Correlates of Physical Health of Informal Caregivers: A Meta-Analysis

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Effects of caregiving on physical health have received less theoretical and empirical attention than effects on psychological health. This meta-analysis integrates results from 176 studies on correlates of caregiver physical health. Caregiver depressive symptoms had stronger associations with physical health than did objective stressors. Higher levels of care recipient behavior problems were more consistently related to poor caregiver health than were care receiver impairment and intensity of caregiving. Higher age, lower socioeconomic status, and lower levels of informal support were related to poorer health. Predictors of physical health are not identical to predictors of psychological health. Associations of caregiving stressors with health were stronger among older samples, dementia caregivers, and men. In sum, negative effects of caregiving on physical health are most likely to be found in psychologically distressed caregivers facing dementia-related stressors.

**Correlates of Physical Health**

**Sociodemographic Variables**

We focus on associations of caregiver health with three sociodemographic characteristics: age, spousal status, and coresidence. We do not focus on gender or ethnicity because our previous meta-analyses have already shown that caregiving women have lower levels of physical health than do caregiving men (Pinquart & Sörensen, 2006) and that ethnic minority caregivers have poorer physical health than do Caucasian caregivers (Pinquart & Sörensen, 2005).

**Age**.—The literature has been inconsistent with regard to age differences in caregiver health. One would expect older caregivers to have worse physical health (a) because of age-associated decreases in physical health irrespective of the caregiving role (Rowe & Kahn, 1998) and (b) because caregiving-related stressors may have stronger negative effects on the physical health of older caregivers with preexisting health problems. Nonetheless, because caregiving is more developmentally on time for older than for younger adults (Neugarten, 1969) and as some sources of stress would be less prevalent in older caregivers (e.g., competing demands from the work role), age differences in physical health might be smaller than expected. In fact, some studies have found poorer physical health among older caregivers (e.g., Navaie-Waliser et al., 2002), whereas others have found no significant age differences (e.g., Harwood, Barker, Ownby, & Duara, 2000).

**Spousal status**.—Similarly, spouses may report worse physical health than adult children do, because they are usually older
and more likely to show age-associated physical decline. However, many adult children have additional family and work responsibilities (Cantor, 1992) that may conflict with caregiving. Associations of spousal status with physical health also were inconsistent in previous studies. For example, Cantor (1983) found poorer physical health in caregiving spouses than in caregiving adult children, but Grisel (2002) found that health changes in caregivers did not differ between spouses and adult children.

**Coresidence.**—Sharing the home with the care recipient (CR) may be associated with more stressors, because coresiding caregivers have less time off from their caregiving role. Brodaty and Hadzi-Pavlovic (1990) found worse physical health in caregivers who lived with their parents than in other caregivers. However, Li, Seltzer, and Greenberg (1999) could not replicate this finding.

**Caregiver Stressors**

Greater physical impairment of the CR and high need for providing hands-on care may affect caregiver health through physical strain, changes in health habits, psychological distress, and physiological changes (Shaw et al., 1997). The latter three pathways may also explain the negative effect of CR’s cognitive impairment and behavior problems on the caregiver’s physical health.

However, the literature shows inconsistent results: Some studies report associations of physical health with the number of hours of care provision (e.g., Navaie-Waliser et al., 2002), the number of caregiver tasks (e.g., Pruchno, Kleban, Michaels, & Dempsey, 1990), and the number of months in the caregiver role (e.g., Mui, 1995 for men only), as well as the level of the CR’s functional impairment (e.g., Penning, 1998), cognitive impairment (e.g., Moritz, Kasl, & Ostfeld, 1992), and behavior problems (e.g., Brodaty & Hadzi-Pavlovic, 1990). Other studies, however, do not find significant such effects (e.g., Fredman & Daley, 1997; Morissey, Becker, & Rubert, 1990; Mui; Neundorfer, 1991; Penning, 1998).

**Caregiver Resources**

With regard to caregiver resources, we focus on socioeconomic status (SES) and social support.

**SES.**—Caregivers with higher SES face fewer stressors not specific to caregiving and have better access to the health care system (Brodaty, Thompson, Thompson, & Fine, 2005). However, some studies report a positive correlation between educational attainment and caregiver health (e.g., Navaie-Waliser et al., 2002), whereas others do not find such an association (e.g., Beach, Schulz, Yee, & Jackson, 2000). Similarly, positive correlations of income with physical health have been reported in some studies (e.g., Riemsma et al., 1999) but not in others (e.g., Kiecolt-Glaser, Dura, Speicher, Trask, & Glaser, 1991).

