

A Multimethod Approach to Measuring Communal Coping in Adults With Type 1 Diabetes

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Objective: Communal coping with a chronic illness has been associated with better health outcomes and includes two components: an individual's appraisal of the illness as shared and collaborative strategies to manage the illness. Although multiple methods have been used to assess these constructs, there is limited understanding of whether these methods tap similar components of communal coping. The study goals were to assess how individuals diagnosed with type 1 diabetes communally cope with their romantic partner using multiple methods to (a) distinguish between the two components of communal coping and (b) examine links of both components to health outcomes and test whether interactions between the two are linked to health outcomes. **Method:** Individuals with type 1 diabetes ($n = 199$, 52% female, 90% non-Hispanic white) completed self-report, diary, observational, and open-ended interviews to measure communal coping. Psychological well-being, diabetes distress, and diabetes health outcomes were assessed. **Results:** A confirmatory factor analysis supported our hypothesis that communal coping is reflected by 2 distinct components: shared appraisal and collaborative coping. There were no direct effects of either shared appraisal or collaboration to outcomes, however, the interaction between shared appraisal and collaboration was linked to diabetes distress, self-care, and self-efficacy. Specifically, collaboration was linked to worse outcomes at low shared appraisal but not high shared appraisal. **Conclusions:** These findings support the two components of communal coping and suggest that collaboration can be detrimental for health among those who do not view an illness as shared.

Keywords: communal coping, couple relationships, health, interpersonal coping, type 1 diabetes

Supplemental materials: <https://doi.org/10.1037/hea0001123.supp>

Stress and coping researchers have traditionally focused on how individuals cope with stressors but have increasingly recognized the role that the social environment has in coping. This body of research

—referred to as interpersonal coping—has been explicated through a number of theories and approaches, including relationship-focused coping (Coyne & Smith, 1991), coping congruence (Revenson, 1994), the systemic transactional model of coping (Bodenmann, 1997; Bodenmann et al., 2019), and the developmental contextual model of coping (Berg & Upchurch, 2007). Interpersonal coping has frequently been examined in the context of couples coping with chronic illness (Martire & Helgeson, 2017). In the present study we focus on adults coping with type 1 diabetes, an illness that requires a daily self-care regimen (e.g., multiple daily blood glucose checks or bolusing, injecting insulin, food and exercise management) in order to mimic a functioning pancreas.

Communal coping is a specific interpersonal coping theory that has gained more recent attention and refers to a dual process of a shared appraisal of a stressor (i.e., “our” problem instead of “my” or “your” problem) and collaborative actions to manage the stressor (e.g., Helgeson, Jakubiak, et al., 2018; Lyons et al., 1998). Shared appraisal refers to whether an individual perceives the illness to be a shared versus individual responsibility. Collaboration refers to joint actions undertaken to manage an illness as well as joint actions that address daily stressors that arise in regard to illness management.

The vast majority of the literature on communal coping has focused on either shared appraisal or collaboration, but not both (see Bodenmann et al., 2019 and Helgeson, Jakubiak, et al., 2018 for recent reviews). Thus, it is not clear whether shared appraisal

This article was published Online First December 30, 2021.

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This research was supported by Grant DP3 DK103999 from the National Institute of Health.

Melissa Zajdel served as lead role for formal analysis and writing-review & editing and contributed equally to conceptualization and writing-original draft. Vicki S. Helgeson contributed equally to conceptualization, funding acquisition, and writing-original draft as well as served in a supporting role for writing-review & editing. Jonathan E. Butner served as lead for methodology and a supporting role for formal analysis, writing-original draft, and writing-review & editing. Eunjin Lee Tracy served in a supporting role for writing-original draft and writing-review & editing. Cynthia A. Berg contributed equally to conceptualization and funding acquisition, and a supporting role for writing-original draft and writing-review & editing.

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and collaboration are distinct constructs, whether they have additive effects for illness outcomes, or whether they interact to predict health. Such issues are crucial for interpersonal coping theories. For instance, extensive overlap between shared appraisal and collaboration would argue against separable theoretical constructs. Addressing these issues is important clinically as interpersonal coping research is used to facilitate how couples jointly deal with chronic illnesses. Thus, it is important to understand whether interventions targeting shared appraisal, collaboration, or both are needed.

Addressing such issues is complicated as there are a number of ways to measure overall communal coping and the individual components of shared appraisal and collaboration. There has been little attention as to how these measures are related to one another, and no clear guidance has been offered as to the best measurement approach. Communal coping has been examined via self-report with a single assessment of survey items, repeated daily diary assessments of shared appraisal and collaboration, linguistic analyses of the relational language used (i.e., first person plural pronoun usage, or “we-talk”), adaptations of relationship scales, and observational measures based on discussions of illness-related difficulties (e.g., Afifi et al., 2019; Van Vleet et al., 2018; Van Vleet et al., 2019; Zajdel & Helgeson, 2020). There are advantages to each measurement approach. For example, linguistic and observational measures are less vulnerable to demand characteristics that are associated with self-report—for instance, representing the relationship in a manner couples think is desirable. However, self-report questionnaires are also valuable as they allow us to directly ask participants how they perceive the constructs of interest. Thus, understanding whether these different measures tap the same constructs of shared appraisal and collaboration set forth by the theory is an important contribution for the literature.

