2009; Mandal, Muralidharan, and Pappa 2017; Venguer, Pick, and Fishbein 2007). None used validated empowerment measures for youth.

Additionally, women's empowerment measures rely on items that may not be relevant markers of the adolescent experience, but to older stages of the life cycle (Gage 2000). These may include decisions regarding use of contraception or spacing between children or major household purchases rather than whether or where to pursue education or when and whom to marry. This may be the case even when young women are the intended focus of inquiry. As a case in point, a purported measure of empowerment for girls and young women nonetheless included items that required it be restricted to married women (Moreau et al. 2020). Similarly, the Female Empowerment Index (FEMI) and the SWPER Index, both of which incorporate decision-making items in DHS data, can only be used with married youth (Ewerling et al. 2017; Rettig, Fick, and Hijmans 2020). Because much of our measurement of empowerment relates to married women, much of our analysis is circumscribed to this population only (Upadhyay and Karasek 2012).

### **1.3 Study Purpose**

In order to understand how empowerment for young women relates to a range of outcomes, including but not restricted to fertility intentions and reproductive behaviors, we must first develop a valid measure of Youth Empowerment. Such a measure is most valuable if it draws upon widely available data and is valid with a wide spectrum of young women at different stages and circumstances of their lives. This paper describes the process and results of developing a multidimensional Youth Empowerment (YE) scale from data available in DHS surveys and testing it across subgroups of youth (married or unmarried, youngest to older youth, in school or out-of-school youth) in 10 countries.



## 2 METHODS

### 2.1 Data

This study uses the most recent DHS survey from 10 USAID family planning priority countries. To be included in the study, surveys had to be conducted since 2015 with data publicly available by fall 2020. Further, they had to have a sample of all women, rather than samples restricted to ever-married or currently married women. Surveys used in this study are: Ethiopia 2016, Haiti 2016-17, Malawi 2015-16, Mali 2018, Nepal 2016, Nigeria 2018, Philippines 2017, Senegal 2019, Uganda 2016, and Zambia 2018.

This study restricts its analysis to women age 15-29, in keeping with the USAID definition of youth (age 10-29). Sample sizes are presented in Table 1 and range from 4,944 young women in Senegal to 22,538 young women in Nigeria.

**Table 1 Surveys and sample sizes**

	Total	Age	Marital Status			School Status	
Ethiopia 2016	9,246	15-19	3,498	Never married	3,997	Out of school	6,886
		20-24	2,903	Currently married	4,683	In school	2,360
		25-29	2,845	Formerly married	566		
Haiti 2016-17	8,282	15-19	3,307	Never married	5,304	Out of school	4,384
		20-24	2,773	Currently married	2,736	In school	3,898
		25-29	2,202	Formerly married	242		
Malawi 2015-16	14,343	15-19	5,273	Never married	5,169	Out of school	10,940
		20-24	5,094	Currently married	7,965	In school	3,403
		25-29	3,976	Formerly married	1,209		
Mali 2018	6,084	15-19	2,209	Never married	1,721	Out of school	5,230
		20-24	1,907	Currently married	4,223	In school	854
		25-29	1,968	Formerly married	140		
Nepal 2016	7,022	15-19	2,622	Never married	2,547	Out of school	4,958
		20-24	2,306	Currently married	4,418	In school	2,064
		25-29	2,094	Formerly married	157		
Nigeria 2018	22,470	15-19	8,423	Never married	9,884	Out of school	17,510
		20-24	6,844	Currently married	12,112	In school	4,960
		25-29	7,203	Formerly married	474		
Philippines 2017	12,720	15-19	5,120	Never married	7,585	Out of school	8,011
		20-24	3,914	Currently married	4,906	In school	4,708
		25-29	3,686	Formerly married	229		
Senegal 2019	5,044	15-19	1,989	Never married	2,225	Out of school	3,720
		20-24	1,623	Currently married	2,706	In school	1,324
		25-29	1,432	Formerly married	113		
Uganda 2016	11,072	15-19	4,276	Never married	4,532	Out of school	8,573
		20-24	3,782	Currently married	5,667	In school	2,499
		25-29	3,014	Formerly married	873		
Zambia 2018-19	7,965	15-19	3,112	Never married	4,082	Out of school	6,050
		20-24	2,687	Currently married	3,369	In school	1,915
		25-29	2,166	Formerly married	514		
Total	104,248	15-19	39,829	Never married	47,046	Out of school	76,262
		20-24	33,833	Currently married	52,785	In school	27,985
		25-29	30,586	Formerly married	4,417		

## 2.2 Inventory of Youth Empowerment Items

Developing a YE measure is, out of necessity, a data-driven process based on data available within DHS surveys.

To identify items to consider for inclusion in a YE measure, we first developed an inventory of candidate youth empowerment items. Developing this inventory adopted a simultaneously inside-out and outside-in approach. The inside-out approach examines possibilities within DHS data, while outside-in focuses on non-DHS sources. Developing the inventory entailed three steps.

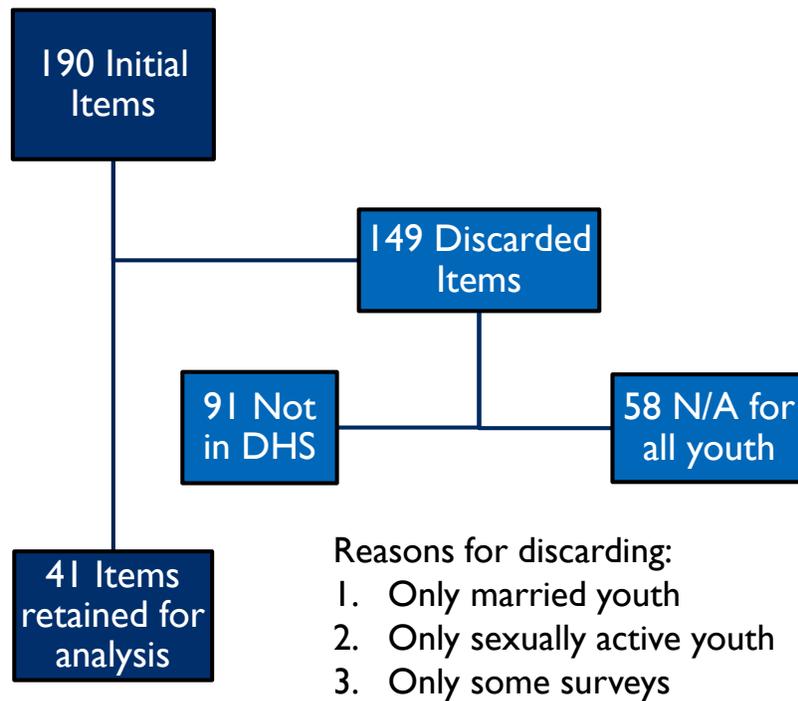
First, we examined existing measures that are based on DHS data. These included the SWPER (Ewerling et al. 2017; Ewerling, Raj, et al. 2020), an inventory of gender-power-related items in DHS surveys (MacQuarrie and McFarland 2020), and SDG indicators that are measured with DHS data. The focus of this review was to determine if their component items are relevant to youth.