**Social support.**—Social support may positively affect caregiver health by reducing caregiver stressors (e.g., Chappell & Reid, 2002), helping to develop effective forms of coping (Losada, Montorio, Marquez, & Izal, 2005), and promoting positive health behaviors (Tang & Chen, 2002). Morissey and colleagues (1990) and Uchino, Kiecolt-Glaser, and Cacioppo (1992) observed that lower levels of social support were associated with worse physical health of caregivers, although Mui (1995) did not find such a relationship. Two sources of social support have been distinguished: Informal support from relatives and friends, and formal support from professional helpers. We investigate these separately.

**Psychological Distress**

According to Shaw and colleagues (1997), Patterson and Grant (2003), and Vitaliano and associates (2003), psychological distress, such as caregiver burden and depression, may cause negative hormonal changes, increase susceptibility to infectious agents, and disrupt health habits, such as getting enough sleep and engaging in healthy eating patterns. In addition, depressed caregivers may overreport physical problems (DeFrias, Tukko, & Rosenberg, 2005).

Consistent with these considerations, Pruchno and colleagues (1990) observed that depression predicted a decline of physical health of caregiving wives over a 6-month period. Although no associations were found among male caregivers, this was likely due to the sample size. There may be a negative feedback loop between decline in psychological health and decline in physical health, with worsening physical health acting as a risk factor for caregiver depression (Whitlatch, Feinberg, & Sebasta 1997; also see Killian, Turner, & Cain, 2005). Notably, the size of associations of caregiver burden and depressive symptoms with physical health varies considerably among available studies (e.g., Atienza & Stephens, 2000; Blood, Simpson, Dineen, Kaufman, & Raimondi, 1994).

**Influences of Study Characteristics**

The variability in results of existing studies demonstrates the need for an integrative approach to analyzing and interpreting these data. The heterogeneity of the results of the available studies may, in part, be based on between-study differences in sample and study characteristics. We therefore analyze whether the strength of the association between stressors and caregiver physical health varies by age, spousal status, gender, dementia caregiving, health measures chosen, and sampling procedure of the studies.

**Age.**—In addition to being directly related to poorer caregiver physical health, age may also affect the associations between stressors and physical health. Thus, because the physical health of older adults becomes increasingly fragile (Rowe & Kahn, 1998), stronger associations between stressors and caregiver health may be expected in older samples.

**Spouse status.**—After statistical control for the fact that spouses are, on average, older than other caregivers, spouses may show weaker associations between caregiver stressors and physical health because caregiving for a spouse is more normative than caregiving for other frail persons, and because spouses usually do not face conflicts between the caregiver role and other family roles.

**Gender.**—Because women are often socialized to be caregivers, they may be more prepared than men for the caregiver role (Stoller, 1994). As a result, associations between stressors and health may be stronger in men than in women. In a study by Mui (1995), functional impairments of the CR were related to worse physical health, but only for male caregivers. However,
Table 1. Measures Used in the Included Studies

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th>No. of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver health</td>
<td>Subjective health measures:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single-item indicators</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>Symptom checklists (e.g., SF-36)</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Objective indicators:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. of medical or chronic conditions</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Medication use</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>No. of hospitalizations or</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>doctor visits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combination of subjective and objective measures</td>
<td>5</td>
</tr>
<tr>
<td>CR physical impairments</td>
<td>ADL or IADL scales</td>
<td>37</td>
</tr>
<tr>
<td>CR cognitive problems</td>
<td>Mental status questionnaires</td>
<td>29</td>
</tr>
<tr>
<td>CR behavioral problems</td>
<td>Original or revised MBPC</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Related scales</td>
<td>29</td>
</tr>
<tr>
<td>Caregiver involvement</td>
<td>No. of caregiving hours per day/week</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>No. of caregiving tasks (e.g., help</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>with toileting, cooking)</td>
<td></td>
</tr>
<tr>
<td>Duration of caregiving</td>
<td>No. of months in caregiver role</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Change in caregiver health</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>between 2 points of measurement</td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>Years of school completed</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Level of income</td>
<td>22</td>
</tr>
<tr>
<td>Social support</td>
<td>Availability or use of informal support</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Use of formal services</td>
<td>11</td>
</tr>
<tr>
<td>Caregiver burden</td>
<td>CBI</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Other scales</td>
<td>84</td>
</tr>
<tr>
<td>Caregiver depression</td>
<td>CES-D</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Related measures</td>
<td>25</td>
</tr>
</tbody>
</table>