Addressing these theoretical and measurement issues is important because there is a large and growing body of research that has linked communal coping to positive relational, psychological, behavioral, and physical health in the context of community stressors (Afifi et al., 2019; Włodarczyk et al., 2016) and adjustment to chronic illness (Berg & Upchurch, 2007; Helgeson, Jakubiak, et al., 2018). When the two components of communal coping have been examined separately, there is evidence for their health benefits. For example, in the context of the present sample, self-reported shared appraisal has been associated with better relationship, better self-care, and fewer self-regulatory failures in type 1 diabetes (Berg et al., 2020; Helgeson et al., 2019). A recent meta-analytic review of 30 studies showed positive links of we-talk to relationship, psychological, and physical functioning (Karan et al., 2019). Additionally, daily collaboration has been associated with positive mood and self-care in cancer (Berg et al., 2008) and type 2 diabetes (Stephens et al., 2013).

There is also growing evidence that the two components of communal coping may interact to predict health. For example, a study of couples in which one person had type 2 diabetes showed that diet-related support was related to decreases in diabetes-related distress when illness responsibility was appraised as shared but was unrelated to diabetes-related distress when illness responsibility was not shared (Stephens et al., 2013). In a study of adolescents with type 1 diabetes, parent–child collaboration was related to more effective coping for adolescents who held a shared appraisal (viewed diabetes as shared between teen and parent) but less effective coping for adolescents who held an individual

appraisal (viewed diabetes as belonging to teen; Berg et al., 2009). In the sample used for the present study, we found that self-reported shared appraisal (both overall and daily) moderated the links of self-reported collaborative strategies to well-being and self-care (Berg et al., 2020; Helgeson et al., 2019). Specifically, collaboration was more likely to be associated with detrimental outcomes in the context of an individual appraisal, but more likely to be beneficial when the illness was appraised as shared.

The overall goal of the present research was to apply a multimethod framework to communal coping and test its links to psychological and diabetes health in the context of couples in which one member has type 1 diabetes. We are building on our prior work with this sample by employing multiple methods to assess shared appraisal and collaboration and determining whether we could empirically distinguish between the two components of communal coping. This latent variable approach was recently applied to a multimethod study of couples in which one person had type 2 diabetes (Zajdel & Helgeson, 2020). The researchers found evidence for the two distinct components of communal coping (shared appraisal, collaboration) and found that the two-factor model provided a better fit to the data than a single factor. Thus, the first aim of the present study is to determine whether employing a latent variable approach would replicate the two-component structure of communal coping in a new context—couples in which one member has type 1 diabetes.

Whereas Zajdel and Helgeson (2020) studied couples in which one member was recently diagnosed with type 2 diabetes (diagnosed on average for 2 years), the present study involves adults with type 1 diabetes who had been diagnosed with diabetes for a much longer period of time (average of 27 years ago)—most of whom had been coping with the disease since childhood. Communal coping may operate differently in type 1 diabetes (compared to type 2 diabetes) as patients’ established management behaviors and habits may conflict with spousal attempts to engage in communal coping. In addition, the main self-care behaviors involved in type 1 and type 2 diabetes are different; type 1 diabetes heavily involves insulin management while type 2 diabetes mainly involves diet and exercise. It is much easier for partners to be involved in diet and exercise than insulin management. Finally, research on adults with type 1 diabetes is a unique context itself to examine communal coping, as the majority of research in type 1 diabetes is in childhood or adolescence (Wiebe et al., 2016).

We hypothesized that the shared appraisal component of communal coping would be reflected by single occasion self-reports of shared appraisal, an aggregate of multiple daily reports of shared appraisal, and a linguistic marker of shared appraisal (i.e., we-talk). We hypothesized that the collaboration component would be reflected by single occasion self-reports of collaboration and an aggregate of multiple daily reports of collaboration. Finally, we hypothesized that an observational measure of communal coping would reflect both the shared appraisal and the collaboration components because raters are asked to take into account both the language used in the conversation (e.g., we-talk) as well as the content that reflects joint actions.

The second study aim was to determine whether the shared appraisal and collaboration components of communal coping were related to patient health outcomes: general psychological well-being, diabetes-specific distress, and diabetes health (self-care, self-efficacy, and HbA1c). There is a dearth of research on adults with type 1 diabetes, and this aim will elucidate how social and behavioral processes may influence health. We hypothesized that the

latent shared appraisal variable would be related to less psychological well-being, less diabetes-specific distress, and better diabetes health based on prior research (Karan et al., 2019; Zajdel & Helgeson, 2020), including some data from the present study (Berg et al., 2020; Helgeson et al., 2019).

