Religion, social support, fat intake and physical activity

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Abstract
Objective: Most research on diet and exercise has focused on these health behaviours as proximate causes of disease, rather than examine the context of how diet and exercise are developed and maintained. This study examined religion and social support in relationship to fat intake and physical activity.
Design, setting and subjects: Data from surveys of 546 adults aged 17–91 years, residing in one upstate New York county, were analysed.
Results: Most relationships between the multiple facets of religion, fat intake and physical activity were not statistically significant. After controlling for demographics and social support, Conservative Protestant women and women specifying an ‘Other’ religious affiliation reported higher fat intakes than did Catholic women. There were no relationships between religion and fat intake in men. In women, religious commitment was associated with greater moderate and vigorous physical activity, whereas in men, divine social support was associated with greater moderate physical activity. Social support did not substantially change the magnitude of the relationships between religion, diet and physical activity.
Conclusion: Overall, there were few relationships between religion, fat intake and physical activity, suggesting that in contemporary US society religion may play a small role in the context of how diet and exercise are developed and maintained. The limited range of religiosity in the sample, however, may have underestimated the role of religion. Significant relationships between religion and physical activity in women suggest that further research is needed to more clearly delineate religion’s relationship with health behaviours.

Keywords
Religion
Fat
Diet
Exercise
Physical activity
Health

Research about diet and exercise’s relationships with health has predominantly focused on these behaviours as proximate causes of disease, rather than examine the context of how these particular health behaviours are developed and maintained1. Proximate risk factors for health, such as diet and physical activity, can be contextualised by linking them with particular social institutions. An under-investigated social institution that may provide insights about health behaviours is religion.

Religion as a social institution encompasses a multifaceted set of social organisations, norms, values and experiences that defines group members and their relationship to the larger society2. Religious groups use health behaviours as identifiers to distinguish their community from others. Judaism has Kosher food regulations3, Islam uses Halal food guidelines3, Seventh-Day Adventists encourage a lacto-ovo vegetarian diet4 and the Church of Jesus Christ of Latter-day Saints (Mormon) prescribes a balanced diet and discourages excessive meat intake5. Apart from denominational prescriptions, general religiosity in the USA encompasses theological teachings about the body as a temple where God resides5, which may also lead to the consumption of a healthier diet and increased physical activity. Broad teachings about the sacredness of the body may also further enforce specific religious health-behaviour guidelines4. Thus religion may directly shape diet and physical activity through specific theological teachings and indirectly through general teachings about the body and its relationship to God.

Religion may also influence diet and physical activity by providing social support, social networks and social control6,7. Religion offers venues for people of like values, interests and activities to interact, enabling adherents to form larger social networks and receive greater social support8. In national9, elderly9, college student10 and African American samples11, religion was related to greater emotional support, larger network size and better perceived support. Religion has also been proposed to promote health-related socialisation12, with the church serving as a context for promoting, developing and maintaining health behaviours such as diet and exercise13.

Social support is associated with diet14–16 and physical activity17,18. Social support may influence health behaviours by offering models for lifestyle change, resources to help individuals develop and maintain healthy behaviours, and social controls over behaviour14,19. Thus
religion’s relationship with diet and physical activity may be mediated by social support.

Social support, diet and physical activity
A review of the literature on social support and dietary change concluded that social support could ‘play a significant role in helping people undertake or maintain healthy changes in their diets’. In samples of the elderly, different aspects of social support (network density, perceived support) have been related to intakes of fat, salt and sugar, fibre and fruit, and vitamins and minerals. While these studies used various measures of diet and multiple measures of social support, the external validity of these predominantly rural, elderly white samples is limited and the cross-sectional design of some of these studies does not clarify whether social support causes changes in diet. Relationships between social support and diet may also be more pronounced in the elderly. Given the increased risk of social isolation among the elderly and its subsequent effect on diet, age-associated differences may occur in social support’s connection with diet. Social support from religion, in this case, may better enable the religious – particularly the older religious – to practise positive health behaviours.