Notes: SF-36 = Short Form-36 (see Ware & Sherbourne, 1992); ADL = activity of daily living; IADL = instrumental activity of daily living; MMSE = Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975); MBPC = Memory and Behavior Problems Checklist (Teri et al., 1992); SES = socioeconomic status; CBI = Caregiver Burden Interview (Zarit, Reever, & Bach-Peterson, 1980); CES-D = Center for Epidemiological Studies–Depression scale (Radloff, 1977).

male caregivers may be more likely to seek social support or to give up the caregiver role when demands become too high. Indeed, number of months in the caregiver role was correlated with caregiver health for women but not men in that study.

Dementia caregiving.—Because dementia caregiving is more stressful than caregiving for physically impaired older adults (Pinquart & Sörensen, 2003a), stronger associations of stressors with physical health are expected among dementia caregivers versus other carers.

Health measure.—Associations with caregiving demands with the use of objective measures of health (e.g., number of chronic illnesses, number of hospitalizations) may be smaller than associations with the use of subjective indicators of perceived health, because many diseases included in the checklists (e.g., osteoporosis) are not likely to be influenced by caregiving.

Sampling procedure.—Because nonsignificant results are less likely than significant results to be published (the file-drawer problem; see Rosenthal, 1991), more significant correlations and larger average correlations are expected in peer-reviewed articles than in other articles. Similarly, stronger associations may be expected in probability samples than in convenience samples, because convenience samples often focus on highly distressed caregivers (Schulz et al., 1995). This may restrict the variance of measures assessing stressors and distress and reduce the strength of associations of stressors and resources with caregiver physical health.

Methods

Sample

We identified studies from the developmental and gerontological literature through three electronic databases [PsycINFO, MEDLINE, PSYNDEx, with search terms: health and (caregiving or caregivers or carer or support provider) and (elderly or old age)], cross-referencing, and searches for unpublished studies at conferences. Our criteria for the inclusion of studies in the meta-analysis were as follows:

1. Informal caregivers of older adults were assessed.
2. Associations of study variables with physical health were reported as correlations or as other effect size measures.
3. Studies were written in English, German, or a language for which we could get translation.

About 23% of the total number of publications surveyed had to be eliminated, for the most part because insufficient information about the magnitude of relationship (zero-order effect sizes) between variables had been reported. After exclusion of such studies, we were able to include 176 articles in the meta-analysis. The majority of these were from English-language journals; only 7 German articles, 1 Dutch article, and 1 Spanish article could be used. The majority of articles were from the Journals of Gerontology (13) or The Gerontologist (10); others were from the International Journal of Geriatric Psychiatry (8), Psychology and Aging (6), the Journal of Applied Gerontology (6), Aging & Mental Health (5), Research on Aging (5), the Journal of Aging and Health (5), and other journals (90). In addition, 13 presentations at conferences, 6 dissertations, 6 books or book chapters, and data from three electronic raw data files were included. Studies used in the meta-analysis are listed in the Reference section and are marked with an asterisk. Studies were coded by two doctoral-level researchers, and a good interrater agreement was found ($\kappa = 0.88$). An overview of the measures is provided in Table 1. We entered the sample size, the sampling procedure (1 = probability sample, 0 = convenience sample), publication status (1 = peer-reviewed journal, 0 = others), illness of the CR (1 = dementia, 0 = others), the percentage of caregivers who are spouses, the percentage of women, the mean age of the respondents, the measurement of the variables, and the correlations between the variables. If more than one study from one and the same author was available, we checked whether these articles referred to different data sets; we omitted duplicate results.

