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An Exploratory Model of Shared Decision-Making in Women's Reproductive Health in Indiana: A Cross-Sectional Study

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Keywords

shared decision-making, women's reproductive health, ecological approaches structural equation modeling

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Authors

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Abstract

Ecological approaches to shared decision-making (SDM) are underexplored in women's reproductive health. Our purpose was to identify ecological factors important to women in contraceptive and prenatal care SDM. In this cross-sectional study, women (18-45 years) living in Indiana who had sought reproductive healthcare completed an online survey (N=432). We used multiple linear regression to identify predictors of SDM. Furthermore, we conducted exploratory factor analysis, confirmatory factor analysis, and structural equation modeling to explore ecological factors associated with SDM in contraception and prenatal care. Healthcare professional type was associated with decreased contraceptive SDM scores, but not prenatal care SDM scores. Access, social support, and patient-healthcare professional relationship demonstrated good global fit in confirmatory factor analysis. Path coefficients suggested significant relationships between these ecological factors and contraceptive and prenatal care SDM scores. Additionally, the ecological factors demonstrated good global fit for contraceptive and prenatal care SDM. Social support had a significant, strong, and inverse relationship with both contraceptive and prenatal care SDM in the models. Findings further SDM work by moving beyond option discussion and toward increased attention to women's contexts and relationships. Taking a holistic approach to SDM and the patient experience ensures that women's multi-faceted needs, influences, and preferences are met across healthcare settings.

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Introduction

Women's reproductive health (e.g., contraception, pregnancy) represents an opportunity to support patient-centered care and shared decision-making (SDM) (Nyhof et al., 2020). The SDM model encourages patient-healthcare professional (HCP) partnerships, focusing on patient preferences to guide decision-making (Elwyn et al., 2017; Gulbrandsen et al., 2016). Enhanced SDM adoption may support women choosing

contraceptive methods that align with their goals (Dehlendorf et al., 2017; Gulbrandsen et al., 2016). Patients indicating high-quality HCP relationships are more likely to maintain their chosen contraception, experience improve satisfaction, and feel involved in their care (Dehlendorf et al., 2016). SDM also may improve the prenatal care experience (Farrell et al., 2015; Moore et al., 2015). Engaging in SDM can promote positive birthing experiences and enhance the quality of obstetric care (Attanasio et al.,

2014). Thus, women may benefit from SDM practice during contraceptive and prenatal care decision-making (Baijens et al., 2018). However, prior work found SDM infrequently occurs in women's reproductive healthcare, offering opportunities for improvement (Baijens et al., 2018; Coley et al., 2018; Meier, Carter, et al., 2020; Meier et al., 2019; Nyhof et al., 2020).

A key aspect of SDM includes understanding patient preferences, which tie to patients' lifestyle and social contexts (Clayman et al., 2017; Gulbrandsen et al., 2016; Meier, Carter, et al., 2020; Thomas et al., 2021). According to the Socio-Ecological Model, ecological factors related to social context and physical environment influence individual behaviors (DiClemente et al., 2013), indicating external factors may shape patient health-related decision-making. Literature suggests that women value social communication, particularly in trusted relationships, and may relate to decision-making (Anderson et al., 2014). The interpersonal level in patient-provider interactions on decision-making also may be associated with relationship quality and subsequent health choices (Rapley, 2008; Street, 2003). At the community level, the decision to attend reproductive health appointments has been found to be related to inaccessibility due to geographical factors (Meyer et al., 2016).

Limited prior SDM research has explored contextual needs in reproductive health choices (Elwyn et al., 2017; Meier, Carter, et al., 2020; Meier et al., 2019, 2021), suggesting further insight into ecological factors may expand SDM. Some work has called for incorporating ecological approaches into SDM efforts to identify how lifestyle factors impact decision-making (McCormack et al., 2017). Although extant research notes context matters in women's reproductive health decisions, empirical studies have not integrated this into SDM

(Elwyn et al., 2017; McCormack et al., 2017; Meier, Carter, et al., 2020). Including ecological approaches within SDM may improve care quality and HCPs' ability to counsel women (Meier et al., 2019).

Ecological factors in SDM include social support and its role in women's decision-making (Rapley, 2008; Smissen et al., 2019), including its influence on reproductive health choices (Levy et al., 2015; Smissen et al., 2019). Additionally, access to services can impact women's real and perceived choices (Meier, Carter, et al., 2020; Meier et al., 2021). Access barriers may be especially critical in reproductive healthcare professional shortage areas (ACOG, 2014; ISDH, 2018), such as in Indiana. Over half of Indiana's 92 counties are designated primary care shortage areas (ISDH, 2018), reducing primary care and women's reproductive healthcare services. Furthermore, 37 of 92 Indiana counties have no OBGYN (ACOG, 2014). Reduced access may have detrimental effects on women's health and well-being; Indiana has a 49% unintended pregnancy rate compared with 46% nationally (Guttmacher Institute, 2016). In addition, Indiana is the third worst state in the country for maternal mortality (Edme, 2019). Thus, care quality, healthcare access, and social-ecological differences in patient involvement may negatively impact Indiana women.

Therefore, the purpose of the study was to explore what ecological factors, including those related to social support, access, and HCP relationship, are associated with SDM in prenatal care and contraception among Indiana women.