Second, we looked outside the DHS to empowerment instruments that were not based on DHS data. This included the Women's Agency Scale (WAS-61) (Yount et al. 2020), Reproductive Empowerment and Reproductive Autonomy measures (Edmeades et al. 2018; Hinson et al. 2019; MEASURE Evaluation 2020; Upadhyay, Dworkin, et al. 2014), Women's Empowerment in Agriculture (WEIA) index (Alkire et al. 2013; Malapit et al. 2019; Meinzen-Dick et al. 2019), the Gender-equitable Men (GEM) Scale (Pulerwitz and Barker 2008), Women's Economic Empowerment (WEE) measure (Laszlo and Grantham 2017; Laszlo et al. 2020), and the Women & Girls' Empowerment Index (WGE-SRH) (Moreau et al. 2020), among others. These instruments were reviewed to determine if there are the same or substantively similar component items in the DHS.

Third and finally, we conducted a top-to-bottom review of the DHS-7 questionnaire for any overlooked or novel items that could possibly speak to youth empowerment.

The result is an inventory of more than 190 initial items for consideration. As shown in Figure 1, we discarded 149 of these 190 items. We excluded 91 items because there was not a corresponding item in the DHS. We excluded another 58 items from consideration because they were not available for all youth. The most common reason for discarding these items is that they were only available for married youth, followed by only being available for sexually active youth. A small number of items were discarded because of skip patterns that similarly limited their availability to less than the full sample of youth. Some items were discarded because they were included in some but not all surveys. This process yielded 41 items that we retained for analysis.

Figure 1 Inventory of possible youth empowerment items



## 2.3 Factor Analysis

We used exploratory factor analysis (EFA) to develop a YE scale from these 41 possible items. We conducted principal components analysis (PCA) with oblique rotation on these items on pooled data from all 10 surveys. We were guided by the eigenvalue  $>1.0$  and screeplots to identify the possible number of factors. We omitted items with a rotated factor loading of less than absolute value of 0.4, and examined the factor structure and provided provisional labels to each domain. We tested the Cronbach's alpha of the overall scale and each subscale and examined collinearity among items and factors.

We used confirmatory factor analysis (CFA), again with principal components analysis and oblique rotation, to test the resulting factor structure with retained items. We conducted this confirmatory factor analysis first on the full pooled sample, then on each of the 10 countries (full samples), and then finally within each of the 10 countries on subsamples that were disaggregated by marital status, age, and school status. We examined three marital categories of youth: never-married youth, currently married, and formerly married (widowed, divorced, or separated) youth; three age groups: youth age 15-19, age 20-24, and age 25-29; and those who were in school and those who were out of school in the current school year.

Stata code to produce the final YE scale and factor scores (for both the overall scale and each subscale) is presented in the appendix (MacQuarrie 2021). This program will also be made available in the DHS Github repository (<https://github.com/DHSProgram>).



## 3 RESULTS

### 3.1 Exploratory Factor Analysis

Table 2 describes the items in the initial pool of youth empowerment items used in the first stage of EFA. In the first EFA, five items resulted in a loss of sample size and were dropped. The items are: 1. Name is on title or deed for house; 2. Name is on title or deed for land; 3. Wife is justified in asking husband to use condom if he has an STI; 5. Wife can refuse sex if husband has sex with other women; and 5. Ever used contraception. All but the first two of these items failed to load onto a single factor.

**Table 2** Item pool for youth empowerment exploratory factor analysis

#	Item stem	Response code or unit
<b>Domain 1: Violence attitudes (intrinsic agency)</b>		
Wife beating is justified if:		
1	Wife goes out without telling husband	yes/no
2	Wife neglects the children	yes/no
3	Wife argues with husband	yes/no
4	Wife refuses to have sex with husband	yes/no
5	Wife burns the food	yes/no
<b>Domain 2: Sexual health self-efficacy (intrinsic agency)</b>		
6	<i>Wife is justified in asking husband to use condom if he has an STI [dropped]</i>	yes/no
7	<i>Wife can refuse sex if husband has sex with other women [dropped]</i>	yes/no
<b>Domain 3: Digital connectedness: Banking and internet</b>		
8	Owns a mobile telephone	yes/no
9	Uses mobile phone for financial transactions	yes/no
10	Has an account in a bank or other financial institution	yes/no
11	Use of internet	never; yes but not in last 12 months; yes in last 12 months)
12	Frequency of internet use in last month	not at all; less than once a week; at least once a week; almost every day)
<b>Domain 4: Work and earnings</b>		
13	Currently working	yes/no
14	<i>Worked in last 12 months [dropped]</i>	yes/no
15	Worked in last 12 months	no, in past year but not currently; currently working
16	Earnings	no earnings; in-kind earnings; cash
<b>Domain 5: Health facility access</b>		
The following is a big problem to get medical advice/treatment when sick		
17	Getting permission to go	big problem/not a problem
18	Getting money needed for treatment	big problem/not a problem
19	Distance to health facility	big problem/not a problem
20	Not wanting to go alone	big problem/not a problem
<b>Domain 6: Major asset ownership</b>		
21	Owns house alone or jointly	yes/no
22	Owns land alone or jointly	yes/no
23	<i>Name is on title or deed for house [dropped]</i>	no title/does not own house; title but not on it; on house title
24	<i>Name is on title or deed for land [dropped]</i>	no title/does not own land; title but not on it; on land title

Continued...