However, unlike previous research, we did not hypothesize a direct link of the collaboration latent variable to health outcomes. Our previous research with these couples has shown single collaboration measures to be unrelated to health (Helgeson et al., 2019) or inversely related to health (Berg et al., 2020). Because some studies have shown shared appraisal and collaboration to interact synergistically (Berg et al., 2009; Stephens et al., 2013), including our own (Berg et al., 2020; Helgeson et al., 2019), we built on this prior research by testing whether the latent shared appraisal and collaboration variables interacted to predict health. We hypothesized that either (a) collaboration would be related to good health in the context of a higher shared appraisal but not a lower shared appraisal or (b) a higher shared appraisal would mitigate any negative effects of collaboration on health. The current study expands upon earlier reports by leveraging the full set of communal coping measures included in the study. This study seeks to integrate each of these measures to enhance our understanding of communal coping processes in adults with type 1 diabetes.

Method

Procedure

Participants were recruited from university-affiliated endocrinology clinics in Pittsburgh, Pennsylvania and Salt Lake City, Utah. Study procedures were approved by the Carnegie Mellon University and University of Utah Institutional Review Boards. Individuals were eligible to participate if (a) they were 25 years of age or older as the NIH RFA that funded the study stipulated a focus on adults with type 1 diabetes (rather than emerging adults); (b) had a diagnosis of type 1 diabetes for at least one year (to avoid the honeymoon period immediately after diagnosis where individuals can still produce insulin on their own); (c) were taking insulin for type 1 diabetes within one year of diagnosis to ensure individuals were properly diagnosed as type 1 diabetes (as opposed to type 2 diabetes); (d) were married or in a cohabiting relationship for at least one year; and (e) their partner did not have type 1 diabetes and was willing to participate. At the Pittsburgh site, 92 couples were enrolled in the study, and at the Utah site, 107 couples were enrolled in the study. Thus, the final sample included 199 couples across both sites. More detail is provided on recruitment and sample demographics elsewhere (Tracy et al., 2019).

Briefly, just over half of participants with type 1 diabetes (T1D) were female (52%), and the majority were white (90%) and non-Hispanic (94%). The majority of the sample was married (92%), and the remainder were cohabiting, with the vast majority (97%) in heterosexual relationships. The average relationship length was 19 years ($SD = 15$ years). Persons with T1D were average age 47 years ($SD = 14$ years), just over two thirds (69%) used an insulin pump, and 43% used continuous glucose monitoring. Participants had been diagnosed with diabetes for 27 years ($SD = 14$, range 3–61) at average age 19.5 years, ($SD = 12$, range: 0–50) and had an average HbA1c of 7.57 ($SD = 1.06$), which is above the current ADA recommendations of HbA1c < 7.0% (American Diabetes Association, 2019).

Once couples were recruited for the study, they were emailed online surveys (that included consent) to complete at home prior to the in-lab visit. During the laboratory visit, couple members provided written consent for all study procedures, completed an online questionnaire in separate rooms as well as a brief coping interview. Next, couples were reunited and asked to discuss a diabetes-related concern, as described in detail below. Finally, HbA1c was obtained during the laboratory session. At the end of the in-person session, the 14-day daily diary procedure was described. Couples were emailed a link to brief questionnaires (which contained measures of daily shared appraisal and collaboration) to complete online at the end of the day for the next 14 days. Couples were compensated individually for study participation.

Measures of Shared Appraisal

Self-Report

Participants were asked in an interview: “When you think about diabetes, choose one of the following phrases that best describes how you think about it.” Persons with T1D chose from the following options: (a) It is my issue to deal with; (b) It is my issue, but I know it affects my partner; (c) It is a shared issue; or (d) It is my partner’s issue to deal with. No persons with T1D chose the latter option. Therefore, participant scores on a scale from 1 to 3 were used in these analyses, where higher numbers represent higher shared appraisal. This measure has been used in previous research (e.g., Zajdel & Helgeson, 2020).

Daily Diary

For daily shared appraisal, participants were presented with the following question each day via online questionnaires: “When you thought about diabetes today, did you view diabetes as ‘our issue’ (shared by you and your partner equally), mainly your own issue, or your partner’s issue?” Response options included (a) completely my own issue, (b) mostly my issue, (c) both our issue, (d) mostly my partner’s issue, or (e) completely my partner’s issue. Because few participants said that it was “completely the partner’s issue” or “mostly partner’s issue,” we dropped these options. Similar to the appraisal measure described above, we used a 1 to 3 scale, where higher numbers represent higher shared appraisal. Responses across the 14-day period were aggregated (averaged), and the aggregate value was used in these analyses.

