



Regular Research Article

Interpersonal Predictors of Grief Among Caregivers of Persons With Dementia

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ABSTRACT

Objective: Family caregivers of persons with dementia experience grief as the care recipients' dementia advances. Here, we explore how various interpersonal factors hypothesized to relate to prolonged grief disorder (PGD) (e.g., perceived burdensomeness, thwarted belongingness) and our micro-social theory of grief (e.g., relational deprivation, self-esteem-related social support) relate to caregiver dementia-related grief. **Design, Setting, and Participants:** Baseline caregiver data (N = 69) from an National Institute on Aging funded randomized pilot trial evaluating a digital reminiscence platform for dementia family caregiver–care-recipient dyads were analyzed. Apparent (unadjusted), independent, and most significant associations between 12 interpersonal constructs and caregiver dementia-related grief were assessed using ordinary, multiple, and stepwise linear regression, respectively. **Measures:** Dementia-specific grief was measured using a 10-item adaptation of the Prolonged Grief-12. Interpersonal constructs were measured using the Interpersonal Support Evaluation List, the Interpersonal Needs Questionnaire, and the Relational Deprivation Scale. **Results:** In ordinary regression models, 10 interpersonal constructs were apparently associated with caregiver grief. In a multiple regression model, only perceived burdensomeness ($\beta = 0.30$; $t = 2.25$, $df = 56$, $p = 0.029$) and relational deprivation ($\beta = 0.21$; $t = 2.05$, $df = 56$, $p = 0.045$) were independently associated with caregiver grief. In a stepwise regression model, self-esteem-related social support ($\beta = -0.41$; $t = -3.53$, $df = 65$, $p = 0.001$) was associated with lesser, and perceived burdensomeness ($\beta = 0.30$; $t = 2.50$, $df = 65$, $p = 0.015$) and relational deprivation ($\beta = 0.25$; $t = 2.84$, $df = 65$, $p = 0.006$) were associated with greater caregiver dementia-related grief. **Conclusion:** Perceived burdensomeness, a risk for suicidal ideation, and relational deprivation and self-

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esteem-related social support, theoretically aligned with our micro-social theory of grief, were most significantly predictive of caregiver dementia-related grief. Interventions addressing grief among dementia caregivers should target these influential interpersonal vulnerabilities. (Am J Geriatr Psychiatry 2026; 34:1031–1039)

Highlights

- **What is the primary question addressed by this study?**

Does perceived burdensomeness, relational deprivation, and self-esteem-related social support predict the severity of dementia-related grief among family caregivers?

- **What is the main finding of this study?**

Perceived burdensomeness and relational deprivation were the only interpersonal constructs independently associated with greater caregiver dementia-related grief. Self-esteem-related social support was strongly protective when considered in a stepwise model.

- **What is the meaning of the finding?**

Interventions aiming to reduce caregiver grief should directly target these interpersonal vulnerabilities, i.e., perceived burdensomeness, relational deprivation, and lack of self-esteem-related social support, to mitigate distress.

INTRODUCTION

The cognitive decline and dysfunction accompanying Alzheimer's disease and related dementias impose significant burdens on family caregivers (e.g., partners/spouses, adult children).¹ After 4.5 hours/day on average attending to the needs of persons with dementia (PwD), caregivers are left vulnerable to feelings of depression and anxiety,² loneliness,^{3,4} and burden.⁵ It is no wonder that dementia caregivers report very elevated rates of suicidal ideation (e.g., 32.3% in a recent meta-analysis⁶), reflecting the desperation many experience.

As dementia progresses, PwD experience a decline in cognitive function and, consequently, their ability to communicate and interact with caregivers.⁷ This decline invariably alters the informal caregiver's relationship with the PwD, leading caregivers to experience relational deprivation (i.e., erosion of meaningful interpersonal connection⁸). It also evokes distressing and disabling feelings of loss and missing the relationship that they once had—that is, “pre-death grief.”^{9–11} Predeath grief has proven a strong predictor of postdeath Prolonged Grief Disorder (PGD) and associated impairment, including suicidal

ideation.^{12–17} In addition to being an impairing and distressing condition in itself, severe grief symptoms, whether predeath or postdeath, are associated with declines in both mental and physical health.^{14–17} This creates a compelling interest in advancing an understanding of grief in the context of dementia caregiving.

