Research Article

Marital Status, the Economic Benefits of Marriage, and Days of Inactivity due to Poor Health

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Purpose. This study explored whether the economic benefits of marriage mediate the association between marriage and health and if that relationship is conditional on the level of shared economic resources. *Methods.* Pooled, cross-sectional data from NHANES 2001–2006 were analyzed using multivariate zero-inflated negative binomial regression for the number of days of inactivity due to poor physical or mental health. *Results.* Persons that were divorced/separated reported the highest average number of days of inactivity (mean = 2.5) within a 30 day period, and married persons reported the lowest number of days of inactivity (mean = 1.4). Multivariate results indicated that widowed persons did not report significantly more days of inactivity than married persons. Income to poverty ratio reduced the size and eliminated statistical significance of the difference between divorced/separated and never married marital statuses compared to married persons. The interaction effect for marital status and income to poverty ratio was statistically significant suggesting that the relationship between marital status and inactivity is conditional on shared income. *Conclusion.* Marriage confers health protective benefits in part through pooled income relative to other marital statuses.

1. Introduction

There is a growing interest in how the types and quality of social ties influence our mortality, morbidity, and health lifestyle [1–4]. One form of social relationships that has near unanimous support for being health enhancing is marriage [5–8]. One view of this relationship is that healthier persons are more likely to get married and stay married, which is referred to as the selection hypothesis [9, 10]. Another view, the causation hypothesis, argues that marriage confers numerous social and economic benefits that protect married persons from ill health over time [6]. The social benefits of marriage include social support during times of stress, which can protect health by reducing inflammation and increasing serotonin release to elevate moods, and encouragement to engage in healthy behaviors [3, 11–14]. Economic benefits of marriage include pooled assets, living in the same household, access to spousal health insurance, and shared household

labor [9, 15, 16]. Some of these benefits can also be gained by cohabiting with a partner, which may partially explain the rise in cohabiting unions over the past few decades [16–18].

Although these economic benefits may enable married and cohabiting persons to invest in health promoting resources, there is still little research done on identifying whether the economic benefits mediate or moderate the association between marriage and health. Therefore, this study will build on the existing literature by determining whether the association between marriage and health is related to the economic benefits of marriage such as improved access to health insurance or pooled income.

2. Methodology

2.1. Description of the Data. This study used publicly available data collected by the National Center for Health Statistics (NCHS) from 2001–2006. The National Health and

Nutrition Examination Survey (NHANES) is a nationally representative survey of noninstitutionalized individuals in the United States on various health topics with particular emphasis on nutrition. Since 1999, the NCHS has conducted NHANES surveys every two years with an oversampling of older adults, Hispanics and African Americans to ensure adequate representation. Each respondent completes a questionnaire administered by trained personnel and may also be given a physical examination including blood work [19]. The final analytical sample consisted of 13,678 respondents who were 20 years of age or older with complete data on all study variables.

2.2. Measures. The outcome variable selected was self-reported days of inactivity in the past 30 days. The questionnaire asked respondents the following question: "During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, school or recreation?". Responses ranged from 0 to 30 days. An advantage of this outcome variable is that the time frame for the response (past 30 days) fits well with the cross-sectional design of the study compared to health outcome measures that develop over long time horizons.

Marital status was the main predictor variable in this study. Persons self-reported that they were currently married, never married, widowed, cohabiting, or divorced/separated. Age was categorized into the following groups: 20–39, 40–64, and 65+. Gender was measured with a binary indicator (female = 1, male = 0). Education was measured as less than high school, high school, and more than high school. Race/ethnicity reflected non-Hispanic Whites as the reference group, compared to non-Hispanic Black, Hispanic, and other ethnicities. Health behaviors included binary indicators of anyone currently smoking in the household and obesity ($>30\,\mathrm{kg/m^2}$). Access to health care was defined as having a usual source of care or currently having any health insurance. Family income-to-poverty ratio ranged from 0 to 5 with lower scores indicating greater levels of poverty relative to income. This variable was categorized into the following groups: 0–0.99, 1–3.99, and 4-5.