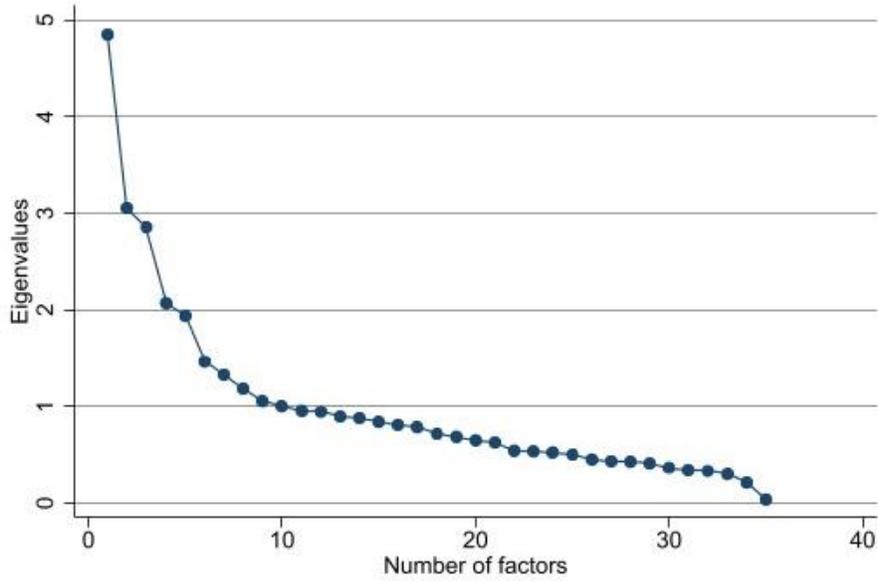
**Table 2**      *Continued*

#	Item stem	Response code or unit
<b>Domain 7: Media and family planning messaging exposure</b>		
<i>Frequency of media exposure</i>		
25	<i>Reading a newspaper or magazine [dropped]</i>	not at all; less than once a week; at least once a week; almost every day
26	<i>Listening to the radio [dropped]</i>	not at all; less than once a week; at least once a week; almost every day
27	<i>Watching television [dropped]</i>	not at all; less than once a week; at least once a week; almost every day
<i>In the last few months have you:</i>		
28	<i>Heard about family planning on the radio [dropped]</i>	yes/no
29	<i>Seen anything about family planning on the television? [dropped]</i>	yes/no
30	<i>Read about family planning in a newspaper or magazine? [dropped]</i>	yes/no
31	<i>Received a voice or text message about family planning on a mobile phone? [dropped]</i>	yes/no
<b>Domain 8: Reproductive health knowledge</b>		
32	Knows ovulatory cycle	yes/no
33	Knows postpartum fecundability	yes/no
34	Knowledge of contraceptive methods	none; only traditional/folkloric method; modern method)
35	<i>Knows a source of modern contraceptive methods [dropped]</i>	yes/no
<b>Domain 9: Sexual and reproductive health experience</b>		
36	<i>Age at first sex [dropped]</i>	never had sex; age <18; age ≥18
37	<i>Ever used contraception [dropped]</i>	yes/no
<b>Domain 10: Health service interactions</b>		
38	<i>Was visited by a fieldworker in last 12 months [dropped]</i>	yes/no
39	<i>Fieldworker discussed family planning [dropped]</i>	no/no fieldworker visit; yes
40	<i>Visited a health facility in last 12 months [dropped]</i>	yes/no
41	<i>Discussed family planning at health facility visit [dropped]</i>	no/no visit to facility; yes

<sup>(1)</sup> Items in this domain have a negative valence on the overall scale.

A second EFA on the remaining 35 items suggested a primary “elbow” at six factors and a secondary “elbow” at 9 factors, as shown by the screeplot in Figure 2. While no items loaded onto more than one factor, an additional 14 items indicated in Table 2 failed to load (factor loading <0.4) and were also dropped from further solutions. In total, 19 items from the initial item pool in Table 2 were dropped.

**Figure 2** Screeplot of pooled exploratory factor analysis with 35 items

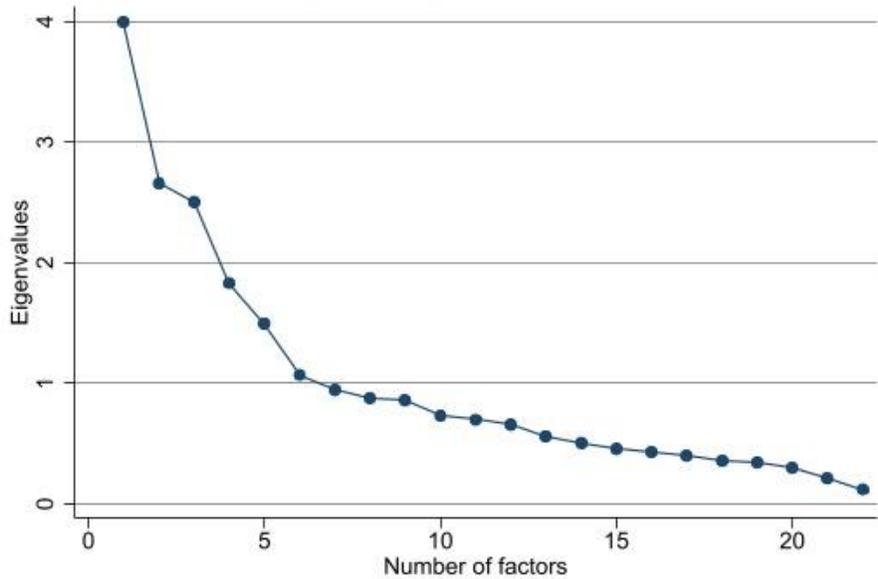


## 3.2 Confirmatory Factor Analysis

### 3.2.1 Overall CFA

Pooled CFA with the remaining 22 items indicate a six-factor solution, confirmed by screeplot (Figure 3) that explains 62% of the variance. The six-factor solution has an eigenvalue of 1.07.

**Figure 3** Screeplot of pooled confirmatory factor analysis with 22 items



Rotated factor loadings are presented in Table 3. The resulting YE scale has a Cronbach's alpha of  $\alpha=0.7260$ , indicating good internal reliability. The six domains of the YE scale are labeled: (1) Violence attitudes ( $\alpha=0.8821$ ), containing five items; (2) Digital connectedness: Banking and internet ( $\alpha=0.7095$ ) with five items; (3) Work and earnings ( $\alpha=0.8203$ ) with three items; (4) Health facility access ( $\alpha=0.7042$ ) with four items; (5) Major asset ownership ( $\alpha=0.7799$ ) with two items; and (6) Reproductive health knowledge ( $\alpha=0.2394$ ) with three items. This latter domain has a poor internal reliability but high face validity and importance to the construct of youth empowerment, and so it was decided to retain this subscale at this point.

