

Analysis of the Reliability of the Modified Caregiver Strain Index

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Objectives. The Caregiver Strain Index (CSI) is a 13-item index originally developed in the early 1980s to screen for caregiver strain after hospital discharge of an elderly family member. This study examined the reliability of a modified CSI for applications with contemporary long-term family caregivers.

Methods. As part of a larger family caregiver study using focus groups, telephone interviews, and mailed surveys, test-retest procedures were included to examine the reliability of the Modified CSI. The sample consisted of 158 family caregivers, with an average age of 61 years. Targeted recruitment resulted in participants from diverse racial/ethnic backgrounds. Minority caregivers represented 25% of the sample.

Results. The Modified CSI has slightly better internal reliability ($\alpha = .90$) than the original Index, as reported in 1983 ($\alpha = .86$). The two-week test-retest reliability is .88. No prior test-retest data were available for comparison.

Discussion. The Modified CSI can be a useful method for detecting strain levels among informal caregivers, and is easily administered and scored. The CSI continues to be a useful measure of caregiver strain for long-term care research and practice.

RECENTLY, Travis and colleagues (Travis, Bernard, McAuley, Thornton, & Kole, 2002) developed and tested a multidimensional measure for family caregiver medication administration hassles. Preliminary work on a medication hassles typology (Travis, Bethea, & Winn, 2000) provided the conceptual basis for this measurement work. In addition, the authors drew heavily from the early stress and caregiver research of the 1980s to name the hassles construct and to think about ways of testing the validity of the new measure. In particular, “hassles” were considered minor irritations that can build up over time and may contribute to a negative effect on both a caregiver and the outcomes of the caregiving situation (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982; Kinney & Stephens, 1989; Lazarus & DeLongis, 1983). Therefore, part of the validity testing of the new family medication administration hassles scale called for a measure of caregivers’ appraisals of their caregiving situation. This article offers updated reliability information on the instrument selected for this purpose, the Caregiver Strain Index (CSI) by Robinson (1983), and discusses the continued relevance of the instrument for certain types of contemporary family caregiving research and practice situations.

Review of the Literature

The location and selection of an instrument that could be used in tests of concurrent validity with a new caregiver medication administration hassles instrument proved to be an interesting conceptual and logistical challenge. The conceptual challenge had to do with the fact that the terms burden, stress, and strain are often used interchangeably in the caregiver literature (Braithwaite, 1992; England, 2000; England & Roberts, 1996). For our needs, it was important to differentiate among these three constructs. After reviewing the literature, we defined stress and burden as an individual’s physical and/or emotional response to

challenges in the caregiver role. In contrast, strain was considered the caregiver’s perception of enduring problems or an altered state of well-being. From a metaphorical perspective, we came to think of burden and stress as the forces that produce strain, the enduring change in the shape and integrity of a caregiver’s fabric of well-being. Even when the force is removed, a lasting change often remains. This conceptualization is presented in Figure 1. The hassles construct under study had logical and conceptual ties to stress and strain, according to these definitions.

The logistical challenges in our search had to do with selecting an instrument that was consistent with our research question and compatible with the data collection methods planned for the field-testing phase of the research project. In addition to acceptable psychometric properties, we sought an instrument that (a) was easy to administer via mail survey procedures; (b) did not overpower or detract from the purpose of the study, which was testing a multidimensional measure of caregiver medication administration hassles; (c) reflected the caregiver experiences reported in the earlier pilot work for the project (Travis, Bethea, & Winn, 2000); (d) could be easily understood by respondents of diverse socioeconomic circumstances and individuals who we knew would be in a variety of family eldercare situations (General Accounting Office, 1994, 1995; Travis & Piercy, 2002), not just dementia care; and (e) offered measurement economy for already overtaxed and busy caregiver respondents (Braithwaite, 1996a).

