Relationships Among Religiosity, Physical Activity, and Sedentary Behavior in Jewish Adolescents

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Because the effects of religion or religiosity on physical activity (PA) and sedentary activity (SA) are unknown, weekend accrual of PA and SA was measured among Jewish adolescents (N = 437) attending religious day schools in two large cities in the western United States. Participants completed the Self-Administered Physical Activity Checklist and demographic and religious questionnaire items. Orthodox respondents accrued less PA and SA on Saturday than the non-Orthodox; no differences on Sunday were found. Factor analysis of the religiosity items yielded three factors: observance, devotion, and doctrinal consonance. Correlation of factor scores with PA and SA revealed that observance was most strongly associated with accrual of PA and SA.

Among the many disparities in levels of physical activity (PA) among population groups, ethnicity, socioeconomic status (SES), gender, and age most consistently differentiate PA accrual across populations (22,40). Accompanying concern over inadequate PA accrual by Americans is concern for youth sedentary behavior—particularly for behaviors associated with excessive media use (5,16).

Among youth, disparities in PA based on sociodemographic variables are evident in both national (4,29) and international (24,32,42) samples. For sedentary activity (SA), similar disparities among youth pertaining to media usage have also been noted (8,14).

Observed differences in PA levels and patterns among population groups are partly explained through correlates of PA, which are variously rooted in biological, developmental, psychological, sociocultural, environmental, or combinatory frameworks (34). Several explanations for SA levels overlap with those for PA, but sociocultural and environmental frameworks are emphasized over others (15,19). Moreover, some evidence suggests that certain sedentary behaviors are compatible with adequate accrual of PA (28).

The study of how religion and religiosity might play roles in the accrual of PA and SA is absent from research on prevalence and determinants of PA and SA. Religiosity, the degree to which one’s beliefs, attitudes, and behavior conform to
religious canon, can increase understanding of correlates of PA and SA (21). Certain religions promote doctrines that prescribe and proscribe specific behaviors that directly affect health (e.g., tobacco and alcohol use, sexual relations, exercise) (20). For example, Orthodox Jews proscribe driving on the Sabbath (Saturday) and seek to live within walking distance of a synagogue (environmental variable that promotes PA on Saturdays). Thus far, research demonstrates that religious commitment in youth is associated with decreased substance abuse (31) and risk-taking behavior (3), but little is known about the association between religion and PA.

In the case of Judaism, research findings have been equivocal; differences in favor of religious Jews for morbidity and health outcomes have been found (21), whereas in other studies leading a religious lifestyle predisposed Jews to conditions such as rickets (30) and low bone-mineral density (38). Within the Jewish community, anecdotal reports of differential accrual of PA and SA are common, although research evidence is lacking. Furthermore, previous research conducted primarily with adults in Israel limited the operational definition of religiosity to dichotomous behavior (e.g., keeping kosher, yes or no; travel by car on the Sabbath, yes or no) and denomination (12,13,23). The limited scope and definition of religiosity could pose a methodological limitation to those studies. Therefore the purposes of the current research were to determine the quantity of PA and SA accrued by Jewish youth over a weekend, whether there are differences in accrual by denomination, and how assorted religiosity variables are associated with PA and SA.

Methods

School Recruitment

Jewish parochial middle schools in Los Angeles and San Diego were targeted in this study. Nineteen schools were available and were mailed a packet containing a cover letter from the researcher, a letter of support for the research (by an Orthodox rabbi/middle-school headmaster), a school consent form, and the study questionnaire. Follow-up contacts were made by phoning, e-mailing, remailing, or faxing administrators in order to verify receipt of the mailing, answer questions about the study, and solicit participation.

After 10 weeks, 10 school administrators (52.6%) agreed to have their schools participate in the study, which was approved by the San Diego State University Institutional Review Board.

