Giving to Others and the Association Between Stress and Mortality

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Objectives. We sought to test the hypothesis that providing help to others predicts a reduced association between stress and mortality.

Methods. We examined data from participants (n = 846) in a study in the Detroit, Michigan, area. Participants completed baseline interviews that assessed past-year stressful events and whether the participant had provided tangible assistance to friends or family members. Participant mortality and time to death was monitored for 5 years by way of newspaper obituaries and monthly state death-record tapes.

Results. When we adjusted for age, baseline health and functioning, and key psychosocial variables, Cox proportional hazard models for mortality revealed a significant interaction between helping behavior and stressful events (hazard ratio [HR] = 0.58; $P < .05$; 95% confidence interval [CI] = 0.35, 0.98). Specifically, stress did not predict mortality risk among individuals who provided help to others in the past year (HR = 0.96; 95% CI = 0.79, 1.18), but stress did predict mortality among those who did not provide help to others (HR = 1.30; $P < .05$; 95% CI = 1.05, 1.62).

Conclusions. Helping others predicted reduced mortality specifically by buffering the association between stress and mortality. (*Am J Public Health.* 2013;103:1649–1655. doi:10.2105/AJPH.2012.300876)

In a seminal review published more than 20 years ago, House et al. described the strong association between social connections and physical health.[1] The researchers concluded that socially isolated people, compared with those with strong social ties, were at substantially increased risk of mortality and morbidity. In fact, the magnitude of the association between social isolation and mortality was comparable to that for high blood pressure, smoking, and sedentary lifestyle, even after statistical controls for other known risk factors such as baseline health. Despite the robustness of this effect, it remains unclear what aspects of the social environment influence physical health outcomes.

One hypothesized link between social connections and health is that the social support people receive from their network of friends and loved ones may "buffer" against the detrimental physical consequences of psychosocial stress.[2,3] Indeed, stressful life events have long been established to be a predictor of increased mortality risk.[4,5] However, the social support hypothesis has not been consistently supported in empirical studies. Although some empirical studies suggest health benefits of received social support—and at least 1 indicates that these benefits accrue via stress buffering[6]—a meta-analytic review concluded that the overall relationship between receiving support and health outcomes "may not be considered significant or generalizable."[7(p352)] This may be why House, in 2001, concluded that after nearly 2 decades of empirical work, very little is known about how social connectivity, as opposed to isolation, translates into physical health outcomes.[8]

The failure of the social support hypothesis to account for the links between social connectedness and health[8] has prompted research on whether health may be associated with the other side of social interactions—namely, the provision of help and support to others. Providing help to others appears to promote the helper's health, even when there is statistical control for plausible confounds such as baseline physical health and functioning or receiving support from others. For example, volunteering predicts increased self-rated health and longevity.[9–13] In a similar way, providing aid to a relationship partner predicts reduced morbidity and mortality.[14–16]

Given the robust associations between support provision and health, it is possible that support provision may have stress-buffering effects even if the receipt of support does not. To date, health research has not explicitly tested this hypothesis; however, providing help to others has psychological and physiological correlates that may buffer against stress. For example, helping leads to improved mood,[17,18] which itself may act as a stress buffer.[19] In addition, caring for loved ones, in particular, may draw on the functioning of neural and hormonal mechanisms that support parenting behavior[20–22]—that is, the caregiving behavioral system.[23,24] Several hormones and neurochemicals associated with the caregiving system, including oxytocin, prolactin, and endogenous opioids, have known stress-reducing effects.[20,25–29]

Laboratory and field studies provide preliminary evidence consistent with the prediction that providing help or support may act as a physiological stress buffer. Communicating affection to a relationship partner has been shown to predict reduced perceived stress, lowered baseline cortisol levels,[30,31] and faster recovery from peak cortisol levels following lab stressors.[32] In a similar way, experimentally manipulated helping predicts reduced cardiovascular reactivity to and faster cardiovascular recovery from laboratory stressors (written communication from Stephanie L. Brown, October 3, 2008). In addition, field studies indicate that engaging in helping behavior may buffer the effects of stress-related constructs on health-related outcomes. For example, engaging in helping behavior versus not doing so predicts lessened associations between grief and subsequent depression,[33] financial difficulties and mortality,[34] and functional limitations and mortality.[35]