Methods

Recruitment

This cross-sectional study was part of a larger mixed-methods project examining women's reproductive healthcare decision-

making experiences and ecological factors associated with SDM. The prior phase of the study included six focus groups conducted with reproductive-aged women (N = 22; 18-45 years old) living in Indiana at the time of the study who had ever sought reproductive healthcare. The focus groups intended to improve understanding of factors shaping their reproductive health decision-making outside of clinical factors. Focus groups revealed women valued opinions and experiences of others in their social support systems when making health decisions. Additionally, women identified relationships with healthcare providers, both positive and negative, as influencing their choices regarding reproductive healthcare decisions. Finally, women noted the significance of race/ethnicity on reproductive health decisions, related to seeking care, trusting providers, and making contraceptive and pregnancy choices. These factors were incorporated into the survey as ecological factors, which cross-walked with the spheres of influence provided in the Social-Ecological Model, which was used to identify contextual factors to include in the survey.

Women (N = 432) were eligible to participate if they were 18-45 years old, lived in Indiana, and had ever sought reproductive healthcare. Participants completed the online survey between February and June 2020. Recruitment primarily included flyers distributed at community health centers and community locations, emails through community health service Listservs, paid social media advertisements, and shareable social media flyers. The survey link was embedded into those online channels. The online study information flyer/advertisement also was shareable by individuals in our personal networks to increase reach. Additionally, researchers recruited women in-person at community locations and asked them to

complete the online survey on a personal mobile device.

Upon survey completion, all participants had the option to submit their contact information for a chance to win one of 20 \$25 gift cards. Personal information was kept separate from survey responses.

Procedure

The survey was developed from extant SDM and reproductive health decision-making literature. It incorporated findings from earlier qualitative phases of the project and was piloted with two women who met study inclusion criteria to identify whether items were clear and reflective of their understanding of experiences with reproductive healthcare. These women provided feedback and suggestions for item improvement, which were incorporated prior to launching the survey.

The survey was accessed via a supplied website link and completed at the participant's convenience on her own electronic device. Participants were first presented with a study overview and initial screening questions to determine eligibility, and then clicked continue allowing for implied informed consent. The survey took an average of 13 minutes (12.37 ± 8.74) to complete.

Measures

Items included in the survey were related to reproductive healthcare type, SDM, social support, decisional influence items developed from prior qualitative phases based on what factors women shared as impacting their reproductive healthcare choices, and demographics.

Reproductive Healthcare Type

To conceptualize type of healthcare received, items related to HCP type (options provided: doctor, nurse practitioner, physician assistant, nurse-midwife, nurse, public health nurse, community health worker, paramedic, other) and healthcare setting (options provided: doctor's office, urgent care, emergency room, hospital, public health clinic, mobile health clinic, do not receive healthcare, other) were included.

Shared Decision-making (SDM)

We used the SDM-Q9 scale to assess the extent of patient involvement in the decision-making process from the patient's perspective (Hölzel et al., 2013; Kriston et al., 2010). The nine items are measured on a six-point Likert scale from completely disagree (0) to completely agree (5). We modified the scale questions for contraception and prenatal care and computed the raw composite scores (Hölzel et al., 2013; Kriston et al., 2010). The nine-item scale highlighted whether the provider: (1) made clear that a decision needed to be made, (2) wanted to know how patients want to be involved in making decision, (3) told different treatment options, (4) explained *pro* and *contra* of each treatment options, (5) helped patients to understand all provided information, (6) asked which treatment preferred by patients, (7) asked patients to collaborate weighing treatment options, (8) asked patients to select treatments together, (9) and reached agreement with patients. The Cronbach's α for the modified contraceptive and prenatal care versions were 0.90 and 0.94, respectively.

Social Support

Social support for reproductive health decisions was assessed with five items

modified from the MOS-Social Support Survey (Moser et al., 2012) measured on a five-point Likert scale. The Cronbach's α for the modified scale was 0.84.

Decision-making Influences

To assess the importance of context in women's reproductive health decisions, we included 14 items developed from the prior qualitative phases of the study. These explored the extent to which ecological factors impacted women's decisions. Items were rated on Likert scales from not influential at all (1) to extremely influential (5) and included decision-making influences related to *demographic factors, social networks, HCP experiences, and access*. The Cronbach's α for the decision-making influence items was 0.78.

Sociodemographic Variables.

Income was assessed by asking annual income of all household members combined. The options were: *less than \$20,000; \$20,000-49,999; \$50,000-99,999; \$100,000 or more, and prefer not to answer*. We then coded income into three options: *\$5000-49,999; \$50,000-99,999, \$100,000 or more*. *Race* was assessed by asking participants to choose any of the six options of *White, Hispanic, Black, Native American or American Indian, Asian/Pacific Islander, and other*. In analysis, we later recoded race into three categories: *White, Black, and other*. *Education* was assessed through participants choosing one of nine options. Then we simplified education into four categories: *some college or less, currently in college, 4-year college degree, and graduate degree*. *Sexual orientation* was categorized into *heterosexual and LGBTQ+*. *Contraceptive method* was categorized into eight types: *contraceptive pill, intrauterine device, implant, condoms, withdrawal, not*

currently using, natural family planning, and other non-daily method. Employment was assessed through six categories: employed, not employed outside the home, unemployed, student, prefer, and prefer not to answer. In our analysis, prefer not to answer was coded as missing.

Data Analysis

We used multiple linear regression to examine significant predictors of the primary outcome of participant's SDM-Q9 scores for contraception and prenatal care. Independent variables were HCP type and reproductive healthcare setting.

We completed an exploratory factor analysis (EFA) on the 14 decisional influence items to identify those that related closely to each other using iterated principles factor method. Items that did not load onto the factors were not used. We then confirmatory factor analysis (CFA) to confirm items loading onto the latent factors. Additionally, CFA was performed on social support items to identify which measures loaded best onto a social support latent factor. We carried out structural equation modeling (SEM) on the latent variables for contraceptive and prenatal care SDM models to identify relationships between ecological factors and SDM. The raw SDM composite score served as the observed outcome for all models based on recommendations in prior work (DeMaria et al., 2017; Hölzel et al., 2013). We controlled for income, race, HCP type, education, sexual orientation, primary contraceptive method, and employment in all models. The maximum likelihood with missing variables estimator was utilized, which allowed for any items with missing values to be imputed and incorporated. Global fit statistics (i.e., chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA) at 90% confidence; Comparative Fit Index (CFI);

Tucker Lewis Fit Index (TLI)), along with factor loadings, were used to assess model fit (Hu & Bentler, 1999). All factor loadings and effects were standardized. Analyses were completed using Stata/SE 16 (StataCorp, 2019).