Participant Recruitment and Profile

A two-stage procedure was employed to recruit participants and collect data. At the initial visit to each school, the researcher or a trained assistant met with the seventh- and eighth-grade student body to explain the study and answer questions. Consent forms were then distributed to students to take home; parents had been alerted by mail about the project before the school visit. The questionnaire was administered on the second visit. Overall, 437 adolescents were surveyed (response rate was 57.5—45.1% male and 54.9% female; mean age = 12.8 ± 0.88).
Measures

On the Self-Administered Physical Activity Checklist (SAPAC) respondents reported time engaged in any of up to 24 different activities for each weekend day. The instrument segments the day into three time periods to aid recall, and respondents identify time spent beyond 5 min and breathing intensity during participation in an activity (35). There is also space for listing up to two other activities and an additional section to report sedentary activities. (In this study, reporting SA was confined to the technology-based behaviors of viewing television or videos, computer use, and video-game play).

To assess religious belief, attitude, and practice, nine variables were included in the questionnaire: synagogue affiliation and denomination, synagogue attendance over previous week, prayer frequency over previous weekend, degree of Jewish dietary-law observance (kashrut), degree of Sabbath observance, commitment to Judaism in comparison with peers, degree of intertwining of personal and Jewish identities, belief that Judaism supports PA, and belief that overall observance level hinders PA levels. Topics and items were selected from a review of research (21) and recommendations made in the literature (26,41). Respondents also reported height, weight, age, gender, ZIP code, and residence type.

Questionnaire Administration

The questionnaire and administration protocol were piloted at one school, with no additional change in items or procedures. Data were collected from late February through late May. The questionnaire was administered on Mondays from 5 to 14 days after the initial meeting with students. The investigator and two trained assistants (all religiously knowledgeable Jews who adjusted dress and behavior in accordance with the school’s religious affiliation) administered the protocol according to published guidelines (35).

Data Analysis

All questionnaires were coded and data entered into SPSS 11.5 for Windows®. Height and weight were converted into body-mass index (kg/m²) and then transformed to age-predicted, criterion-referenced categories of normal and overweight/obese (6). Chi-square analysis revealed no significant association between body-mass-index category and religious denomination. Reported ZIP code and type of residence were transformed into median price data (SES proxy) using Data Quick Real Estate News annual data for home and condominium median price by ZIP code. Chi-square analysis revealed a statistically significant association between SES and religious denomination, \( \chi^2(3, 240) = 10.2, p < .05 \), but because both religious subgroups’ median residence values exceeded $500,000, differential accrual of PA/SA as a function of SES was considered unimportant.

A MET-derived PA score (kcal/kg) was calculated by multiplying the minutes reported (converted into hours) for each activity on the SAPAC form by the derived MET value found in the updated compendium (1) and summed over all activities. SA accrual was calculated by summing responses in hours to SA items on the SAPAC form. One-sided winsorization (a process of editing data to adjust for outliers) of PA and SA outliers exceeding the Z score of +2.00 was conducted (2). (The percentage of winsorized cases for the six dependent variables ranged
from 0.5% to 5.4%). PA and SA data were transformed, \ln(x + 1), to reduce positive skew (\(\mu/SE > 2.0\)).

To determine whether there were mean differences among religious denominations for PA and SA accrual, an independent one-tailed \(t\) test was conducted. (Respondents were first grouped into Orthodox and non-Orthodox based on the synagogue they reported attending.) The significance of the \(t\) statistics was then determined by calculating effect sizes.

To understand the interrelationships among religiosity items, a principal-components analysis with oblique rotation was conducted. The KMO statistic (.78) indicated that factor analysis would reveal distinct and reliable factors (11). (The Kaiser-Meyer-Olkin statistic [KMO] is an index used to determine the utility of a factor analysis.) Factor scores were calculated using the Anderson–Rubin method. Pearson correlations and 95% confidence intervals were calculated to examine the relationships between factor scores and PA and SA.