Research to date has not specifically examined whether providing help or support to others can buffer the associations between psychosocial stress and physical health outcomes. We sought to do so by using survey data from the Changing Lives of Older Couples (CLOC) study. The CLOC data set included 5-year survival data on a sample of 846 older adults along with baseline measures of helping, past-year stressful events, and potential confounds (e.g., demographic and socioeconomic factors, baseline health and well-being, personality, and social support receipt), allowing for a test of the stress-buffering role of prosocial behavior. We hypothesized that exposure to a recent stressful life event would moderate the association between helping behavior and mortality and vice versa. That is, we predicted that helping behavior would most strongly predict reduced mortality among individuals exposed to significant stress compared with those not exposed.

METHODS

The CLOC study was a prospective study of a 2-stage area probability sample. Participants were 1532 members of married couples in which the husband was aged at least 65 years, from the Detroit Standard Metropolitan Statistical Area.[36] Of those selected for participation in the CLOC study, 65% agreed to participate, a response rate consistent with response rates in other Detroit, Michigan, area studies.

The CLOC study as a whole was primarily designed not to examine predictors of mortality, but to assess predictors of a surviving spouse's experience of widowhood. However, more than half of the CLOC sample (n = 846) consisted of married couples in which both members were focal respondents and, thus, for whom baseline data could be used to predict mortality of each individual. Therefore, members of this subsample comprised the sample for the present study. Exactly 50.0% of this sample was female, and the ethnic composition of the sample was 87.7% White, 11.7% African American, and less than 1.0% other ethnicity. The mean age of the sample was 71 years (range = 34–93 years).

All participants completed a face-to-face baseline interview, all of which were conducted over an 11-month period in 1987 and 1988. Subsequently, we monitored mortality of participants over a 5-year period by checking obituaries in 3 Detroit-area newspaper and monthly death-record tapes obtained from the State of Michigan. If a participant died, the surviving spouse was reinterviewed 3 months after the deceased spouse's death. These procedures were approved by the institutional review board of the University of Michigan, and all participants completed provided informed consent in writing.

Measures

Mortality data. Throughout the study, researchers updated each spouse's status as either widowed (1) or not widowed (0). When researchers learned of the death of a participant, they coded the surviving spouse as widowed. When the last surviving spouse of a couple died, they recorded this as well. This variable was used as indicator of the deceased spouse's death. In addition, the researchers created a "gap" variable that represented how many months passed between the baseline interview and the follow-up interview of the surviving spouse (at 6 months postdeath). We used this variable as an indicator of time of postbaseline survival (i.e., time to death).

Stressful events. Recent life stress was measured at baseline by asking respondents if they had experienced any of the following events in the past 12 months: serious non–life-threatening illness, burglary, job loss, financial difficulties, or death of a family member. We used the number of these events (potentially ranging from 0 to 5) as an index of recent stressful events.

Helping close others. Helping behavior directed toward close others was measured at baseline as self-reported engagement in any of 4 unpaid helping activities directed toward friends, neighbors, or relatives who did not live with them. The 4 activities were (1) transportation, errands, or shopping; (2) housework; (3) child care; and (4) other tasks. In addition, respondents reported the total amount of time in the past 12 months they spent in all of these activities combined: (0) no help provided; (1) less than 20 hours, (2) 20 to 39 hours, (3) 40 to 79 hours, (4) 80 to 159 hours, or (5) 160 hours or more.

Control variables. We assessed several other variables that were not directly related to the hypotheses of the present study, but were important potential confounds of the hypothesized associations between key study variables and mortality. These control variables included demographic and socioeconomic factors, self-rated health and health behaviors, mental health variables (i.e., subjective well-being, depression, and anxiety), personality factors (i.e., Big Five personality traits,[37] self-esteem, perceived control), and social support variables (i.e., social contact, received instrumental and emotional support).

Analyses

Cox proportional hazard models tested the associations of helping and stress with survival over time. Cox models test predictors of mortality risk over time while requiring minimal assumptions about underlying distributions, and yield regression parameters that can be antilogged and interpreted as hazard ratios (HRs). Hazard ratios represent the degree of change in mortality risk for a unit change in a predictor.