General and specific measures of social support have been related to increased physical activity in adults and older adults. Particularly in adult women and older adults, there is evidence that this relationship between social support and physical activity is causal, with social support predicting physical activity. However, the literature is less clear about the direction of causality for men. These studies used self-reported physical activity and various measures of social support, but more valid and comprehensive measures would more clearly delineate social support’s relationship with physical activity. Given these limitations, however, these studies suggest that increased levels of general social support from religion may facilitate increased physical activity among certain samples (particularly women and older adults) who are more religious.

Religion and diet
The literature on religion’s relationship with diet is sparse. Religion and diet have been examined in studies of denomination and general religiosity. Some religious groups have dietary laws and guidelines. Hassidic Jewish sects reported different nutrient intakes from general populations. Catholics reported different diets from Protestants. These studies used detailed measures of diet to bring greater clarity to the under-examined relationships of religion and diet. However, possible confounders like socio-economic status were not adjusted, so it is unclear whether these observed differences were due to denomination or other factors.

Few studies have examined general religiosity’s relationship with dietary intake. Among religious samples, religiosity was associated with ‘healthful nutrition’ among the Greek Orthodox and healthier nutritional practices (without controls) in a sample of predominantly Mormons. In other samples, religion was related to healthier eating practices, food choice and nutrient intake. In contrast, nutritional practices like fruit and vegetable intake and limiting sweet and junk foods were not related to seeing the body as a manifestation of God or with seeing the body as sacred among university students. (Mahoney A, Carels RA, Pargament K, Wachholtz A, Leeper LE, Kaplar M, et al. The sanctification of the body and behavioral health patterns of college students, unpublished manuscript, 2002). This scarce literature suggests a tentative relationship between religion, diet and nutrition. However, the external validity of these studies is limited to their select samples, and their cross-sectional designs do not fully conceptualise different aspects of religion that may work concurrently in relationship with diet.

Religion and physical activity
Religion’s relationships with physical activity have also not been thoroughly examined. Weekly attendance to religious services was associated with becoming physically active in adults followed for 30 years, after controlling for demographics and self-reported health. Different aspects of religiosity (attendance, importance, denomination, theology and growth) were related to greater exercise frequency in adolescents, college students (Mahoney et al., unpublished) and working adults. However, many of these studies examined religion’s relationship with physical activity through bivariate correlations, not adjusting for demographics. For example, Mormons attending church weekly were more likely to engage in vigorous exercise than those attending church less than once a week, but this relationship became insignificant when demographics were controlled. In contrast to research showing religion’s relationship with increased exercise, greater use of religious coping was associated with decreased exercise among adults. Thus, existing literature about religion and physical activity is meagre and ambiguous, in part because potential confounders were typically not examined. Different aspects of religion may also play different roles in their relationship to physical activity.

Hypotheses
Given that the relationships between religion, diet and physical activity are unclear, this study sought to examine associations between religion and these health behaviours in greater depth. Social support was examined as a mediator in the relationships between religion and health behaviours. Based on previous literature, it was hypothesised that greater religiosity would be related to a healthier diet, defined as having a lower percentage of

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energy from fat and higher levels of physical activity. Specifically, negative aspects of religion – negative religious coping and negative congregation support – were expected to be related to decreased physical activity and a greater percentage of energy from fat. It is unclear from prior research how denomination would be related to diet and physical activity. Relationships between religion and individual health behaviours were hypothesised to be mediated by social support.

**Methods**

**Sample**

Sixty religious congregations in one upstate New York county were identified and available for sampling, and were categorised by denomination as ‘Catholic’, ‘Conservative Protestant’, ‘Mainline Protestant’ and ‘Other’. Four congregations from each denomination were randomly selected, and parishioners were randomly selected from each religious group. To maximise the diversity of religious groups in the ‘Other’ denomination, all groups categorised as ‘Other’ were asked to participate in the study. After obtaining permission from religious group leaders, 280 questionnaires were mailed to Catholic church members, 244 to Conservative Protestant church members, 179 to Mainline Protestant church members, and 188 distributed to those in the ‘Other’ denomination.