We-Talk

Participants were asked to briefly describe how they were coping or dealing with diabetes. After their initial response, they were asked two follow-up questions. Audiotaped responses were transcribed and submitted to the Linguistic Inquiry Word Count (Pennebaker & Francis, 1996) program. We-talk was computed using the proportion of first-person plural pronouns (e.g., we). This ranged from 0% to 40% ($M = 11.09\%$; $SD = 8.96\%$; Lee et al., 2020).

Measures of Collaboration

Self-Report

Collaborative and supportive strategies consisted of three collaboration items (i.e., couple working together on joint problem

solving) and four instrumental support receipt items (i.e., assistance, advice). These items were combined into a collaborative and supportive strategies index because they loaded together on a single factor following principle components analysis (Helgeson et al., 2019). Scale means were used for analyses.

Daily Diary

Daily perceptions of partner collaboration and supportive strategies consisted of three collaboration items (e.g., made decisions together with me for diabetes care) and five emotional and instrumental support items (e.g., was there by giving me undivided attention, remind me of the things I needed to do to manage diabetes). Each response was rated from 1 ("not at all") to 5 ("a lot"). Participants completed these questions via an online questionnaire for each day of the diary in which they had contact with their partners. The 8 items were subjected to an exploratory factor analysis procedure suitable for daily diary items in MPlus (Version 8), which revealed that these items loaded onto a single factor. A scale for each day was constructed using mean scores, and responses were aggregated (averaged) across the 14 days.

Dyadic Observation

Persons with T1D and partners engaged in an eight-minute discussion about a mutually agreed upon topic of diabetes concern. Prior to the discussion, each couple member rated a set of 13 diabetes-related concerns (e.g., diabetes-related complications, maintaining a healthy weight or losing weight, avoiding/managing hypoglycemia) on a seven-point scale ranging from 1 (not at all concerning) to 7 (very concerning). Answers were then reviewed by the experimenter to determine the highest rated shared diabetes concern. Couples were instructed to discuss the topic for the next 8 minutes. They were told to try to stay on topic for the entire time and to try to understand and resolve the issue as best as possible. The most common topics discussed were diabetes-related complications (18%), maintaining a healthy weight (12%), financial concerns (11%), managing diabetes away from home (11%), avoiding hypoglycemia (9%), controlling diet (8%), exercising (7%), and medication management (7%). Other topics included blood glucose checking, planning ahead, feet checking, and quitting smoking.

A team of seven research assistants rated the video-recorded discussions on a number of dimensions using the reliable and well-validated Naïve Observational Rating System (Baucom et al., 2012). The interrater reliability was .74 for the communal coping code, the only observational code relevant to the present paper. Patient's communal coping was defined as: "approaches the discussion as though the topic being discussed is a joint problem. A low score would indicate that the person being rated perceives the problem to be the patient's problem only, or a behavior in which the patient engages in by him/herself." Ratings were made on a 7-point scale (= low communal coping, 4 = moderate, 7 = high communal coping).

Outcome Measures

Psychological Well-Being

Psychological well-being was measured with three instruments in line with past research (Helgeson, Vaughan, et al., 2018; Zajdel

& Helgeson, 2020). We measured depressive symptoms with the 20-item Center for Epidemiological Studies Depression Scale (CESD; Radloff, 1977). Each item is rated on a 0 (*rarely or none of the time*) to 3 (*all of the time, 5–7 days*) scale ($\alpha = .90$). We administered the Satisfaction with Life Scale (SWLS; Diener et al., 1985), which asks participants to indicate how much they agree or disagree with five statements on a 1–7 scale ($\alpha = .87$). Finally, we used the 4-item abbreviated version of the Perceived Stress Scale (PSS; Cohen et al., 1983), which asks participants how often they felt or behaved a certain way on a scale ranging from 0 (*never*) to 4 (*very often*; $\alpha = .80$). These three scales were used as indicators of a latent psychological well-being variable, and a confirmatory factor analysis showed good model fit (see overview of analyses).

Diabetes-Specific Distress

Persons with T1D completed the 17-item Diabetes Distress Scale (DDS; Polonsky et al., 2005) to assess distress associated with four diabetes domains: emotional burden ($\alpha = .90$), regimen distress ($\alpha = .85$), interpersonal distress ($\alpha = .84$), and physician distress ($\alpha = .79$). Persons with T1D indicated the extent to which each item was currently bothering them using a 6-point scale, ranging from 1 (*not a problem*) to 6 (*a very serious problem*). We constructed a diabetes-specific distress latent variable with these four subscales as indicator variables, and a confirmatory factor analysis showed good model fit (see overview of analyses).

