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Factor structure of a male involvement index to increase the effectiveness of prevention of mother-to-child HIV transmission (PMTCT) programs: Revised Male Involvement Index

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Abstract

Male involvement in the prevention of mother to child transmission of HIV (PMTCT) during pregnancy is encouraged, but the accuracy of its measurement has not been established. The purpose of this cross-sectional study was to establish the factor structure of an index of male involvement in PMTCT. Using a structured questionnaire, 1369 HIV positive pregnant women and 522 male partners were recruited in rural Mpumalanga, South Africa. A principal component analysis with varimax rotation yielded two components accounting for 49.9% of the variance. The first factor, named Communication-Based Male Involvement and addressing partner discussions about prenatal, HIV, birth and postnatal issue, accounted for 39.8% of the variance. The second, named Action-Based Male Involvement and addressed partner awareness and actions, and information provided during antenatal visits, financial support, and attendance to visits, accounted for 10.1% of the variance. Given the low rates of male involvement participation in antenatal care, interventions are needed to increase male involvement. However, a method of quantifying male partner participation was needed to assess the effectiveness of such interventions. We hope that the Revised Male Involvement Index will stimulate further research in this area, thus increasing the effectiveness of PMTCT programs aimed at increasing male partner involvement.

Keywords

Male involvement; PMTCT; factor structure; primary health care; South Africa

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee of the University of Miami Miller School of Medicine and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflicts of Interest

No conflicts of interest to declare.

Introduction

To prevent mother to child transmission of HIV (PMTCT), women in underserved areas--specifically sub-Saharan Africa--require opportunities to access adequate prenatal care and PMTCT resources (Brusamento, Ghanotakis, Car, Majeed, & Car, 2011; United Nations, 2001). Although access to counseling and antiretroviral prophylaxis (ARV) during pregnancy is exceedingly important, of equal magnitude is support from male partners (Brusamento et al., 2011). Research has demonstrated that one of the most influential factors on a woman's decision to take an HIV test is her male partner's acceptance of the test (Bajunirwe & Muzoora, 2005; Brusamento et al., 2011). In Uganda specifically, studies have found that upwards of 80% of women who declined prenatal care and HIV testing did so due to the need for male partner approval, and over 50% refused due to apprehension of male partner response if the HIV test result were to be positive (Brusamento et al., 2011; Dahl, Mellhammar, Bajunirwe, & Björkman, 2008). Similar results were found in Kenya, where research demonstrated that male involvement was correlated with positive relationships, honesty and disclosure of HIV infection status, and HIV testing for both partners (Hampanda et al., 2019). Male involvement in developing countries is critical because men are often making final decisions regarding women's access to healthcare, contraception, food, and work, and thereby have a vast influence on pregnancy outcomes (Matseke, Ruiter, Barylski, et al., 2017; Nesane, Maputle, & Shilubane, 2016; Vermeulen et al., 2016; Yargawa & Leonardi-Bee, 2015).

In addition to influencing prenatal outcomes, male partner involvement postnatally results in better care for both the infant and mother by reducing rates of postpartum depression, lessening complications during the birth process, and increased use of healthcare resources by the mother (Matseke, Ruiter, Barylski, et al., 2017; Yargawa & Leonardi-Bee, 2015). Conversely, women with HIV in South Africa who did not have the support of their male partners experienced depressive symptoms (Matseke, Ruiter, Barylski, et al., 2017; Karl Peltzer, Rodriguez, & Jones, 2016). Male partner involvement is particularly important for women with HIV, as research has shown greater levels of adherence to antiretrovirals while pregnant (Matseke, Ruiter, Barylski, et al., 2017; K. Peltzer & Shikwane, 2011). In rural South Africa, qualitative studies have conceptualized male involvement as the provision of instrumental support, such as running errands and assisting with household chores, as well as providing emotional and financial support (Matseke et al., 2017). Qualitative investigations suggest that although nearly all men believed antenatal clinic attendance to be supportive of women, most men did not attend antenatal clinic appointments. In fact, older men perceived male involvement to be limited to the provision of financial support and other forms of support as a "women's job".