The review of the literature located a number of measures used in contemporary caregiving research to measure stress, strain, and burden. Our critique of the instruments included an analysis of the strain domains that were included in the each measurement tool. Specifically, we were interested in seeing four generic strain domains that we believed fit our targeted population of family caregivers regardless of their situation- or

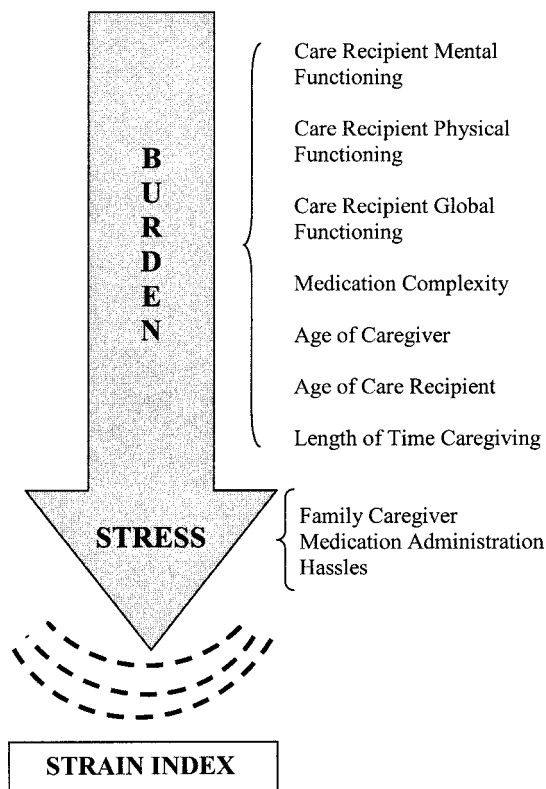


Figure 1. Burden, stress, and strain model for family caregivers with medication administration responsibility.

disease-specific caregiving experiences. These domains, derived from literature reviews and our prior work with members of the target population included physical, financial, emotional and social/personal aspects of caregiver strain (Mui, 1992, 1995; Scharlach, Sobel, & Roberts, 1991; Travis et al., 2000; Travis & Piercy, 2002). In addition, two relevant areas of debate in the caregiving literature were considered. First, ongoing concerns about the utility of creating an instrument for one caregiver population and then using it with groups for which it may not have been intended (e.g., Rubio, Berg-Weger, & Tebb, 1999; Vitaliano, Young, & Russo, 1991). Therefore, we were very concerned about how the instrument was developed, on what caregiver group(s), and how the instrument was used in subsequent research. The second area concerned the ongoing and unresolved debates about operational definitions for those constructs most often associated with caregivers' appraisals (Braithwaite, 2000; Lawton, Kleban, Moss, Rovine, & Glicksman, 1989) of their caregiving situations (e.g., burden and well-being; George, 1994). We tried to make sense out of this ongoing definitional quagmire and finally created our own definitions, as stated in the introduction and depicted in Figure 1. The one aspect of measurement in which there seemed to be a high level of agreement among researchers was that the outcomes of family caregiving are complex and multidimensional in nature (Braithwaite, 1996b, 2000; Frazier, 2000; Rubio et al., 1999).

After taking all of these issues into consideration and combining them with our particular research question and measurement needs, we found ourselves going back to one of

the early instruments used to measure caregiver strain. The CSI, developed in the early 1980s (Robinson, 1983), specified three strain dimensions in the original work: perception of caregiving, care-recipient characteristics, and emotional status. Subsequent exploratory factor analysis (Rubio et al., 1999) reported three viable strain factors that were similar but not identical to those described by Robinson. These factors were labeled: inconvenience, adjustment, and upsetting behavior. A fourth factor in the Rubio analysis (Rubio et al., 1999) had only one item and was eliminated from their measurement model. Therefore, the CSI appeared to have multidimensional properties that were similar to those strain domains we were seeking.

The 13-item CSI examines both subjective and objective elements of caregiver strain, and has reports of good internal reliability ($\alpha = .86$; Robinson, 1983). Originally, the Index was administered through interviews with family caregivers of individuals who had an acute hospital stay for arteriosclerotic heart disease or hip surgery, and who resided in the community after hospitalization. Scoring on the original version included dichotomous response categories consisting of "yes" if the strain item applied to the caregiver's situation and "no" if it did not. All things considered, the CSI was a good fit for our research needs and was selected for the study of caregiver medication administration hassles.