For the present study, the first author conducted all analyses with the STCOX module in Stata version 11.0 (StataCorp, College Station, TX), and used robust standard errors to adjust for within-couple shared variance by using Stata's cluster option. To better estimate the unique association of helping close others with mortality, analyses controlled for several potential confounds, including demographic and socioeconomic factors, personality, social interactions, self-rated health, health behavior, and mental health.

RESULTS

Of the subsample of 846 respondents, 134 died over the course of the study. Most respondents (74%) reported having helped a close other in some way in the past year, for an average range of 20 to 39 hours. The majority of respondents (70%) had experienced no recent stressful life events, whereas 26% had experienced 1 such event and 4% had experienced 2 or 3 events; the latter 2 groups were grouped for the present analyses. Individuals who helped close others were, on average, younger, healthier, more likely to be White, of higher socioeconomic status, and higher in social support and social contact than those who did not do so. Additional descriptive statistics and correlations among key study variables can be found in Table 1.

TABLE 1—Descriptive Statistics for and Correlations Among Study Variables (n = 846): Detroit-Area Changing Lives of Older Couples Study, 1987–1993

Variable	Mean (SD)	Range	Stressful Events	Helping Close Others	Age in Years	Male Gender	Income	Education, Years	Non-White Race	Satisfaction With Health	Functional Health	Smoking (Cigarettes Per Day)	Drinking (No. in Past Month)	Exercise	Depression	Subjective Well-Being
Stressful events	0.34 (0.56)	0–2	1.00													
Helping close others	0.74 (0.44)	0–1	-0.01	1.00												
Age in years	70.85 (6.22)	36–93	0.02	-0.13***	1.00											
Male gender	0.50 (0.50)	0–1	0.03	0.03	0.32***	1.00										
Income	5.06 (2.28)	1–10	-0.07*	0.13***	-0.20***	-0.04	1.00									
Education, y	11.68 (2.88)	0–17	-0.05	0.08*	-0.09**	0.02	0.46***	1.00								
Non-White race	0.12 (0.33)	0–1	0.06	-0.09*	0.07***	0.01	-0.18***	-0.17***	1.00							
Satisfaction with health[a]	0.03 (0.99)	−2.61–1.81	-0.24***	-0.21***	-0.14***	0.00	0.18***	0.11***	-0.08*	1.00						
Functional health[a]	−0.03 (0.98)	−0.71–5.63	-0.16***	0.13***	-0.16***	0.05	0.09**	0.05	0.02	0.61***	1.00					
Smoking (cigarettes per day)	2.46 (6.95)	0–50	0.01	-0.06	-0.13***	-0.06	-0.03	0.01	-0.02	-0.06	-0.06	1.00				
Drinking (no. in past month)	13.36 (34.33)	0–450	-0.01	-0.01	-0.01	0.16***	0.05	0.09**	-0.06	-0.01	0.02	18***	1.00			
Exercise[a]	0.01 (0.97)	−1.74–1.96	-0.08*	0.23***	-0.12***	0.12***	0.16***	0.19***	-0.07*	0.26***	0.26***	-0.05	0.02	1.00		
Depression[a]	−0.01 (0.97)	−1.16–4.27	0.10**	-0.11**	0.02	-0.10**	-0.09*	-0.10**	0.02	-0.38***	-0.29***	0.04	0.00	-0.16***	1.00	
Subjective well-being[a]	−0.00 (0.97)	−3.10–1.59	-0.06	0.12***	-0.09**	0.00	0.02	0.04	0.01	0.25***	0.18***	-0.01	0.04	0.19***	-0.49***	1.00
Anxiety[a]	−0.04 (0.93)	−0.59–9.41	0.08*	-0.05	-0.03	-0.08*	-0.03	-0.05	0.02	-0.35***	-0.25***	0.10**	0.11**	-0.06	0.51***	-0.24***

[a]Variable centered and standardized.
*P < .05; **P < .01; ***P < .001.

Results of a series of Cox regression models are reported in Table 2. Consistent with previous research, stressful events predicted increased mortality whereas helping predicted decreased mortality (Table 2, model 1). In addition, however, there was a significant interaction between helping and stressful events that remained with significant adjustment for all assessed confounds (Table 2, models 2–6).