Quantifying male partner involvement can be complex as there is no one definition that encompasses all the roles of a partner before, during, and after pregnancy. The general definition is the male partner being physically with his partner prenatally or postnatally (Matseke, Ruiter, Barylski, et al., 2017; Montgomery, van der Straten, & Torjesen, 2011). An additional component of this definition includes partner involvement during pregnancy as well, in the form of supporting female partners through pregnancy healthcare visits, discussing plans for birth, and formulating future plans to care for children (Bhatta, 2013;

Matseke, Ruiters, Barylski, et al., 2017; Vermeulen et al., 2016; Hampanda et al., 2019). Ideally, male partners would also be knowledgeable and involved in possible birthing emergencies, and hence help women prepare for potential complications (Bhatta, 2013; Maternal, 2001). Although there are many general definitions of male involvement, there is no one agreed-upon definition because there is no value that encompasses all aspects of partner support (Ampt et al., 2015; Byamugisha, Tumwine, Semiyaga, & Tylleskär, 2010; Matseke, Ruiters, Rodriguez, et al., 2017; Tilahun & Mohamed, 2015). Researchers in Kenya developed a 10-item male involvement scale asking postpartum women with HIV to evaluate their partners on ten specific behaviors: 1) attending appointments, 2) supporting child birth in medical setting, 3) prompting female partners to take ARVs, 4) advising female partners to receive PMTCT healthcare, 5) providing financial means to transport to healthcare appointments, 6) prompting female partners to provide infant with ARV prophylaxis, 7) assisting with medication prophylaxis to infants, 8) obtaining ARVs for both infant and mother, 9) supporting infant feeding, and 10) supporting infant HIV infection testing (Hampanda et al., 2019). The aforementioned scale demonstrated that as the amount of male partner involvement increased, so did PMTCT actions (Hampanda et al., 2019). Other studies have similarly broken down male involvement into multiple components, including the partner attending healthcare appointments with his wife, being aware of what is required for prenatal care, speaking of these prenatal care issues with his wife, providing financial support, knowing what will occur at prenatal appointments, and use of barrier contraception for the duration of the pregnancy (Byamugisha et al., 2010; Matseke, Ruiters, Rodriguez, et al., 2017).

Because there is currently no one comprehensive measure of male partner involvement, the aim of this study was to examine the factor structure of a revised Male Involvement Index, which was hoped would serve as a method of quantifying male involvement participation. In addition to assisting in the evaluation of the effectiveness of male involvement interventions, this will help to have a valid male involvement index for future studies in South Africa and to help clinicians target interventions to improve male involvement and PMTCT.

Methods

Study design and procedure

Cross-sectional data were utilized from a PMTCT randomized controlled trial (RCT) (Jones et al., 2014). HIV positive pregnant women were interviewed at 8 to 31 weeks pregnancy. Male participants were enrolled in the study as couples. Both men and women completed a survey in their preferred language (English, isiZulu, or seSotho) using Questionnaire Development System Audio Computer-Assisted Self-Interview (ACASI) software.

Ethics Approval—Ethics approval for this study was granted by the Human Sciences Research Council (HSRC) Research Ethics Committee (REC; South Africa), protocol approval number REC4/21/08/13. Furthermore, additional approval was also obtained from the Department of Health and Social Welfare, Mpumalanga Provincial Government, South Africa and the University of Miami Miller School of Medicine Institutional Review Board

(IRB ID: 20130238 (CR00006122)). Written informed consent was obtained from all participants.

Measure—The Male Involvement Measure (Peltzer & Mlambo, 2010) was originally developed to assess male involvement in the Prevention of Mother-to-Child Transmission of HIV (PMTCT) process in the context of studying factors determining HIV viral testing of infants in South Africa. It consisted of six items for women, which was expanded in this study to 10 questions (see Tables 2 and 3 for each item) to represent clinic attendance and financial support for antenatal services, a more active form of male involvement compared to the communication items originally in the scale. Therefore, it was hypothesized that the original items would load onto two factors: 1) a more passive form of male involvement (i.e., communication based) and 2) a more active form of male involvement consisting of financial support and clinic attendance. The measure was therefore a composite of indicators related to male involvement based on responses to questions about participation in specific areas of the PMTCT cascade: antenatal care, delivery, postnatal care and prevention. Based on reviews of the literature during the process of designing the RCT and methods of quantifying improvement in male involvement, to the best of the authors' knowledge, no other existing measures exist of male involvement conceptualized as communication- versus action-based male involvement exist (Jones et al., 2014; Peltzer, Jones, Weiss, & Shikwane, 2011). Items were developed and selected were consistent with previous qualitative conceptualizations of male involvement in the South African context (Matseke et al., 2017). The response options were “Yes” and “No”. The translation procedure of the male involvement index entailed having two native-speakers of the target languages independently do a back-translation. Discrepancies were determined and solutions were reached.

Data Analyses—Descriptive statistics, including means, standard deviations, and frequencies, were used to characterize the sample. Descriptive statistics were used to compute the frequency of the study variables of the study population. Principal component analysis with varimax rotation was used to identify the factor structure of the male involvement index questionnaire. Factors with eigenvalues above 1, which were confirmed by scree plot, were retained, as suggested by previous studies (Yong & Pearce, 2013). A threshold of removal for scale items with an explained variance smaller than 20% or standardized factor loadings of less than 0.45 was set, also consistent with guidelines (MacCallum, Widaman, Zhang, & Hong, 1999). For internal consistency, a threshold of .60 is recommended (Hulin, Netemeyer, & Cudeck, 2001). The data were analyzed using IBM-SPSS for Windows, version 23 (Chicago, USA).