An unexpected problem arose during the pilot testing phase of the larger project when it was discovered that long-term family caregivers were not comfortable with the dichotomous choices on the original CSI. It seems that whereas the content of the Index items were still relevant to their caregiving experiences, the response choices were not. The long-term caregivers in the pilot phase wanted a middle response category for "sometimes" to match their long-term caregiving experiences, many of which lasted 5 years or more. The caregivers in the pilot phase also indicated that some of the examples given with each CSI item needed to be clarified and updated. Because the larger project was designed to collect strain data through mailed questionnaires and not personal interviews, it was imperative that the examples on the strain measure be clear. Both of these changes were made, and the project moved from the pilot to a field testing phase. Although we had already planned to check the reliability of the CSI with a long-term caregiving sample, the additional modifications to the CSI prompted a more thorough examination of the Modified CSI, which is the focus of this paper. A copy of the Modified CSI is found in Table 1 with the changes in italics.

METHODS

The Sample

The sample for instrument testing, Phase 3 of the medication administration study, consisted of 158 caregivers of family members or friends aged 53 years of age or older who took medications on a regular basis and received formal or informal in-home or community-based assistance. Recruitment efforts were targeted to caregivers of individuals age 55 and above. However, two caregivers asked to participate in the study who were caring for individuals age 53. Because both caregivers were clearly in long-term caregiving arrangements, they were allowed to enroll in the study. A criterion for length of time in

Table 1. The *Modified Caregiver Strain Index*^a

Directions: Here is a list of things that other caregivers have found to be difficult. Please put a check mark in the columns that apply to you. We have included some examples that are common caregiver experiences to help you think about each item. Your situation may be slightly different, but the item could still apply.

	Yes, On a Regular Basis = 2	Yes, Sometimes = 1	No = 0
My sleep is disturbed <i>(For example: the person I care for is in and out of bed or wanders around at night)</i>	_____	_____	_____
Caregiving is inconvenient <i>(For example: helping takes so much time or it's a long drive over to help)</i>	_____	_____	_____
Caregiving is a physical strain <i>(For example: lifting in and out of a chair; effort or concentration is required)</i>	_____	_____	_____
Caregiving is confining <i>(For example: helping restricts free time or I cannot go visiting)</i>	_____	_____	_____
There have been family adjustments <i>(For example: helping has disrupted my routine; there has been no privacy)</i>	_____	_____	_____
There have been changes in personal plans <i>(For example: I had to turn down a job; I could not go on vacation)</i>	_____	_____	_____
There have been other demands on my time <i>(For example: other family members need me)</i>	_____	_____	_____
There have been emotional adjustments <i>(For example: severe arguments about caregiving)</i>	_____	_____	_____
Some behavior is upsetting <i>(For example: incontinence; the person cared for has trouble remembering things; or the person I care for accuses people of taking things)</i>	_____	_____	_____
It is upsetting to find the person I care for has changed so much from his/her former self <i>(For example: he/she is a different person than he/she used to be)</i>	_____	_____	_____
There have been work adjustments <i>(For example: I have to take time off for caregiving duties)</i>	_____	_____	_____
Caregiving is a financial strain	_____	_____	_____
I feel completely overwhelmed <i>(For example: I worry about the person I care for; I have concerns about how I will manage)</i>	_____	_____	_____
[Sum responses for "yes, on a regular basis" (2 pts each) and "yes, sometimes" (1 pt each)]			
Total Score =			

^aWords appearing in *italics* represent modifications from the original Caregiver Strain Index from "Validation of a caregiver strain index," by B. C. Robinson, 1983, *Journal of Gerontology*, 38, 344-348, Copyright by The Gerontological Society of America. Adapted with permission.

the caregiving role was not used for study eligibility, and we did not define a family caregiver for the respondents. The final group of respondents had been in their caregiving roles for as little as 3 months to as long as 372 months, or more than 30 years (mean = 62.5 months).

