Shared Use of Physical Activity Facilities Among North Carolina Faith Communities, 2013

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Abstract

Introduction

Shared use of recreational facilities is a promising strategy for increasing access to places for physical activity. Little is known about shared use in faith-based settings. This study examined shared use practices and barriers in faith communities in North Carolina.

Methods

Faith communities in North Carolina (n = 234) completed an online survey (October–December 2013) designed to provide information about the extent and nature of shared use of recreational facilities. We used binary logistic regression to examine differences between congregations that shared use and those that did not share use.

Results

Most of the faith communities (82.9%) that completed the survey indicated that they share their facilities with outside individuals and organizations. Formal agreements were more common when faith communities shared indoor spaces such as gymnasiums and classroom meeting spaces than when they shared outdoor spaces such as playgrounds or athletic fields. Faith communities in the wealthiest counties were more likely to share their spaces than were faith communities in poorer counties. Faith communities in counties with the best health rankings were more likely to share facilities than faith communities in counties that had lower health rankings. The most frequently cited reasons faith communities did not share their facilities were that they did not know how to initiate the process of sharing their facilities or that no outside groups had ever asked.

Conclusion

Most faith communities shared their facilities for physical activity. Research is needed on the relationship between shared use and physical activity levels, including the effect of formalizing shared-use policies.
ful eating or physical activity policies, provide spaces or time for physical activity, and promote access to healthful foods (5,8).

Given the importance of ecological frameworks in the design and implementation of physical activity interventions, community and environmental supports for physical activity are increasingly promoted as a strategy to increase individual physical activity levels among community members (4,11). Shared-use policies and practices, mainly in school settings, are promoted as a way to increase physical activity levels, particularly in areas that lack spaces to be active (12–14). For example, in North Carolina, a high percentage of schools (88.9%) allowed shared use of their facilities, a percentage much greater than that found in previous studies (15,16). Shared use was disproportionately lower in schools in economically distressed counties and in schools with a greater proportion of black students (17). Schools reported several barriers to implementing shared-use policies, including concerns about liability and maintenance (16) and feelings among school administrators that the community lacked interest in shared use or that administrators did not know where to start this work (17).

Research on health promotion in faith communities is increasing (18). Formal (ie, written) or informal (ie, verbal) agreements and policies on shared use for health promotion purposes can regulate whether and how people or groups are allowed to use the facilities of faith communities. Some faith communities adopt formal facility-use policies that outline the conditions and costs associated with individuals and groups using their space for meetings (eg, for Alcoholics Anonymous, Boy Scouts) or events. Some faith communities permit unstructured use — sometimes called open use — of their recreational spaces by individuals and groups in the community. For example, many faith communities have playgrounds that are used by neighborhood children and families (19). A policy allowing unstructured use may be part of an intentional decision by the leaders of the faith community to make space available to the community for open recreational use and can lead to the adoption of a formal open-use policy. On the other hand, open use may be a customary practice of the faith community or neighborhood that has not been explicitly discussed or affirmed and is occurring with no policy — either formal or informal — in place.

The objectives of this study were to 1) create a baseline assessment of shared use of physical activity facilities among North Carolina faith communities, 2) determine barriers to shared use, and 3) determine priorities for future programs to support shared use of physical activity facilities in faith communities.

Methods

We conducted a survey of faith-based organization in North Carolina in fall 2013. Three organizations collaborated to implement this assessment: North Carolina State University, Partners in Health and Wholeness, and the North Carolina Division of Public Health (DPH). North Carolina State University and DPH have a history of working together. In 2007, they collaborated to create the practice-tested faith-based intervention Faithful Families Eating Smart and Moving More (Faithful Families) (1). Partners in Health and Wholeness (PHW), sponsored by the North Carolina Council of Churches, certifies and supports congregations in their efforts to encourage healthful eating, physical activity, and tobacco cessation. As a part of its Community Transformation Grant (CTG) project, DPH worked with faith communities to promote shared use of their facilities (2). The institutional review board at North Carolina State University approved this research.