To evaluate the nature of this interaction, we examined the main effects of stress in 2 separate models: one in which nonhelping was coded as "0," revealing the adjusted main effect of stress among nonhelpers, and one in which helping was coded as "0," revealing the adjusted main effect of stress among helpers. These models indicated that stress was not a predictor of mortality for those who engaged in helping behavior (HR = 0.96; 95% CI = 0.79, 1.18), but that each additional stressful event (1 vs 0 or 2 vs 1) predicted a 30% relative increase in mortality risk among those who did not engage in helping (HR = 1.30; P < .05; 95% CI = 1.05, 1.62). This pattern is illustrated in Figure 1, where odds of survival over time are graphed by helping or not helping close others and levels of stressful events, with adjustment for mean levels of control variables.

A follow-up analysis examined whether these stress-buffering results depended on degree of helping in the form of reported amount of time spent helping (hours in the past year). Specifically, we created dummy-coded variables corresponding to low (less than 20 hours) medium (20–80 hours), and high (> 80 hours) levels of helping. When entered into a regression model simultaneously, these variables provided information about the unique contribution of each level of helping compared with no helping. We computed interactions between each of these dummy variables and stress. None of these interactions attained significance; however, the stress-buffering pattern appeared strongest for low (HR = 0.44; P = .09) and medium (HR = 0.60; P = .12) levels of helping. Importantly, the interaction between high helping levels and stress, though not significant, was in a stress-buffering, not stress-augmenting, direction (HR = 0.79; P = .56).

An additional set of follow-up analyses tested whether the main effect of helping or the stress-buffering effect pertained only to

TABLE 2—Cox Proportional Hazard Models of Mortality as a Function of the Interaction of Stress and Helping Behavior, With Control Variables (n = 846): Detroit-Area Changing Lives of Older Couples Study, 1987–1993

Variable	Hazard Ratio (95% CI)					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Stressful events	1.56*** (1.22, 1.99)	2.09*** (1.49, 2.93)	1.88*** (1.33, 2.64)	1.82** (1.29, 2.56)	1.81** (1.29, 2.54)	1.62** (1.14, 2.32)
Helping activities	0.41*** (0.29, 0.57)	0.54** (0.36, 0.81)	0.66 (0.44, 1.00)	0.68 (0.45, 1.04)	0.70 (0.46, 1.06)	0.94 (0.58, 1.51)
Helping × stressful events		0.57* (0.35, 0.92)	0.62* (0.39, 0.99)	0.62* (0.38, 0.99)	0.63 (0.39, 1.00)	0.54* (0.33, 0.90)
Age			1.07*** (1.04, 1.10)	1.07*** (1.04, 1.10)	1.07*** (1.04, 1.10)	1.06*** (1.03, 1.10)
Male gender			1.97** (1.33, 2.91)	1.85** (1.20, 2.85)	1.82** (1.15, 2.89)	2.14** (1.36, 3.36)
Income			0.87** (0.79, 0.96)	0.87** (0.79, 0.96)	0.87** (0.79, 0.96)	0.91 (0.82, 1.01)
Education			1.02 (0.96, 1.08)	1.02 (0.96, 1.09)	1.03 (0.96, 1.10)	1.02 (0.95, 1.09)
Non-White race			1.35 (0.90, 2.04)	1.32 (0.84, 2.07)	1.29 (0.82, 2.01)	1.32 (0.81, 2.15)
Neuroticism[a]				1.18 (0.93, 1.49)	1.18 (0.93, 1.49)	1.19 (0.93, 1.51)
Extraversion[a]				0.84 (0.70, 1.02)	0.86 (0.70, 1.05)	0.97 (0.78, 1.21)
Openness to experience[a]				1.17 (0.97, 1.40)	1.16 (0.97, 1.39)	1.07 (0.89, 1.29)
Agreeableness[a]				0.91 (0.76, 1.10)	0.92 (0.76, 1.11)	0.90 (0.74, 1.10)
Conscientiousness[a]				1.04 (0.84, 1.27)	1.04 (0.85, 1.28)	1.11 (0.88, 1.39)
Self-esteem[a]				0.80* (0.64, 0.99)	0.81 (0.65, 1.00)	0.91 (0.72, 1.15)
Internal locus of control[a]				0.99 (0.81, 1.21)	0.99 (0.81, 1.22)	1.02 (0.82, 1.25)
Social contact[a]					0.95 (0.79, 1.16)	0.92 (0.75, 1.12)
Received instrumental support					0.95 (0.81, 1.12)	0.96 (0.82, 1.14)
Received emotional support[a]					0.95 (0.78, 1.16)	1.05 (0.87, 1.27)
Satisfaction with health[a]						0.68*** (0.56, 0.84)
Functional health limitations						1.59*** (1.26, 2.01)
Smoking						1.02 (0.99, 1.04)
Drinking						1.00 (0.99, 1.00)
Exercise[a]						0.96 (0.78, 1.17)
Depression[a]						1.09 (0.84, 1.41)
Well-being[a]						1.14 (0.93, 1.41)
Anxiety[a]						0.94 (0.76, 1.16)