Statistical Integration of the Findings

We based our computations on random-effects models (Hedges & Vevea, 1998). First we computed effect sizes ($d$) for each study by transforming correlation coefficients, $r$ values,
F values, and exact p values (Rosenthal, 1991). Then we tested
the homogeneity of effect sizes by using homogeneity statistics
(Q). Next we weighted studies by the inverse of their variances,
and we computed weighted mean effect sizes d and their
confidence intervals (CIs) that include 95% of the effects.
Because readers may be more familiar with interpreting
correlation coefficients than effect sizes d as indicators of the
size of association between variables, we converted the effects
sizes and their CIs back into the metric of correlation
coefficients (Rosenthal). We then tested the significance of
the mean by dividing the weighted mean effect size by the
estimated standard deviation. We interpreted differences
between two conditions as significant when the 95% CIs did
not overlap. In order to test for the influence of study
characteristics, we used weighted multiple ordinary least
squares regression analyses, following the random-effects
approach and the method of moments outlined by Raudenbush
(1994). As a tool for interpreting the practical significance of
correlation coefficients, we used the binomial effect size display
(BESD; Rosenthal). For example, after the median split of a
caregiving stressor and of caregiver health, the percentage of
caregivers with above-average health in the distressed group is
computed by 0.5 + r/2, and the percentage of above-average
health in the less distressed group is 0.5 − r/2.

**Results**

**Sample Description**

The studies we included were published or presented
between 1986 and spring 2006. Forty-eight percent of the
studies focused on dementia caregiving, 18% focused on
caregiving for physically frail older adults, and 34% included
both dementia caregivers and other caregivers. About 13% of
studies used probability samples, and 6.8% (12 studies) had
a longitudinal design. The number of participants of the studies
ranged between 14 and 5,627 (median = 111). The caregivers
had a mean age of 60.6 years (SD = 6.0 years). Approximately
74% were women, 38% were adult children, and 50% spouses.
The CRs were, on average, 75.7 years old (SD = 5.3) and about
62% of them were women. They had been providing care for
about 54 months (SD = 21), and they provided at the time of
assessments, on average, 55 hours of care per week (SD = 30).

**Table 2. Bivariate Associations of Sociodemographic Variables, Stressors, Resources, and Psychological Distress
With Physical Health of Caregivers**

<table>
<thead>
<tr>
<th>Variable</th>
<th>k</th>
<th>N</th>
<th>r</th>
<th>95% CI</th>
<th>t</th>
<th>χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sociodemographic variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>50</td>
<td>14,721</td>
<td>−.15</td>
<td>−0.19 − 0.12</td>
<td>−9.21****</td>
<td>182.87****</td>
</tr>
<tr>
<td>Spouse</td>
<td>45</td>
<td>17,441</td>
<td>−.13</td>
<td>−0.17 − 0.09</td>
<td>−7.30****</td>
<td>191.21****</td>
</tr>
<tr>
<td>Coresidence</td>
<td>11</td>
<td>4,091</td>
<td>−.14</td>
<td>−0.29 − 0.02</td>
<td>−1.71</td>
<td>228.17****</td>
</tr>
<tr>
<td><strong>Stressors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours of care provision</td>
<td>17</td>
<td>8,933</td>
<td>−.10</td>
<td>−0.20 − 0.04</td>
<td>−3.37****</td>
<td>76.23****</td>
</tr>
<tr>
<td>No. of caregiving tasks</td>
<td>26</td>
<td>9,938</td>
<td>−.06</td>
<td>−0.11 − 0.02</td>
<td>−2.73****</td>
<td>99.61****</td>
</tr>
<tr>
<td>No. of months in caregiver role</td>
<td>38</td>
<td>8,784</td>
<td>−.08</td>
<td>−0.12 − 0.04</td>
<td>−3.59****</td>
<td>97.79****</td>
</tr>
<tr>
<td>Physical impairments of care recipient</td>
<td>37</td>
<td>8,931</td>
<td>−.10</td>
<td>−0.14 − 0.06</td>
<td>−4.88****</td>
<td>92.02****</td>
</tr>
<tr>
<td>Cognitive impairments of care recipient</td>
<td>29</td>
<td>5,865</td>
<td>−.07</td>
<td>−0.11 − 0.03</td>
<td>−3.39****</td>
<td>51.38**</td>
</tr>
<tr>
<td>Behavioral problems of care recipient</td>
<td>41</td>
<td>13,960</td>
<td>−.14</td>
<td>−0.19 − 0.11</td>
<td>−7.08****</td>
<td>152.47****</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>25</td>
<td>9,109</td>
<td>.14</td>
<td>0.09 − 0.18</td>
<td>5.95****</td>
<td>89.37****</td>
</tr>
<tr>
<td>Income</td>
<td>22</td>
<td>4,946</td>
<td>.18</td>
<td>0.12 − 0.24</td>
<td>6.10***</td>
<td>79.81****</td>
</tr>
<tr>
<td>Informal support</td>
<td>39</td>
<td>11,605</td>
<td>.08</td>
<td>0.03 − 0.12</td>
<td>3.84***</td>
<td>115.39***</td>
</tr>
<tr>
<td>Formal support</td>
<td>11</td>
<td>4,456</td>
<td>.10</td>
<td>−0.02 − 0.22</td>
<td>1.57</td>
<td>63.56***</td>
</tr>
<tr>
<td><strong>Psychological distress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver burden</td>
<td>118</td>
<td>21,368</td>
<td>−.29</td>
<td>−0.32 − 0.25</td>
<td>−14.89****</td>
<td>759.70***</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>74</td>
<td>19,121</td>
<td>−.37</td>
<td>−0.40 − 0.34</td>
<td>−24.05***</td>
<td>246.15***</td>
</tr>
</tbody>
</table>