**Table 3 Scale metrics and rotated factor loadings from confirmatory factor analysis of youth empowerment items (n=104,248)**

	Violence attitudes	Digital connectedness: Banking & internet	Work & earnings	Health facility access	Major asset ownership	Reproductive health knowledge
<b>Violence attitudes</b>						
Wife beating is justified if:						
Wife goes out without telling husband	0.8264					
Wife neglects the children	0.8300					
Wife argues with husband	0.8618					
Wife refuses to have sex with husband	0.8210					
Wife burns the food	0.7726					
<b>Digital connectedness: Banking &amp; internet</b>						
Owns a mobile telephone		0.6522				
Uses mobile phone for financial transactions		0.5908				
Has an account in a bank or other financial institution		0.5571				
Use of internet		0.8576				
Frequency of internet use in last month		0.8676				
<b>Work &amp; earnings</b>						
Currently working			0.9235			
Worked in last 12 months			0.9522			
Earnings			0.8425			
<b>Health facility access</b>						
The following is a big problem to get medical advice/treatment when sick:						
Getting permission to go				0.6769		
Getting money needed for treatment				0.7114		
Distance to health facility				0.7681		
Not wanting to go alone				0.7640		
<b>Major asset ownership</b>						
Owns house alone or jointly					0.9003	
Owns land alone or jointly					0.8962	
<b>Reproductive health knowledge</b>						
Knows ovulatory cycle						0.6069
Knows postpartum fecundability						0.7465
Knowledge of contraceptive methods						0.5236
<b>Subscale metrics:</b>						
Factor order:	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Number of items in the subscale:	5	5	3	4	2	3
Cronbach's alpha (internal reliability):	0.8821	0.7095	0.8203	0.7042	0.7799	0.2394
<b>Scale metrics:</b>						
Eigenvalue	1.0695					
Cumulative variance explained	61.6%					
Number of items in the scale:	22					
Cronbach's alpha (internal reliability):	0.7260					

The resulting YE scale includes both empowerment resources, such as reproductive health knowledge and major asset ownership (Kabeer 1999) and intrinsic agency (Ewerling, Raj, et al. 2020; Yount et al. 2020) describing injunctive empowerment norms such as attitudes toward wife beating, and instrumental agency as in health access. Some domains combine items reflecting both empowerment resources and instrumental agency, such as the digital connectedness domain wherein mobile phone ownership and having a bank

account may reflect the former while use of internet and phone for financial transactions may reflect the latter.

Table 4 presents the prevalence (percent distribution or mean) of the YE scale items in each of the 10 study countries.

**Table 4 Youth empowerment items among analytic sample of women age 15-29**

	Ethiopia	Haiti	Malawi	Mali	Nepal	Nigeria	Philippines	Senegal	Uganda	Zambia
<b>Wife beating is justified if:</b>										
Wife goes out without telling husband	41.7	12.1	8.1	53.0	10.7	22.9	4.7	29.0	31.7	29.8
Wife neglects the children	46.8	11.4	10.5	51.8	25.4	23.2	11.1	30.1	41.1	36.0
Wife argues with husband	40.7	2.6	8.1	67.8	8.6	21.1	3.8	32.3	28.3	36.2
Wife refuses to have sex with husband	34.0	4.5	9.8	62.1	2.9	22.4	3.9	31.5	19.5	34.2
Wife burns the food	38.2	4.7	6.6	23.3	3.3	15.7	2.8	18.9	15.2	24.8
Owens a mobile telephone	32.8	54.9	29.4	59.6	75.0	50.9	88.4	64.7	40.2	48.2
Uses mobile phone for financial transactions	1.6	11.5	8.4	18.2	8.9	12.1	9.8	23.1	29.8	24.7
Has an account in a bank or other financial institution	13.9	9.5	7.4	3.2	29.0	16.8	16.2	3.9	9.5	8.2
<b>Use of internet</b>										
Never	93.0	63.3	92.4	80.7	66.7	80.3	15.7	47.1	87.5	84.5
Yes, not in last 12 months	0.7	2.8	1.0	1.6	1.3	1.8	1.9	1.5	1.5	1.6
Yes, in last 12 months	6.3	33.9	6.6	17.7	32.0	17.9	82.3	51.4	10.9	13.8
<b>Frequency of internet use in last month</b>										
Not at all	94.1	69.1	93.8	82.4	69.3	82.8	18.5	49.3	89.6	86.5
Less than once a week	1.3	4.7	0.8	1.8	3.4	2.9	11.4	10.9	1.8	2.0
At least once a week	2.5	8.9	1.7	5.8	9.6	5.4	24.4	17.7	3.2	4.2
Almost every day	2.1	17.2	3.8	10.0	17.8	8.9	45.7	22.1	5.4	7.3
Currently working	30.4	26.9	54.2	47.3	48.7	52.0	32.7	31.4	64.8	32.9
Worked in last 12 months	46.9	38.4	59.2	51.2	60.3	55.5	41.0	40.6	70.1	39.6
<b>Has earnings</b>										
No earnings	74.8	62.0	76.6	64.0	73.2	57.4	64.3	75.3	46.6	69.4
In-kind earnings	3.0	0.4	2.4	1.2	1.6	1.4	0.4	0.9	3.6	0.8
Cash	22.2	37.6	21.0	34.8	25.2	41.2	35.3	23.8	49.8	29.8
<b>The following is a big problem to get medical advice/treatment when sick</b>										
Getting permission to go	31.7	10.9	16.6	25.1	24.6	11.9	9.8	10.3	6.0	3.9
Getting money needed for treatment	51.8	71.7	50.9	36.6	51.9	44.9	45.2	45.7	41.2	19.2
Distance to health facility	48.9	36.9	54.4	27.0	52.5	25.4	23.2	26.3	35.0	27.3
Not wanting to go alone	42.8	22.6	31.0	19.2	68.8	17.9	25.5	19.1	21.0	13.8
Owens house alone or jointly	34.8	10.1	44.4	25.7	2.3	5.3	13.7	5.8	24.7	21.3
Owens land alone or jointly	27.4	11.6	45.2	25.5	4.1	6.4	5.0	2.7	20.7	16.6
Knows ovulatory cycle	24.5	24.3	15.8	25.8	26.4	21.3	19.5	19.9	20.1	19.0
Knows postpartum fecundability	41.1	38.3	50.6	38.1	63.4	54.4	54.1	27.2	45.2	41.8
<b>Knowledge of contraceptive methods</b>										
None	1.9	0.2	2.6	8.1	0.1	10.0	1.7	11.0	1.4	2.1
Only traditional/folkloric method	0.0	0.0	0.0	0.2	0.0	0.5	0.1	0.1	0.1	0.0
Modern method	98.1	99.8	97.4	91.7	99.9	89.5	98.3	88.9	98.5	97.9
Total N	9,099	8,270	14,375	6,009	6,984	22,538	12,789	4,944	11,137	7,971

Table 5 shows the pairwise correlations among the factors, specifically among the pooled factor scores. This indicates that all of the factors are significantly associated with one another. However, the magnitude of the correlations between any pair of factors is not substantial. With the exception of the correlation between the reproductive health knowledge and work and earnings factors (0.41), no correlations exceed 0.4. They largely range between 0.01 and 0.24. Table 6 shows the range of correlations in separate country samples, and likewise reveal significant but not substantial factor correlations. These findings offer evidence that the dimensions in the YE scale are related but separate constructs.