The ‘Non-religious’, defined as atheists, agnostics or having no religious preference, were recruited through a community list-serve, a local food co-operative, acquaintances and other contacts. A total of 62 in the ‘Non-religious’ group were asked to participate in the study. This project was approved by the University Institutional Review Board (IRB), University Committee on Human Subjects (UCHS).

**Mailings**

Potential respondents were recruited using a series of mailings. From questionnaires that were mailed directly to the respondent, the response rate was 65%. Of 619 questionnaires received, 50 cases from one ‘Other’ denomination congregation were excluded because of unrepresentative selection by the religious leader, and 23 ‘Non-religious’ food co-operative members were excluded because of unrepresentative selection. Thus 546 cases were available for analysis.

**Measures**

**Religion and religiosity**

Religion was conceptualised as three broad components: Behavioural, Subjective and Functional. The behavioural component included religious denomination, attendance and religious application; the subjective component included religious identity and commitment; and the functional component included religious coping and religious social support through congregation and divine support.

Based on previous research, religious denomination for this analysis was grouped into five categories: Catholic, Conservative Protestant, Mainline Protestant, Other and Non-religious. Respondents were asked their religious denomination to confirm whether they were correctly sampled from their respective religious denominations.

Religious attendance was assessed through a single-item measure: ‘How often do you usually attend religious/spiritual services?’

Religious application was assessed by asking how often respondents asked themselves what their religious or spiritual beliefs suggest they should do in making daily life decisions.

Religious commitment was assessed through one scale and two single-item questions. The religious commitment scale (α = 0.87) was a sum of four categorical questions about how religious and spiritual respondents considered themselves, and how important they considered religion and spirituality to be in their lives. The single-item religious commitment questions asked respondents whether they contributed a substantial amount of money to their congregation or to religious causes in the last year, and how many hours were spent on activities for religious or spiritual reasons.

Religious identity (α = 0.80) was a continuous scale constructed from four single-item categorical variables. An example question is ‘How closely do you identify with being a member of your religious group?’

Religious coping was assessed through the Brief RCOPE, a 14-item scale that assesses positive religious coping (α = 0.94) and negative religious coping (α = 0.81). Respondents were told to think of a recent negative event in their life and asked to what extent they used a series of coping mechanisms.

Religious social support was comprised of divine social support and congregation social support. Divine social support was assessed through a single-item question and a continuous scale about prayer. The single item asked respondents how close their relationship with God was.

The prayer scale (α = 0.87) was constructed by collapsing five questions on prayer that were scaled according to degrees of intimacy with the divine. Two positive congregation social support items and two negative social support items were summed to assess positive congregation support (α = 0.81) and negative congregation social support (α = 0.61).

**Health behaviours: fat intake and physical activity**

Percentage of energy from fat was assessed through the National Cancer Institute’s Quick Food Scan, based on frequency of intake of 16 foods.

Physical activity was assessed through moderate and vigorous activity items.
Social support

Social support was assessed by summing the seven-item perceived social support component of the Piedmont Health Survey (α = 0.82)37 plus two social interaction items from the National Survey of Midlife Development in the United States48.

Demographics

Gender (male/female) and age (years) were determined from direct questions. Race was analysed as ‘White’ and ‘Other’. Marital status was examined as ‘Never married’, ‘Currently married’ and ‘Previously married.’ Education categories were ‘High school or less’, ‘Associates degree or some college’, ‘Bachelor’s degree’ and ‘Graduate degree’. Employment status was assessed as working at a job or business or being a full-time student in the last three months.

Analysis

Frequencies were examined for all variables. If respondents answered less than half of the items of a given scale, the total score of that given scale was declared missing. Multivariate regressions were conducted using SAS 8.2 (SAS Institute, Cary, NC, USA) to examine religion’s relationship with fat intake and physical activity. All regressions were conducted separately by gender because fat intake and physical activity differ markedly between men and women50–52. First, fat intake was regressed on the religion variables controlling for the appropriate demographics, then social support was added to the model to examine its potential as a mediator in the relationship between religion and fat intake. Second, religion’s relationship with moderate physical activity was examined, then social support was added to the model. Third, religion’s relationship with vigorous physical activity was examined, with and without social support in the model. All regressions controlled for age, race, education, marital status and employment.