To date, grief has been conceptualized and investigated primarily as an intrapersonal, psychological response to the death of a close other. Our micro-sociological theory of adjustment to loss,¹⁸ more succinctly, our micro-social theory of grief, reframes grief as a social-psychological response to the loss of a close interpersonal relationship that served as a source of meaning and identity. According to our theory, the death of a close other deprives the mourner of an important social connection and its personally resonant, meaningful interpersonal interactions. Applying this theory in the context of dementia caregiving, as a PwD's disease progresses, the caregiver's social connection to and meaningful interactions with that person winnow and create social deprivations, exacerbating caregiver grief.

A variety of interpersonal constructs have been used to investigate social-psychological health relevant to dementia caregiving. These include constructs

representing social support,¹⁹ social connectedness,²⁰ unmet interpersonal needs,²¹ relational deprivation,²² positive aspects of caregiving,^{23,24} mutuality,²⁵ and relationship rewards.²⁶ Presently, it is unclear to what extent these interpersonal constructs are related to caregiver dementia-related grief.

Here, we aim to explore how these various interpersonal constructs listed above relate to caregiver dementia-related grief. We hypothesize that constructs aligned with our micro-social theory of grief—relational deprivation and social interactions that buttress one's sense of personal identity—will be most significantly associated with caregiver dementia-related grief. We also hypothesize that constructs that heretofore raised suicide risk (e.g., perceived burdensomeness and thwarted belongingness) based on Joiner's Interpersonal Theory of Suicide,²⁷ will be significantly related to caregiver grief.

METHODS

Data were derived from an National Institute on Aging funded randomized controlled trial (R21 AG077144) designed to assess the feasibility, acceptability, and preliminary efficacy of the *Living Memory Home for Dementia Care Pairs (LMH-4-DCP)* digital reminiscence intervention. Eligibility criteria for caregivers included: being the primary source of unpaid care for a PwD in the early to moderate stages of dementia (confirmed by their caregiver), over 18 years of age, and having no signs of cognitive impairment (Short Portable Mental Status Questionnaire²⁸ score of three or more). All study activities were approved by Weill Cornell Medicine's IRB (Protocol #: 23-07026251).

Prior to randomization into the *LMH-4-DCP* pilot trial, 69 caregivers of PwD completed a baseline assessment battery online via Research Electronic Data Capture (REDCap)²⁹ that included established, validated measures of interpersonal constructs (e.g., interpersonal support, social connectedness, etc.) as well as a validated measure of dementia-related pre-death grief (based on the Prolonged Grief-12^{30,31}). This sample ($N = 69$ caregivers) and cross-sectional, baseline data obtained with these measures were used in the present analysis. Further information about the design and methods of the parent study is provided elsewhere.^{32,33}

Measures

Caregiver sociodemographic characteristics

In their baseline assessment, caregivers provided information about their age, sex, race, ethnicity, and the relationship of the PwD to the caregiver (e.g., PwD is caregiver's spouse, parent).

Dementia-related predeath grief

Caregiver grief is associated with the loss of the relationship with the PwD due to dementia-related incapacities. It was assessed using 10 items from the 12-item Prolonged Grief-12 (PG-12) scale, an instrument assessing illness-related "predeath" grief, that constitutes a valid, dementia-specific 10-item version of the PG-12 (i.e., the PG-10-D).³¹ This 10-item scale assesses yearning and missing the person as they were before being diagnosed with dementia. Each item is assessed on a 5-point (range 1–5) Likert scale; total scores range from 10 to 50; higher scores represent more severe grief. This 10-item scale was internally consistent (Cronbach's $\alpha = 0.89$) in the present study sample.

Social support

Caregiver perceived social support was assessed using the 40-item Interpersonal Support Evaluation List (ISEL),¹⁹ which includes four 10-item subscales that measure appraisal, tangible, self-esteem, and belonging interpersonal support. Each item is assessed on a 4-point (range 0–3) Likert scale; total scores for each subscale range from 0 to 30; higher scores represent greater perceived support. The four subscales were internally consistent (Cronbach's $\alpha = 0.92, 0.91, 0.86$, and 0.93 , for appraisal, tangible, self-esteem, and belonging support, respectively) and highly intercorrelated (r 's between 0.70 and 0.88 ; all p 's < 0.001) in the present study sample.