The collaborating agencies involved with the recruitment process included seven adult day centers in Oklahoma, four adult day service programs in North Carolina, and one case management service in both Oklahoma and North Carolina. Personal and professional contacts of the research team were also used to recruit caregivers for the study. This combined effort lead to the participation of informal caregivers in seven states (Oklahoma, North Carolina, Virginia, Florida, New Jersey, Georgia, and Ohio). The final sample consisted of 93 (59%) clients from adult day services, 33 clients (21%) from case management services, and 32 (20%) personal contacts of members of the research team. An overrepresentation of males and minorities (18% and 25% of the sample, respectively) in

long-term caregiving arrangements was built into recruitment procedures. The minority groups represented in the sample included African American (14%), American Indian (3%), Hispanic (3%), and those who were African American and Caucasian or African American and American Indian mix (5%). The mean age of participating caregivers was 61 years, with a range of 18 to 86 years. The majority of participating caregivers shared a residence with their care-recipients (87%), and most were caring for either a spouse or a parent (83%).

Recruitment procedures.—The collaborating agencies were sent study invitation packets, which they mailed or personally delivered to their client families. There were 860 invitations sent to all participating agencies and distributed to personal and professional contacts by members of the research team. Most agencies also wrote articles about the project for their newsletters to family members. The invitation packets consisted of an invitation to participate in the study, an explanation of the

study goals and procedures, a contact form (name, address, convenient times to be reached via telephone, and inclusion criteria), and a self-addressed postage-paid envelope to be returned to the project research office. Because the funded project focused on medication administration issues, caregivers had to perform two of four activities related to medication administration to be eligible for the study, including (a) purchasing, ordering, or picking up the care-recipient's medication; (b) overseeing or planning the medication schedule; (c) administering the medication; and (d) making decisions to hold, increase, or decrease the dosage or medication. Caregivers who depended on others for their own care were not eligible for the study. The final sample of 158 individuals represented an enrollment rate of approximately 18% of the total distributed invitations and 88.2% of those individuals who sent eligible contact forms to the research office.

Data Collection Procedures

The initial contact with interested caregivers consisted of a detailed explanation of the study, an opportunity to ask questions about the study, and the determination of respondent eligibility. One third of the participants ($n = 53$) were randomly preselected for retesting using identification numbers that were assigned prior to the initial contact. At the time of the telephone contact, retest respondents were informed that they would receive a second packet of study materials 2 weeks after the first packet was returned to the research office. Therefore, respondents knew about their retesting status when they gave consent to participate in the study.

Following verbal, recorded informed consent, a brief interview was conducted to obtain information about the caregiver, the care-recipient, and the caregiving situation. The telephone interview lasted between 10 to 20 minutes. On completion of the interview, a postcard was mailed thanking the individual for agreeing to participate in the study, and reminding him or her of the receipt of either one or two questionnaire packet(s) in the weeks ahead. All but two of the respondents who were enrolled in the study completed all parts of data collection for a completion rate of 98%. All procedures were approved by the IRB of the authors' employing University.

Study Variables

Data about the caregiving arrangement and caregiver/care-recipient characteristics included a determination of the care-recipient's mental and physical functioning, age of the caregiver and care-recipient, and length of time in the caregiving arrangement (measured in months). Data about medication administration included a medication administration complexity index and the new family caregiver medication hassles scale.

Mental and physical capacity of the care-recipient.—The mental capacity of the care-recipient was measured through three questions: (a) how well does your care-recipient make decisions regarding tasks of daily life?; (b) how well does your care-recipient make him/herself understood?; and (c) how well does your care-recipient understand others? The response categories ranged from 0 (“independent decisions consistent/reasonable or understood”) to 3 (“severely impaired—never/

rarely makes decisions or rarely/never understands”) for the first two items, with higher scores equaling increased impairment. The last item regarding the care-recipient's understanding of others included a response range of 0 (“understands”) through 2 (“rarely/never understands”). The internal reliability of the three item measure was .80.

