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POPULATIONS AT RISK ACROSS THE LIFESPAN-PROGRAM EVALUATIONS

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National survey of nurse home visitor collaboration with health care and social services

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Abstract

Objective: To assess the degree to which nurses in a national public health home visiting program collaborate with interprofessional providers to serve families experiencing adversity.

Design: A descriptive, cross-sectional survey measured collaborative practices between nurse home visitors, health care, and social service providers. A census of 263 nursing supervisors completed a web-based survey.

Measurements: The survey included the validated 7-item Relational Coordination Scale, adapted items from the Interagency Collaboration Activities Scale on shared resources, and items related to collaboration attitudes and beliefs. Data were analyzed with descriptive statistics.

Results: Relational coordination scores, which are relative measures, ranged from 1 to 5; highest with supplemental nutrition for Women, Infants & Children ($M = 3.77$) and early intervention ($M = 3.44$); and lowest with housing ($M = 2.55$). The greatest sharing of resources was with supplemental nutrition (sum = 12.95) and mental health providers (sum = 11.81), and least with housing (sum = 7.26); with a range of 1–30 where higher scores indicated greater resource-sharing.

Conclusion: Home visiting nurses collaborate with interprofessional providers with variation in the degree of collaboration between agencies and by provider type within an agency. Collaboration was a function of two interrelated domains: interpersonal relationships supported by organizational and contextual factors at the systems-level.

KEYWORDS

interprofessional collaboration, nurse home visiting, prevention, relational coordination

1 | INTRODUCTION

Community-based interventions like Nurse-Family Partnership® (NFP) require collaboration across sectors and professions to best address families' needs (Becker & Smith, 2018). The NFP program is an evidence-based public health nursing program designed to improve the health and well-being of first-time mothers and their children experiencing economic adversity. The home visiting program is based on over 40 years of evidence from three separate randomized clinical trials, with the first trial beginning in the 1970s in Elmira, New York (Eckenrode et al., 2010; Olds et al., 2014, 2019). Since program replication began in the United States (US) in 1996, the program has served over 340,000 families in 692 counties among 40 states and the U.S. Virgin Islands. The program aims to

improve pregnancy outcomes by helping women engage in good preventive prenatal health practices, improve child health and development by helping parents provide responsible and competent care, and increase families' economic self-sufficiency by helping parents develop a vision for their own future. Trained nurses visit eligible women early in their pregnancy through child age two, providing support and education as well as linking families to needed community services. Program protocols are grounded in theories of developmental epidemiology, human attachment, human ecology, and self-efficacy; and adapted to families' individual needs (Olds, 2002).

The NFP program mitigates a range of problems related to pregnancy and child health development, including fewer hypertensive disorders in pregnancy (Miller, 2015) and lessens child behavioral and intellectual problems (Kitzman et al., 2019). Yet, nurses' ability to address these issues may be affected by their collaboration (or lack thereof) with community service providers (Tung et al., 2019). It is critical, however, that public health home visiting nurses work closely with providers across sectors and professions to ensure that program effectiveness is maximized for mothers and babies.

1.1 | Background

A large body of evidence suggests that interprofessional collaboration is an important driver of health care quality and nursing practice in any setting (Institute of Medicine, 2011), where interprofessional collaboration involves linking of practices, coordination between providers, and integration of physical resources like staff, systems, and policies (Reeves et al., 2017). In the original trials of the NFP program, nurse home visitors routinely requested consent to communicate and coordinate care with other health care providers. Since then, there have been many changes regarding how health care providers communicate and work together in the United States, including the passage of the Patient Protection and Affordable Care Act and initiatives like the Triple Aim to reduce costs and improve quality of care and access (Berwick et al., 2008). Changes in health care provision have also resulted in fragmented delivery systems and associated challenges to effectively coordinate care, often with providers working in silos rather than in collaboration (Djulbegovic et al., 2019).