Results

Sample characteristics of men and women

Table 1 below contains a description of the respondents of the study. Respondents were N = 1399 women and N = 539 men. On average, women were 28.45 (SD = 5.82) years of age, where as men were an average of 33.22 (SD = 7.13). In terms of educational level, nearly half (48%) of women had completed 10 to 11 years of education, compared to 40% of men. Men had a higher income, with 64% of women making 311 South African Rand (USD\$21),

compared with 81% of men). The number of women and men for whom the current pregnancy was their first child was 21% for women and 22% for men.

Factor structure of the male involvement index

Table 2 shows the frequency for each item by gender. Table 3 shows principal component analysis with varimax rotation of male involvement index among participants (N = 1891). Based on the Kaiser-Guttman criterion, factors with an eigenvalue greater than one were retained for subsequent varimax rotation. Only those items loading .40 and higher were retained. All items had a factor loading of at least .40. The Kaiser-Meyer-Olkin measure of sampling adequacy was .89, which was above the recommended value of .6, and Bartlett's test of sphericity was significant ($c^2(4842) = p < .001$). The principal component analysis with varimax rotation yielded two components accounting for 49.9% of the variance. The first factor (eigenvalue: 3.98) accounted for 39.8% of the variance in the responses and contained items concerned partner discussion about prenatal, HIV, birth and postnatal issues, and as such was named Communication-Based Male Involvement. The second (eigenvalue: 1.0) 10.1% of the variance included items on partner awareness and actions, such as what actually happens in antenatal visits, financial support, and attendance to visits; this factor was named Action-Based Male Involvement. Every item loaded greater than .45 on its respective factor (see Table 1).

Internal consistency for each of the sub-scales was examined using Cronbach's alpha. The alphas were high for Communication-Based Male Involvement (0.80, 6 items), and low for Action-Based Male Involvement (0.62, 4 items).

Discussion

Male involvement has been shown to be an important factor in increasing women's participation in antenatal care, making them an essential part of ensuring optimal maternal and child outcomes. In the context of HIV, women's participation is imperative to preventing maternal transmission of HIV to infants. However, previous studies have shown that male partner participation in antenatal activities is low, particularly in Sub-Saharan African countries (Farquhar et al., 2004; Rodriguez et al., 2017). Thus, it is necessary to conceptualize and quantify male involvement in prevention of mother-to-child HIV transmission (PMTCT) programs to increase these participation rates through intervention programs. In this study of couples in rural South Africa, a previous male involvement index was expanded to 10 items from six to assess specific information related to PMTCT to account for more action-based items, as opposed to communication only (Peltzer & Mlambo, 2010). Findings from this study showed that items loaded strongly onto the two factors, and that internal consistency of the factors was adequate. A factor analysis yielded a multidimensional two-factor solution; these two factors were conceptualized as Communication-Based Male Involvement and Action-Based Male Involvement. Communication-Based Male Involvement included items related to the partners discussing place of delivery, infant feeding, HIV testing, condom use, antenatal healthcare, and HIV testing. Action-Based Male Involvement included items related to the male partner knowing what takes place in antenatal clinic visits, providing financial support for antenatal clinic visits, appointment times, and attendance to antenatal clinic visits.

A previous comprehensive qualitative study conducted in rural South Africa with antenatal clinic staff showed many barriers to male partner involvement in antenatal clinic visits in South Africa, including traditional perceptions of pregnancy which discourage male partner participation, scheduling conflicts with working male partners, and limited clinic space to accommodate male partners (Rodriguez et al., 2017). A study in Kenya similarly found that both depression and stigma surrounding HIV was negatively correlated with male partner involvement, suggesting that these factors may also be significant barriers in resource limited settings (Hampanda et al., 2019). Another study showed that participation in antenatal visits was as low as 15% (Farquhar et al., 2004). As such, interventions are needed to increase male partner participation in antenatal care to ensure optimal maternal and infant outcomes. The Revised Male Involvement Index provides researchers and clinicians with an easily administered instrument to quickly assess male involvement and potentially make recommendations to increase male partner participation.