We adapted the survey used for this project from an existing survey of shared use that was administered in North Carolina public schools in 2013, which was based on an assessment developed by Spengler et al in 2011 (16,17). The survey asked faith communities whether their facilities (including meeting rooms, kitchens, gymnasiums, playgrounds, and athletic or open fields) were used by groups or individuals outside of the faith community’s membership. If facilities were available for outside individual or group use, the survey asked participants whether this use occurred through a formal policy or agreement (ie, a written contract), an informal policy or agreement (ie, verbal permission), or no policy or agreement (ie, permission to use the space had not been discussed). Faith communities that did not open their facilities to outside groups or individuals were asked a series of questions about the barriers to doing so, including liability, maintenance, not knowing where to start, and lack of space or interest. Participants were asked to what extent they agreed or disagreed (1 = strongly agree, 2 = agree; 3 = neither agree nor disagree; 4 = disagree; 5 = strongly disagree) with statements about common barriers to shared use, including not having been asked, not knowing where to start, concerns about liability, and concerns about maintenance cost.

We administered the survey electronically, via Qualtrics (Qualtrics LLC), and permitted faith communities with limited access to the Internet to submit paper copies of the survey. Using program records, partners distributed the survey to faith communities that had participated in Faithful Families or the PHW program (262 faith communities). CTG coordinators throughout the state also distributed the survey to faith community contacts in their counties. Any faith community could participate, regardless of tradition or religious background. Emails were addressed generically but were tailored by local staff members (Faithful Families facilitators, PHW liaisons, or CTG coordinators) to be delivered to their local contacts in the faith community. The survey was completed by clergy, deacons, health committee members, and faith com-

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and the 20 least distressed as Tier 3. The 40 most distressed counties were designated as Tier 1, the next 40 as Tier 2, and the remaining 40 as Tier 3 based on economic well-being (26). The 40 most distressed counties were used to summarize a variety of health measures,“ with 1 being the healthiest and 100 being the least healthy (23). Because standard-ized county classification systems designating rural areas are lacking (24), we used data from the 2010 decennial census (25) on the percentage of the county’s population living in rural areas (ie, outside urban areas or urbanized clusters) to characterize the rurality of counties. We obtained economic data from the North Carolina Department of Commerce’s 2013 ranking of the state’s 100 counties based on economic well-being (26). The 40 most distressed counties were designated as Tier 1, the next 40 as Tier 2, and the 20 least distressed as Tier 3.

Data analysis

We used descriptive statistics to describe faith community characteristics and type of shared use. We used binary logistic regression to examine differences between congregations that shared use and those that did not share use. The regressions focused on faith community size, county economic tier, county health ranking, percentage of county population living in rural areas, and percentage of black residents in the county as key explanatory variables. Initial unadjusted models were estimated without controlling for other variables, followed by models estimated that controlled for other variables. Statistical significance was established at $P = .05$.

Results

Of the 234 faith communities that responded to the survey, 78 (34.4%) were small (<120 members), 75 (33.0%) were medium sized (120–299 members), and 74 (32.6%) were large (≥300 members) (Table 1). Forty-four (18.8%) faith communities in the sample were in the most economically distressed counties in North Carolina; 41.0% were in Tier 2 counties, and another 40.2% were in Tier 3 counties (Table 1). Survey respondents varied by type of position and included clergy, lay health leaders, deacons, PHW liaisons, and general members of the faith community.

Of the 100 counties in North Carolina, 53 were represented in the survey (Figure). The distribution of the survey counties most likely reflects the interests and priorities of local PHW, CTG, and Faithful Families program staff. The largest number of faith communities that responded, by county, were from Wake County (27 respondents) and the second largest from Forsyth County (21 respondents).
Formal agreements and faith communities that have informal
formation in a public database, which is now available online. Ad-
that shared facilities whether they were willing to share their in-
athletic fields. As a part of this study, we asked faith communities
are opening up their spaces for shared use. As the first study of
communities. First, these data illustrated that faith communities
practices related to shared use of physical activity facilities in faith
environment to maximize usage and promotion of shared use of fa-
tions should consider the social, physical, and organizational en-
rics for shared use and increasing physical activity. From a so-
cial-ecological perspective, place-based physical activity interven-
tions should consider the social, physical, and organizational en-
vironment to maximize usage and promotion of shared use of fa-
cilities for physical activity (18). A follow-up study examining the
supporting practices and characteristics of faith community facilit-
ies with varying levels of shared use could provide a better under-
standing of the effectiveness of shared use and, more importantly,
identify strategies for increased use of these facilities.