Nurses are natural facilitators in care coordination particularly in relational care contexts, where interprofessional providers engage with patients to meet their needs often in the hospital setting (Salmond & Echevarria, 2017); but also in accountable care organizations and patient-centered medical homes (Budgen & Cantiello, 2017). Nurses are educated to understand and assess the various factors that shape an individual's life, such as poverty and addiction, as well as their effects on health (Moss et al., 2016). Nurses develop personal relationships with their patients more than other health care providers (Ghiyasvandian et al., 2014); and this is particularly true in NFP where the success of program implementation is attributed to the strength of relationships between nurse and mother (Landy et al., 2012).

Previous studies of NFP implementation have examined cross-sector or interprofessional collaboration (i.e., collaboration with other health care and social service providers) through a qualitative lens or within a specific local context lacking generalizability. In Colorado, collaboration between home visiting nurses and child welfare varied across communities, with strong collaboration associated with aligned mission and risk assessment methods between the two organizations, having a contact person, and knowledge of one another's roles (Tung et al., 2019; Williams et al., 2019). Also in Colorado, Hicks et al. (2008) studied community commitment where the presence of process quality and authenticity in collaborations led to improved client retention in the program. In the Canadian context, a qualitative study showed that health care and social service professionals who were knowledgeable about NFP viewed it as an important service that fulfilled a gap and a means to reducing service duplication (Li et al., 2015). These studies suggest collaboration is critical. Yet there has not been a systematic quantitative assessment of NFP nurse home visitor collaboration with providers across sectors and professions in the US. Given this research gap, this study sought to quantitatively assess NFP nurse collaboration dynamics with interprofessional providers (i.e., health care and social services) across the US from the nursing supervisor perspective.

2 | METHODS

2.1 | Design

This study is a cross-sectional survey of collaboration dynamics between NFP home visiting nurses and interprofessional providers in the US.

2.2 | Measures and instrument development

A large-scale qualitative study that examined collaboration dynamics between NFP home visiting nurses and interprofessional providers informed the development of a web-based survey instrument (Williams et al., 2020). The qualitative study found that effective collaboration in the NFP home visiting setting requires leadership commitment and provider champions; mission congruence between providers; shared perceptions of trust, respect, and value; policy and structural facilitators; referral partnerships and outreach; and data sharing and having communication channels (Williams et al., 2020). After a thorough review of collaboration literature and existing validated instruments, this study used a survey instrument that integrated the validated 7-item Relational Coordination Scale (Gittell, 2002), adapted the Interagency Collaboration Activities Scale (Dedrick & Greenbaum, 2011), and added new items related to attitudes and beliefs in collaboration (four and two items respectively), having a contact person, perceptions of trust, and champions in the community; all which

mapped to identified themes from the qualitative study (Williams et al., 2020). Table 1 describes the survey domains mapped to the identified themes from the qualitative study, the specific wording of survey items, and response options.

The Relational Coordination Scale was based on the relational coordination theory for understanding the relational dynamics of coordinating work. It measured high-quality communication as a function of frequency, timeliness, accuracy, and problem solving; and high-quality relationships based upon shared goals, shared knowledge, and mutual respect (Gittell, 2000). This scale consisted of seven items with five response options ranging from never/nothing/not at all to constantly/completely (coded numerically from 1 to 5). To complement the measures of relational coordination, the 17-item Interagency Collaboration Activities Scale was adapted to capture other collaborative activities of an organization or structural nature such as shared financial and physical resources, program development and evaluation, and collaborative policy activities (Dedrick & Greenbaum, 2011). The Interagency Collaboration Activities Scale was adapted to better align with the activities of home visiting nurses and the setting of this study. This scale was reduced to six dimensions (shared facility space, shared data, joint activities, service planning, shared policies, and shared funding) covering the same three domains of financial and physical resources, program development and evaluation, and collaborative policy activities, with five response options ranging from not at all to very much (coded numerically from 1 to 5; Table 1). For both scales, nursing supervisors were asked about their perceptions of relational coordination and shared resources with nine provider types, including four health care (obstetrics care, pediatric care, mental health, substance use treatment) and five social services (child welfare, Special Supplemental Nutrition Program for Women, Infants and Children—WIC, parenting programs, housing resources, and early intervention).