**Notes:** k = number of samples; N = number of caregivers; r = mean correlation coefficient; CI = confidence interval; t = test of significance of gender differences; χ² = test of heterogeneity of effect size.

*p < .05, **p < .01, ***p < .001.

Correlates of Physical Health

We first tested whether the effects sizes would vary between
studies by use of objective measures (e.g., number of chronic
illnesses) versus subjective measures of perceived health.
Because no significant differences appeared, we combined all
studies for the following analyses. As shown in Table 2, two out
of three sociodemographic variables were associated with
caregiver health: Older caregivers and spouses had worse
physical health, whereas living with the CR showed no bivariate
associations with physical health, probably due to the smaller
number of available studies. According to Cohen’s (1992)
criteria, we interpret both significant correlations as small effects.

In bivariate analyses, all five caregiving stressors were
significantly related to poorer physical health. Small effects
(≤0.20) emerged for the association of health with CR behavior
problems, CR physical impairments, and the number of hours
of care provision. The other effects were very small (≤0.10;
Cohen, 1992). To further exemplify the meaning of these
effects, we present the BESD, which indicates that 57.5% of
caregivers caring for CRs with above-median levels of behavior
problems had above-median impairments of physical health, as
compared with 42.5% of caregivers for older adults with lower
levels of behavior problems. For physical impairments of the

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Table 3. Multivariate Associations With Physical Health, Burden, and Depression of Caregivers (Structural Equation Modeling)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Impairment of Physical Health</th>
<th>Caregiver Burden</th>
<th>Caregiver Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.07*** 0.05 – 0.10</td>
<td>.08*** 0.10 – 0.05</td>
<td>.04*** 0.06 – 0.01</td>
</tr>
<tr>
<td>Spouse</td>
<td>.07*** 0.09 – 0.04</td>
<td>.03* 0.00 – 0.06</td>
<td>.03* 0.00 – 0.06</td>
</tr>
<tr>
<td>Coresidence</td>
<td>.17*** 0.14 – 0.20</td>
<td>.01 0.00 – 0.03</td>
<td>.07*** 0.04 – 0.09</td>
</tr>
<tr>
<td>Hours of care provision</td>
<td>.00 0.00 – 0.03</td>
<td>.12*** 0.09 – 0.15</td>
<td>.08*** 0.06 – 0.10</td>
</tr>
<tr>
<td>No. of months in caregiver role</td>
<td>.06*** 0.08 – 0.03</td>
<td>.09*** 0.06 – 0.11</td>
<td>.03 0.05 – 0.00</td>
</tr>
<tr>
<td>CR physical impairments</td>
<td>-.01 0.03 – 0.02</td>
<td>.04*** 0.01 – 0.06</td>
<td>.02 0.01 – 0.05</td>
</tr>
<tr>
<td>CR cognitive impairments</td>
<td>.03* 0.01 – 0.05</td>
<td>.06*** 0.03 – 0.08</td>
<td>.03* 0.01 – 0.06</td>
</tr>
<tr>
<td>CR behavioral problems</td>
<td>.18*** 0.16 – 0.20</td>
<td>.31*** 0.29 – 0.33</td>
<td>.26*** 0.24 – 0.28</td>
</tr>
<tr>
<td>Education</td>
<td>-.07*** 0.09 – 0.04</td>
<td>.01 0.00 – 0.04</td>
<td>.07*** 0.09 – 0.05</td>
</tr>
<tr>
<td>Income</td>
<td>-.10*** 0.12 – 0.08</td>
<td>.04* 0.02 – 0.06</td>
<td>.03* 0.05 – 0.00</td>
</tr>
<tr>
<td>Informal support</td>
<td>-.03** 0.05 – 0.01</td>
<td>-.14*** 0.16 – 0.12</td>
<td>-.19*** 0.21 – 0.17</td>
</tr>
<tr>
<td>Formal support</td>
<td>.02 0.00 – 0.04</td>
<td>-.00 0.02 – 0.02</td>
<td>.04*** 0.02 – 0.06</td>
</tr>
<tr>
<td>Caregiver burden</td>
<td>.19*** 0.17 – 0.21</td>
<td>.30*** 0.28 – 0.32</td>
<td>.16</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>.24*** 0.22 – 0.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: A saturated model was computed; N = 7,638; β = standardized path coefficient; CI = confidence interval; $R^2$ = explained variance; CR = care recipient. Boldface effect sizes differ between caregiver health and caregiver burden or depression. For impairment of physical health, caregiver burden, and caregiver depression, higher values indicate stronger impairments of health, stronger burden, and more depressive symptoms.