Results

Sample Description

Table 1 shows details for the descriptive characteristics of the sample.

SDM Experience

Table 2 presents the multiple linear regression analyses of contraceptive SDM and prenatal care SDM. As the data were collected randomly through various recruitment strategies, we assumed that the data had independence errors. Moreover, we tested normality by creating a histogram of the residuals plot on our outcome.

For this sample, seeing a non-physician HCP was associated with a decrease in SDM contraceptive score of 2.53 points, on average, compared to seeing a physician ($p < .05$). However, healthcare setting was not related to contraceptive SDM ($p > .05$), when controlling for other factors. HCP type ($p > .05$) and healthcare setting ($p > .05$) were not associated with prenatal care SDM. Location ($p > .05$) was not associated with either contraceptive or pregnancy SDM.

Table 1
Sample Description (n = 432)

Race	
White	86.57% (374)
Black	7.64% (33)
Other Race	5.79% (25)
Age	30.94±6.93 (R: 18-45)
Characteristics	% (n)
Heterosexual	82.87% (358)
LGBTQ+	17.13% (74)
Relationship Status	
Married	51.85% (224)
Single	18.98% (82)
In a relationship and not living with a partner	12.27% (53)
Living with a partner	14.12% (61)
Other	2.78% (12)
Household Income	
\$5,000-\$49,999	25.93% (112)
\$50,000-\$99,999	35.65% (154)
\$100,000 or above	34.26% (148)
Insurance Type	
Private	81.48% (352)
Public	15.28% (66)
Do not currently have insurance	3.24% (14)
Education	
Some college or less	13.19% (57)
Currently in college	13.66% (59)
4-year college degree	37.96% (164)
Graduate degree	35.19% (152)
Employment Status	
Employed full time	57.87% (250)
Not employed outside the home	6.25% (27)
Employed part time	17.13% (74)
Not currently employed	3.01% (13)
Student	13.89% (60)
Location	
Rural	23.61% (102)
Urban	29.17% (126)
Suburban	46.30% (200)
Ever Pregnant	
Yes	52.08% (225)
No	47.45% (205)

Ever Received Reproductive Care from Community Health**Setting**

Yes	66.90% (289)
No	33.10% (143)

Reproductive HCP Type

Physician	62.73% (271)
Non-physician	37.27% (161)

Typical Reproductive Healthcare Setting

Private	86.11% (372)
Community-based	13.89% (60)

Primary Birth Control Method

Contraceptive pill	31.02% (134)
Intrauterine device	19.91% (86)
Implant	3.94% (17)
Condoms	8.33% (36)
Withdrawal	4.63% (20)
Not currently using	14.81% (64)
Natural family planning	12.27% (53)
Other non-daily method	4.63% (20)

Raw Contraceptive SDM Score 32.61± 9.68 (R:0-45)

Raw Pregnancy SDM Score 31.67±10.90 (R:0-45)

Note.

Percentages that do not add up to 100% indicate missing data.

Exploratory Factor Analysis

We retained three factors in EFA, which explained 74% of the variance proportion. We only included items loading at or greater than 0.34. The three factors were HCP Relationship, Access, and Social Network Influence.

Confirmatory Factor Analysis

Following EFA, we completed the CFA on each factor (Table 3). HCP Relationship ($\chi^2(2, N = 432) = 0.26, p > .05$; RMSEA: 0.00; CFI: 1.00; TLI: 1.00), Access ($\chi^2(2, N = 432) = 0.27, p > .05$; RMSEA: 0.00; CFI: 1.00; TLI: 1.00), and Social Support ($\chi^2(3, N = 432) = 3.04, p > .05$; RMSEA: 0.01; CFI: 1.00; TLI: 1.00), demonstrated great global model fit, and statistically significant factor loadings. Social Network Influence demonstrated a moderate fit ($\chi^2, p \leq .000$; RMSEA > 0.08). All factors together had good global fit ($\chi^2(123), N = 432) = 249.01, p < .001$; RMSEA: 0.05; CFI: 0.95; TLI: 0.94); thus, we included all factors in the SEM.