After the instrument was developed, the questionnaire was pretested for length and clarity with three key informants familiar with the NFP model. The questionnaire was then revised based on pretesting feedback and piloted with seven home visiting nurses and nursing supervisors in the program. The final questionnaire included 30 items including demographic questions.

2.3 | Setting and sample

This survey sought to implement a census of all nursing supervisors from all NFP implementing agencies in the US, using a contact list from the NFP National Service Office, the nonprofit agency responsible for overseeing the implementation of NFP in the US. In October 2018, all nursing supervisors in all NFP implementing agencies (377 individuals from 259 agencies) in the US were invited to participate in a web-based questionnaire via Qualtrics (Provo, UT). Participants could respond to the questionnaire via a personal link in their email invitation. Four email reminders were sent every seven to 10 days, resulting in five varied contacts as suggested by the Dillman method in accordance with best practices in survey research (Dillman et al., 2014). The questionnaire was open for 6 weeks. There was no monetary incentive offered. The study received ethical approval from the researchers' local Institutional Review Board.

2.4 | Analytic strategy

Descriptive statistics (i.e., proportion, mean, standard deviation, range) for all relevant survey items were calculated. Relational coordination responses were averaged to produce a relational coordination index that provides a measure of the level of coordination with a specific provider type and coordination dimensions across provider types. In other words, there is a relational coordination score for each of the nine provider types (e.g., relational coordination with obstetrics care providers) and for each dimension (e.g., frequency of communication). Similarly, shared resources responses were added together to produce a shared resources index score for the level of collaborative activities with a specific provider type and shared resource dimensions across provider types.

A submeasure of shared resources was then constructed to measure integration with interprofessional providers at the physical and environmental level. "Structural integration" scores were created from responses to four of the six dimensions used in the shared resources measure to conceptualize collaboration that is driven by organizational policies and structures. These included the dimensions of "shared facility space," "shared data," "shared policies," and "shared funding." The dimensions of "joint activities" and "service planning" were excluded in creating the structural integration scores because these activities are relationship-oriented, rather than systems-driven. Two-sample *t*-tests were conducted to assess for differences between agencies with a contact person versus agencies without over a range of relational coordination dimensions, using 95% confidence intervals. All statistical analyses were conducted in STATA-SE version 14 (College Station, TX).

2.5 | Survey reliability and validity

Previous research has examined the validity of the Relational Coordination scale and found a Cronbach's alpha of 0.86, where the seven dimensions of relational coordination behave as a single factor with an eigenvalue of 3.41 (Gittell et al., 2010). Internal consistency reliability estimates for the Interagency Collaboration Activities Scale ranges from 0.76 to 0.86 (Dedrick & Greenbaum, 2011). In this study, Cronbach's alpha for the Relational Coordination Scale was 0.86 or higher suggesting strong internal consistency, which aligns with previous research on this scale's reliability. The shared resources measure had a Cronbach's alpha of 0.62 or higher suggesting good internal consistency, yet was lower than previous reliability studies (Dedrick & Greenbaum, 2011). In regards to scale validity, principal component factor analysis results for relational

TABLE 1 Survey domains, items, and response options

Survey domains/measures	Source of survey item(s)	Survey item(s)	Response options	Corresponding qualitative theme
Attitudes toward collaboration	New items	1. Agencies in our community have a history of working together. 2. Among the organizations we partner with, there is interest and willingness from leadership to foster collaboration. 3. Within my implementing agency, there is interest and willingness from leadership to foster collaboration. 4. Community providers perceive the NFP[a] program to be valuable.	Strongly Disagree Somewhat Disagree Somewhat Agree Strongly Agree	Leadership commitment Perceptions of value
Beliefs about collaboration	New items	1. I believe that teamwork with other organizations is important to serve NFP[a] clients. 2. I have time to meet with people from other organizations to collaborate.	Strongly Disagree Somewhat Disagree Somewhat Agree Strongly Agree	Perceptions of value
Perceptions of trust	New item	1. Do you trust people from the following groups to provide care and services for NFP[a] client Obstetrics care providers Pediatrics care providers Mental health providers Substance use treatment providers Child Protective Services WIC[b] Parenting programs Housing resources Early Intervention	Not at all A little Somewhat A lot Completely	Perceptions of trust
Champions	New items	1. There are champion(s) of NFP[a] who work in the health care sector within my community. 2. There are champion(s) of NFP[a] who work in social services within my community.	Strongly Disagree Somewhat Disagree Somewhat Agree Strongly Agree	Provider champions
Contact persons	New item	1. Does your organization have at least one contact person with the following services? Obstetrics care providers Pediatrics care providers Mental health providers Substance use treatment providers Child Protective Services WIC[b] Parenting programs Housing resources Early Intervention	Yes No Unsure	Referral partnership and outreach