Diabetes Health Outcomes

Diabetes health outcomes included self-care, self-efficacy, and HbA1c. Self-care was measured with the Revised Self Care Inventory (Lewin et al., 2009). One item from the original measure ("ketone testing") was dropped based on health care provider recommendations, leaving 13 items from the original scale. Persons with T1D rated how often they engaged in each recommended behavior (e.g., glucose checking, administering correct insulin dose) in the past month from 1 (*did not do*) to 5 (*always did without fail*). The scale had acceptable reliability ($\alpha = .76$). The 6-item self-efficacy subscale of the Multidimensional Diabetes Questionnaire (Talbot et al., 1997) was used to assess diabetes-specific self-efficacy. Persons with T1D indicated on a scale from 0–100 how confident they are in managing different aspects of diabetes (e.g., "How confident are you in your ability to follow your diet?," "How confident are you in your ability to test your blood glucose regularly?," $\alpha = .83$). Participants gave a capillary blood sample to measure their HbA1c levels using Siemens DCA Vantage Analyzer. These items were examined as separate indicators of diabetes health because they are conceptually distinct outcomes.

Overview of Analyses

First, to determine whether we needed to control for demographic or illness variables we ran multivariate analysis of variance across the six measures of communal coping for categorical variables: patient gender, race, work status, marital status, CGM, insulin delivery system (pump status), and insulin delivery type (continuous or bolus). Of these variables, multivariate effects were significant only for race and insulin delivery system ($p < .05$); univariate analyses suggested race was related to only two of the six

communal coping variables and insulin delivery to one of the six. Additionally, correlations of the six communal coping variables to continuous variables—relationship length, age, length of diagnosis, and age of diagnosis—were examined. Age was only related to one variable. To be conservative, we controlled for age, race, and insulin delivery system in all subsequent models.

To determine whether we could empirically distinguish shared appraisal from collaboration, we used confirmatory factor analysis (CFA) using R Version 4.01. We hypothesized that the shared appraisal element of communal coping would be best reflected by the self-report of appraisal, daily diary report of appraisal, we-talk, and the observational measure. We hypothesized that the collaboration component of communal coping would be best reflected by the self-report of collaboration, daily diary report of collaboration, and the observational measure. We allowed the correlation of the residuals from the two daily diary measures due to shared method variance. We also allowed the correlation of residuals across shared appraisal and collaboration latent variables. We evaluated overall model fit and compared this model to a unidimensional model in which all variables loaded on a single factor.

Next, we ran a CFA to examine the adequacy of assessing psychological well-being and diabetes distress as latent variable constructs. The CFA consisted of two latent variables, the first of which was diabetes distress and consisted of the four subscales of the diabetes distress scale (Polonsky et al., 2005)—regimen distress was used as the marker variable. The second latent variable was psychological well-being, which consisted of the CESD (Radloff, 1977), the SWLS (Diener et al., 1985) and the PSS (Cohen et al., 1983)—the CESD scale was used as the marker variable meaning that higher numbers represent worse psychological well-being.

We then examined whether the latent appraisal and latent collaboration variables were related to outcomes (psychological well-being, diabetes distress, self-care, self-efficacy, and HbA1c) with structural equation modeling (SEM). All SEM analyses were conducted using the R package lavaan .6-6 (Rosseel, 2012). For all models we used a robust maximum likelihood estimator (MLR) and full information maximum likelihood (FIML) for missing data. Missing data were minimal: no more than .5% missing data in any survey variable; .5% we-talk; 2% observational communal coping.

First, we examined the direct links to outcomes by creating a model with both appraisal and collaboration regressed on each of the outcomes. Next, to determine whether appraisal and collaboration interacted to predict each of the outcomes, we created a model that tested the interaction between the two latent variables. To do so, we followed the recommendations from Marsh and colleagues (2004) by creating a series of pairwise interactions of mean centered variables across the appraisal and collaboration factors. This set of interactions was then used to create an interaction latent variable. We used the unconstrained solution which equates the covariance between the factors to the mean of the interaction. We used the Yuan and Bentler adjustment for nonnormality. We then created one model testing the effects of appraisal, collaboration, and the interaction between the two on psychological well-being, diabetes distress, self-care, self-efficacy, and HbA1c. We did not assume any additional correlated residuals.

For all models we used commonly accepted fit statistics to assess model adequacy and report the robust fit statistics. Good model fit is generally determined by whether the chi-square test is rejected, RMSEA < .05, CFI > .95, TLI > .95, and SRMR < .08

(Kline, 2016). We report relations below that meet the conventional requirement of $p < .05$ and report semi R^2p effect sizes using Marsh's (2004) method following guidance from Asparouhov and Muthén (2020) and Mooijaart and Satorra (2009). However, we used the realized values for the latent variable mean as the covariance rather than extrapolating it as is implied in these references. We also note that while our sample size fits general median guidelines for SEM research (i.e., $n = 200$; Kline, 2016), only the CFA model has the power to both reject an ill-fitting model and detect significant path loadings. Because the models were rooted strongly in theory and the CFA fit the data well, we concluded it was appropriate to test the fit of these models and evaluate path coefficients.