Table 2
Predictors of SDM

Independent Variable	Contraceptive SDM			Pregnancy SDM		
	Coef.	p-value	95% CI	Coef.	p-value	95% CI
HCP Type						
Non-Physician	-2.53	0.02*	-4.68, -0.38	-3.54	0.07	-7.38, 0.30
Reproductive Healthcare Setting						
Community-Based	0.62	0.70	-2.62, 3.86	-5.15	0.16	-12.33, 2.03
Primary Contraceptive Method						
Intrauterine Device	6.01	0.00***	3.28, 8.74	-0.92	0.72	-5.88, 4.05
Implant	4.33	0.09	-0.65, 9.31	5.97	0.37	-7.27, 19.23
Patch	5.23	0.35	-5.70, 16.15	-	-	-
Ring	2.69	0.42	-3.89, 9.27	6.37	0.43	-9.58, 22.33
Condoms	-1.89	0.34	-5.76, 1.98	-0.86	0.81	-8.02, 6.30
Shot	4.17	0.26	-3.19, 11.53	-15.60	0.18	-38.28, 7.09
Not currently using	0.41	0.81	-2.85, 3.66	2.66	0.30	-2.43, 7.75
Withdrawal	1.36	0.61	-3.82, 6.05	7.10	0.08	-0.97, 15.18
Natural Family Planning	2.68	0.12	-0.68, 6.15	3.06	0.21	-1.68, 7.80
Age						
27-35 years	-3.60	0.01**	-6.41, -0.80	-1.65	0.65	-8.92, 5.61
36-45 years	-3.89	0.02*	-7.08, -0.69	-3.04	0.42	-10.45, 4.39
Race						
Black/African American	-3.33	0.09	-7.15, 0.50	-5.00	0.11	-11.13, 1.14
Asian	-1.56	0.70	-9.43, 6.31	17.12	0.14	-5.82, 40.05
Income Categories						
\$50,000-\$99,999	0.93	0.49	-1.71, 3.58	-2.03	0.40	-6.74, 2.68
\$100,000 or greater	3.96	0.01**	1.13, 6.80	1.37	0.59	-3.63, 6.36
Employment						
Unemployed	1.67	0.81	-5.03, 6.45	-0.22	0.96	-7.86, 7.42
Employed Part-Time	1.93	0.18	-0.87, 4.73	2.76	0.21	-1.60, 7.12
Student	-1.20	0.52	-4.87, 2.48	-7.50	0.18	-18.38, 3.38
Not Employed Outside of Home	1.67	0.46	-2.79, 6.12	-0.37	0.90	-5.86, 5.15
Self-Employed	1.60	0.65	-5.26, 8.46	-0.17	0.97	-10.23, 7.12
Education						
Currently in College	-4.61	0.04*	-9.02, -0.22	1.82	0.70	-7.57, 11.21
4-Year College	-0.51	0.76	-2.80, 3.81	-0.91	0.70	-5.57, 3.74
Graduate Degree	-0.88	0.62	-4.33, 2.56	-1.59	0.54	-6.69, 3.51
Location						
Urban	-1.00	0.48	-3.79, 1.79	-0.81	0.73	-5.42, 3.81
Suburban	-1.37	0.28	-3.86, 1.12	-0.52	0.80	-4.59, 3.54
R²			0.16			0.20
F			2.04***			1.29

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Note.

Reference Group: Physician (HCP type), Private Healthcare (Reproductive Healthcare Setting), pills (Primary Contraceptive Method), 18-26 years old (Age), White/Caucasian (Race), less than \$50,000 (Income Categories), Employed full time (Employment), High School (Education), Rural (Location).

Table 3
CFA Standardized Effects for Measurement Models

<i>Item</i>	HCP Relation- ship	Access	Social Network Influenc e	Social Support	All Factors
Trust	0.77 (0.03)***				0.76 (0.03)***
Compassion	0.77 (0.03)***				0.73 (0.03)***
Listening	0.81 (0.03)***				0.79 (0.03)***
Prior Experience	0.65 (0.03)***				0.66 (0.03)***
Healthcare Environment	0.59 (0.04)***				0.63 (0.04)***
Access		0.64 (0.08)***			0.82 (0.04)***
Ability to Pay		0.92 (0.10)***			0.73 (0.04)***
Sexual Orientation		0.27 (0.05)***			0.24 (0.05)***
Location		0.01 (0.05)			-0.00 (0.05)
Social Support Influence			0.54 (0.06)***		0.55 (0.06)***
Partner Influence			0.61 (0.07)***		0.62 (0.06)***
Others Influence			0.22 (0.07)***		0.29 (0.07)***
Religious Influence			0.49 (0.06)***		0.45 (0.06)***
Someone to Discuss Problems				0.61 (0.04)***	0.61 (0.04)***
Someone to Understand				0.63 (0.04)***	0.63 (0.04)***
Someone to Care for You if Ill				0.73 (0.04)***	0.73 (0.04)***
Someone to Take You to Dr.				0.76 (0.04)***	0.75 (0.03)***
Someone to Advocate for You				0.74 (0.03)***	0.74 (0.03)***

Note.

All factor loadings are presented as fully standardized. Standard errors are presented after each factor loading.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Structural Equation Modeling

Models 1 and 2 (Figure 1) tested the relationship between ecological factors and contraceptive SDM. Model 1 included HCP Relationship, Access, Social Network Influence, and Social Support. Standardized loadings for the structural model indicated statistically significant pathways for HCP Relationship, Access, and Social Support and an adequate global fit (Table 4). Social Network Influence was not a statistically significant predictor of contraceptive SDM. In the subsequent model, this pathway was removed as it was non-significant with a small effect size, demonstrating an improved model fit. Social Support presented as a statistically significant ($p < .001$) negative predictor of contraceptive SDM.

Models 3 and 4 (Figure 2) tested the relationship between ecological factors and prenatal care SDM. Model 3 included HCP Relationship, Access, Social Network Influence, and Social Support, whereas Model 4 did not include Social Network Influence and demonstrated an improved global fit (Table 4). Social Support was statistically significant and negatively related in both models. HCP Relationship

had a statistically significant and positive relationship with prenatal care SDM ($p < .05$) in Model 4.

Discussion

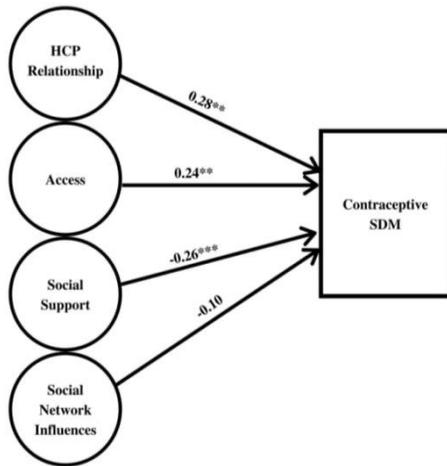
We used multiple linear regression, EFA, CFA, and SEM to examine the relationship between ecological factors and SDM in women's reproductive healthcare related to contraception and prenatal care. Regression results indicated HCP type was associated with contraceptive SDM. Ecological factors (i.e., Social Support, Access, and HCP Relationship) were associated with SDM in contraception and prenatal care models, and demonstrated good global model fit. Findings provide a deeper understanding of the ecological factors that should be addressed when engaging women in reproductive health SDM.