(Continues)

TABLE 1 (Continued)

Survey domains/measures	Source of survey item(s)	Survey item(s)	Response options	Corresponding qualitative theme
High-quality communication, in terms of: Frequency Timeliness Accuracy Problem-solving nature	Relational Coordination Scale	1. When there is a need, how frequently do people in the following groups communicate with you about providing care and services to NFP[a] clients? 2. When there is a need, do they communicate with you in a timely way about providing care and services to NFP[a] clients? 3. When there is a need, do they communicate with you accurately about providing care and services to NFP[a] clients? 4. When there is a problem with providing care and services to NFP[a] clients, do people from these groups work with you to solve the problem?	Never Rarely Occasionally Often Constantly	Communication channels
High-quality relationships, in terms of: Shared goals Shared knowledge Mutual respect	Relational Coordination Scale	1. Do people from the following groups share your goals for providing care and services to NFP[a] clients? 2. Do they know about the work you do to provide care and services to NFP[a] clients? 3. Do they respect the work you do to provide care and services for NFP[a] clients?	Not at all/Nothing A little/Little Somewhat/Some A lot Completely/Everything	Mission congruence Perceptions of respect
Shared resources, in the form of: Physical space Data Joint activities Service planning Policies Funding	Adapted from Interagency Collaborative Activities Scale	1. To what extent does your organization share the following resources with your local [provider type] in: Facility space Record keeping and management information system data Participation in joint activities Service planning, case conferences, or case reviews Written agreements Funding	Not at all Little Somewhat Considerable Very much	Policy and structural facilitators Data sharing Communication channels

Note: The items of facility space, record keeping, and management information system data, written agreements and funding were used to construct a submeasure of Structural Integration.

[a]Nurse-Family Partnership®.

[b]Special supplemental nutrition program for Women, Infants, and Children.

coordination are consistent with previous studies; with factor 1 eigenvalues greater than 3.8 and factor 2 eigenvalues less than 0.8. These factor analysis results suggest that relational coordination behaves as expected, as a single factor in the NFP home visiting setting.

3 | RESULTS

Three hundred and seventy-seven staff members were emailed, of which 370 invitation emails were received and seven emails bounced back (ineligibles). A total of 263 representatives responded to the survey from 257 teams among 199 agencies from 39 states (response rate of 71%). NFP agencies were classified into four types: public health department ($n = 130$), community-based organization ($n = 71$), health care ($n = 36$) and "other" which includes higher education and visiting nurse services ($n = 23$). Table 2 presents agency characteristics according to responses to questions about role and caseload. There were no significant differences in respondents that completed the survey versus not based on nurses' number of years in the program (program tenure) and no differences based on agency type.