Results

Confirmatory Factor Analysis

The CFA showed that this model fit the data moderately well ($\chi^2[6] = 13.06$, $p = .04$; RMSEA = .07; CFI = .98; TLI = .96; SRMR = .04; BIC = 1718.33). However, there was no evidence that the observational measure loaded on the collaboration latent variable (unstandardized factor loading = $-.33$, $p = .36$). Therefore, we removed the observational measure from the collaboration latent variable and allowed it to load only on the appraisal latent variable. Because the collaboration latent variable only consisted of two variables in the revised model, we constrained both of the factor loadings to 1. The revised model revealed a better fit to the data ($\chi^2[8] = 16.32$, $p = .04$; RMSEA = .07; CFI = .98; TLI = .96; SRMR = .04; BIC = 1711.09). Appraisal was reflected by self-report shared appraisal (factor loading = 1.00), daily diary appraisal (unstandardized factor loading = 1.70, $p < .001$), we-talk (unstandardized factor loading = .06, $p < .05$), and the observational measure (unstandardized factor loading = .78, $p < .01$). Collaboration was reflected by self-report collaboration and daily diary collaboration (factor loadings = 1.00). The BIC decreased by more than two when we made this change to the model, which is consistent with conventional norms on evaluation of model fit (Seltman, 2018).

We tested an alternative model in which all of the variables reflected a single measure of communal coping, but the model did not fit the data as well as the two factor CFA ($\chi^2[9] = 27.81$, $p = .001$; RMSEA = .10; CFI = .95; TLI = .92; SRMR = .04; BIC = 1715.93).

Finally, we tested a separate CFA to assess the adequacy of examining psychological well-being and diabetes distress as latent factors. The model fit the data well ($\chi^2[13] = 10.84$, $p = .62$; RMSEA = .00; CFI = 1.00; TLI = 1.01; SRMR = .03). Thus, we tested these outcomes as latent factors.

Structural Model

The main effects model tests the relations of the appraisal and collaboration latent variables to psychological well-being, diabetes distress, self-care, self-efficacy, and HbA1c (Hypothesis 2). The model fit was adequate ($\chi^2[119] = 218.23$, $p < .001$; RMSEA = .07; CFI = .90; TLI = .86; SRMR = .06). The direct effects of appraisal were unrelated to psychological well-being ($\beta = -4.29$, $p = .48$), diabetes distress ($\beta = -1.23$, $p = .07$), self-care ($\beta = .21$, $p =$

.55), self-efficacy ($\beta = -6.37, p = .65$), and HbA1c ($\beta = -.40, p = .57$). Similarly, the direct effects of collaboration were unrelated to psychological well-being ($\beta = .50, p = .81$), diabetes distress ($\beta = .33, p = .18$), self-care ($\beta = -.02, p = .86$), self-efficacy ($\beta = 4.51, p = .35$), and HbA1c ($\beta = .12, p = .63$).

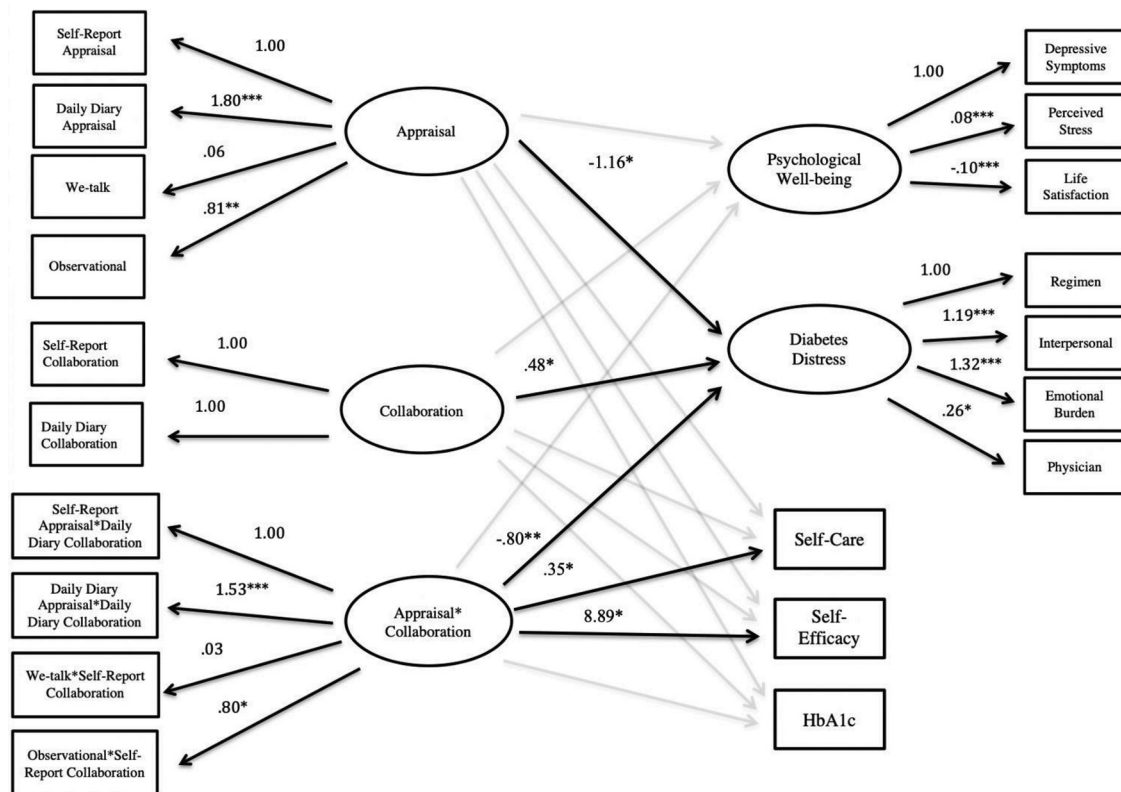
The interaction model also demonstrated adequate fit ($\chi^2[190] = 345.40, p < .001$; RMSEA = .07; CFI = .88; TLI = .84; SRMR = .07, see Figure 1). The appraisal by collaboration interaction was linked to diabetes distress ($\beta = -.80, p < .01, R^2 = .18$), self-care ($\beta = .35, p < .05, R^2 = .09$), and self-efficacy ($\beta = 8.89, p < .05, R^2 = .005$), but was unrelated to psychological well-being ($\beta = -1.63, p = .47, R^2 = .00$) and HbA1c ($\beta = -.48, p = .08, R^2 = .00$). Significant interactions were graphed using the simple slope analyses one standard deviation below and one standard deviation above the mean of shared appraisal. As shown in Figure 2, collaboration was significantly related to more diabetes distress at low shared appraisal ($\beta = .72, t = 2.53, p = .01$) and average shared appraisal ($\beta = .48, t = 2.11, p = .03$) but was unrelated to diabetes distress at high shared appraisal ($\beta = .25, t = 1.32, p = .19$). For self-care, the pattern of results indicated that collaboration was related to lower self-care for those with low shared appraisal, but the relation was attenuated for those with high shared appraisal (Supplementary Figure 1). For self-efficacy, collaboration was related to lower self-efficacy for