The level of the care-recipient's physical functioning capacity was measured through eight items for walking, dressing, eating, toilet use, personal hygiene, bathing, bowel incontinence, and bladder incontinence. Six of the items had response categories of 0 (“independent in the ability to perform the activity”) through 4 (“totally dependent on the assistance of others”). The last two items, bowel and bladder incontinence, had response categories of 0 (“continent”) through 4 (“multiple daily episode of bladder incontinence” or “bowel incontinence all or almost all of the time”). This summative measure of physical capacity had a reliability coefficient of .89. Overall functioning was assessed through the calculation of both physical functioning scores and mental capacity scores to produce a summative global functioning measure. The reliability coefficient for this measure was .88.

Medication administration variables.—The Family Caregiver Medication Hassles Scale is a 24-item questionnaire with four subscales and strong subscale reliability coefficients ranging from .80 to .92. Overall scale reliability is .95 and test-retest reliability at 2 weeks is .84. The scale addresses a range of hassles that caregivers experience when administering their care-recipients' medication regimens (Travis et al., 2002). The Medication Complexity Index (Conn, Taylor, & Kelley, 1991) was used to record the effort needed to administer medications on a daily basis. Medication Complexity Index scores represent all actions and decisions required to administer medications during a 24-hour period. The advantage of this measure over simple counts of the number and frequency of medications is the ability to assess regimen complexity when the number of medications may be equal (Conn et al., 1991).

RESULTS

The internal reliability coefficient for the Modified CSI using a long-term caregiving sample is .90. The addition of a third middle response category and the rephrasing of some items on the Index proved to be a useful enhancement to this measurement tool. Two-week retest data for one third of the caregiving sample ($n = 53$) were available and resulted in a test-retest reliability coefficient of .88. Thus, there is ample evidence that the Modified CSI is a stable and reliable measure of the strain construct for contemporary long-term caregiver samples.

To determine if the modified Index offered improvement over the original version in our sample, comparisons were made between the original response format of the Index and the Modified Index. To perform these analyses on our sample data, the original format of dichotomous response categories (“yes” or “no”) were reapplied by coding the “sometimes” category as a “yes” response. We calculated an internal reliability coefficient using the original response format and found it to be slightly higher ($\alpha = .88$) than the coefficient originally reported in 1983 for posthospitalization caregivers ($\alpha = .86$). The reliability coefficient for the Modified CSI was the highest of the three calculations ($\alpha = .90$). There was no test-retest reliability

reported in the early 1980s for the original Index. In our analyses, the test-retest reliability using the original response format with our long-term caregiver data was .60, compared with .88 calculated on data from the modified version of the CSI.

Relationships With the Modified CSI

The relationship between selected caregiver characteristics, caregiving circumstances, and caregiver strain (the Modified CSI scores) were assessed through Pearson product-moment correlation coefficients. First, the care-recipient's mental capacity was assessed using the three items previously described. The combined score on these three items was significantly correlated with caregiver strain ($r = .34$). Physical functioning of the care-recipient was computed through eight functioning items, previously described. This correlation coefficient was also statistically significant ($r = .27$). An overall functioning measure was developed by combining the summed scores on each of the above 11 items for mental and physical functioning. The global functioning scores of the care-recipients were significantly correlated with caregiver strain ($r = .32$). All three of these functioning relationships with caregiver strain were significant at the .01 level of significance. Descriptive statistics of the 11 items used to compute these measures are located in Table 2.

Age of the caregiver and care-recipient were analyzed for possible relationships with caregiver strain. Caregiver age had a significant inverse correlation with caregiver strain ($r = -.33$; $p = .00$), suggesting that younger long-term caregivers experienced higher levels of caregiver strain. The age of the care-recipient was significantly correlated with caregiver strain ($r = .17$; $p = .03$), such that the older the care-recipient, the greater the level of caregiver strain. Finally, the length of time the caregiver had been providing care to the care-recipient was inversely related to strain, but lacked statistical significance ($r = -.11$, $p = .16$).

The Family Caregiver Medication Administration Hassles Scale was significantly correlated with the Modified CSI ($r = .44$, $p = .001$). There was no significant relationship between the Modified CSI and the Medication Complexity Index. This may be because of measurement issues rather than the logistic and conceptual relationship of the two variables. For example, certain aspects of medication administration, such as finances, were not measured in the current complexity formula that could impact caregiver strain.