[a]Variable centered and standardized.
*$P < .05$; **$P < .01$; ***$P < .001$.

subgroups of participants as defined by our control variables (demographic and socioeconomic factors, health variables, personality, and social network characteristics). Specifically, we tested all 2-way interactions between helping and each control variable and all 3-way interactions among helping, stress, and each control variable; none of these interactions was significant.

DISCUSSION

Social connectedness predicts health and longevity.[1] Previous research has indicated that helping behavior predicts favorable health outcomes as well, even if that help occurs in a stressful context such as long-term caregiving.[18,38] Our findings, obtained in a prospective study of mortality in a community sample, go beyond these past analyses to indicate that the health benefits of helping behavior derive specifically from stress-buffering processes. This finding provides important guidance for understanding why helping behavior specifically may promote health, and potentially for how social processes in general may influence health.

Beneficial social connections are a key resource for health and well-being,[39] and our data help to clarify what kinds of social connections are beneficial, and why. Specifically, our finding that helping behavior serves as a stress buffer suggests that helping behavior provides unique psychosocial benefits that promote health. Psychosocial benefits of social connectedness have often been described in terms of feelings of support or belonging.[2,3,40,41] However, our data, along with data from previous studies,[15,42] indicate that help given to others is a better predictor of health and well-being than are indicators of social engagement or received social support. Although the mechanisms for this phenomenon remain unknown, individuals' contributions to their social networks provide them with several unique psychosocial benefits, including a sense of meaning or mattering,[13,43] opportunities for generativity,[44,45] or improved social well-being.[46] Moreover, several stress-buffering features of helping could distinguish it from other kinds of social interactions, including the emotional state of compassion[47]

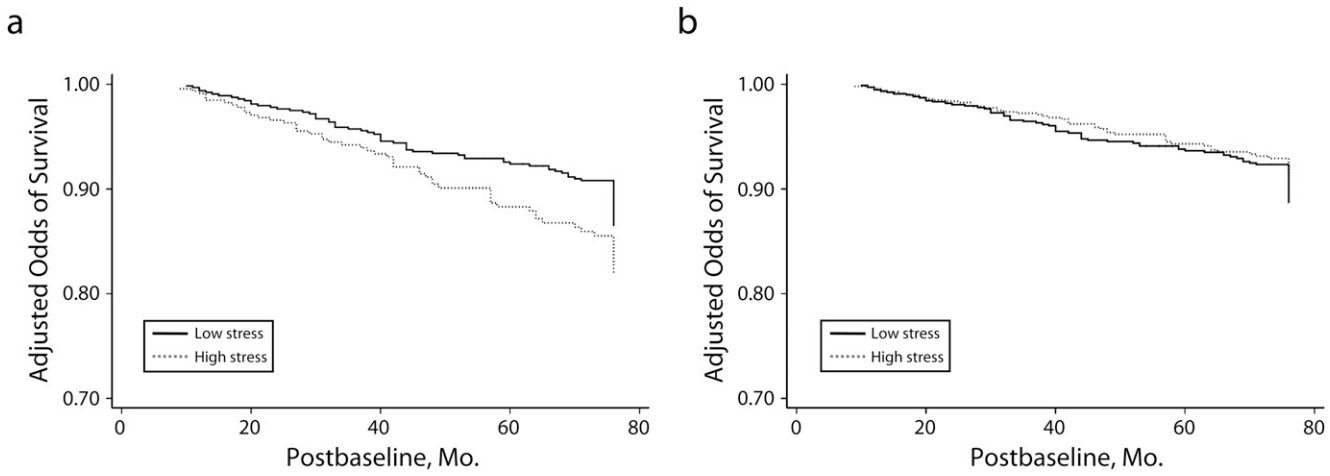

FIGURE 1—Product-limit estimator survival probability curves for low (mean – 1 SD) or high (mean + 1 SD) numbers of stressful events in the past year for those who (a) did not help close others and (b) did help close others.

and the physiology of the caregiving behavioral system.[25,27,29] In short, social connections may be "beneficial" to the extent that they provide individuals with the opportunity to benefit others.