Results

Frequencies

The average age of the sample was 42 years for men and 45 years for women, with the majority being white (Table 1). About half of the sample was married, and most of the sample was employed. There was a fairly balanced distribution between the four denominations, with a higher proportion of men reporting a Conservative Protestant denomination and a higher proportion of women reporting a Catholic denomination. Overall, the sample was very religious, and reported low use of negative religious coping and low reception of negative congregational support. Overall social support was relatively high. The sample reported high fat intake, with an estimated 46% of energy from fat for men and 43% for women, yet was also fairly active.

Regressions

Most religion variables were not significantly related with fat consumption when demographics were controlled. There were no relationships between any measures of religion and fat intake in men (Table 2). However, there were significant relationships between denomination and fat intake in women (Table 2), with those indicating a ‘Conservative Protestant’ or ‘Other’ religious denomination reporting higher estimated percentage of energy from fat than those indicating a ‘Catholic’ religious denomination. Adding social support to the model did not substantially change the relationship between religious denomination and fat intake in women (Table 2).

There were several significant relationships with religion when moderate physical activity was examined as the dependent variable (Table 3), although most religion variables were not significantly related to physical activity. In men, greater prayer was related to increased moderate physical activity; in women, giving more money to religion was related to increased moderate physical activity. Adding social support did not substantially alter these significant relationships between religion and moderate physical activity. Regressing vigorous physical activity against the religion variables yielded no significant relationships in men (Table 4). In women, more money given to religion was associated with increased vigorous activity, and social support did not affect this relationship between religion and vigorous physical activity.

Discussion

Conservative Protestant women, women specifying a religious affiliation of ‘Other’ and women indicating no religion reported higher estimated percentage energy from fat than women indicating a Catholic denomination, controlling for age, race, marital status, education and employment. With the exception of the non-religious, these relationships between denomination and fat intake remained significant when social support was added to the model. There were no relationships between religion and fat intake in men. This overall lack of significant relationships is consistent with previous research by Merrill and Thygerson37 and Mahoney et al. (unpublished). However, there were some significant relationships between religion and fat intake by religious denomination among women. These denominational differences in dietary fat are consistent with Shatenstein et al.29 and Mullen et al.50.

Regarding religion’s relationship with physical activity, greater religious commitment (giving money to religion) was related to greater moderate and vigorous physical activity in women. For men, prayer was related to increased moderate physical activity. Social support did not change the magnitude of these significant relationships. Religion’s relationship with greater physical activity is consistent with Wallace and Forman35 and Mahoney...
et al. (unpublished), but not with Steffen et al., whose only measure of religion was religious coping. Perhaps different aspects of religion work concurrently in relationship to physical activity. It is unclear why those with certain denominations have different fat intakes, and why only particular aspects of religion were related to physical activity. Conservative Protestants hold ideological, family and political attitudes distinct from those of mainstream American culture and other religions. For instance, Conservative Protestants are generally more supportive of traditional gender roles and have selective tendencies towards greater intolerance. These distinct attitudes may extend to dietary practices as well, producing different food cultures, cooking and preparation norms, and meal patterns. The greater fat intake of the non-religious and those in the ‘Other’ religious group may also stem from their marginality in mainstream society.