TABLE 2 Demographics and characteristics of Nurse-Family Partnership® nurse respondents and nonrespondents

Demographics and characteristics	Respondents, *n* (%)	Nonrespondents, *n* (%)
Role		
Nurse supervisor	250 (95.1)	224 (100)
Nurse home visitor	5 (1.9)	-
Administrator or other	8 (3.0)	-
Carry caseload		
Yes	124 (47.1)	-
No	136 (51.8)	-
Nonresponse	3 (1.1)	-
Agency tenure, years		
0–5	11 (4.2)	11 (4.9)
>5–10	92 (35.0)	70 (31.2)
>10–15	63 (24.0)	52 (23.2)
>15–20	54 (20.5)	38 (17.0)
>20 and more	43 (16.3)	53 (23.7)
Agency type		
Public Health Department	130 (49.4)	124 (55.4)
Community-Based Organization	71 (27.0)	29 (12.9)
Health Care Entity	36 (13.7)	20 (8.9)
Other	23 (8.8)	11 (4.9)
Missing	3 (1.1)	40 (17.9)

Note: $n = 263$ among respondents. Information on carrying caseload was not available for nonrespondents.

3.1 | Attitudes toward and beliefs about collaboration

The majority of nursing supervisors reported somewhat or strongly agreeing with supportive attitudes toward collaborating with community service providers, including community agencies having a history of working together (88%); interest and willingness from other organizational leadership to collaborate (92%); and interest and willingness from their NFP agency to collaborate (93%; see Table 3). The majority of supervisors also reported agreement that providers value the NFP program (96% of nursing supervisors reporting somewhat or strongly agree). Most supervisors believed teamwork to be important to serving clients (99%) and that they have time to collaborate (85%). Perceptions of trust ranged by provider types with the greatest levels of trust perceived with WIC (rated by 88% of supervisors trusting them a lot or completely to provide care and services for NFP clients). Lower levels of trust were perceived among housing resources (rated by 26% of agencies as not at all trusting them or trusting them a little).

3.2 | Champions and contact persons

Most supervisors reported having a champion in health care (83%) and in social services (83%; see Table 3). In terms of having a contact person, the majority of supervisors reported having contacts with obstetrics, pediatrics, mental health, WIC, and early intervention providers (see Table 3). However, less than half reported having contacts with substance use treatment providers and housing resources.

3.3 | Collaboration dynamics

Nursing supervisors reported moderate relational coordination among all providers ($M = 3.21$ representing occasional/some coordination; see Table 4). By provider type, the highest reported coordination was with WIC ($M = 3.77$) followed by early intervention ($M = 3.44$). The lowest reported coordination was with housing services ($M = 2.55$) and substance use treatment providers ($M = 2.74$). The highest-rated dimensions of relational coordination across all providers were shared goals ($M = 3.55$) and mutual respect ($M = 3.54$), whereas frequency ($M = 2.87$) and timeliness of communication ($M = 3.06$) were least endorsed.

In terms of shared resources, nursing supervisors reported the highest shared resources with WIC (sum = 12.95) and mental health (sum = 11.81), whereas shared resources with housing services (sum = 7.26) were the lowest (see Table 4). With structural integration (sharing of facility space, data, policies, and funding), nursing supervisors reported the greatest integration also with WIC (sum = 8.03) and mental health (sum = 7.06), and the least with housing services (sum = 4.44; see Table 4). Dimensions of shared resources and structural integration across all providers ranged from

TABLE 3 Descriptive statistics of survey measures: Attitudes, beliefs, champions, trust, and contact person

Survey measure	n	M	SD
Attitudes/Beliefs (Strongly Disagree = 1 to Strongly Agree = 4)			
1. Agencies in our community have a history of working together.	254	3.24	0.64
2. Among the organizations we partner with, there is interest and willingness from leadership to foster collaboration.	254	3.41	0.59
3. Within my implementing agency, there is interest and willingness from leadership to foster collaboration.	254	3.70	0.53
4. Community providers perceive the NFP[a] program to be valuable.	254	3.47	0.66
5. I believe that teamwork with other organizations is important to serve NFP[a] clients.	254	3.96	0.24
6. I have time to meet with people from other organizations to collaborate	254	3.25	0.73
Champions (Strongly Disagree = 1 to Strongly Agree = 4)			
1. There are champions of NFP[a] who work in the health care sector within my community	223	3.10	0.82
2. There are champions of NFP[a] who work in social services within my community	214	3.07	0.77
Trust (Not at all = 1 to Completely = 5)			
Do you trust people from the following groups to provide care and services for NFP[a] clients?			
WIC[b]	228	4.29	0.75
Pediatric care providers	228	4.18	0.74
Early intervention	224	4.16	0.84
Obstetrics care providers	229	4.14	0.78
Mental health providers	226	3.89	0.88
Parenting programs	212	3.89	0.96
Substance use treatment providers	218	3.74	0.96
Child welfare	226	3.49	1.03
Housing resources	216	3.21	1.08