From linear regression analyses, findings suggested physician HCP had higher scores in contraceptive SDM compared to non-physician HCP. This is similar to another study in which patients put higher trust in physicians compared to non-physicians in acquiring reliable health and medical

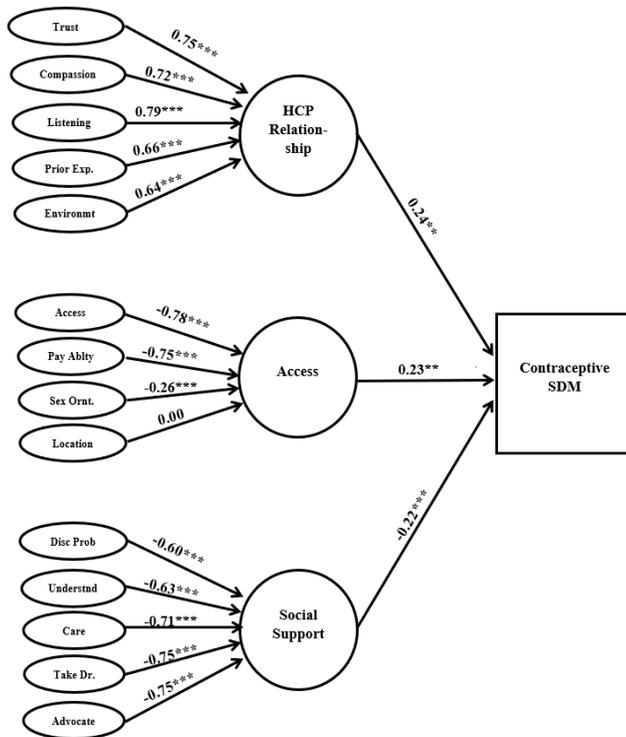
Table 4
SEM Global Model Fit

Model	X2		df	p	RMSE A (90% CI)	CFI	TLI
Model 1: Contraceptive SDM with all factors	269.05	-	162	0.00	0.05	0.95	0.94
Model 2: Contraceptive SDM without Social Network Influence	255.31	13.74	154	0.00	0.04	0.96	0.95
Model 3: Pregnancy SDM with all factors	293.26	-	155	0.00	0.05	0.95	0.94
Model 4: Pregnancy SDM without Social Network Influences	251.84	41.42	153	0.00	0.04	0.96	0.95

Figure 1
Contraceptive SDM Models



Model 1

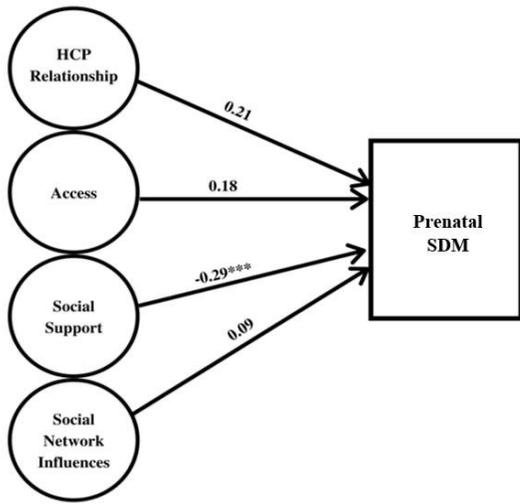


Model 2

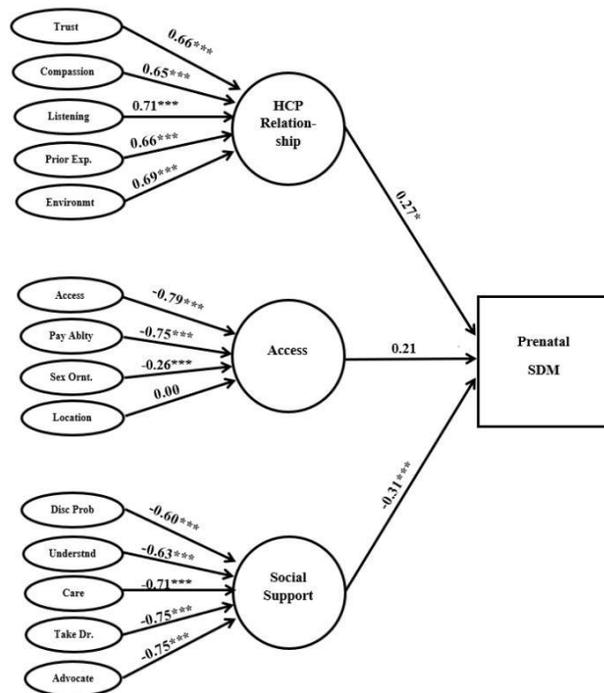
information (Chen et al., 2018). Women valued respect and desired relationship building when making reproductive decisions (Meier, Carter, et al., 2020).

Women with intrauterine devices also had higher contraceptive SDM scores compared to women using birth control pills. This may be explained by the nature of those

Figure 2
Prenatal SDM Models



Model 3



Model 4

contraceptive types. Whereas choosing pills is more patient-driven decision, choosing an intrauterine device requires communication and relationship-building with an HCP.