In women, the consistent relationship between religious commitment and exercise in both moderate and vigorous activity could illustrate women who participate in more church-related and other activities, some of which could include physical activity in the form of active church projects, church-based recreation and sports, and volunteer activities. Another possible explanation is that those women who give financially to their religion may be wealthier, and thus have greater resources and opportunities to exercise. The lack of an income measure in the data precludes the direct testing of this hypothesis, although controlling for education should have accounted for

<table>
<thead>
<tr>
<th>Table 1 Frequencies†</th>
<th>Men (n = 193)</th>
<th>Women (n = 353)</th>
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<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
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<tr>
<td>Age (years)</td>
<td>42 ± 20.8</td>
<td>44 ± 20.5</td>
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<tr>
<td>Race/ethnicity (white)**</td>
<td>74</td>
<td>85</td>
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<tr>
<td>Education*</td>
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<tr>
<td>High school or less</td>
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<td>Associates degree or some college</td>
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<td>33</td>
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<td>Bachelor’s degree</td>
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<td>Graduate degree</td>
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<tr>
<td>Married*</td>
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<tr>
<td>Never married</td>
<td>38</td>
<td>33</td>
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<tr>
<td>Married</td>
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<td>52</td>
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<td>Previously married</td>
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<tr>
<td>Employed (yes)*</td>
<td>82</td>
<td>73</td>
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<td><strong>Independent variables</strong></td>
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<td>Denomination**</td>
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<tr>
<td>Conservative Protestant</td>
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<td>Mainline Protestant</td>
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<td>Catholic</td>
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<td>35</td>
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<tr>
<td>Other</td>
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<td>14</td>
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<tr>
<td>No religious preference</td>
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<td>6</td>
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<td>Religious attendance (1 = never, 6 = once a week or more)</td>
<td>4.9 ± 1.2</td>
<td>4.7 ± 1.3</td>
</tr>
<tr>
<td>Religious application (1 = low, 4 = high)</td>
<td>3.4 ± 0.7</td>
<td>3.4 ± 0.7</td>
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<tr>
<td><strong>Religious commitment</strong></td>
<td></td>
<td></td>
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<tr>
<td>Religious commitment (1 = low, 4 = high)**</td>
<td>3.5 ± 0.6</td>
<td>3.4 ± 0.7</td>
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<tr>
<td>Money given to religion (1 = low, 4 = high)</td>
<td>3.0 ± 0.9</td>
<td>2.8 ± 1.0</td>
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<tr>
<td>Hours given to religion</td>
<td>5.6 ± 6.8</td>
<td>6.2 ± 12.6</td>
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<tr>
<td>Religious identity (1 = low, 4 = high)</td>
<td>3.2 ± 0.7</td>
<td>3.2 ± 0.7</td>
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<tr>
<td><strong>Religious coping</strong></td>
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<td>Positive religious coping (1 = low, 4 = high)</td>
<td>2.9 ± 0.9</td>
<td>2.9 ± 0.9</td>
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<tr>
<td>Negative religious coping (1 = low, 4 = high)</td>
<td>1.3 ± 0.4</td>
<td>1.3 ± 0.5</td>
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<td><strong>Congregation social support</strong></td>
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<td>Positive congregation support (1 = low, 4 = high)</td>
<td>2.7 ± 0.8</td>
<td>2.7 ± 0.9</td>
</tr>
<tr>
<td>Negative congregation support (1 = low, 4 = high)</td>
<td>1.4 ± 0.6</td>
<td>1.4 ± 0.5</td>
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<td><strong>Divine social support</strong></td>
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<td>Relationship with God (1 = low, 7 = high)</td>
<td>5.2 ± 1.4</td>
<td>5.3 ± 1.5</td>
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<tr>
<td>Pray to God (yes)</td>
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<td>94</td>
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<tr>
<td>Prayer (1 = low, 4 = high)</td>
<td>2.9 ± 0.8</td>
<td>2.8 ± 0.8</td>
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<td><strong>Psycho-social variable</strong></td>
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<tr>
<td>Social support (1 = low, 3 = high)*</td>
<td>2.6 ± 0.3</td>
<td>2.7 ± 0.3</td>
</tr>
<tr>
<td><strong>Dependent variables</strong></td>
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<td></td>
</tr>
<tr>
<td>Percentage energy from fat**</td>
<td>46.0 ± 11.6</td>
<td>42.9 ± 12.1</td>
</tr>
<tr>
<td>Moderate physical activity (1 = never, 6 = several times a week or more)</td>
<td>5.3 ± 1.1</td>
<td>5.3 ± 1.2</td>
</tr>
<tr>
<td>Vigorous physical activity** (1 = never, 6 = several times a week or more)</td>
<td>4.5 ± 1.7</td>
<td>4.1 ± 1.8</td>
</tr>
</tbody>
</table>

† Values are expressed as mean ± standard deviation or %.
Significant differences by gender: *, P < 0.05; **, P < 0.01.
for this possibility to some extent. These women could also be more ritualistic, regularly giving money and consistently making physical activity a priority in their lives.