Social connectedness

Caregiver social connectedness was assessed using the 6-item version of the Lubben Social Network Scale (LSNS-6),²⁰ measures the size of one's network of ties with relatives and friends. Each item is assessed on a 6-point (range 0–5) Likert scale; total scores range

from 0 to 30; higher scores represent greater social connectedness. The LSNS-6 was internally consistent (Cronbach's $\alpha = 0.88$) in the present study sample.

Unmet interpersonal needs

Caregiver unmet interpersonal needs were assessed using the 15-item Interpersonal Needs Questionnaire (INQ),²¹ which includes two subscales, i.e., a 6-item measure of Perceived Burdensomeness (PB) and a 9-item measure of Thwarted Belongingness (TB), that measure an unmet social need. PB and TB are cast within the context of Joiner's Interpersonal Theory of Suicide²⁷ as proximal causes of desire for suicide. Each item is assessed on a 7-point (range 1–7) Likert scale; total scores for PB range from 6 to 42; higher PB scores represent greater unmet need for social competence; total scores for TB range from 9 to 63; higher TB scores represent greater unmet need to belong. PB and TB were internally consistent (Cronbach's $\alpha = 0.96$ and 0.91 , respectively) and moderately correlated ($r = 0.61$; $p < 0.001$) in the present study sample.

Relational deprivation

Caregiver relational deprivation was assessed using a 6-item Relational Deprivation Scale,²² which in the present context measures how much the caregiver feels s/he has lost in his/her relationship with the PwD due to the PwD's illness. Each item is assessed on a 4-point (range 1–4) Likert scale; total scores range from 6 to 24; higher scores represent greater relational deprivation. The Relational Deprivation scale was internally consistent (Cronbach's $\alpha = 0.88$) in the present study sample.

Positive aspects of caregiving

Positive aspects of caregiving were assessed using the 9-item Positive Aspects of Caregiving,^{23,24} which measures rewards attributed to caregiving. Each item is assessed on a 5-point (range 1–5) Likert scale; total scores range from 9 to 45; higher scores represent more positive feelings as a result of fulfilling a caregiving role. The Positive Aspects of Caregiving Scale was internally consistent (Cronbach's $\alpha = 0.92$) in the present study sample.

Mutuality

Caregiver perception of mutuality within the caregiver–care recipient relationship was assessed using the 15-item Mutuality Scale of the Family Care Inventory,²⁵ which in the present context measures what the caregiver believes to be positive reciprocal feelings between his/her self and the PwD. Each item is assessed on a 5-point (range 0–4) Likert scale; total scores range from 0 to 20; higher scores represent greater perceived mutuality. The Mutuality Scale was internally consistent (Cronbach's $\alpha = 0.96$) in the present study sample.

Relationship rewards

Caregiver relationship rewards were assessed using a 4-item Relationship Rewards Scale,²⁶ which measures frequency of rewarding aspects of the caregiver's relationship with the care recipient and is repeated to assess both past (preillness) and present (postillness) relationship rewards. Each item is assessed on a 4-point (range 1–4) Likert scale for each time frame; total scores for each time frame range from 4 to 16; higher scores represent greater relationship rewards. The pre- and postillness relationship rewards scales were internally consistent (Cronbach's $\alpha = 0.86$ and 0.81 , respectively) and moderately correlated ($r = 0.61$; $p < 0.001$) in the present study sample. Scores for present (postillness) relationship rewards were significantly lower than those for past (preillness) relationship rewards (mean difference = -1.0 , $SD = 2.6$; $t = -3.29$, $df = 68$, $p = 0.002$).

Statistical Analyses

We used ordinary, multiple, and stepwise linear regression to explore relationships between interpersonal predictor variables and caregiver dementia-related grief. In preparation for these regressions, we standardized caregiver dementia-related grief (the outcome variable) and each (i.e., social support, social connectedness, unmet interpersonal needs, relational deprivation, positive aspects of caregiving, mutuality, and relationship rewards) interpersonal predictor variable such that each standardized variable had mean = 0.00 and $SD = 1.00$. As a result of using standardized variables, all our regressions estimate standardized regression coefficients (β 's) that each

represent change, expressed in terms of standard deviations, in caregiver illness-related grief associated with a one-standard-deviation change in the associated predictor variable. An advantage of estimating standardized regression coefficients is that they can be interpreted as effect sizes, where $\beta = 0.1$, $\beta = 0.3$, and $\beta = 0.5$ commonly indicate small, moderate, and large effects, respectively.