DISCUSSION

Changes in family structures have and will continue to affect families' responses to caregiving demands. Thus, a reliable, parsimonious, and convenient measure of family caregiver strain is likely to be a useful instrument for caregiver research and practice for the foreseeable future. The Modified CSI is such a measure. Although tests of the original version of the CSI found the Index to be a reliable measure, the modified version appears to be an even better instrument for measuring strain among long-term caregivers. It is a short, easily administered, easily scored assessment tool, and correlates well with variables often associated with caregiver stress and enduring strain.

Our satisfaction with the performance of the Modified CSI does not mean that this instrument should be used as a substitute for the more sophisticated, multidimensional measures

Table 2. Mental and Physical Functioning Descriptive Statistics

Functioning Items	Theoretical Range	<i>M</i>	<i>SD</i>
Mental			
Care-recipient decisions with tasks of daily life	0–3	1.87	1.17
Care-recipient makes him/herself understood	0–3	1.25	1.10
Care-recipient understands others	0–2	.68	.73
Summative mental	0–8	3.80	2.6
Physical			
Care-recipient ability with walking	0–4	1.08	1.44
Care-recipient ability with dressing	0–4	1.66	1.55
Care-recipient ability with eating	0–4	.54	1.03
Care-recipient ability with toilet use	0–4	1.32	1.51
Care-recipient ability with personal hygiene	0–4	1.24	1.39
Care-recipient ability with bathing	0–4	2.18	1.53
Care-recipient bowel incontinence	0–4	1.20	1.52
Care-recipient bladder incontinence	0–4	1.77	1.69
Summative physical	0–32	11	8.78
Global	0–40	14.80	10.15

Note: Higher scores equal greater impairment.

of caregiving appraisal being used in outcomes research. However, we do believe that the instrument is a useful device for monitoring strain associated with increased medication hassles, transitions in a caregiving situation, or other adjustments in caregiving that occur over time.

Additional analyses are forthcoming on this instrument. A preliminary principal components analysis of the Modified CSI with our caregivers' data resulted in three components that are consistent with, but not identical to, those reported by Rubio and colleagues (1999) for the original CSI. Adding additional items and further efforts to develop and test a set of subscales could enhance the applicability of the instrument for research and practice. We reiterate, however, that we were very satisfied with the performance of the Modified CSI as currently presented in this study.

The most serious limitation in our efforts to update the CSI lies in the fact that data were collected from caregivers who were using formal services (adult day services or case management) or had personal or professional relationships with members of the research team. Therefore, all caregivers in the study had some attachment to formal providers, or were knowledgeable about long-term care. This sample may not represent the most vulnerable groups of family caregivers who are the most susceptible to caregiver strain. Additional work with highly strained long-term caregivers could include caregivers who are receiving little to no formal assistance with their caregiving activities.

The sample also represented caregivers of individuals with high to moderate levels of functioning, as shown in Table 2. Therefore, the caregivers in this study may not be representative of individuals who experienced the highest levels of strain over the long-term. Highly strained caregivers simply may have declined invitations to participate in the study.

Finally, whereas our study sample represented a deliberate overrepresentation of minority long-term caregivers, much more information is still needed to understand fully the strain

experienced by minority caregiving populations. In addition, translation/back-translation of the Modified CSI for non-English speaking caregivers also remains to be done.

In conclusion, the Modified CSI has once again surfaced as a useful instrument in family caregiving research. It represents a set of domains that have been associated with caregiver strain, and yields impressive internal consistency and test-retest reliability for use with long-term caregivers. It is well researched that caregiving can have negative and detrimental effects on the care-recipient's care and the caregiver themselves. The prevalence of strain among informal caregivers can increase the risk of caregiver burnout and the decision to institutionalize the dependent family member. Reliable measures of the strain construct, as we are using it in our research, will be needed well into the foreseeable future. The ease of administration, scoring procedures, and overall versatility of the Modified CSI should keep this instrument in use for a new generation of caregiver researchers and practitioners who do not require the more sophisticated measures of strain used for outcomes research.

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