2.3. Analysis Plan. Statistical analyses pool three different cross-sections of NHANES: 2001-02, 2003-04, and 2005-06. STATA SE/12 [STATA Corporation, College Station, TX] was used to adjust for survey weighting and the complex sample design of NHANES. Descriptive statistics were calculated by marital status categories and adjusted for sample weights and complex sample design factors. The outcome variable is a count of days of inactivity, which was overdispersed and therefore Poisson regression was not appropriate. Zero-inflated negative binomial regression was chosen based on the results from the Vuong likelihood ratio test. Rate ratios were calculated for the negative binomial regression results; rate ratios are interpreted similar to odds ratios with values higher than 1.00 suggesting a higher relative risk of reporting an additional day of inactivity. The first step of the model accounted for demographic characteristics and health

behaviors, which could vary by marital status [3, 11–14]. The next step added access to healthcare, which is one of the economic benefits of marriage [15]. Finally, income to poverty ratio was added to the models, which is a benefit for both married and cohabiting couples [16]. In addition to the main predictor variables, all analyses adjust for year of the survey interview. Given the potential for the association of marriage and health to vary by the economic benefits of marriage, an interaction effect was calculated between marital status and income to poverty ratio as well as marital status and health insurance.

Sensitivity analyses investigated the effect of age on relationship between marital status and health given the strong relationship age has with both variables. An interaction effect was calculated between marital status and age and the statistically significant results indicate that the effect of marital status on health depends on age of the respondent. Age was also stratified to investigate the role of social support on the relationship between marital status and health. NHANES only collected social support data for respondents 60 years of age and older from 1999–2002 and from persons 40 years of age and older from 2003–2006. We calculated the model using social support for persons 65 years and older, and the results indicated that social support was not a statistically significant main predictor for the outcome variable. The results from the sensitivity analyses are shown in the appendix.

3. Results

The descriptive statistics for the study variables by marital status categories are presented in Table 1. Overall, 59% of the sample was married during the study period. There was considerable variation among the study variables by martial status in large part due to the relationship between age and marital status. Among those that were married, 52% were 40–64 years of age, 32% were 20–39 years of age, and the remaining 15% were 65 and older. A similar age distribution was found within the divorced/separated martial status. However, a dramatic and opposite difference in the age distribution was found for the widowed and never married marital statuses. The younger age group comprised 78% of the never married; conversely, 76% of the oldest age group made up the widowed. Gender was approximately evenly distributed among the marital statuses with the exception of widowed status, which was predominantly comprised of women. Other notable differences in the distribution of marital status were that never married and cohabiting had a lower percentage affirmatively reporting a usual source of health care or any health insurance compared to other marital statuses. Married persons reported the lowest levels of poverty at 7% and the highest levels of income relative to the poverty level at 45% compared to other marital statuses. Finally, persons that were divorced/separated reported the highest average number of days of inactivity (mean = 2.5) within a 30 day period, and married persons reported the lowest number of days of inactivity (mean = 1.4).

TABLE 1: Weighted means or percentages by marital status: national health and nutrition examination surveys, 2001–2006.

	Married	Widowed	Divorced/separated	Never married	Cohabiting	Total
Overall, number	7338	1319	1615	2550	856	13678
%	59	6	12	16	7	100
Age, %						
20–39	32	2	24	78	66	39
40–64	52	22	63	19	32	45
65+	15	76	13	3	2	16
Female, %	49	82	59	46	46	52
Race/ethnicity, %						
Non-Hispanic White	78	78	70	61	69	77
Non-Hispanic Black	7	12	16	19	14	13
Hispanic	11	6	10	14	13	14
Other ethnicity	5	5	4	6	4	5
Household size, number	3.2	1.7	2.2	2.8	2.9	2.9
Education, %						
<High school	15	31	18	18	21	19
High school	25	34	29	23	27	27
>High school	60	35	53	59	52	59
Current smoker, %	16	15	30	27	34	23
Obese, %	33	33	36	28	26	34
Usual source of care, %	90	95	85	74	72	87
Any health insurance, %	87	93	79	70	66	84
Family income/poverty ratio, %						
0–0.99	7	16	18	20	22	13
1–3.99	48	66	55	52	52	53
4-5	45	18	27	27	26	39
Days of inactivity due to poor physical or mental health, number	1.4	1.8	2.5	1.7	1.9	1.6