Our findings also suggest conditions under which stressful events may be more or less consequential for health and mortality. Experiencing stressful events significantly predicted increased mortality over the study period among those who had not tangibly helped others in the past year, but among those who had provided help, there was no association between stress and mortality. In effect, this finding suggests that, among individuals who do not help others, exposure to a stressful life event is associated with 30% increased mortality risk. Given that previous studies of stress and health have not differentiated those who engage in helping behavior, it is possible that the magnitude of the link between stress and health may have been underestimated in previous work. Future research should explore this possibility.

Limitations and Future Directions

We recognize that there are noteworthy limitations of the current study. First, because this was a nonexperimental study, it is not possible to claim a causal role for our key predictors: stressful events and prosocial behavior. We were able to statistically control for many plausible confounds, including baseline health and functioning, health behaviors, psychological well-being, personality traits, and social engagement and received social support. In addition, we found that these possible confounds specifically did not function as moderators of the stress–mortality association, as did prosocial behavior. Nonetheless, it is possible that unobserved variables account for the associations we found between key variables and mortality.

Second, although there are several aspects of helping that may lead to stress buffering, including increased positive affect, relief of personal distress, or activation of the caregiving system, assessing these mechanisms was beyond the scope of the present study. Future research should test potential mediators to establish the mechanisms by which helping might buffer the effects of psychosocial stress. Identifying the mechanisms by which helping buffers stress would have the added benefit of helping researchers identify forms of helping that are more or less likely to have stress-buffering effects. For example, whereas the present study looked at the provision of tangible aid, or instrumental support,[2] it is possible that expressing warmth and caring, or emotional support, would be even more beneficial.[30–32]

Finally, although these results were found in a reasonably diverse sample, they may or may not generalize to all populations. The characteristics of those who chose not to participate in the CLOC study are unknown, and the sample consisted notably of only married couples. In addition, only a few types of stressors were assessed in the CLOC study, so it is not clear how our findings apply to a broader set of stressful experiences. A related issue is the fact that participants in our study could only report up to 5 stressful events in the past year, but it is possible that some individuals experienced many more stressors. Our finding that the association between stress and health was completely eliminated for those who engaged in helping may not apply to individuals exposed to very high levels of stress. Whether similar associations among helping, stress, and behavior will apply to nonmarried individuals, those exposed to other kinds or greater levels of stress, or other populations is a ripe topic for future research.

Conclusions

Helping behavior, along with other types of social interaction, is associated with positive health outcomes, including reduced mortality. The present research indicates that helping valued others predicts reduced mortality specifically because it buffers the association between stress and mortality. To our knowledge, this is the first study to find evidence for a stress-buffering mechanism for explaining the beneficial association of prosocial behavior with mortality. It will be important for research in public health to follow up on

this finding to determine the causal relationships between exposure to stress, prosocial behavior, and development of disease, and to test the generalizability of these findings across forms of helping, types of stress, and populations.

If research continues to find stress-buffering effects of helping, however, it may be wise for researchers and policymakers to consider interventions to promote helping, especially for older adults. As research reveals what types of helping are most beneficial, and under what conditions, seniors could be routinely advised and even incentivized (e.g., through tax deductions) to engage in informal helping in their communities, formalized volunteering with a one-on-one emphasis such as the Foster Grandparents program or Experience Corps, or volunteering in general. At-risk populations are frequently advised to seek support from their social networks. A less common message, but one that perhaps deserves more prominence, is for them to support others as well. ■

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Contributors

All authors participated in the conceptualization and design of the analyses reported herein, as well as the interpretation of data, drafting of the article, and critical revision of the article for important intellectual content. M. J. Poulin is fully responsible for all statistical analyses, had full access to all of the data in the study, and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Human Participant Protection

All procedures were approved by the institutional review board of the University of Michigan, and all participants provided informed consent in writing.

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