A number of considerations emerged from the present study that may inform future studies attempting to improve the measurement of male partner involvement. Although it is common practice to include a midpoint option in scales, such as “Sometimes”, a midpoint answer was not included in the Revised Male Involvement Index. This was based on previous guidelines showing that midpoint options are often endorsed more frequently given that participants are less likely to consider more extreme points when a neutral answer is available, and such answers may be provided impulsively (Weems & Onwuegbuzie, 2001). In addition, although it is common practice to include reverse-coded items in scales as validity checks and to force participants to consider a full spectrum of potential answers, no reverse-coded items were included in the Revised Male Involvement Index. Reverse-coded items may confuse participants due to changes in polarity or the change in polarity may be missed given that they require more cognitive resources (Herche & Engelland, 1996). To accommodate different levels of literacy and cognitive resources/functioning, no reverse-coded items were included. However, midpoint options and reverse-coded items may be explored in future research and retained if supported by the performance of the scale.

Limitations

The present study was limited by the lack of a validation sample, which would involve the validation of the factor structure in an independent sample using confirmatory factor analysis. Future studies should validate the factor structure of the Revised Male Involvement Index. Another limitation was that participants were all from rural South Africa, limiting the generalizability and relevance of the scale; a more broadly representative sample may be needed to confirm the factor structure of the Revised Male Involvement Index. Focus groups about the scale with participants, and specifically pregnant women living HIV, may have also facilitated the development of items addressing women’s perceptions of male involvement.

Conclusions

Given the low rates of male involvement participation in antenatal care, interventions are needed to increase male involvement. However, a method of quantifying male partner participation was needed to assess the effectiveness of such interventions. Although a

previous conceptualization of male involvement primarily involved communication, it was also necessary to include Action-Based Male Involvement to account for partners that may be more actively involved in their pregnant partners' health care. These two factors of male involvement may be conceptualized and interpreted as two different levels of male involvement, with one being more passive (Communication) and the other being more active (Action). It is possible that these two different levels may differentially predict maternal and infant outcome in PMTCT programs. It is hoped that the Revised Male Involvement Index will stimulate further research in this area, thus increasing the effectiveness of PMTCT programs aimed at increasing male partner involvement.

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Table 1:

Sample characteristics of men and women in the study

Variables	Women (n=1399)	Men (n=539)
	Mean (SD) n (%)	Mean (SD) n (%)
Age	28.45 (5.82)	33.22 (7.13)
Education		
Grade 9	287 (20.5%)	106 (19.7%)
Grade 10 to 11	673 (48.1%)	217 (40.3%)
12 years or more	439 (31.4%)	216 (40.1%)
Income		
Rand 310	498 (35.6%)	101 (18.8%)
Rand 311 or more	901 (64.4%)	437 (81.2%)
Number of children		
None	298 (21.3%)	199 (22.1%)
One child	511 (36.5%)	155 (28.8%)
More than one child	590 (42.2%)	265 (49.2%)

Table 2:

Frequencies of male involvement index for women (N = 1891)

Items	Men (N = 522)	Women (N = 1369)
	N (%)	N (%)
Have you discussed the place of delivery for the baby with your partner?	339 (64.9%)	884 (64.6%)
Has your partner discussed feeding options for the baby with you?	361 (69.2%)	968 (70.7%)
Have you discussed testing your baby for HIV with your partner?	140 (26.8%)	773 (56.5%)
Have you discussed condom use with your partner?	420 (80.5%)	1117 (81.6%)
Have you discussed antenatal health care for your baby with your partner?	350 (67.0%)	968 (70.7%)
Have you been asked to take an HIV test?	435 (83.3%)	936 (68.4%)
Do you know what happens in the antenatal clinic? / Does your male partner know what happens in the antenatal clinic?*	265 (50.8%)	826 (60.3%)
Do you support your partner's antenatal visits financially? / Does your male partner support your antenatal visits financially?*	442 (84.7%)	1118 (81.7%)
Do you know your partner's antenatal appointment times? / Does your male partner know your antenatal appointment time?*	338 (64.8%)	1040 (76.0%)
Do you attend antenatal care visits with your partner? / Does your male partner attend antenatal care visits with you?*	163 (31.2%)	410 (29.9%)

* *Note.* Denotes new questions.

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Table 3:

Principal component analysis with varimax rotation of the male involvement index (N = 1891)

Items	Communication-Based Male Involvement	Action-Based Male Involvement
Have you discussed the place of delivery for the baby with your partner?	.737	
Has your partner discussed feeding options for the baby with you?	.725	
Have you discussed testing your baby for HIV with your partner?	.695	
Have you discussed condom use with your partner?	.680	
Have you discussed antenatal health care for your baby with your partner?	.627	
Have you been asked to take an HIV test?	.518	
Do you know what happens in the antenatal clinic? / Does your male partner know what happens in the antenatal clinic?*		.477
Do you support your partner's antenatal visits financially? / Does your male partner support your antenatal visits financially?*		.743
Do you know your partner's antenatal appointment times? / Does your male partner know your antenatal appointment time?*		.736
Do you attend antenatal care visits with your partner? / Does your male partner attend antenatal care visits with you?*		.564

* *Note.* These items were presented according to participant's gender.