**Results**

**PA and SA Comparisons**

Table 1 summarizes Saturday and Sunday PA and SA accrual by denomination. Overall, respondents accrued more PA on Saturday (\(M = 20.1 \pm 20.7\) kcal/kg) than on Sunday (\(M = 13.6 \pm 15.9\) kcal/kg) and more SA on Sunday (\(M = 1.8 \pm 1.9\) hr) than on Saturday (\(M = 1.6 \pm 1.9\) hr). A significant difference of low to moderate effect size was found for Saturday PA: Non-Orthodox adolescents accrued 39% more PA than their Orthodox peers. A significant difference of moderate to high effect size was found for Saturday SA. Non-Orthodox adolescents accrued 97% more SA than their Orthodox peers. No significant differences for either PA or SA were found for Sunday.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Orthodox, (M \pm SD)</th>
<th>Non-Orthodox, (M \pm SD)</th>
<th>(df)</th>
<th>(t)</th>
<th>(p)</th>
<th>(ES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday PA (kcal/kg)</td>
<td>16.6 (\pm 18.2)</td>
<td>23.0 (\pm 20.4)</td>
<td>338</td>
<td>2.97</td>
<td>*</td>
<td>.33</td>
</tr>
<tr>
<td>Sunday PA (kcal/kg)</td>
<td>11.8 (\pm 14.2)</td>
<td>15.0 (\pm 14.8)</td>
<td>338</td>
<td>1.96</td>
<td>ns</td>
<td>.22</td>
</tr>
<tr>
<td>Saturday SA (hr)</td>
<td>1.13 (\pm 1.64)</td>
<td>2.22 (\pm 1.89)</td>
<td>333</td>
<td>5.54</td>
<td>**</td>
<td>.63</td>
</tr>
<tr>
<td>Sunday SA (hr)</td>
<td>1.75 (\pm 1.93)</td>
<td>1.73 (\pm 1.76)</td>
<td>328</td>
<td>–.097</td>
<td>ns</td>
<td>.01</td>
</tr>
</tbody>
</table>

*\(p < .01. **p < .001.\)
**Factor-Analysis Results**

Table 2 presents the three factors with eigenvalues exceeding 1.0 (accounting for 57% of variance) and items loading greater than 0.4 on a factor. Cronbach’s alpha values were used to assess the internal consistencies of the items that loaded on each factor. The items composing Factor 1 were most internally consistent and above the generally accepted criterion (\( \alpha = .70 \)) of acceptability. (The remaining factors did not exceed this criterion, but Factor 2, composed of only two items, might be marginally reliable.) Factor 1 was labeled observance, and the two oldest and strongest markers of the Jewish religion (Sabbath and dietary-law observance) loaded on it. Comparative commitment and affiliation items also loaded strongest on observance. Factor 2 was labeled devotion and consisted of items related to prayer and frequency of synagogue attendance. Scriptural references to prayer and synagogue are minimal to nonexistent compared with Sabbath and dietary laws and can be independent of observance (i.e., the non-Orthodox who are more likely not to keep the Sabbath and dietary laws could still be quite active devotionally). Factor 3 was labeled doctrinal consonance and was composed of items that asked respondents to contrast Judaism against their own beliefs regarding personal identity and PA. Higher scores on this factor would indicate a generally positive and congruent personal view of one’s religious identity and Judaism’s promotion of PA.

**Religiosity, PA, and SA Associations**

Pearson correlations are presented with their corresponding confidence intervals in Table 3. For PA, only the weak- to moderate-magnitude negative correlation

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Loadings and Pattern Matrix Correlations for Religiosity Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor/Item</td>
<td>Factor loadings</td>
</tr>
<tr>
<td>Factor 1: observance (( \alpha = .72 ))</td>
<td></td>
</tr>
<tr>
<td>dietary-law observance</td>
<td>.86</td>
</tr>
<tr>
<td>Sabbath observance</td>
<td>.81</td>
</tr>
<tr>
<td>comparative religious commitment</td>
<td>.57</td>
</tr>
<tr>
<td>religious denomination</td>
<td>.73</td>
</tr>
<tr>
<td>Factor 2: devotion (( \alpha = .53 ))</td>
<td></td>
</tr>
<tr>
<td>synagogue attendance</td>
<td>.08</td>
</tr>
<tr>
<td>prayer frequency</td>
<td>.00</td>
</tr>
<tr>
<td>Factor 3: doctrinal consonance (( \alpha = .48 ))</td>
<td></td>
</tr>
<tr>
<td>religious /personal identity confluence</td>
<td>.01</td>
</tr>
<tr>
<td>Judaism is in keeping with PA lifestyle</td>
<td>-.08</td>
</tr>
<tr>
<td>observance hinders PA (reverse coded)</td>
<td>.09</td>
</tr>
</tbody>
</table>