$p < .05$; $**p < .01$; $***p < .001$.

CR and for hours of care, the numbers were 55% (above-median levels of stressors) and 45% (below-median stressors), respectively. According to the fail-safe N (Rosenthal, 1991), 217 or more studies with null results would have been to make the correlations for health with behavior problems nonsignificant, and more for the other associations.

Having higher income and education levels as well as receiving more informal and formal support were related to better physical health of caregivers. Effects were very small for receipt of formal support and small for the other resources.

Finally, greater caregiver burden and more severe depressive symptoms were related to worse physical health. According to Cohen’s criteria, both associations were of medium size. The BESD indicates that 64.5% of caregivers with above-median levels of burden show below-median levels of physical health, as compared with 35.5% of caregivers with lower levels of burden. The nonoverlap of the 95% CI suggests that associations of physical health with burden and depression were significantly stronger than associations with stressors, resources, age, and spousal status.

Because the correlates of physical health are not independent of each other, and should only be interpreted if confirmed in multivariate analyses, we computed multivariate statistics. We computed a full correlation matrix of the variables, on the basis of the meta-analytic approach of Rosenthal (1991). Because physical health, caregiver burden, and depression may influence each other, and because we wanted to compare predictors of physical health with predictors of burden and depression, we computed a path analysis that specified paths from sociodemographics variables, stressors, and resources on physical health, burden, and depression, and error covariances between physical health, burden, and depression.

Worse physical health was associated with higher age, not being a spouse, coresidence, higher levels of behavior problems and cognitive impairments of the CR, fewer caregiving tasks, more months in the caregiver role, lower educational attainment, lower income, receipt of less informal support, and higher levels of burden and depression. No associations emerged with hours of care provision, physical impairments of the CR, and with use of formal support (Table 3). As indicated by the nonoverlap of the 95% CI, physical health showed weaker associations with behavior problems and with receipt of informal support than did burden and depression. However, physical health was more strongly associated with coresidence and income than burden and depression. In addition, lower age and being a spouse were related to better physical health but to higher levels of burden and depression. Furthermore, the number of hours of care provision was only associated with burden and depression. Whereas performing more caregiving tasks was associated with better caregiver physical health, it was also related to more caregiver burden.

**Impact of Study Characteristics**

In order to analyze the effect of study characteristics on the size of correlations with physical health, we computed weighted multiple linear regression analyses, based on random-effects models (Raudenbush, 1994). Because only 11 studies were available for associations with coresidence and formal support, we excluded these two variables from the analysis.