Third, our study found that several factors were associated with
differences in sharing facilities. Faith communities in counties
with the greatest wealth and highest health rankings were more
likely to share their facilities than faith communities in poorer
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in adjusted models, faith communities in the wealthiest (Tier 3)
counties were significantly more likely (odds ratio [OR], 3.19;
95% confidence interval [CI], 1.10–9.25; P = .03) than faith com-
munities in the poorest counties (Tier 1) to share facilities (Table
3). Similarly, faith communities in counties with the highest rank-
ing in health outcomes were significantly more likely (OR, 3.32;
95% CI, 1.31–8.45; P = .01) to share facilities than faith commu-
nities in counties ranked lowest in health outcomes. In addition,
faith communities in counties with a moderate percentage of rural
residents were less likely (OR, 0.28; 95% CI, 0.11–0.71; P = .007)
than faith communities with a high percentage of rural residents or
a low percentage of rural residents to share facilities.

Thirty-nine faith communities reported not sharing their facilities;
of these, 29 answered the question on barriers. The barrier most
frequently cited was not knowing how to start the shared-use pro-
cess (mean score = 2.9; 7 of 29 [24.1%] reporting). The second
most common reason given was not being asked by outside groups
or individuals to share (mean score = 2.7; 7 of 29 [24.1%] report-
ing).

Discussion

Our study yielded findings that can help shape future projects and
practices related to shared use of physical activity facilities in faith
communities. First, these data illustrated that faith communities
are opening up their spaces for shared use. As the first study of
shared use among faith communities, this study can encourage
public health practitioners to expand or enhance partnerships with
faith communities to encourage shared use. To aid in this work,
and as a direct result of this research and a request by DPH,
ChangeLab Solutions developed a guide to implementing shared-
use practices in faith communities (19).

Second, our study showed that faith communities are sharing vari-
ous types of spaces: classrooms, gymnasiums, playgrounds, and
athletic fields. As a part of this study, we asked faith communities
that shared facilities whether they were willing to share their in-
formation in a public database, which is now available online. Ad-
ditional research is needed to understand how these spaces are
used and whether use differs between faith communities that have
formal agreements and faith communities that have informal
agreements or no agreements.

Fourth, our study found that faith communities did not cite liabil-
ity concerns or maintenance costs as the primary reasons for not
sharing their facilities. These finding are similar to those of anoth-
er study in North Carolina that examined shared-use practices in
schools (17). In our study, although faith communities did express
concerns about maintenance and liability, the barriers most fre-
cently cited were not knowing how to start the shared-use pro-
cess and not being asked by outside groups or individuals to share
their facilities.

Our study identified faith communities as potentially untapped re-
ources for shared use and increasing physical activity. From a so-
cial-ecological perspective, place-based physical activity interven-
tions should consider the social, physical, and organizational en-
vironment to maximize usage and promotion of shared use of fa-
cilities for physical activity (18). A follow-up study examining the
supporting practices and characteristics of faith community facilit-
ies with varying levels of shared use could provide a better under-
standing of the effectiveness of shared use and, more importantly,
identify strategies for increased use of these facilities.

This study has several limitations. First, it was not designed to
serve as a comprehensive assessment of the facilities of faith com-
munities in North Carolina. Because the study was based on a con-
venience sample, the results may not be representative of all faith-
based organizations in the state. Because we sent the survey to a
wide network of practitioners and partners, we could not deter-

determine a baseline number of faith communities to whom the survey
was distributed, and therefore cannot calculate a response rate.
This research focused on how faith communities shared their facil-
ities, not whether they used the facilities of another organization.
Second, the organizations that completed the assessment might represent those most interested in the topic of shared use or in promoting physical activity. As a result, a higher number of faith-based organizations that allow community access to their facilities might be represented in our data. Our data suggest the need for additional, larger studies that examine shared use policies and practices in faith communities. Third, we did not include denomination or religious affiliation in the survey, which has led us to adapt the survey instrument to include that information for future use. Fourth, the logistic regression had limitations. Because of the small sample size, some variables had small numbers of outcome events, which led to wide confidence intervals for the odds ratios. Therefore, associations between variables should be interpreted with caution; a larger sample of faith communities is needed for more precise estimates.