Survey measure	Yes	No	Unsure	Nonresponse
Contact Person (Yes, No, Unsure, Nonresponse)				
Does your organization have at least one contact person with the following services:				
WIC[b]	209 (79)	6 (2)	1 (1)	47 (18)
Obstetrics care providers	202 (77)	16 (6)	7 (3)	38 (14)
Mental health providers	192 (73)	15 (6)	18 (7)	38 (14)
Early intervention	186 (71)	26 (10)	5 (2)	46 (17)
Parenting programs	176 (67)	22 (8)	18 (7)	47 (18)
Pediatric care providers	175 (66)	31 (12)	18 (7)	39 (15)
Child welfare	163 (62)	39 (15)	14 (5)	47 (18)
Housing resources	125 (48)	69 (26)	22 (8)	47 (18)
Substance use treatment providers	124 (47)	55 (21)	46 (18)	38 (14)

[a]Nurse-Family Partnership.

[b]Special supplemental nutrition program for Women, Infants, and Children.

1 through 5, where joint activities were rated the highest ($M = 2.31$) and shared funding ($M = 1.31$) the lowest.

Agencies that identified a contact person with a specific provider type were significantly more likely than those that did not to have better communication, in particular the frequency of, timeliness of, accuracy of, and problem-solving nature in the communication ($p < .05$). This relationship was statistically significant for relational coordination with all nine provider types ($p < .05$; partial data for relational coordination with obstetrics, WIC, and early intervention in Table 5).

4 | DISCUSSION AND SUMMARY

Nurse-Family Partnership® and other community-based interventions that improve the lives of mothers and families are implemented across the US and internationally. Yet the success of these programs depends on collaboration across sectors and professions. This study sought to assess the degree of interprofessional collaboration, as measured by relational coordination, shared resources, and structural integration between NFP home visiting nurses and nine different provider types. These included four health care provider types

TABLE 4 Mean scores for collaboration measures: Relational coordination and shared resources

Collaboration measures	*n*	*M*	*SD*
Relational Coordination index score across all providers	236	3.21	0.62
Relational Coordination dimensions across all providers			
Shared goals	227	3.55	0.85
Mutual respect	226	3.54	0.76
Accurate communication	230	3.40	0.96
Shared knowledge	229	3.20	0.66
Problem solving communication	229	3.13	0.79
Timely communication	231	3.06	0.77
Frequent communication	238	2.87	0.65
Relational Coordination scores by provider type			
WIC[a]	235	3.77	0.90
Early intervention	233	3.44	0.90
Obstetrics care providers	236	3.39	0.79
Child welfare	234	3.28	0.73
Mental health providers	232	3.24	0.83
Parenting programs	222	3.23	0.95
Pediatric care providers	234	3.13	0.82
Substance use treatment providers	219	2.74	0.89
Housing resources	225	2.55	0.93
Shared Resources index score across all providers	225	10.12	2.45
Shared Resources dimensions across all providers			
Joint activities	225	2.31	0.72
Service planning	225	1.74	0.67
Shared physical space	225	1.68	0.59
Shared policies	225	1.65	0.77
Shared data	225	1.44	0.55
Shared funding	225	1.31	0.41
Shared Resources scores by provider type			
WIC[a]	218	12.95	5.94
Mental health providers	223	11.81	5.72
Obstetrics care providers	225	11.00	5.00
Parenting programs	218	10.77	5.15
Early intervention	219	10.10	4.79
Pediatric care providers	224	9.58	4.56
Child welfare	217	9.34	3.87
Substance use treatment providers	222	8.23	3.55
Housing resources	218	7.26	2.24
Structural Integration index score across providers	225	6.07	1.61
Structural Integration scores by provider type			
WIC[a]	218	8.03	4.17
Mental health providers	223	7.06	3.86
Obstetrics care providers	225	6.60	3.56
Parenting programs	218	6.50	3.65
Pediatric care providers	224	5.92	3.31
Early intervention	219	5.70	3.25
Child welfare	217	5.28	2.44
Substance use treatment providers	222	5.07	2.42
Housing resources	218	4.44	1.39

[a]Special supplemental nutrition program for Women, Infants, and Children.