Social support’s relationship to SDM extend conversations surrounding relational autonomy (Clayman et al., 2017; Paton et al., 2020; Rapley, 2008), such that patients

make decisions based on their needs, and those of their social support systems (Elwyn et al., 2017; Smissen et al., 2019). In the final contraceptive and prenatal care models, social support demonstrated a statistically significant inverse relationship to SDM. Because relatively little SDM work incorporates ways to address others' influence in decision-making (Elwyn et al., 2017; Gulbrandsen et al., 2016; Smissen et al., 2019), understanding opportunities for HCPs to consider this is important. Thus, SDM practice may be enhanced by considering how social support is associated with women's reproductive health decisions (Clayman et al., 2017; Gulbrandsen et al., 2016; Smissen et al., 2019), particularly during preference elicitation (Elwyn et al., 2017). Open-ended questions that probe into a woman's social support system influences may improve HCPs' ability to address concerns stemming from friends and family and facilitate women achieving lifestyle-concordant reproductive decisions. Actionable recommendations for probing questions could include: *'Whose advice do you really want if you have reproductive health problems?'* or *'What advice do they typically give?'*

Findings demonstrated HCP relationship showed a statistically significant and positive pathway for contraceptive and prenatal care SDM. How women view their relationship with HCPs may affect their level of SDM, with better relationships likely improving the perceived SDM experience. Prior research identified that women desire relationship-building and respect when making contraceptive and prenatal care decisions (Meier, Carter, et al., 2020; Nyhof et al., 2020). However, relatively limited research incorporates those relationship-forming components in the current SDM model proposed by Elwyn et al. (2017), despite evidence that women value compassion, empathy, and trust

(Dehlendorf et al., 2016; Hölzel et al., 2013). Thus, this finding demonstrates additional work is needed to ensure the SDM model incorporates patient-HCP relationship components.

Access to reproductive health is critical to care quality (Meier et al., 2019; Sundstrom et al., 2019), particularly in locations like Indiana, where women face geographic and demographic disparities (ACOG, 2014; Guttmacher Institute, 2016; ISDH, 2018). Our findings revealed that, in contraceptive consultations, HCP type was associated with SDM. This may indicate opportunities for enhancing SDM training across HCPs (e.g., physician vs. non-physician), as much SDM work has focused specifically on physicians (Légaré et al., 2012). Increased SDM training may ensure that women are involved in decision-making across healthcare settings (Vogel et al., 2021).

The importance of access, including cost, demographic, and geographic components, to contraceptive SDM was further demonstrated in SEM. Because access had a strong, statistically significant, and positive relationship to contraceptive SDM, it may be essential to investigate key access issues during contraceptive appointments (Meier et al., 2021). Ability to pay, seek services, and achieve respectful, inclusive care, are important for making lifestyle-concordant choices (Meier, Carter, et al., 2020; Meier et al., 2019; Sundstrom et al., 2019). Thus, HCPs should have access conversations to personalize care, including practical questions related to accessing healthcare services. Interestingly, access was not a statistically significant predictor in prenatal care SDM for this sample. Thus, further exploration into how access fits into prenatal care decision-making is necessary. This sample may have experienced fewer access barriers to prenatal care; thus, access

concerns may have been less prominent (Meyer et al., 2016).

The focus on the decision-making processes related to patient-HCP relationship quality and social support is novel. It provides insight into what women value when making reproductive health decisions (Farrell et al., 2015; Meier et al., 2021). Findings extend the SDM model, while providing key guidance for HCPs on what to probe into during appointments to personalize care and enhance quality.

Strengths and Limitations

The study had several strengths. It is the first to identify relationships between ecological factors and SDM in two reproductive health contexts to improve understanding of the topics HCPs should investigate in SDM. Additionally, the items were developed from prior qualitative research and extant validated scales, providing improved content and construct validity.

This study was not without limitations, however, and results should be interpreted in the context of these. First, these data are self-reported and are subject to recall and social desirability bias. The women in our study may not have remembered their reproductive healthcare experiences vividly. Additionally, the sensitive nature of some items may have enhanced social desirability bias. However, we believe the anonymous nature of the survey responses appropriately limited this phenomenon. Furthermore, we used convenience sampling limited to Indiana and participants reported high income and educational attainment, indicating results may not be generalizable to a broader population. The nature of online data collection may cause reporting bias as some of participants who do not fulfill eligibility criteria may be included. Moreover, because

recruitment for this study took place at the beginning of the COVID-19 pandemic, it is possible that the pandemic may have adversely affected our recruitment or the responses by the participants. However, the online nature of recruitment and survey completion, along with the fact that the survey was completed early in the course of the pandemic, likely minimized any potential limitations of pandemic restrictions. Lastly, these data are cross-sectional; therefore, associations should not be interpreted as causal. Despite these limitations, our findings extend SDM research to gain better understanding and characterization of ecological factors of importance in women's reproductive healthcare.

Future research should continue to explore the characterizations and definitions of social support in SDM within women's reproductive healthcare. Additionally, training materials emphasizing patient-provider communication that encourages HCPs to ask questions about social support, access, and HCP relationship quality should be developed and tested.

Conclusion

We identified ecological factors associated with women's reproductive SDM in prenatal care and contraception. Findings demonstrated the components important to women when making reproductive health choices, including social support, access, and HCP relationship, that can be incorporated into SDM to empower women in their choices.

Implications for Health Behavior Theory

This is among the first studies to explore which ecological factors, including those related to social support, access, and HCP relationship, are associated with SDM in

pregnancy care and contraception among Indiana women. Relating to Social-Ecological Model constructs, HCP relationship, social network, and social support are interpersonal ecological factors in contraceptive and prenatal care SDM. HCPs should focus on relationship-building to support patients to have high quality SDM. Moreover, healthcare access is one of enabling environmental aspects in public policy. Access in healthcare should be addressed at an upstream level to reduce health inequality.