**Table 5 Pearson pairwise correlations (absolute values) of Youth Empowerment scores derived from final confirmatory factor model**

		Violence attitudes <sup>1</sup>	Digital connectedness: Banking & internet	Work & earnings	Health facility access	Major asset ownership	Reproductive health knowledge
Violence attitudes <sup>1</sup>	Pearson correlation Sig. (2-tailed)	1					
Digital connectedness: Banking & internet	Pearson correlation Sig. (2-tailed)	0.022 <i>0.000</i>	1				
Work & earnings	Pearson correlation Sig. (2-tailed)	0.237 <i>0.000</i>	0.034 <i>0.000</i>	1			
Health facility access	Pearson correlation Sig. (2-tailed)	0.057 <i>0.000</i>	0.040 <i>0.000</i>	0.225 <i>0.000</i>	1		
Major asset ownership	Pearson correlation Sig. (2-tailed)	0.013 <i>0.000</i>	0.103 <i>0.000</i>	0.181 <i>0.000</i>	0.065 <i>0.000</i>	1	
Reproductive health knowledge	Pearson correlation Sig. (2-tailed)	0.155 <i>0.000</i>	0.049 <i>0.000</i>	0.412 <i>0.000</i>	0.128 <i>0.000</i>	0.076 <i>0.000</i>	1

<sup>1</sup> Violence attitudes has a negative valence with the overall Youth Empowerment scale.

**Table 6 Range of Pearson pairwise correlations (absolute values) of Youth Empowerment scores derived from final confirmatory factor model across 10 surveys**

		Violence attitudes <sup>1</sup>		Digital connectedness: Banking & internet		Work & earnings		Health facility access		Major asset ownership		Reproductive health knowledge	
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Violence attitudes <sup>1</sup>	Pearson correlation	1	1										
Digital connectedness: Banking & internet	Pearson correlation	0.030 <i>Haiti</i>	0.120 <i>Mali</i>	1	1								
Work & earnings	Pearson correlation	0.087 <i>Malawi</i>	0.355 <i>Ethiopia</i>	0.028 <i>Mali</i>	0.233 <i>Ethiopia</i>	1	1						
Health facility access	Pearson correlation	0.050 <i>Malawi</i>	0.238 <i>Ethiopia</i>	0.031 <i>Uganda</i>	0.296 <i>Philippines</i>	0.197 <i>Mali</i>	0.376 <i>Nepal</i>	1	1				
Major asset ownership	Pearson correlation	0.025 <i>Philippines</i>	0.138 <i>Ethiopia</i>	0.041 <i>Senegal</i>	0.245 <i>Haiti</i>	0.016 <i>Nigeria</i>	0.260 <i>Ethiopia</i>	0.035 <i>Nigeria</i>	0.113 <i>Malawi</i>	1	1		
Reproductive health knowledge	Pearson correlation	0.032 <i>Malawi</i>	0.238 <i>Ethiopia</i>	0.034 <i>Senegal</i>	0.151 <i>Ethiopia</i>	0.499 <i>Ethiopia &amp; Nigeria</i>	0.332 <i>Nepal</i>	0.051 <i>Senegal</i>	0.243 <i>Ethiopia</i>	0.032 <i>Nigeria</i>	0.167 <i>Ethiopia</i>	1	1

<sup>1</sup> Violence attitudes has a negative valence with the overall Youth Empowerment scale.

### 3.2.2 CFA by country

We repeated the principal components analysis in each country sample separately. Rotated factor loadings for each country are available as Supplementary Material (Tables 3-12). The factor structure is remarkably similar in each run. The same six factors are present in each country, with the solution explaining 56%-67% of the variance and with a Cronbach's alpha ranging between  $\alpha=0.6599$  (Malawi) and  $\alpha=0.8013$  (Ethiopia).

In Ethiopia, Malawi, Nigeria, and Zambia, the items load onto the six domains in identical fashion to the overall CFA. In all countries, the reproductive health knowledge domain had the lowest internal reliability. Knowledge of the fertile period did not load onto this or any other domain in Haiti or Mali. In the Philippines contraceptive knowledge did not load, and in Senegal neither of these items loaded onto this or another domain. In Haiti, the item “getting permission to go for medical treatment when sick” loaded onto this domain rather than the health access domain. In Nepal and Senegal, having a bank account did not load onto a domain, and in the Philippines, neither this nor using mobile phone for banking did. And in Uganda, two items (having a mobile phone and using it for banking) loaded onto both the digital connectedness and reproductive health knowledge domains. Despite these minor variations, the Cronbach’s alpha remained robust for the first five factors and weak for the sixth in all 10 countries.

### **3.3 Testing the YE scale in Youth Subpopulations**

Using the pooled sample and in each of the 10 study country samples, we estimated the six-factor solution across youth population stratified by age, marital status, and school status. The YE scale proved to be robust across each of these subsamples, as detailed below.

#### **3.3.1 YE scale and age**

Table 7 presents the rotated factor loadings from pooled solutions on each age group. Tables 14-23 in the Supplementary Material show these results for each country. The equivalent solution is reproduced in each age group. The alpha ranges from  $\alpha=0.702$  in the age 15-19 sample to  $\alpha=0.7574$  in the age 25-29 sample. With the usual exception of the reproductive health knowledge domain, the internal reliability of all domains are robust in each age group.

These results are similar across countries as well. In Nepal (Supplementary Table 18), the optimal solution in the age 20-24 sample suggests a seventh factor, which is formed by the Violence attitudes factor dividing into two separate factors, with the first three violence attitude items in one and the last two violence attitude items in the other. This factor does not emerge in either of the other age groups. Similarly in Senegal (Supplementary Material Table 21), the health access divides into two factors (getting permission to go and getting money vs distance and not wanting to go alone), but this division appears in all three age groups.



### 3.3.2 YE scale and marital status

As shown in Table 8, the YE scale is consistent across subpopulations of never married, currently married, and formerly married young women (see country results in Supplementary Material Tables 25-34). The major asset ownership domain shows slightly less internal reliability ( $\alpha=0.6673$ ) among the never-married sample than either the currently or formerly married samples ( $\alpha=0.7429$  to  $0.7554$ ). This is a typical pattern across separate country analyses (see Supplementary Material), though Malawi, the Philippines, and Senegal present exceptions to this rule.