*Note.* Each item is abbreviated or reworded from its original form. Numbers in boldface type signify factor loadings \( \geq .40 \). PA = physical activity.
between Saturday PA and observance (Factor 1) was notable (i.e., $r = 0 \not\in 95\% \text{ CI}; \text{more observance, less Saturday PA accrual}$). For SA, weak- to moderate-magnitude negative correlations among Saturday SA and observance (Factor 1) and doctrinal consonance (Factor 3) were notable (more observance or consonance, less Saturday SA accrual). These associations reinforce the subgroup comparisons reported earlier in the Results section.

### Discussion

**Physical Activity**

The present sample met national guidelines (40) for PA accrual (daily accrual of 60 min of 3- to 6-MET intensity) for the weekends recalled. Compared with adolescents in several other studies investigating weekend PA, albeit using varying instruments or measures, the present sample accrued less (33,42) and equivalent (24) amounts of PA over a similar time frame.

Among denomination subgroups, non-Orthodox adolescents accrued more PA on Saturday than their Orthodox peers, and the negative correlation between observance (Factor 1) and Saturday PA further qualified this difference. With these results, the anecdotal stereotype of Orthodox Jews as less interested or active in PA can be addressed. Specifically, observant adolescents in this study accrued less PA than the less observant. Whereas the Sabbath affords observant Jews opportunities to walk, more strenuous and organized activities, especially those that require travel to venues, equipment, or money, are proscribed (21). As such, nonobservant adolescents are able to engage in more secular PA pursuits (e.g., organized sport) on the Sabbath and thus accrue more PA.

Alternatively, Orthodox parents exercise strong control over their children for the observance (Factor 1) behaviors of Sabbath and kashrut observance at this age. Thus, the instrumentality for behavior (at least for these two variables) resides not within children but as an extension of their parents’ beliefs and attitudes (41). In contrast, parents exert less control over adolescent children’s religious attitudes and beliefs (i.e., devotion [Factor 2] and doctrinal consonance [Factor 3]) (10,17,25),

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### Table 3  Correlations and 95% CI Between Factor Scores and Weekend Physical Activity (PA) and Sedentary Activity (SA)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sat PA</th>
<th>Sun PA</th>
<th>Sat SA</th>
<th>Sun SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: observance</td>
<td>-.21</td>
<td>-.14</td>
<td>-.37</td>
<td>-.03</td>
</tr>
<tr>
<td></td>
<td>(-.10, -.31)</td>
<td>(-.03, -.24)</td>
<td>(-.27, -.46)</td>
<td>(-.14, .08)</td>
</tr>
<tr>
<td>Factor 2: devotion</td>
<td>.06</td>
<td>.11</td>
<td>-.11</td>
<td>-.04</td>
</tr>
<tr>
<td></td>
<td>(-.05, .17)</td>
<td>(.00, .22)</td>
<td>(-.22, .00)</td>
<td>(-.15, .07)</td>
</tr>
<tr>
<td>Factor 3: doctrinal consonance</td>
<td>-.03</td>
<td>.04</td>
<td>-.21</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>(-.14, .08)</td>
<td>(-.15, .07)</td>
<td>(-.10, -.31)</td>
<td>(-.11, .11)</td>
</tr>
</tbody>
</table>

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which in this study were unrelated to PA. During early adolescence, parents exert strong influence on their children’s PA experiences (39): Orthodox Jewish parents’ views of and engagement in PA could influence similar tendencies in their children. In addition, peers who assume a greater role in PA modeling and cuing as children mature (37) can, in the religious community, reinforce parental emphasis on PA.