Future research should extend the model to identify areas that women desire to discuss during reproductive healthcare appointments. This may enhance HCPs' ability to personalize care via open-ended questions related to social support and access. Furthermore, engaging in these SDM-behaviors with specific guidance about what to explore with women may ensure women receive high-quality healthcare across settings.

Discussion Questions

How are ecological factors associated with SDM in women's health care?

Which ecological factor(s) should be prioritized to provide effective support for patients to make reproductive health decisions?

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Ethical Approval

The Purdue Institutional Review Board approved procedures and tools for this study. All participants provided informed consent.

Conflict of Interest

The authors have no conflicts of interest to declare.

References

- American College of Obstetricians and Gynecologists (ACOG). (2014). *2014 ACOG workforce fact sheet: Indiana*. ACOG.
- Anderson, N., Steinauer, J., Valente, T., Koblentz, J., & Dehlendorf, C. (2014). Women's social communication about IUDs: A qualitative analysis. *Perspectives on Sexual and Reproductive Health*, 46(3), 141-148. <https://doi.org/10.1363/46e1814>

- Attanasio, L. B., McPherson, M. E., & Kozhimannil, K. B. (2014). Positive childbirth experiences in U.S. hospitals: A mixed methods analysis. *Maternal and Child Health Journal*, 18(5), 1280-1290. <https://doi.org/10.1007/s10995-013-1363-1>
- Baijens, S. W. E., Huppelschoten, A. G., Van Dillen, J., & Aarts, J. W. M. (2018). Improving shared decision-making in a clinical obstetric ward by using the three questions intervention: A pilot study. *BMC Pregnancy and Childbirth*, 18(1), 283. <https://doi.org/10.1186/s12884-018-1921-z>
- Chen, L., Vasudev, G., Szeto, A., & Cheung, W. Y. (2018). Trust in doctors and non-doctor sources for health and medical information. *Journal of Clinical Oncology*, 36(15_suppl), 10086. https://doi.org/10.1200/JCO.2018.36.15_suppl.10086
- Clayman, M. L., Gulbrandsen, P., & Morris, M. A. (2017). A patient in the clinic; A person in the world. Why shared decision making needs to center on the person rather than the medical encounter. *Patient Education and Counseling*, 100(3), 600-604. <https://doi.org/10.1016/j.pec.2016.10.016>
- Coley, S. L., Zapata, J. Y., Schwei, R. J., Mihalovic, G. E., Matabele, M. N., Jacobs, E. A., & Anderson, C. K. (2018). More than a “number”: Perspectives of prenatal care quality from mothers of color and providers. *Women's Health Issues*, 28(2), 158-164. <https://doi.org/10.1016/j.whi.2017.10.014>
- Dehlendorf, C., Grumbach, K., Schmittziel, J. A., & Steinauer, J. (2017). Shared decision making in contraceptive counseling. *Contraception*, 95(5), 452-455. <https://doi.org/10.1016/j.contraception.2016.12.010>
- Dehlendorf, C., Henderson, J. T., Vittinghoff, E., Grumbach, K., Levy, K., Schmittziel, J., Lee, J., Schillinger, D., & Steinauer, J. (2016). Association of the quality of interpersonal care during family planning counseling with contraceptive use. *American Journal of Obstetrics and Gynecology*, 215(1), 78.e1-e9. <https://doi.org/10.1016/j.ajog.2016.01.173>
- DeMaria, A. L., Sundstrom, B., Moxley, G. E., & Meier, S. (2017). Predicting women's responses to contraceptive campaign messages. *Health Behavior and Policy Review*, 4(1), 87-96. <https://doi.org/info:doi/10.14485/HBPR.4.1.10>
- Edme, B. (2019, May 7). Moms concerned as Indiana's maternal mortality rate drops to 3rd worst in nation. *FOX59*. <https://fox59.com/2019/05/06/moms-concerned-as-indianas-maternal-mortality-rate-drops-to-3rd-worst-in-nation/>
- Elwyn, G., Durand, M. A., Song, J., Aarts, J., Barr, P. J., Berger, Z., Cochran, N., Frosch, D., Galasiński, D., Gulbrandsen, P., Han, P. K. J., Härter, M., Kinnersley, P., Lloyd, A., Mishra, M., Perestelo-Perez, L., Scholl, I., Tomori, K., Trevena, L., ... Van der Weijden, T. (2017). A three-talk model for shared decision making: Multistage consultation process. *BMJ (Clinical Research Ed.)*, 359, j4891. <https://doi.org/10.1136/bmj.j4891>
- Farrell, R. M., Nutter, B., & Agatista, P. K. (2015). Patient-centered prenatal counseling: Aligning obstetric healthcare professionals with needs of pregnant women. *Women & Health*, 55(3), 280-296.