The relationship between prayer and moderate physical activity in men may be a marker of being active in everyday activities and not vigorous physical activity. Alternatively, this particular relationship could have been
Given that multiple aspects of religion were examined, causes changes in fat consumption or physical activity. A longitudinal study could better establish whether religion and physical activity may lead to increased religiosity. A sample that is not predominantly religious could reveal behaviours in a fairly religious sample. Perhaps using a predominantly of church members. The results presented further limited because the sample was comprised of non-religious in the sample limited the range of religiosity, which decreased the ability to examine the full range of religious involvement and detect significant differences. The range of religiosity in the sample was also further limited because the sample was comprised predominantly of church members. The results presented here represent relationships between religion and health behaviours in a fairly religious sample. Perhaps using a sample that is not predominantly religious could reveal more significant relationships between religion, social support, fat intake and physical activity.

Besides the restricted range of religiosity in the sample, several limitations must be kept in mind in interpreting the study’s results. The cross-sectional design cannot provide strong evidence about the direction of causality: eating higher-fat foods and increased involvement in physical activity may lead to increased religiosity. A longitudinal study could better establish whether religion causes changes in fat consumption or physical activity. Given that multiple aspects of religion were examined separately in their relationship to fat intake and physical activity, not adjusting for multiple hypothesis testing may have also showed significant results between religion and health behaviours when they were due to chance alone. However, adjusting for multiple hypothesis testing using a Bonferroni procedure or another technique would be an over-adjustment, especially given the high correlations between the religion variables. Bonferroni adjustments were not conducted, but multiple P-values are shown for readers to permit them to make their own decisions about interpreting P-values. The health behaviour measures’ brief assessment of fat intake and physical activity may have limited sensitivity in examining relationships between religion and health behaviours compared with a more comprehensive measure. Other measures of nutrition would be useful, such as fruit and vegetable intake, to examine religion’s relationship with aspects of nutrition in addition to fat intake. Furthermore, despite attempts to sample the non-religious in a variety of ways, the external validity of this study is limited to church members in one county in upstate New York.

Given these limitations, this study provides new information about relationships between religion and health behaviours by assessing religion as multifaceted and complex, and by specifically examining religion’s relationship with physical activity and fat intake, controlling for appropriate demographics. Most prior studies reporting relationships between religion and health behaviours did not specifically examine religion’s relationship to physical activity and fat intake as outcome.
variables, used simple conceptualisations and assessments of religion, and/or did not control for appropriate demographics.

Taking into account the current study’s weaknesses and strengths, the results suggest that future researchers examining fat intake and physical activity should not expect religion, as conceptualised in this paper, to play a considerable role in a fairly religious sample in predicting these health behaviours. Further studies of samples with a wider range of religiosity and more comprehensive measures of diet and physical activity need to be conducted to more definitively delineate religion’s role. Examining different aspects of religion beyond religious support, coping and similar constructs may also clarify religion’s relationship with diet and physical activity. Future studies tapping into specific doctrinal beliefs (e.g. the body as the ‘temple of God’) may reveal more potent religious variations in fat intake and physical activity. Some congregations’ collective social activity surrounding food and food roles, particularly in women, may also reveal relationships between religion and diet. Religion may also support cultural food norms of particular communities, including the southern United States and some non-Southern African American communities, where consumption of foods prepared with high-fat ingredients is common. Given that social contexts such as religion play an important part in shaping health behaviours, understanding what aspects of particular contexts are influential is important to encourage healthful behaviours and prevent illness.

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