those with low shared appraisal and higher self-efficacy for those with high shared appraisal (Supplementary Figure 2). However, the simple slope analyses indicated that collaboration was significantly linked to self-care and self-efficacy only more than two standard deviations above and below average shared appraisal, which reflect the extreme ends of shared appraisal (e.g., completely individual vs. completely shared).

Discussion

The results confirm the theoretical perspective of communal coping as involving two distinct components in the context of type 1 diabetes. The confirmatory factor analysis indicated that there were two distinct factors, one that reflected shared appraisal and one that reflected collaboration. The two-factor solution provided a better fit to the data than a one-factor solution, again supporting the hypothesis that there are two distinct components of communal coping. Further, the fact that explicit (self-report) and implicit measures of appraisal (we-talk from interviews and observations of conflict discussions) both loaded on an appraisal factor informs frequent concerns that implicit measures may be more objective measures of communal coping than explicit self-report measures. Rather, implicit and explicit measures may hold much in common.

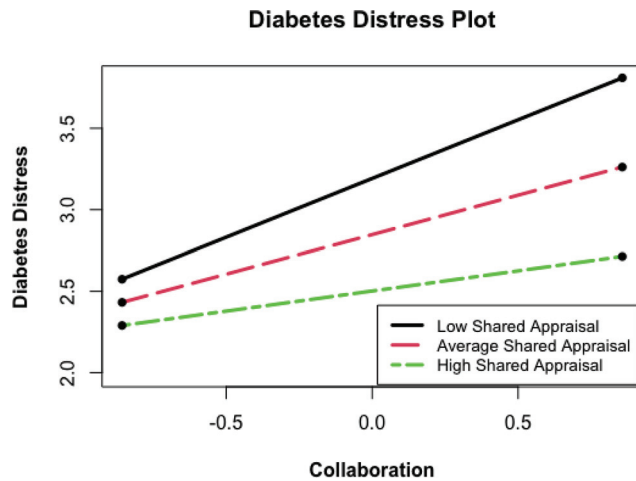
Figure 1
Interaction Model



Note. Coefficients reported are unstandardized. Gray paths represent non-significant regression paths. Not pictured are correlated residuals between daily diary appraisal (appraisal latent variable) and daily diary collaboration (collaboration latent variable) as well as between the latent variables of appraisal and collaboration.

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

Figure 2
Interaction of Appraisal and Collaboration on Diabetes Distress



Note. See the online article for the color version of this figure.