It was expected that Sunday would serve as a compensation day for PA because this study’s sample was skewed toward greater observance (i.e., religious-day-school populations, most of which were Orthodox). Sunday PA accrual was, however, on average, 6.5 kcal/kg less than that on Saturday. Two explanations for this unexpected finding are offered. First, because the sample proportionately represented more Orthodox Jews, who are less likely to travel by car on Saturday, significant amounts of PA could have resulted from walking to and from synagogue and friends’ houses in the neighborhood (both common activities performed on the Sabbath) that would not necessarily occur on Sunday. Second, after data collection, it was brought to the investigator’s attention that several schools in the sample required male students to attend school on Sunday, which limited available time for PA compared with Saturday.

**Sedentary Behavior**

In this study, average daily SA accrual over a weekend met the national objective of at least 75% of children viewing fewer than 2 hr of television per day (40). Study participants engaged in much less technology-based SA than other American youth, who engage in 2.4 hr daily of television watching and 2.9 hr of computer use or video-game playing (40). This trend toward lower engagement in selected SA remains when compared with international samples (18,28).

The correlations among observance (Factor 1) and doctrinal consonance (Factor 3) and Saturday SA qualified the mean differences between Orthodox and non-Orthodox adolescents. For observance (Factor 1), because work on the Sabbath is forbidden, opportunities for Orthodox youth to engage in Saturday SA that requires electricity are limited to the evening hours after the Sabbath’s conclusion. Also, because of potential exposure from popular media of contentious topics (e.g., sex, violence, profanity), some Orthodox families censor popular media by avoiding or restricting certain media technologies (7,36). Finally, as Orthodox families tend to be larger, there is greater opportunity for siblings to co-engage in non-technology-based SA or PA during leisure time. (In this study, Orthodox adolescents had a greater number of older brothers \( p < .05 \) than did their non-Orthodox peers.)

For doctrinal consonance (Factor 3), those who identified more with Judaism and Jewish teachings on PA accrued less SA. Orthodox Jewish adolescents (more doctrinally consonant) could begin adopting more adult roles and responsibilities concerning religious identity and distancing themselves from secularism, which might alter their engagement in technology-based SA (27).

**Limitations**

The data represent springtime-weekend PA and SA patterns of nonrandomly selected 12- to 14-year-old Jewish adolescents attending private religious day schools.
in two large cities in the western United States. Inferences to other Jewish youth might be problematic because of SES and religious skew inherent in day-school populations resulting from high tuition cost and underrepresentation of secular and Reform Jews. In addition, because random sampling was not conducted, selection bias in favor of Jewish youth who possibly engage in more PA and less SA than Jewish youth as a whole is possible.

In general, when PA is measured through self-report, respondents typically overestimate vigorous-intensity PA and underestimate light- and moderate-intensity PA (9). Moreover, as much as 25% overreporting is noted when child respondents complete self-reports without interviewer administration (35). Respondents in this study could have underreported PA, particularly on Saturday, when vigorous-intensity PA is prohibited (21).

Several uncontrollable factors influenced participant recruitment: school provision of incorrect mailing addresses, student absence on day of initial presentation or day of questionnaire administration, nonreturn of consent forms, restricted access to some classes because of scheduling conflicts, and nonuniform school-site promotion of the study. Respondent honesty as a function of memory retrieval, judgment formation, and response editing and an ordering effect (recall of Saturday activity first) might have influenced response.

**Conclusion**

This study indicates that observance was the strongest factor associated with PA and SA. Moreover, more observant Jewish adolescents accrued less PA and SA on the Sabbath than did their less observant peers. As recommended amounts of PA were accrued by all respondents in this sample, remedial interventions might not be of immediate concern in this population. The provision, however, of child and family PA programs by synagogues and day schools that fall within parentally tolerated and religious boundaries can facilitate PA accrual and enhance the health status of religiously observant youth.

Future studies should include non-Jewish populations for direct or comparative study, more diverse geographic and random sampling procedures, Jews who attend public schools and do not receive any religious education (i.e., neither day school nor synagogue religious school), or who come from mixed-religion families. Procedures should include prospective study of individuals and families to track how PA and SA patterns develop and more direct and valid measurement of physical activity (e.g., accelerometry, systematic observation systems).

**References**