Table 2 shows the results of the multivariate regression, which tests whether the economic benefits of marriage mediate the relationship between marital status and days of inactivity due to poor health. The first model, with adjustments for demographic and behavioral factors, indicated that divorced/separated (RR = 1.27), never married (RR = 1.33), and cohabiting (RR = 1.47) marital statuses had significantly more days of inactivity compared to married persons. Widowed status was not statistically significant indicating that married persons and widowed persons have similar days of inactivity net of contributing factors. The second model added adjustments for access to health care, which is one of the benefits of marriage. However, the main effect for health insurance was not a statistically significant, and the combination of both variables did not appear to reduce the size or significance of the relationship between marital status and days of inactivity. The final model added income to poverty ratio, and the main effect of this variable was statistically significant. Furthermore, the addition of this variable reduced the size and eliminated statistical significance of the difference between divorced/separated and never married marital statuses compared to married persons. The magnitude of the difference between married

and cohabiting status was reduced in size (RR = 1.24), but remained marginally statistically significant suggesting that cohabiting persons report more days of inactivity relative to married persons net of contributing factors including the economic benefits of marriage.

The last research question was whether the relationship between marital status and poor health was conditional on the economic benefits of marriage. Therefore, interaction effects are shown in Table 3 for marital status, income to poverty ratio, and health insurance. The interaction effect for marital status and health insurance was not statistically significant. However, the interaction effect for marital status and income to poverty ratio was statistically significant suggesting that the relationship between marital status and inactivity is conditional on shared income. Specifically, compared to unmarried, very poor persons, married persons regardless of income and unmarried persons with higher incomes reported fewer days of inactivity.

4. Discussion

The primary finding of this study was that pooled income mediated and moderated the association between marriage

Table 2: Rate ratios for number of days of inactivity due to poor physical or mental health from zero-inflated negative binomial regression: National Health and Nutrition Examination Surveys, 2001–2006, $N = 13,678$.

	1	2	3
Married (reference)	1.00	1.00	1.00
Widowed	1.01	1.01	.95
Divorced/separated	1.27**	1.29**	1.13
Never married	1.33*	1.38**	1.24
Cohabiting	1.47**	1.46**	1.24*
Age			
20–39 (reference)	1.00	1.00	1.00
40–64	1.68***	1.61***	1.62***
65+	2.63***	2.45***	2.32***
Female	1.05	1.03	1.00
Ethnicity			
Non-Hispanic White (reference)	1.00	1.00	1.00
Non-Hispanic Black	1.17	1.16	1.09
Hispanic	1.13	1.18	1.06
Other ethnicity	1.22	1.26	1.22
Household size	0.99	0.99	0.99
Education			
<High school (reference)	1.00	1.00	1.00
High school	0.97	0.97	0.99
>High school	0.72***	0.70***	0.78**
Current smoker	1.47***	1.46***	1.30**
Obese	1.32***	1.29***	1.23**
Usual source of care		1.44***	1.45***
Any health insurance		1.07	1.13
Family income/poverty ratio			
0–0.99 (reference)			1.00
1–3.99			0.79**
4-5			0.50***

Note: analyses adjusted for sampling weights, complex sample design, survey year, and zero-inflation factors. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$.

Table 3: Rate ratios for interaction effects from zero-inflated negative binomial regression: National Health and Nutrition Examination Surveys, 2001–2006, $N = 13,678$.