Our findings suggest that faith communities are apt partners for increasing shared use in the community setting. Faith communities have facilities that can be used for various physical activities: indoor classrooms can be used for fitness classes; gymnasiums can be used for free play, games, or fitness classes; outdoor spaces can be used for organized games or free play; and large open spaces (including parking lots) can be opened up for biking, walking, and other activities. Faith community partnerships that promote shared use could be particularly important for communities that have persistent health disparities, including low-income and racial/ethnic minority communities, where access to spaces for physical activity may be limited.

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References

1. Wilson DK, Kirtland KA, Ainsworth BE, Addy CL. Socioeconomic status and perceptions of access and safety for physical activity. Ann Behav Med 2004;28(1):20–8.
2. Powell LM, Slater S, Chaloupka FJ, Harper D. Availability of physical activity-related facilities and neighborhood demographic and socioeconomic characteristics: a national study. Am J Public Health 2006;96(9):1676–80.
3. Watson M, Dannenberg AL. Investment in safe routes to school projects: public health benefits for the larger community. Prev Chronic Dis 2008;5(3):A90.
4. Institute of Medicine. Accelerating progress in obesity prevention: solving the weight of the nation. http://www.nationalacademies.org/hmd/Reports/2012/Accelerating-Progress-in-Obesity-Prevention.aspx. Accessed June 29, 2016.
5. Arriola KRJ, Hermstad A, Flemming SSC, Honeycutt S, Carvalho ML, Cherry ST, et al. Promoting policy and environmental change in faith-based organizations: description and findings from a mini-grants program. Am J Health Promot 2016;ajhp.150212-QUAN-724.
6. Lancaster KJ, Carter-Edwards L, Grilo S, Shen C, Schoenthaler AM. Obesity interventions in African American faith-based organizations: a systematic review. Obes Rev 2014;15(Suppl 4):159–76.
7. Dodani S, Fields JZ. Implementation of the fit body and soul, a church-based life style program for diabetes prevention in high-risk African Americans: a feasibility study. Diabetes Educ 2010;36(3):465–72.
8. Hardison-Moody A, Dunn C, Hall D, Jones L, Newkirk J, Thomas C. Multi-level partnerships support a comprehensive faith-based health promotion program. J Ext 2011;49(6).
9. Wilcox S, Laken M, Parrott AW, Condrasky M, Saunders R, Addy CL, et al. The faith, activity, and nutrition (FAN) program: design of a participatory research intervention to increase physical activity and improve dietary habits in African American churches. Contemp Clin Trials 2010;31(4):323–35.
10. Yeary KHK, Cornell CE, Prewitt E, Bursac Z, Tilford JM, Turner J, et al. The WORD (Wholeness, Oneness, Righteousness, Deliverance): design of a randomized controlled trial testing the effectiveness of an evidence-based weight loss and maintenance intervention translated for a faith-based, rural, African American population using a community-based participatory approach. Contemp Clin Trials 2015; 40:63–73.

11. Sallis JF, Floyd MF, Rodriguez DA, Saelens BE. Role of built environments in physical activity, obesity, and cardiovascular disease. Circulation 2012;125(5):729–37.

12. Booth M, Okely A. Promoting physical activity among children and adolescents: the strengths and limitations of school-based approaches. Health Promot J Austr 2005; 16(1):52–4.

13. Chace M, Vilvens H. Opening the Doors for Health: school administrators’ perceived benefits, barriers, and needs related to shared use of school recreational facilities for physical activity. J Phys Act Health 2015;12(7):1017–22.

14. Everett Jones S, Wendel AM. Characteristics of joint use agreements in school districts in the United States: findings from the School Health Policies and Practices Study, 2012. Prev Chronic Dis 2015;12:E50.

15. Lee SM, Burgeson CR, Fulton JE, Spain CG. Physical education and physical activity: results from the School Health Policies and Programs Study 2006. J Sch Health 2007; 77(8):435–63.

16. Spengler JO, Connaughton DP, Maddock JE. Liability concerns and shared use of school recreational facilities in underserved communities. Am J Prev Med 2011;41(4):415–20.