**Table 8 Scale metrics and rotated factor loadings from confirmatory factor analysis of youth empowerment items, by marital status (n=104,248)**

	Digital connectedness:												Reproductive health knowledge			
	Violence attitudes			Banking & internet			Work & earnings			Health facility access			Major asset ownership			
	Never married	Currently married	Formerly married	Never married	Currently married	Formerly married	Never married	Currently married	Formerly married	Never married	Currently married	Formerly married	Never married	Currently married	Formerly married	
Wife beating is justified if:																
Wife goes out without telling husband	0.8143	0.8369	0.7925													
Wife neglects the children	0.8145	0.8443	0.8206													
Wife argues with husband	0.8532	0.8671	0.8503													
Wife refuses to have sex with husband	0.8061	0.8289	0.8136													
Wife burns the food	0.7805	0.7697	0.7635													
Owens a mobile telephone				0.7246	0.5835	0.5318										
Uses mobile phone for financial transactions				0.5585	0.6122	0.4479										
Has an account in a bank or other financial institution				0.5483	0.5505	0.5090										
Use of internet				0.8805	0.8438	0.8912										
Frequency of internet use in last month				0.8904	0.8562	0.8791										
Currently working							0.9371	0.9167	0.9050							
Worked in last 12 months							0.9632	0.9482	0.9441							
Earnings							0.8344	0.8273	0.8068							
The following is a big problem to get medical advice/treatment when sick										0.6666	0.6811	0.6482				
Getting permission to go										0.7196	0.7037	0.7005				
Getting money needed for treatment										0.7738	0.7722	0.7476				
Distance to health facility										0.7456	0.7793	0.7698				
Not wanting to go alone																
Owens house alone or jointly										0.8678	0.8880	0.8932				
Owens land alone or jointly										0.8639	0.8814	0.8866				
Knows ovulatory cycle													0.6443	0.5069	0.5490	
Knows postpartum fecundability													0.7298	0.7569	0.7603	
Knowsledge of contraceptive methods													0.5314	0.5496	0.4638	
<b>Subscale metrics:</b>																
Factor order:																
Number of items in the subscale:	Factor1 5	Factor1 5	Factor1 5	Factor2 5	Factor2 5	Factor2 5	Factor3 3	Factor3 3	Factor3 3	Factor4 4	Factor4 4	Factor4 4	Factor5 2	Factor5 2	Factor6 3	
Cronbach's alpha (internal reliability):	0.8739	0.8875	0.8687	0.7202	0.7052	0.6798	0.8371	0.8007	0.7577	0.6963	0.7135	0.6724	0.6673	0.7554	0.7429	0.1305
<b>Scale metrics, never married (n=47,046):</b>																
Eigenvalue	1.0667															
Cumulative variance explained	61.4%															
Number of items in the scale:	22															
Cronbach's alpha (internal reliability):	0.7437															
<b>Scale metrics, currently married (n=52,785):</b>																
Eigenvalue	1.0679															
Cumulative variance explained	60.9%															
Number of items in the scale:	22															
Cronbach's alpha (internal reliability):	0.7248															
<b>Scale metrics, formerly married (n=4,417):</b>																
Eigenvalue	1.0583															
Cumulative variance explained	58.5%															
Number of items in the scale:	22															
Cronbach's alpha (internal reliability):	0.6859															

### 3.3.3 YE scale and school status

The YE scale and its factor structure are similar and equally robust both in samples of in-school youth and out-of-school youth (Table 9 and Supplementary Tables 36-45). The factor structure and loading pattern was identical across the two groups of in-school and out-of-school young women. In the pooled sample, the Cronbach's alpha is 0.7463 among those not in school and 0.7040 among those in school, suggesting roughly equivalent internal reliability in both samples. The six-factor solution explains 61.8% and 60% of the variance, respectively.

Country-specific findings from school-going and non-school-going subsamples reinforce the general pattern of these findings, with few exceptions. Occasionally, one or more of the digital connectedness or the reproductive health knowledge items failed to load onto its ostensible factor. However, there was no systematic pattern to these exceptions based on school status. Among out-of-school youth in Uganda, two digital connectedness items (owns mobile phone and uses mobile phone for financial transactions) loaded onto the reproductive health knowledge factor. In all other cases, the factor structure mimicked the overall factor structure for both groups.

These findings indicate that the YE scale is robust across 10 countries and across age group, marital status, and school-going status subsamples. Code to produce this YE scale and factor scores in Stata can be found in the appendix (MacQuarrie 2021) and will be made available in the DHS Github repository (<https://github.com/DHSProgram>). This code is replicable on any standard DHS-7 survey, with data obtainable at <https://www.dhsprogram.com/Data/>.

**Table 9 Scale metrics and rotated factor loadings from confirmatory factor analysis of youth empowerment items, by school status (n=104,248)**

	Violence attitudes		Digital connectedness:		Work & earnings		Health facility access		Major asset ownership		Reproductive health knowledge	
	Out of school	In school	Out of school	In school	Out of school	In school	Out of school	In school	Out of school	In school	Out of school	In school
Wife beating is justified if:												
Wife goes out without telling husband	0.8330	0.8029										
Wife neglects the children	0.8426	0.7951										
Wife argues with husband	0.8652	0.8460										
Wife refuses to have sex with husband	0.8244	0.8003										
Wife burns the food	0.7723	0.7742										
Owens a mobile telephone			0.6043	0.7692								
Uses mobile phone for financial transactions			0.6167	0.5350								
Has an account in a bank or other financial institution			0.5987	0.4876								
Use of internet			0.8554	0.8680								
Frequency of internet use in last month			0.8650	0.8833								
Currently working			0.9248	0.9020								
Worked in last 12 months			0.9553	0.9420								
Earnings			0.8288	0.7905								
The following is a big problem to get medical advice/treatment when sick					0.6820	0.6589						
Getting permission to go					0.7079	0.7167						
Getting money needed for treatment					0.7708	0.7658						
Distance to health facility					0.7765	0.7312						
Not wanting to go alone									0.8938	0.8760		
Owens house alone or jointly									0.8914	0.8727		
Owens land alone or jointly												
Knows ovulatory cycle											0.5267	0.6945
Knows postpartum fecundability											0.7725	0.7165
Knowledge of contraceptive methods											0.5543	0.4707
<b>Subscale metrics:</b>												
Factor order:												
Number of items in the subscale:	Factor1 5	Factor1 5	Factor2 5	Factor2 5	Factor3 3	Factor3 3	Factor4 4	Factor4 4	Factor5 2	Factor5 2	Factor6 3	Factor6 3
Cronbach's alpha (internal reliability):	0.8865	0.8638	0.7185	0.7071	0.8057	0.8163	0.6848	0.6848	0.7702	0.6919	0.2268	0.2492
<b>Scale metrics, out of school (n=76,262):</b>												
Eigenvalue	1.0891											
Cumulative variance explained	61.8%											
Number of items in the scale:	22											
Cronbach's alpha (internal reliability):	0.7463											
<b>Scale metrics, in school (n=27,985):</b>												
Eigenvalue	1.0683											
Cumulative variance explained	59.7%											
Number of items in the scale:	22											
Cronbach's alpha (internal reliability):	0.7040											