Married × income-to-poverty ratio	
Unmarried, IPR 0–0.99 (reference)	1.00
Unmarried, IPR 1–3.99	0.76**
Unmarried, IPR 4-5	0.49***
Married, IPR 0–0.99	0.79*
Married, IPR 1–3.99	0.68***
Married, IPR 4-5	0.40***
Married × health insurance	
Unmarried uninsured (reference)	1.00
Unmarried insured	1.21
Married uninsured	1.01
Married insured	1.01

Notes: all analyses adjust for sampling weights, complex sample design, survey year, zero-inflation factors, age, gender, race/ethnicity, household size, education, smoking, obesity, and usual source of care. Married × IPR interaction adds adjustment for any health insurance. Married × health insurance interaction adds adjustment for family income-to-poverty ratio. $*P < 0.05$, $**P < 0.01$, $***P < 0.001$.

and days of inactivity due to poor health. Even when findings indicated that other marital statuses had equivalent risk of poor health as married persons, particularly after adjusting for relevant factors, there was no indication that married persons had a higher risk of poor health, which is consistent with the literature [5–9]. The variation in shared economic resources by marital status may help married persons weather turbulent economic times better than unmarried persons. When you live with a partner, you benefit from an economy of scale by sharing the same household. For example, by living in the same household, not only do couples share in the cost of the living space but also share many household products. These savings from shared living quarters differentially benefit married and cohabiting persons relative to widowed, divorced/separated and never married persons. Further, shared resources help diversify economic risk. If one becomes unemployed, then married persons may have another persons' assets and income to survive until new employment is found, whereas persons that are widowed,

divorced/separated, and single do not have another income to rely on during unemployment or underemployment. Another example of the benefit of shared economic resources is the ability of married and potentially cohabiting persons to advance their economic positions. For example, going to school full time to get a degree that would enable one to advance their career may only be possible by reducing hours at work or quitting one's job. Persons that are sharing a household and income may be in a better financial position to enable one partner to pursue a degree while the other partner supplies income and potentially health insurance.

However, one distinguishing factor between being married and cohabiting is that partners may not completely share economic resources. Cohabiting partners are unlikely to share health insurance plans, depending on local or employer rules. Also, cohabiting partners may be less likely than married partners to have a joint bank account, or joint investments, share health insurance, or name the partner as the beneficiary of financial assets such as life insurance and retirement accounts [16]. This may in part explain the finding that cohabiters reported more days of inactivity even after adjustments for the benefits of marriage.

Another finding that should be noted was that widowed persons did not report significantly more days of inactivity than married persons. This finding was related to age and sex adjustment, both of which were both strongly associated with widowed status. For example, the descriptive table indicated that 76% of the widowed were 65 years and older, and that 82% of the widowed were female. Other research has demonstrated a substantial gender difference in health outcomes within widowed status, even after accounting for age [20].

4.1. Limitations. It should be noted that household income is an imperfect measure of household's pooled economic resources for two reasons. First, variation in annual income

TABLE 4: Zero-inflated negative binomial regression for days inactive due to poor health: interaction effect of marital status and age group.

	IRR	$P > |t|$
Married x age 20–39 (reference)	1.00	
Married x age 40–64	10.81	.00
Married x age 65+	2.81	.00
Widowed x age 20–39	2.16	.11
Widowed x age 40–64	1.78	.16
Widowed x age 65+	2.34	.00
Divorced/separated x age 20–39	1.46	.04
Divorced/separated x age 40–64	1.87	.00
Divorced/Separated x age 65+	2.34	.00
Never married x age 20–39	1.32	.10
Never married x age 40–64	2.33	.00
Never married x age 65+	2.72	.00
Cohabiting x age 20–39	1.56	.01
Cohabiting x age 40–64	1.58	.02
Cohabiting x age 65+	3.13	.08
Year of interview	1.06	.25
Female	1.01	.94
Ethnicity		
Non-hispanic white (reference)	1.00	
Non-hispanic black	1.09	.44
Hispanic	1.06	.62
Other ethnicity	1.22	.26
Household size	.98	.54
Education	.87	.00
Current smoker	1.32	.00
Obese	1.22	.00
Usual source of care	1.42	.00
Any health insurance	1.12	.28
Poverty to income ratio	.69	.00
Constant	3.21	.00
Inflate		
Age		
20–39 (reference)	1.00	
40–64	.04	.61
65+	.61	.00
Physically active	.42	.00
Constant	.58	.00
/Lnalpha	.77	.00
Alpha	2.17	

TABLE 5: Zero-inflated negative binomial regression for days of inactivity due to poor health among persons aged 65+.