(obstetrics care, pediatric care, mental health, and substance use treatment) and five social service provider types (child welfare, WIC, parenting programs, housing resources, and early intervention). Our findings suggest that NFP home visiting nurses collaborate with all provider types included in the survey, but the degree of collaboration differs between agency and by provider type within an agency.

Home visiting nurses in NFP tended to collaborate most, as measured by relational coordination, with WIC, obstetrics care, and mental health providers and the least with substance use treatment providers and housing resources. This finding was expected given nearly universal client needs for prenatal care, mental health, and nutrition, coupled with accessibility barriers for substance use treatment and housing services in most communities. Similarly, a qualitative investigation found strong collaborative efforts between home visiting nurses and obstetrics care providers especially when caring for women with pregnancy risks and complications, and that most NFP agencies receive the majority of their program referrals from obstetrics care and WIC providers (Williams et al., 2020).

In terms of collaboration with mental health providers, home visiting nurses in NFP regularly screen for perinatal mood disorders in their practice, refer to mental health specialists when needs arise, and partner with mental health consultants to adequately support their clients with mental health needs (Olds et al., 2013). These practices are similar to that of other home visiting programs that integrate a mental health provider into their ongoing operations (Goodson et al., 2013).

In addition to variation in the degree of collaboration by provider type, our findings suggest that having a contact person within the organization or provider type one wishes to collaborate with is important, which validates previous qualitative research. For example, having a contact person to liaise between agencies is helpful for improving communications, such as when making and receiving referrals, for ongoing communications, and to coordinate care for high-need, complex families (Tung et al., 2019; Williams et al., 2019). Other research has shown that care coordination programs frequently assign care management functions to clinic personnel like nurses or social workers, or hire dedicated care managers to manage the health of defined populations (Farrell et al., 2015; Taylor et al., 2013), facilitating joint working, activity, and action (Aquino et al., 2016). In the case of NFP, these individuals serve as contact points for home visiting nurses to facilitate care coordination, communications, and service planning with clinical providers.

TABLE 5 Differences in relational coordination dimension scores by having a contact person versus not for selected providers

Relational coordination dimension	Contact with obstetrics care		No contact with obstetrics care		t(233)	p	Contact with WIC[a]		No contact with WIC[a]		t(213)	p	Contact with Early intervention		No contact with Early intervention		t(212)	p
	M	SD	M	SD			M	SD	M	SD			M	SD	M	SD		
Frequency of communication	3.22	0.91	2.32	1.04	−4.35	<0.001	3.63	1.15	1.83	0.98	−3.77	<0.001	3.14	1.04	2.44	0.95	−3.34	0.001
Timeliness of communication	3.41	0.86	2.33	1.06	−5.29	<0.001	3.77	1.07	2.17	1.33	−3.59	<0.001	3.30	1.10	2.57	1.07	−3.28	0.001
Accuracy of communication	3.80	0.98	2.33	1.28	−6.32	<0.001	3.88	1.09	2.00	0.89	−4.28	<0.001	3.64	1.12	3.00	1.36	−2.74	0.007
Problem solving communication	3.42	0.95	2.09	1.04	−6.32	<0.001	3.74	1.10	2.17	0.75	−3.46	0.001	3.39	1.08	2.80	1.27	−3.30	0.001

[a]Special supplemental nutrition program for Women, Infants, and Children.