We used ordinary linear regression to evaluate apparent (unadjusted, potentially confounded) effects of each interpersonal predictor variable included in the present investigation on caregiver dementia-related grief. We used multiple linear regression, including all interpersonal predictor variables used in the present investigation, to evaluate the independent effects of each interpersonal predictor on caregiver dementia-related grief. Finally, to counteract the influence of collinearity occurring when multiple interpersonal predictor variables are estimated simultaneously, we used stepwise linear regression with automatic selection of predictors from all interpersonal predictor variables used in the present investigation (automatic selection entry criterion $p < 0.01$; automatic selection retention criterion $p < 0.05$) to determine the most significant interpersonal predictors of caregiver dementia-related grief.

Statistical analyses were conducted using SAS statistical software, version 9.4 (Cary, NC). Inferences are based on two-sided tests with $p < 0.05$ taken to be statistically significant.

RESULTS

As displayed in Table 1, caregivers were on average 49 years of age, 80% female, 71% White, 17% Black, and 13% Latino. After “parent,” “spouse” was the next most common PwD-caregiver relationship. No sociodemographic characteristics listed in Table 1 were significantly associated with caregiver dementia-related grief.

Table 2 displays results from our ordinary, multiple, and stepwise linear regression analyses that employ interpersonal constructs as predictors of caregiver dementia-related grief. In the ordinary regression models each representing the apparent (unadjusted) effect of a single interpersonal construct on caregiver dementia-related grief, 7 constructs (i.e., appraisal support [$\beta = -0.59$; $t = -6.01$, $df = 67$,

TABLE 1. Caregiver Characteristics (N = 69)

Characteristic		Mean	SD
Age, years		48.9	13.9
Characteristic	Category	n	%
Sex	Female	55	79.7
	Male	14	20.3
Race	White	49	71.0
	Black	12	17.4
	Other	8	11.6
Ethnicity	Latino	9	13.0
	Non-Latino	60	87.0
PwD is the caregiver's	Spouse	12	17.4
	Parent	40	58.0
	Grandparent	6	8.7
	Other	11	15.9

Notes: None of these caregiver characteristics were significantly associated with caregiver dementia-related grief.

$p < 0.001$], tangible support [$\beta = -0.60$; $t = -6.11$, $df = 67$, $p < 0.001$], self-esteem support [$\beta = -0.64$; $t = -6.88$, $df = 67$, $p < 0.001$], belonging support [$\beta = -0.63$; $t = -6.67$, $df = 67$, $p < 0.001$], social connectedness [$\beta = -0.51$; $t = -4.85$, $df = 67$, $p < 0.001$], mutuality [$\beta = -0.30$; $t = -2.54$, $df = 67$, $p = 0.014$], and present relationship rewards [$\beta = -0.38$; $t = -3.31$, $df = 67$, $p = 0.001$]) were significantly associated with lesser dementia-related grief, 3 constructs (i.e., PB [$\beta = 0.65$; $t = 7.08$, $df = 67$, $p < 0.001$], TB [$\beta = 0.60$; $t = 6.18$, $df = 67$, $p < 0.001$], and relational deprivation [$\beta = 0.37$; $t = 3.34$, $df = 67$, $p = 0.002$]) were significantly associated with greater dementia-related grief, and two constructs (i.e., positive aspects of caregiving and past relationship rewards) were not significantly associated with dementia-related grief. In the multiple regression model representing the independent (adjusted) effects of each interpersonal construct on caregiver dementia-related grief, PB [$\beta = 0.30$; $t = 2.25$, $df = 56$, $p = 0.029$] and relational deprivation [$\beta = 0.21$; $t = 2.05$, $df = 56$, $p = 0.045$] were significantly associated with greater dementia-related grief. The multiple regression's R-square was significantly different from zero, as indicated by its associated F-test ($F = 6.52$, $df1 = 12$, $df2 = 56$, $p < 0.001$), further warranting the stepwise regression. In the stepwise regression model representing the most significant interpersonal construct predictors of caregiver dementia-related grief, self-esteem support [$\beta = -0.41$; $t = -3.53$, $df = 65$, $p = 0.001$] was associated with lesser, and PB [$\beta = 0.30$; $t = 2.50$, $df = 65$, $p = 0.015$] and relational deprivation [$\beta = 0.25$;