In older samples the associations of age, spousal status, and functional impairments of the CR with caregiver health were stronger than in younger samples (Table 4). Health was more strongly associated with the number of caregiving tasks in samples with a higher percentage of men. In samples with more spouses, physical health showed weaker associations with age, spousal status, hours of care, and functional impairments of the CR than in samples with fewer spouses. However, associations between burden and physical health were stronger in these samples. Furthermore, in studies focused on dementia caregiving, the hours of care, number of caregiving tasks, cognitive impairment, and income were more strongly associated with physical health than for other caregiver samples.

When measures of objective health were used (such as number of hospitalizations), associations of caregiver health
with number of months in the caregiver role were weaker than when subjective health was assessed. Studies with probability samples showed smaller associations of informal support with physical health than those with convenience samples. Finally, articles in peer-reviewed studies reported stronger associations of health with of hours of care provision, number of months in the caregiver role, functional impairments of the CR, and informal support.

**DISCUSSION**

**Predictors of Physical Health**

Our multivariate results show that the severity of CR behavior problems and cognitive impairments, length of time in the caregiver role, coresidence, not being a spousal caregiver, higher caregiver burden and depression, higher age, lower SES, and lower levels of informal support were related to worse physical health among caregivers.

Interestingly, associations of caregiver health are stronger with depressive symptoms than with objective stressors. This may, first, indicate an overlap of depression and health measures, because some depression scales contain somatic items. However, when depression is measured with the Geriatric Depression Scale, which does not include physical symptoms (Brink et al., 1992), the size of the association with physical health ($d = -0.37$, 95% CI $= -0.39$ to $-0.34$) does not differ from studies using other depression scales ($d = -0.37$, 95% CI $= -0.40$ to $-0.34$).

Second, longitudinal studies suggest reciprocal relationships between depression and physical health (Pruchno et al., 1990; Whitlatch et al., 1997). Such effects may increase the size of the association between physical health and depression.

With regard to caregiving stressors, behavior problems of the CR have the strongest associations with caregiver health, burden, and depression, but the size of the relationship is smaller for physical health than for the other outcomes. Because hours of care provision are associated only with higher levels of burden and depression, we conclude that physical health is less strongly influenced by caregiving stressors than by psychological health. This may explain the results of a previous meta-analysis showing that caregivers and noncaregivers were more likely to differ in depressive symptoms than in physical health (Pinquart & Sörensen, 2003a).

Because no associations of physical impairments of CRs with caregiver health are found in the multivariate analysis, we posit that related behavioral problems rather than physical exertion from high caregiving demands (Shaw et al., 1997) are a probable source of impaired physical health among caregivers. Furthermore, in multivariate analyses, more caregiving tasks are related to better physical health. This result indicates a suppressor effect, because these effects are reversed in the bivariate analysis. The suppressor effect suggests that after the level of impairments of the CR is statistically controlled for, caregivers with better health are able to provide higher levels of support.

Younger caregivers and spouses report better physical health but more caregiver burden and depression. The former effects are not specific to caregiving: When we compare the present bivariate associations to the results from previous meta-analyses with samples not specific to caregiving (not shown; see Pinquart, 1998, 2001), we find that the size of associations of physical health with age, education, income, informal support, and depressive symptoms does not differ between caregivers and noncaregivers. Therefore we conclude that caregivers and noncaregivers benefit to a similar degree from high SES and informal support. However, associations of age and spousal status with burden and depression are caregiving specific. They may indicate competing demands between the caregiver role and other social roles (e.g., work-related and parenting-related roles; see Cantor, 1992). Finally, weaker associations of social support with physical health than with burden and depression are probably due to the fact that most social support instruments assess emotional support, which is more likely to correlate with psychological than physical health.

Caregivers with higher income and those who do not live with the CR have better physical health. Both associations are stronger than those of income and co-residence with burden and depression.
depression. Effects of income on physical health may be based on less than ideal health practices (e.g., Laaksonen et al., 2003) and less access to the health care system by low-income caregivers (e.g., Brodaty et al., 2005). The fact that coresidence has a stronger impact on physical than on mental health may indicate that health-related habits, such as getting enough sleep and engaging in healthy eating patterns, are impaired when living with the CR.