## DISCUSSION

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This study finds that it is possible to measure young women’s empowerment, and to do so using widely available, existing data. The YE scale developed in this study is robust across 10 countries and across age group, marital status, and school-going status subsamples. As such, the YE scale can be used with a diverse set of youth populations. This scale can facilitate new research into the relationships between youth empowerment and a wide variety of social, demographic, and health outcomes.

The YE scale identifies six domains relevant to empowerment among youth. It identifies a new domain—“Digital connectedness: Banking and internet”—as pertinent among youth. This domain accompanies others that are more typical in those measures of women’s empowerment, particularly in the areas of sexual and reproductive health (Mandal, Muralidharan, and Pappa 2017; Upadhyay, Gipson, et al. 2014). In this study, the other domains are Violence attitudes, Work and earnings, Health facility access, Major asset ownership, and Reproductive health knowledge. The YE scale comprises items expressing empowerment resources, intrinsic agency, and instrumental agency.

This study has several limitations to note. First, the YE scale is restricted to data that were available in DHS surveys and, specifically, to items that were available for all youth. The development of this measure took, by necessity, a data-driven approach rather than a conceptually driven approach. The resulting scale may weakly measure—or miss entirely—some domains that are nonetheless salient expressions of and necessary for a holistic understanding of youth empowerment. This is a valid criticism that has been leveled at prior data-driven attempts to measure women’s empowerment (Yount, Peterman, and Cheong 2018).

One advance offered by this YE scale is its applicability to *unmarried* young women. Prior attempts to measure empowerment among young populations have frequently restricted their measures to young women who are in union (e.g., Moreau et al. 2020). This has been a key limitation of applying other measures of adult women’s empowerment using DHS data to youth populations (Ewerling et al. 2017). However, in overcoming this limitation with the YE scale, we have exacerbated another.

The YE scale is missing decision-making items because these items are only available for married women. This includes both general household decision-making items (included in the SWPER index) and decision-making items specific to the use or non-use of contraception (incorporated in the SDG measure). Even though unmarried young women use contraception in many settings, the DHS only asks about contraceptive decision-making among women in union. This is a particularly notable gap for two reasons. First, decision-making is an established component of women’s empowerment. As an expression of agency, there is consensus that this is a direct measure of empowerment (Kabeer 1999) and most contemporary measures of empowerment include measures of decision-making. Second, youth may face more constraints on decision-making than other members of the household, making its measurement particularly critical.

In an early contribution to conceptualizing empowerment, Gage raises the question as to whether “the period of adolescence is different enough [from adulthood] to warrant a separate framework” for empowerment (Gage 2000). At a minimum, for young people—particularly unmarried adolescents—who may be subject to adult authority, we need to abandon the couple dyad as the sole lens for decision-making items, and we must include other actors beyond the spouse/partner and the respondent as possible locus of

control. Only with such adjustments can we include decision-making items in our measures of youth empowerment.

Another criticism of existing measures of (adult) women's empowerment using DHS data is that it insufficiently captures participation or leadership in the political and economic domains (Yount, Peterman, and Cheong 2018). Some of these limitations are intrinsic to DHS surveys, which contain less data on economic activity and civic engagement than, for example, are included in the WEIA index (Alkire et al. 2013; Malapit et al. 2019). Nonetheless, the YE scale in this study makes greater use of items related to access to and control of economic resources than does the SWPER index, the focus of Yount's critique (Ewerling et al. 2017; Ewerling, Raj, et al. 2020). The YE Scale incorporates ownership and use of bank accounts, house ownership, land ownership, employment in the past 12 months, and earnings, whereas the first iteration of the SWPER index only includes employment, an item dropped from the global iteration of the index.

Along the same lines, this study makes use of several novel items in the measurement of empowerment. These include items around ownership of a mobile phone, mobile banking and transactions, and internet use. These items comprise a distinct "digital connectedness" domain in our YE scale. These items represent both empowerment resources and instrumental agency, and are similar to instrumental agency items included in a broader measure of women's empowerment developed for adults in Bangladesh (Yount et al. 2020).

A final limitation of the YE scale is that it does not explicitly include any items that are specific to young people. It makes use of existing DHS data and items that do not restrict measurement to a particular subsample of youth. While the analysis of the YE scale in this study indicates that the items and domains that it contains are relevant for youth of the full age range 15-29, it is possible that it excludes additional items or domains that may be specifically relevant for youth and not for adults.

An improvement over the YE scale presented here would be one that includes measures specific to the youth stage of the life course. This may comprise measures regarding attitudes or decisions to stay in school; pursue a specific type of education or livelihood skills; entering the workforce and developing a vocation; and whether, when, and whom to marry. An expansive literature points to these as key life decisions for many young women (e.g., Sandøy et al. 2016). For example, a multi-country study points to the importance of pursuing educational aspirations and establishing a vocation, and the threat that lack of agency around premarital or early marital pregnancy may pose to those pursuits in Ethiopia and Uganda (Karp et al. 2020). Furthermore, many point to the lack of empowerment and low status of women as a key driver of child marriage for girls (Erulkar and Muthengi 2009; Greene et al. 2018; Jain and Kurz 2007; MacQuarrie 2009; MacQuarrie, Juan, and Fish 2019; MacQuarrie et al. 2016; Steinhaus et al. 2019). The omission of youth-specific decision-making items is a limitation that should be rectified, but one that requires development of new items in DHS data sources.

Nonetheless, the YE scale presented in this study offers an advance useful to the study of empowerment in its own right as well as in relation to economic, social, and demographic phenomena. Its robust performance across diverse cultural settings and youth populations of all ages, marital status, and school status is a notable strength.