TABLE 2. Regression Analyses of Social Construct Predictors of Caregiver Dementia-Related Grief (N = 69)

			Predictor Effects on Caregiver Illness-Related Grief (Mean = 22.0, SD = 8.5)								
Predictor	Mean	SD	Apparent (Unadjusted) Effects			Independent Effects			Most Significant Effects		
			(Ordinary Regression)			(Multiple Regression)			(Stepwise Regression)		
			β	se	p	β	se	p	β	se	p
Social Support (ISEL)											
Appraisal Support	22.2	7.3	−0.59	0.10	0.000	0.15	0.25	0.545			
Tangible Support	20.4	8.0	−0.60	0.10	0.000	−0.24	0.22	0.290			
Self-Esteem Support	20.1	6.0	−0.64	0.09	0.000	−0.24	0.21	0.255	−0.41	0.12	0.001
Belonging Support	20.6	7.7	−0.63	0.09	0.000	0.04	0.29	0.894			
Social Connectedness (LSNS-6)	20.6	6.2	−0.51	0.11	0.000	−0.08	0.14	0.564			
Unmet Interpersonal Needs (INQ-15)											
Perceived Burdensomeness	9.9	6.8	0.65	0.09	0.000	0.30	0.14	0.029	0.30	0.12	0.015
Thwarted Belongingness	22.8	11.7	0.60	0.10	0.000	0.14	0.21	0.523			
Relational Deprivation	14.2	4.8	0.37	0.11	0.002	0.21	0.10	0.045	0.25	0.09	0.006
Positive Aspects of Caregiving	43.2	8.7	−0.22	0.12	0.064	−0.06	0.11	0.626			
Mutuality	51.6	15.1	−0.30	0.12	0.014	0.01	0.17	0.952			
Relationship Rewards											
Past	13.2	2.7	−0.15	0.12	0.207	0.06	0.13	0.660			
Present	12.2	3.0	−0.38	0.11	0.001	0.00	0.18	0.980			

Notes: Standardized regression coefficients (β 's) represent change, expressed in terms of standard deviations, in caregiver illness-related grief associated with a one-standard-deviation change in predictor variable.

All p-values are associated with two-sided t-tests with df = 67, 56, and 65, for ordinary, multiple, and stepwise regression, respectively. Stepwise regression with automatic selection of predictors from all social relationship-related predictor variables (automatic selection entry criterion $p < 0.01$; automatic selection retention criterion $p < 0.05$) was used to determine the most significant social relationship-related predictors of caregiver dementia-related grief.

$t = 2.84$, $df = 65$, $p = 0.006$] were associated with greater, dementia-related grief.

DISCUSSION

In the present investigation, we found that a variety of interpersonal constructs (i.e., appraisal, tangible, self-esteem, and belonging interpersonal support, social connectedness, PB, TB, relationship deprivation, mutuality, and present relationship rewards) were apparently significantly and substantially related in unadjusted analyses (with apparent/unadjusted effect size magnitudes between $|\beta| = 0.30$ and $|\beta| = 0.65$) to caregiver dementia-related predeath grief. However, only PB (effect size: $\beta = 0.30$) and relational deprivation (effect size: $\beta = 0.21$) were independently significantly and substantially related to caregiver dementia-related grief in analyses adjusting for each of these other interpersonal construct factors. Overall, PB (effect size: $\beta = 0.30$), relational deprivation (effect size: $\beta = 0.25$), and self-esteem

support (effect size: $\beta = -0.41$) were most significantly related to caregiver dementia-related grief.

Our findings that relational deprivation and self-esteem-related social support are substantially predictive of caregiver dementia-related grief are consistent with our micro-social theory of grief, which postulates that grief is a consequence of micro-social deprivations associated with the loss of a relationship rich in co-constructed meaning, including a micro-socially constructed sense of self that fosters self-worth and self-esteem. Our findings are also consistent with prior findings indicating that severe grief and PGD are associated with suicidal ideation,^{13,15–17} in that we found PB, a proximal cause of desire for suicide within Joiner's Interpersonal Theory of Suicide,²⁷ to be an independent, significant predictor of caregiver dementia-related grief.