This finding replicates previous research in the area of type 2 diabetes (Zajdel & Helgeson, 2020) with a very different sample—adults with type 1 diabetes. Although there is some commonality between type 1 and type 2 diabetes, there are some sharp differences. The primary self-management behavior for adults with type 1 diabetes is the management of insulin and its effects on blood glucose levels, a behavior that is fairly rare in type 2 diabetes. In contrast, the main management behaviors in type 2 diabetes are exercise and diet, which may have a larger impact on the spouse's daily activities than insulin management. In addition, the majority of participants in the present study were diagnosed with diabetes as children, meaning the disease onset largely occurred prior to the marital relationship. Thus, most of the participants in this study had to negotiate diabetes management behaviors with their partners at the time they entered into this romantic partnership.

The measures of shared appraisal and collaboration loaded on the hypothesized factors as predicted, with one exception. The observational measure of communal coping was expected to load on both the appraisal and collaboration factor because raters were instructed to take both into consideration in their assessment. Interestingly, like the previous study in the area of type 2 diabetes (Zajdel & Helgeson, 2020), the observational measure of communal coping only loaded on the appraisal factor. Because appraisal can be inferred from we-talk, it may be that raters overly emphasized this aspect of the interaction in their ratings. In hindsight, it is also clear that we did not provide couples with a task or with instructions that would necessarily lead to collaboration during the discussion. Couple members were told to discuss the concern and to try to understand and resolve the problem. To better observe collaboration, couples could be presented with a hypothetical or future-oriented diabetes-related situation and asked to plan how they would approach it. For example, couples could be asked to imagine they are going out to dinner with friends and plan how they would approach this situation in relation to diabetes. We also encourage measurement of collaboration in the natural environment, such as observational measures in the couples' home environment (Wang & Repetti, 2016) or the use of Electronically Activated Recorders (Robbins et al., 2014).

A key finding was that shared appraisal and collaboration interacted to impact diabetes outcomes. Higher shared appraisal buffered the negative effects of collaboration on diabetes distress and diabetes outcomes—self-care and self-efficacy. In particular, collaboration was associated with higher diabetes distress when diabetes was appraised as a more individual problem, but higher shared appraisal buffered this effect. The interaction between shared appraisal and collaboration was also linked to self-care and self-efficacy, but the pattern for these effects suggested that a completely individual appraisal combined with collaboration may be linked to worse patient health outcomes. Overall, these data show that collaboration with a romantic partner can be detrimental for diabetes-related outcomes for adults who perceive type 1 diabetes to be largely their own problem but may offer some protection to those who perceive diabetes to be a shared problem.

Although the findings regarding collaboration are inconsistent with previous research on collaboration as a construct (e.g., Berg et al., 2008), they are consistent with the results we have reported in other papers from this dataset of adults with type 1 diabetes (e.g., Berg et al., 2020). The current findings may be due to the unique context of type 1 diabetes in adulthood. Unlike other chronic illnesses that are largely diagnosed earlier in life, perhaps before the start of the spousal relationship. The majority of adults with type 1 diabetes have had years if not decades to manage diabetes on their own; in this context, it appears that collaborating with a partner is detrimental if persons with type 1 diabetes feel the illness is theirs alone to manage. These individuals may perceive collaborative efforts by their partners to be intrusive or over-protective if they already have an established self-care regimen. The lack of benefits from collaboration in this context may also have to do with the fact that the self-care behaviors used to manage the disease (e.g., blood glucose checking and monitoring technology) may be more individually focused compared to other chronic illnesses. These findings suggest that health care professionals should work with couples to identify the best ways to collaborate that are acceptable to both members, to adopt a shared appraisal of the problem, or to do both. These findings also underscore the unique context of type 1 diabetes, a chronic illness that is understudied in adulthood.

The results need to be interpreted in the context of several study limitations. First, the sample was primarily non-Hispanic White and advantaged in terms of their socioeconomic status, which limits the generalizability of the findings. Second, individuals were in largely long-term heterosexual relationships, with further research needed to understand communal coping in the context of developing relationships and same-sex relationships. Third, although the study used a large number of assessments of communal coping, the two-factor structure found here is dependent on the measures used in the present study. The two component structure of communal coping would benefit from replication using additional assessments including observational measures in the couples' home environment (Wang & Repetti, 2016) as well as Electronically Activated Recorders for capturing communal processes (Robbins et al., 2014).

Overall, these results have clinical implications for health care professionals working with adults with type 1 diabetes. Simply encouraging partners to work cooperatively to manage a chronic illness may not be optimal. Instead, interventions should encourage

couple members to both collaborate and reframe their cognitions to approach illness management as a team. Much of the existing intervention work focuses on collaborative behaviors (e.g., Trief et al., 2016), but these results suggest the cognitive appraisal of the illness as shared is critical. Further, these results provide evidence for the conceptual distinction between shared appraisal and collaboration as individuals cope with type 1 diabetes. Such results add to a growing effort in the field to understand the commonalities across multiple methods (Zajdel & Helgeson, 2020). The distinctions between appraisal and collaboration and the multimethods approach advance the field of communal coping and can inform the measurement of these constructs across chronic illness conditions.

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Received October 6, 2020

Revision received July 21, 2021

Accepted July 28, 2021 ■