The Role of Study Characteristics

The size of correlates of physical health was significantly affected by study characteristics. We limit our discussion to associations with caregiving stressors and psychological distress. First, age affects the associations of caregiving demands and CR impairments with caregiver health. Associations are stronger in samples with older individuals, suggesting that physical health becomes more vulnerable to stressors as people age (Rowe & Kahn, 1998). Second, among samples with a higher percentage of spouses, associations of hours of care and CR functional impairment with physical health are weaker than those among nonspouses. Caring for a spouse is more socially normative than caring for other persons. Thus, after general age differences in health are statistically controlled for, higher care demands may have less impact on a spousal caregiver’s than a nonspousal caregiver’s health. Nonetheless, associations of caregiver burden with physical health are stronger among spouses: If spouses feel overburdened, they may be less able to protect their physical health against deterioration.

Third, the association of the number of caregiving tasks with physical health is weaker in samples with a higher percentage of female caregivers. Women are often better socialized to provide personal care and may be more resilient in the face of more care tasks. Fourth, among dementia caregivers, associations of stressors with caregiver health are stronger than those among other caregivers. Providing care for dementia patients is generally more stressful than providing care for physically frail older adults (e.g., Pinquart & Sörensen, 2003a); the higher levels of physical and emotional demands the dementia caregiver experiences are more likely to affect physical health.

Fifth, among studies that measured health more objectively (e.g., with illness checklists), associations of months in the caregiver role with physical health were weaker than among other studies. Several items of checklists ask for illnesses that are not likely to be influenced by caregiving (e.g., cancer, diabetes, and osteoporosis). However, only 1 out of 13 analyses show a moderating effect of the method of health assessment, thus indicating more similarities than differences in the effects of caregiving by use of different health measures.

Finally, we observed stronger associations of stressors with caregiver health in peer-reviewed articles than in other papers, probably indicating a file-drawer problem (Rosenthal, 1991): Because nonsignificant results are less likely to be published, results from peer-reviewed journals alone may overestimate the size of relationships.

LIMITATIONS AND CONCLUSIONS

The present study has several limitations. First, as most of the studies we reviewed here were cross-sectional studies, the causal direction of the associations cannot be evaluated. Nonetheless, it is unlikely that poorer current caregiver health would increase impairments of the CR, the number of caregiving tasks, or (retrospectively) the length of care provision. However, more longitudinal studies would be a useful addition to the literature, because the timing of symptoms appears to affect the trajectory of caregiver distress over time (Gaulger, Kane, Kane, & Newcomer, 2005), which may in turn influence physical health.

Second, stressors, resources, and sociodemographic variables explain only 10% of the variance of caregiver health (Table 3). We could not include some important influences, such as a person’s preexisting illnesses before taking the caregiver role, in the meta-analysis because there was an insufficient number of available studies. Future studies should include preexisting illnesses as well as preexisting vulnerabilities, such as mental health issues, in their assessment. Third, because few studies have assessed associations of caregiver health with coresidence and use of formal support, the estimation of the size of their associations with physical health is less reliable.

Despite these limitations, we can draw several conclusions. First, caregiving-related stressors affect caregivers’ physical health, but these associations are weaker than the effects of stress on psychological health. Second, feeling depressed is more strongly associated with caregivers’ physical health than the absolute levels of caregiving demands. Third, higher caregiving demands have a stronger impact on the physical health of older caregivers, dementia caregivers, and men, thus suggesting that these are additional risk factors for practitioners to be aware of.

We conclude that psychological interventions should not only target caregivers’ psychological health but also include physical health promotion, such as offering opportunities for exercise, nutrition improvement, and preventive care visits (also see Patterson & Grant, 2003). Furthermore, as most available studies on caregiver health are based on self-reports, we need more triangulated, objective assessment approaches to explain the health consequences of informal caregiving more fully. In addition, more longitudinal studies are needed that allow tests for mediators of the relationship of caregiver stressors and burden with physical health. For example, it would be important to identify which changes in health habits mediate the observed relationship between stressors and physical health. Finally, future studies should specify which forms of illness are most likely to be influenced by caregiving stressors.

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References used in the meta-analysis are marked with an asterisk; superscript letters indicate the following: a, association with age; b, association with spousal status; c, coresidence; d, hours of care provision; e, number of caregiving tasks; f, number of months in the caregiver role; g, physical impairments of the CR; h, cognitive impairments of the CR; i,
behavior problems of the CR; j, education; k, income; l, informal support; m, formal support; n, burden; o, depression.


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