The study findings further align with existing literature that suggests collaboration as functioning in two major ways: at the interpersonal level through relationships, which in turn is supported by organizational and contextual factors at the systems-level, which ensures that families with the greatest needs are supported and receive adequate care for their needs (Reeves et al., 2011). For example, collaboration requires team members to develop interpersonal relationships while systemic conditions within an organization like cultural environment further drive collaborative practice (Dahlke et al., 2020; Folkman et al., 2019). As stated, collaboration relies on relational dynamics with one another, and includes high-quality communication coupled with high-quality relationships (Gittell, 2006); both of which were measured in this study. The study findings support research that highlights coordination as reliant on communications (Gerrity, 2016), and requires foundational knowledge and respecting of other providers (Sangaleti et al., 2017). Some researchers have found that other factors affect physician-nurse collaboration including unequal power or autonomy and task prioritizing, which were not explored in this study (Karam et al., 2018).

In this study, collaboration was also measured as the degree to which organizations structurally share resources such as physical space and facilities, communication tools and data-sharing through connected electronic health records, policies and procedures that allow for such interactions, and financial relationships like shared funding sources and contractual agreements. Previous work on integrated care highlights systems integration as a facilitator for practice change by increasing the frequency of communications and development of shared goals among teams that deliver care (Baxter et al., 2018). Integrated and blended funding based on contracts and agreements along with collaborative treatment planning are necessary for practices to be considered integrated (Rickwood et al., 2019).

Structural integration occurs in the form of shared facilities or co-location, communication tools, or connected electronic health records (Dixon et al., 2018; Kellom et al., 2018; Olander et al., 2020). This integration allows for collaboration between care providers to promote the delivery of seamless care from the perspectives of patients (Supper et al., 2015). However, recent efforts on measuring state-level supports and barriers for coordination of home visiting with other early childhood systems suggest that coordination infrastructures of data systems and finance could be improved (West et al., 2020). We found great variation in the degree of structural integration between NFP and interprofessional providers, which supports these results.

5 | STRENGTHS AND LIMITATIONS

This is among the first and most thorough studies to investigate the degree of collaboration between NFP home visiting nurses and providers in health care and social services at a national level in the US. This study had a high response rate among nursing supervisors representing 80% of NFP agencies. There were no significant differences in program tenure or in agency type between respondents

and nonrespondents. Although the length of program operation and agency type did not affect response rates, there is still potential for response bias based upon other unmeasured factors like respondent experience in the program. This study was conducted within the context of the NFP program, which should be taken into consideration when assessing the generalizability of the findings. Finally, this study was cross-sectional; however, collaboration in the context of the NFP program does not fluctuate greatly over time without intentional intervention. Future research, however, should include assessments of collaboration over time to test this hypothesis.

6 | CONCLUSION AND PRACTICE IMPLICATIONS

Widespread public health evidence-based interventions in the community, like NFP, have the potential to address long-term maternal and child health outcomes. This study showed that home visiting nurses in NFP vary in their collaborative efforts with a range of health care and social service providers in different professions. Effective collaboration in this home visiting setting exists in two parts: relationally and structurally. High-quality communication relies on high-quality relationships in sharing goals, shared knowledge, and respecting one another. Structurally, resource-sharing in physical space and facilities, communication tools and data through electronic health records, as well as financial relationships and contractual agreements help to facilitate care coordination and communications.

Given NFP's unique role in bridging health care and addressing social determinants of health, this study's findings are relevant for other home visiting and community-based interventions that interact with health care, as well as for medical care coordination services that interact with social service programs. In respect of public health nursing practice, improving collaboration between nurse home visitors and other service providers requires intentional efforts to develop and maintain relationships that are facilitated by the pooling of resources. Solving problems together to achieve shared goals has the potential to improve population health and well-being. As such, future public health nursing policies and efforts should support the nurse home visitors' role in improving family and child health through enhancing collaborative strategies with interprofessional providers working in health care and social services.

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CONFLICTS OF INTEREST

Dr. Olds was the principle architect of the NFP program model and has been the Principal Investigator on three of the original randomized controlled trials of the program. He has an interest in seeing the NFP program succeed in improving maternal and child health in community practice. All other authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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