17. Kanters MA, Bocarro JN, Moore R, Floyd MF, Carlton TA. Afterschool shared use of public school facilities for physical activity in North Carolina. Prev Med 2014;69(Suppl 1):S44–8.

18. Campbell MK, Hudson MA, Resnicow K, Blakeney N, Paxton A, Baskin M. Church-based health promotion interventions: evidence and lessons learned. Annu Rev Public Health 2007; 28(1):213–34.

19. Change Lab Solutions. Congregation to community: shared use by North Carolina faith-based organizations. 2014. http://eatsmartmovemorenc.com/FacilityUseAssessment/Texts/Congregation-to-Community%20Shared%20Use%20by%20NC%20Faith-based%20Organizations.pdf. Accessed October 25, 2016.

20. Dillman D, Smyth JD, Christian LM. Internet, phone, mail and mixed-mode surveys: the tailored design method. 4th edition. Hoboken (NJ): John Wiley; 2014.

21. The Association of Religion Data Archives. Maps & reports. http://www.thearda.com/rcms2010/rs/37/rcms2010_37_state_name_2010.asp. Accessed September 29, 2016.

22. US Census Bureau. Quick facts. 2015. https://www.census.gov/quickfacts/table/PST045215/00. Accessed December 12, 2016.

23. University of Wisconsin Population Health Institute. County health rankings & roadmaps: North Carolina rankings data. http://www.countyhealthrankings.org/rankings/data.nc. Accessed June 29, 2016.

24. Umstattd Meyer MR, Moore JB, Abildso C, Edwards MB, Gamble A, Baskin ML. Rural active living: a call to action. J Public Health Manag Pract 2015;22(5):E11–20.

25. US Census Bureau. Geography: urban and rural. 2010. https://www.census.gov/geo/reference/urban-rural.html. Accessed December 12, 2016.

26. North Carolina Department of Commerce. County tier designations, 2013. https://www.nccommerce.com/research-publications/incentive-reports/2013-county-tier-designations. Accessed June 29, 2016.

27. Edwards MB, Bocarro JN, Kanters MA. Place disparities in supportive environments for extracurricular physical activity in North Carolina middle schools. Youth Soc 2013;45(2):265–85.
### Table 1. Characteristics of the Sample of Faith Communities (N = 234) Participating in a Study of Share-Use Facilities for Physical Activity, North Carolina, 2013

| Variable | No. (%) |
|----------|---------|
| **Size of faith community, no. of members**<sup>b</sup> (median = 200) | |
| Small (<120) | 78 (34.4) |
| Medium (120–299) | 75 (33.0) |
| Large (≥300) | 74 (32.6) |
| **County economic tier**<sup>c</sup> | |
| Tier 1 | 44 (18.8) |
| Tier 2 | 96 (41.0) |
| Tier 3 | 94 (40.2) |
| **County health ranking**<sup>d</sup> (median = 49) | |
| Low (64–100) | 77 (32.9) |
| Middle (33–63) | 79 (33.8) |
| High (1–32) | 78 (33.3) |
| **Percentage of county population that is black**<sup>e</sup> (median = 20.7%) | |
| Low (≤10) | 67 (28.6) |
| Moderate (11–30) | 89 (38.0) |
| High (≥31) | 78 (33.3) |
| **Percentage of county that is rural**<sup>f</sup> (median = 42.7%) | |
| Low (<20) | 81 (34.6) |
| Moderate (21–49) | 75 (32.1) |
| High (≥50) | 78 (33.3) |
| **Share facilities** | |
| Yes | 194 (82.9) |
| No | 39 (16.7) |
| Did not answer question<sup>g</sup> | 1 (0.4) |

<sup>a</sup> Percentages may not sum to 100 because of rounding.

<sup>b</sup> Several faith communities reported their faith community size as a range and were thus not included in this analysis.

<sup>c</sup> Of the 100 counties in North Carolina, the 40 most distressed counties were designated as Tier 1, the next 40 as Tier 2, and the 20 least distressed as Tier 3. Data source: North Carolina Department of Commerce (26).

<sup>d</sup> Data source: University of Wisconsin Population Health Institute (23). Each county was ranked “according to summaries of a variety of health measures,” with 1 being the healthiest and 100 being the least healthy.