	IRR	$P > |t|$
Married (reference)	1.00	
Widowed	.83	.43
Divorced/separated	.79	.32
Never married	1.17	.67
Cohabiting	1.30	.60
Year of interview	1.23	.08
Female	.69	.01
Ethnicity		
Non-hispanic white (reference)	1.00	
Non-hispanic black	1.19	.32
Hispanic	.65	.09
Other ethnicity	1.17	.69
Household size	.90	.14
Education	.80	.01
Current smoker	.94	.68
Obese	1.28	.05
Usual source of care	.56	.17
Any health insurance	.92	.87
Poverty to income ratio	1.16	.24
Any social support	.82	.45
Constant	21.54	.00
Inflate		
Physically active	.62	.00
Constant	1.27	.00
/Lnalpha	.01	.93
Alpha	10.01	

can unravel whether income is responsible for improving health or whether poor health is limiting income [21]. However, annual household income will tend to be positively correlated with net wealth and, thus, use of household income in the analyses is not expected to be a substantial limitation. Our study results adjusted income relative to poverty, and this measure was a highly significant predictor despite this limitation.

Social support is an important mechanism in the relationship between marital status and health that can buffer stress [3, 4]. Not only do persons gain intimate social support from the marital or cohabiting partner, but one's social network also grows as one inherits the partner's family and friends. Of course, persons that are never married do not have this social benefit, but also persons that divorce/separate lose at least some of the social network gains, and widowed and divorced persons specifically lose the support of the spouse [20]. It is expected that accounting for the differential levels of social support, particularly perceived relationship quality, across marital status that may help to buffer stress would further reduce or potentially eliminate the association between marital status and health. We were able to adjust for social support among persons 65 years and older (see the appendix for results), but future studies may have better

over time will typically be larger than variation in household net worth. However, data on household net wealth were not collected by NHANES. Second, household member incomes may not be equally distributed to each member, affecting individual benefits from pooling household income. A lack of income pooling within households would decrease the significance of household income in improving health status. Another limitation of examining income and health is that the relationship is reciprocal, and only prospective data

access to measures of social support across a wider age range, particularly younger ages.

5. Conclusion

This study explored whether shared economic resources of marriage mediate and moderate the purported health benefits of marriage. The findings suggested that not only income relative to poverty not only mediates the association between marriage and days of inactivity but that the association may also be conditional on the level of income. Persons that were poor and unmarried reported the most days of inactivity. The findings support the theory that marriage may confer health protective benefits in part through shared economic resources relative to other marital statuses.
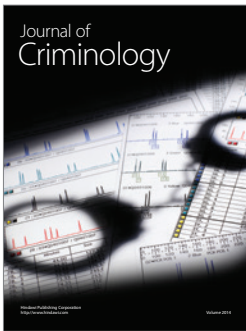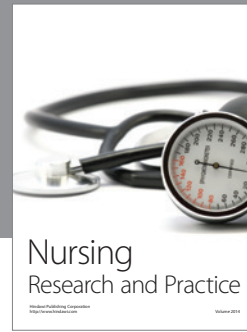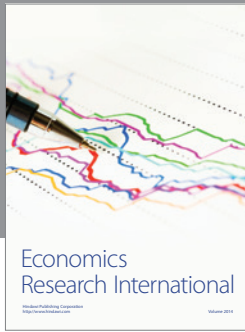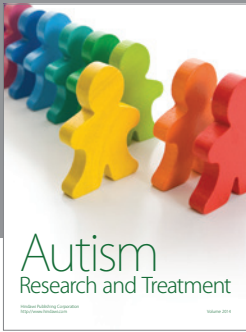
Appendix

A. Technical Appendix

For more details see Tables 4 and 5.

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