- <https://doi.org/10.1080/03630242.2014.996724>
- Gulbrandsen, P., Clayman, M. L., Beach, M. C., Han, P. K., Boss, E. F., Ofstad, E. H., & Elwyn, G. (2016). Shared decision-making as an existential journey: Aiming for restored autonomous capacity. *Patient Education and Counseling*, 99, 1505-1510. <http://dx.doi.org/10.1016/j.pec.2016.07.014>
- Guttmacher Institute. (2016). *State facts about unintended pregnancy: Indiana*. Guttmacher Institute. <http://www.guttmacher.org/factsheet/state-facts-about-unintended-pregnancy-south-carolina>
- Hölzel, L. P., Kriston, L., & Härter, M. (2013). Patient preference for involvement, experienced involvement, decisional conflict, and satisfaction with physician: A structural equation model test. *BMC Health Services Research*, 13(1), 231. <https://doi.org/10.1186/1472-6963-13-231>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- ISDH. (2018). *Health professional shortage areas*. <https://www.in.gov/isdh/23471.htm>
- Kriston, L., Scholl, I., Holz, L., Simon, D., Loh, A., & Harter, M. (2010). The 9-item shared decision making questionnaire (SDM-Q9): Development and psychometric properties in a primary care sample. *Patient Education & Counseling*, 80(1), 94-99. <https://doi.org/10.1016/j.pec.2009.09.034>
- Légaré, F., Politi, M. C., Drolet, R., Desroches, S., Stacey, D., & Bekker, H. (2012). Training health professionals in shared decision-making: An international environmental scan. *Patient Education and Counseling*, 88(2), 159-169. <https://doi.org/10.1016/j.pec.2012.01.002>
- Levy, K., Minnis, A. M., Lahiff, M., Schmittiel, J., & Dehlendorf, C. (2015). Bringing patients' social context into the examination room: An investigation of the discussion of social influence during contraceptive counseling. *Women's Health Issues*, 25(1), 13-21. <https://doi.org/10.1016/j.whi.2014.10.001>
- McCormack, L., Thomas, V., Lewis, M. A., & Rudd, R. (2017). Improving low health literacy and patient engagement: A social ecological approach. *Patient Education and Counseling*, 100(1), 8-13. <https://doi.org/10.1016/j.pec.2016.07.007>
- Meier, S., Carter, M. M., & DeMaria, A. L. (2021). "And understand I am a person and not just a number:" Reproductive healthcare experiences of Italian women. *Women's Reproductive Health*, 8(1), 60-78. <https://doi:10.1080/23293691.2020.1861412>
- Meier, S., Kasting, M. L., Liu, S. S., & DeMaria, A. L. (2021). Shared decision-making among non-physician healthcare professionals: Enhancing patient involvement in women's reproductive health in community healthcare settings. *Patient Education and Counseling*, 104(9), 2304-2316. <https://doi.org/10.1016/j.pec.2021.02.032>
- Meier, S., Sundstrom, B., Delay, C., & DeMaria, A. L. (2021). "Nobody's ever told me that:" Women's experiences with

- shared decision-making when accessing contraception. *Health Communication*, 36(2):179-187. <https://doi.org/10.1080/10410236.2019.1669271>
- Meyer, E., Hennink, M., Rochat, R., Julian, Z., Pinto, M., Zertuche, A. D., Spelke, B., Dott, A., & Cota, P. (2016). Working towards safe motherhood: Delays and barriers to prenatal care for women in rural and peri-urban areas of Georgia. *Maternal and Child Health Journal*, 20(7), 1358-1365. <https://doi.org/10.1007/s10995-016-1997-x>
- Moore, J. E., Titler, M. G., Kane Low, L., Dalton, V. K., & Sampsel, C. M. (2015). Transforming patient-centered care: Development of the evidence informed decision making through engagement model. *Women's Health Issues*, 25(3), 276-282. <https://doi.org/10.1016/j.whi.2015.02.002>
- Moser, A., Stuck, A. E., Silliman, R. A., Ganz, P. A., & Clough-Gorr, K. M. (2012). The eight-item modified Medical Outcomes Study Social Support Survey: Psychometric evaluation showed excellent performance. *Journal of Clinical Epidemiology*, 65(10), 1107-1116. <https://doi.org/10.1016/j.jclinepi.2012.04.007>
- Nyhof, B. B., Jameel, B., Dunn, S., Grace, S. L., Khanlou, N., Stewart, D. E., & Gagliardi, A. R. (2020). Identifying strategies to implement patient-centred care for women: Qualitative interviews with women. *Patient Education and Counseling*, 103(7):1422-1427. <https://doi.org/10.1016/j.pec.2020.02.008>
- Paton, A., Armstrong, N., Smith, L., & Lotto, R. (2020). Parents' decision-making following diagnosis of a severe congenital anomaly in pregnancy: Practical, theoretical and ethical tensions. *Social Science & Medicine*, 266, 113362. <https://doi.org/10.1016/j.socscimed.2020.113362>
- Rapley, T. (2008). Distributed decision making: The anatomy of decisions-in-action. *Sociology of Health & Illness*, 30(3), 429-444. <https://doi.org/10.1111/j.1467-9566.2007.01064.x>
- Smitsen, A., Lamaro Haintz, G., McKenzie, H., & Graham, M. (2020). Discursive representations of social support for reproductive decision-making among Victorian women. *Sexuality & Culture*, 24, 883-902. <https://doi.org/10.1007/s12119-019-09670-y>
- StataCorp. (2019). *Stata Statistical Software: Release 16* (Version 16) [Computer software]. StataCorp LLC.
- Street, R. L., Jr. (2003). Communication in medical encounters: An ecological perspective. In *The Routledge Handbook of Health Communication*. Routledge.
- Sundstrom, B., DeMaria, A. L., Ferrara, M., Meier, S., & Billings, D. (2019). "The closer, the better:" The role of telehealth in increasing contraceptive access among women in rural South Carolina. *Maternal and Child Health Journal*, 23(9):1196-1205. <https://doi.org/10.1007/s10995-019-02750-3>
- Thomas, E. C., Bass, S. B., & Siminoff, L. A. (2021). Beyond rationality: Expanding the practice of shared decision making in modern medicine. *Social Science & Medicine*, 277, 113900. <https://doi.org/10.1016/j.socscimed.2021.113900>
- Vogel, A., Fürstenau, D., & Balzer, F. (2021). The social construction of the

patient-physician relationship in the clinical encounter: Media frames on shared decision making in Germany. *Social Science & Medicine*, 114420. <https://doi.org/10.1016/j.socscimed.2021.114420>