<sup>e</sup> Data source: US Census Bureau (22).

<sup>f</sup> Data source: US Census Bureau (25).

<sup>g</sup> Although 1 faith community did not respond to this question, it did answer questions related to use of facilities.
Table 2. Types of Most Frequently Shared Facilities and Types of Shared Use, Study of Share-Use Facilities for Physical Activity Among Faith Communities in North Carolina, 2013

| Type of Facility          | Faith Communities That Have Type of Facility (N = 234) | Shared Facility | Type of Agreement | Did Not Indicate Type |
|---------------------------|-------------------------------------------------------|----------------|------------------|----------------------|
|                           |                                                       | Formal         | Informal         | No Agreement        |                      |
| Classroom/meeting space   | 186 (79.5)                                            | 167 (89.8)     | 86 (51.5)        | 76 (45.5)           | 3 (1.8)              | 2 (1.2)             |
| Gymnasium                 | 59 (25.2)                                             | 39 (66.1)      | 22 (56.4)        | 16 (41.0)           | 1 (2.6)              | 0                   |
| Playground                | 115 (49.1)                                            | 68 (59.1)      | 15 (22.1)        | 34 (50.0)           | 18 (26.5)            | 1 (1.5)             |
| Athletic/open field       | 69 (29.5)                                             | 38 (55.1)      | 12 (31.6)        | 18 (47.4)           | 6 (15.8)             | 2 (5.3)             |
| Other facility            | 194 (82.9)                                            | 188 (96.9)     | NA               | NA                  | NA                  | NA                  |

a All values are number (percentage). Percentages may not add to 100 because of rounding.
b Percentage calculated according to number who responded to question (n = 234).
c Percentage calculated according to number of respondents that had the type of facility.
d Percentage calculated according to number of respondents that shared facility.
e NA, not applicable. Survey did not ask about type of policy or agreement for shared “other facilities.”
Table 3. Unadjusted Odds Ratios for Likelihood of Shared Facilities, by Faith Community and County Characteristics, Study of Shared-Use Facilities for Physical Activity in North Carolina, 2013

| Characteristics                              | Odds Ratio (95% Confidence Interval) | P Value | Model R² |
|----------------------------------------------|--------------------------------------|---------|----------|
| Size of faith community, no. of members      |                                      |         |          |
| Small (<120)                                 | 1 [Reference]                        | .03     |          |
| Medium (120–299)                             | 1.03 (0.46–2.27)                     | .94     |          |
| Large (≥300)                                 | 2.43 (0.94–6.31)                     | .07     |          |
| County economic tier a                       |                                      |         |          |
| Tier 1                                       | 1 [Reference]                        | .08     |          |
| Tier 2                                       | 0.80 (0.34–1.92)                     | .62     |          |
| Tier 3                                       | 3.19 (1.10–9.25)                     | .03     |          |
| County health ranking b                      |                                      |         |          |
| Low (64–100)                                 | 1 [Reference]                        | .05     |          |
| Middle (33–63)                               | 1.64 (0.74–3.61)                     | .22     |          |
| High (1–32)                                  | 3.32 (1.31–8.45)                     | .01     |          |
| Percentage of county population that is black c |                                      |         |          |
| Low (≤10)                                    | 1 [Reference]                        | .04     |          |
| Moderate (11–30)                             | 0.20 (0.25–1.33)                     | .20     |          |
| High (≥31)                                   | 0.38 (0.58–4.22)                     | .38     |          |
| Percentage of county that is rural d         |                                      |         |          |
| Low (<20)                                    | 1 [Reference]                        | .06     |          |
| Moderate (21–49)                             | 0.28 (0.11–0.71)                     | .007    |          |
| High (≥50)                                   | 0.47 (0.18–1.24)                     | .47     |          |

* Of the 100 counties in North Carolina, the 40 most distressed counties were designated as Tier 1, the next 40 as Tier 2, and the 20 least distressed as Tier 3. Data source: North Carolina Department of Commerce (26).

* Data source: University of Wisconsin Population Health Institute (23). Each county was ranked “according to summaries of a variety of health measures,” with 1 being the healthiest and 100 being the least healthy.

* Data source: US Census Bureau (22).

* Data source: US Census Bureau (25).