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# APPENDIX

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/*****
*****          YOUTH EMPOWERMENT SCALE          *****/
*****
***** PURPOSE: Create Youth Empowerment Scale as defined in WP179 *****/
*****           and applied in the study published in AS77          *****/
*****
***** AUTHOR: Kerry L.D. MacQuarrie              *****/
*****
***** CREATED: 3/1/2021   Version 1.0            *****/
*****
***** INPUTS: DHS-7 IR files                      *****/
*****
***** SUGGESTED CITATION:                         *****/
***** MacQuarrie, Kerry L.D. 2021. "YE_Scale.do: A Stata Program to *****/
*****   Produce the Youth Empowerment Scale Using DHS Data."      *****/
*****   Version 1.0. Rockville, MD: ICF                    *****/
*****
*****/

use "[DATAFILE]", clear
/*Where [DATAFILE] = a DHS-7 women's recode (IR) datafile, e.g.: ETIR71FL.dta. IR
datafiles are available from https://www.dhsprogram.com/data/ */

***SAMPLE RESTRICTION
**Youth age 15-29
keep if v013<4

*****
*****
***** VARIABLE RECODING
*****
*****

lab def yesno 0 "No" 1 "Yes"
lab def tercile 1 "Low" 2 "Medium" 3 "High"

gen wt=v005/1000000
gen psu=v001

**YE Scale Variables

**YE Factor 1: DV attitudes

*Wife-beating attitudes: Move DK to yes
recode v744a(8=1),g(dva)
lab val dva yesno
recode v744b(8=1),g(dvb)
lab val dvb yesno
recode v744c(8=1),g(dvc)
lab val dvc yesno
recode v744d(8=1),g(dvd)
lab val dvd yesno
recode v744e(8=1),g(dve)
lab val dve yesno

**YE Factor 2: Banking & internet
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*Keep v169a (has mobile phone) as is

*Phone banking: Put missings with not using phone for banking
recode v169b(.,=0),g(mobank)
  lab var mobank "Uses mobile phone for financial transactions"
  lab val mobank yesno

*keep v170 (has bank account) as is

*keep v171a (ever used internet) as is

*keep v171b (frequency of using internet) as is

**YE Factor 3: Work & Earning

*keep v714 (currently working) as is

*Worked in last 12 months: dichotomize
recode v731(0=0) (1/3 =1),g(work12)
  lab var work12 "Worked in last 12 months"
  lab val work12 yesno

*Cash earnings: collapse categories
recode v741(. 0 =0 "No earnings") (3=1 "In-kind earnings") (1/2=2 "Cash"),g(earn)
  lab var earn "Has earnings"

**YE Factor 4: Health facility access

*keep v467b v467c v467d v467f (big problem seeking medical care) as is

**YE Factor 5: Home/land Ownership

*Dichotomize v745a (owns house) and v745b (owns land)
recode v745a(0=0 "No") (1/max=1 "Yes"),g(house)
  lab var house "Owns house alone or jointly"

recode v745b(0=0 "No") (1/max=1 "Yes"),g(land)
  lab var land "Owns land alone or jointly"

**YE Factor 6: RH knowledge

*Fertility knowledge: dichotomize v217 (ovulatory cycle) & v244 (post-partum
fecundability) into correct Y/N
recode v217(3=1 "Yes") (0/2 =0 "No") (4/max =0),g(fertile)
  lab var fertile "Knows ovulatory cycle"

recode v244(0 8 =0 "No") (1=1 "Yes"),g(ppfertile)
  lab var ppfertile "Knows post-partum fecundability"

*Contraceptive knowledge: Collapse folkloric and traditional categories
recode v301(0=0 "None") (1/2=1 "Only traditional/folkloric method") (3=2 "Modern
method"),g(FPknow)
  lab var FPknow "Knowledge of contraceptive methods"

```

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*****
****
**** FACTOR ANALYSIS (to create YE Scale and compute scores)
****
*****

/*Conduct factor analysis with promax (oblique) rotation. This produces the 6-factor
scale.*/
factor dva dvb dvc dvd dve v169a mobank v170 v171a v171b v714 work12 earn ///
v467b v467c v467d v467f house land fertile ppfertile FPknow, pcf factors(6)
rotate, promax

***Produce scores
predict YE1score YE2score YE3score YE4score YE5score YE6score
lab var YE1score "YE: Violence attitudes factor score"
lab var YE2score "YE: Banking & internet factor score"
lab var YE3score "YE: Work & earnings factor score"
lab var YE4score "YE: Health facility access factor score"
lab var YE5score "YE: Ownership factor score"
lab var YE6score "YE: RH knowledge factor score"

***Produce Cronbach alphas for YE subscales
alpha dva dvb dvc dvd dve
alpha v169a mobank v170 v171a v171b
alpha v714 work12 earn
alpha v467b v467c v467d v467f
alpha house land
alpha fertile ppfertile FPknow

***Produce overall scale score & alpha
factor dva dvb dvc dvd dve v169a mobank v170 v171a v171b v714 work12 earn ///
v467b v467c v467d v467f house land fertile ppfertile FPknow, pcf factors(1)
rotate, promax

predict YEscore
lab var YEscore "YE score"

***Produce overall YE scale Cronbach alpha
alpha dva dvb dvc dvd dve v169a mobank v170 v171a v171b v714 work12 earn ///
v467b v467c v467d v467f house land fertile ppfertile FPknow

***Create terciles based on YE factor scores
xtile YE_tercile=YEscore, nq(3)
lab var YE_tercile "Youth empowerment tercile"
lab val YE_tercile tercile

***Create terciles based on YE factor scores for each subscale
xtile YE1_tercile=YE1score, nq(3)
lab var YE1_tercile "Youth empowerment tercile: violence attitudes"
lab val YE1_tercile tercile

xtile YE2_tercile=YE2score, nq(3)
lab var YE2_tercile "Youth empowerment tercile: Banking & internet"
lab val YE2_tercile tercile

xtile YE3_tercile=YE3score, nq(3)
lab var YE3_tercile "Youth empowerment tercile: Work"
lab val YE3_tercile tercile

xtile YE4_tercile=YE4score, nq(3)
lab var YE4_tercile "Youth empowerment tercile: Health access"
lab val YE4_tercile tercile

```

```
xtile YE5_tercile=YE5score, nq(3)
  lab var YE5_tercile "Youth empowerment tercile: Major asset ownership"
  lab val YE5_tercile tercile
```

```
xtile YE6_tercile=YE6score, nq(3)
  lab var YE6_tercile "Youth empowerment tercile: RH knowledge"
  lab val YE6_tercile tercile
```

```
*****
*****
*****  END
*****
*****
```