The fact that our findings align with the micro-social theory of grief, and prior evidence that severe grief is a risk for suicidal ideation suggests that grief in the context of dementia caregiving is remarkably like grief in the context of bereavement. The similarity between grief in bereavement and grief in dementia caregiving is at odds with other perspectives, e.g.,

those within the Dementia Grief Model,¹⁰ that view grief in the context of dementia caregiving as unique to, and a normal part of, the dementia caregiving experience.

Why might this be the case? Within the framework of our micro-social theory, grief is associated with the loss of a social relationship. The physical death of a person is the primary cause of this loss, not the loss itself. Similarly, grief in dementia caregiving is associated with loss of a micro-social environment and interpersonal interactions with the PwD, and the dementia of the PwD is the primary cause of this micro-social deprivation. In both contexts, the bereft individual is robbed of a unique, deeply meaningful, micro-social environment. In one case, the “thief” robbing the survivor is death, and in the other case, the “thief” is dementia, precipitating the loss of a close other.

Our finding that caregiver dementia-related grief is independently significantly and substantially associated with PB, an interpersonal construct that represents a proximal cause of desire for suicide within Joiner’s Interpersonal Theory of Suicide,²⁷ not only suggests a parallel between severe grief in dementia caregiving and severe grief in bereavement but also suggests that there may be significant psychopathology and/or risk for psychopathology associated with severe dementia-related grief. In the United States, 4.3% of adults reported having had suicidal thoughts in the past year;³⁴ in a meta-analysis of eight studies worldwide, the prevalence of suicidal ideation among dementia caregivers was found to be 32.3%.⁶ Given that PGD is a risk for suicidal ideation and the similarities we have found between grief in dementia caregiving and grief in bereavement, future studies ought to investigate the extent to which elevated rates of suicidal ideation in dementia caregivers may be attributed to severe caregiver dementia-related grief.

As a cautionary note, in our ordinary regression models, we found that nearly all (10 of 12) examined interpersonal constructs appeared to be significantly and substantially related to caregiver dementia-related grief. It was only through our multiple and stepwise regressions that we were able to isolate interpersonal constructs that were independently and most significantly associated with caregiver dementia-related grief by accounting for (in the multiple regression) or minimizing

the effects of (in the stepwise regression) collinearity in the full set of examined interpersonal construct predictor variables. Thus, apparent (unadjusted) associations between certain interpersonal constructs and caregiver grief may be misunderstood and misinterpreted if those constructs are correlated with other interpersonal constructs that are genuinely predictive of caregiver grief (i.e., confounding variables).

The present investigation has strengths and limitations. Data used in the present study were derived from a pilot trial of the *LMH-4-DCP* intervention, and thus are constrained by this pilot trial’s design, instrumentation, methodology, sample, and sample size. As a strength, the pilot trial assessment battery included an array of reliable, valid instruments to assess multiple theoretically grounded and empirically supported interpersonal constructs that provided a solid foundation for the present investigation. As a limitation, the pilot trial had a modest sample size, which made it difficult to discern, if at all, how and to what extent each interpersonal construct that we examined contributes to the determination of caregiver dementia-related grief. Still, we were able to find moderately large, statistically, theoretically, and clinically meaningful effects of self-esteem-related social support, PB, and relational deprivation on caregiver dementia-related grief. Future studies should use larger and longitudinal data to examine the effects of various social constructs on the risk of caregiver predeath grief.

In conclusion, our findings suggest that grief in dementia caregiving is like grief in bereavement in that both pertain to loss of a deeply meaningful, micro-social environment co-constructed by the bereft individual and the person s/he has lost due to cognitive decline or death. Future research is needed to identify and investigate ways to support relational connections between PwD and their caregivers, as well as ways for caregivers to foster relationships with others with whom they can connect to protect against severe dementia-related grief and its likely adverse consequences.

DISCLAIMER

The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

AUTHOR CONTRIBUTIONS

FF and HGP are grant holders. HGP, PKM, and LO conceived of the study. PKM, HGP, and FF oversaw all aspects of study implementation. PKM conducted all analyses. LO, PKM, and HGP drafted the manuscript. All authors approved the final submission.

DATA STATEMENT

The data presented in this report has not been previously presented orally or by poster at scientific meetings.

DISCLOSURES

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