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Actor and partner effects of positive affect on communal coping

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Abstract

Positive affect (PA) has been shown to facilitate the accrual of social resources which, in turn, reduces stress and improves health. These social resources may encourage interpersonal coping strategies, but this effect has been understudied. The present research examined if PA facilitates the interpersonal coping style of communal coping, defined as the perception of a stressor as shared (shared appraisal) and collaborative action to manage the stressor (collaboration). We assessed whether trait and state PA predicted increased collaboration and shared appraisal on the same day, and whether state PA predicted increased collaboration and shared appraisal the following day. Participants were romantic partners in which one person had recently been diagnosed with type 2 diabetes. Patients (n = 198, 45% female, 44.9% Black, 72% married) and their significant others completed daily diary surveys that assessed PA, negative affect, and diabetes-specific shared appraisal and collaboration for 14 days. Multilevel modeling was used to differentiate the effects of within-person (state) and between-person (trait) PA. Actor Partner Interdependence Modeling was used to assess the effects of both couple member's mood on one person's coping. Results showed partner state PA was cross-sectionally linked to shared appraisal, but the link of actor PA to shared appraisal was accounted for by the inclusion of actor NA. Both actor and partner state and trait PA were cross-sectionally linked to collaboration. Importantly, actor state PA predicted next-day shared appraisal. Findings provide initial support for the role of affect in predicting communal coping.

Keywords

positive affect, communal coping, collaboration, shared appraisal, daily diary, diabetes

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A robust literature has found positive affect (PA) to predict reduced stress and improved health across a variety of contexts (Pressman et al., 2019; Pressman & Cohen, 2005). These effects can occur directly; for example, PA reduces stress appraisals (Bono et al., 2013) and predicts healthier immune function (Marsland et al., 2007). PA can also impact stress and health indirectly. As both the broaden-and-build theory of positive emotions (Fredrickson, 1998) and the stress-buffering hypothesis of positive affect and health (Pressman & Cohen, 2005) stipulate, PA facilitates the accrual of a number of personal resources which, in turn, buffer stress, support effective coping, and lead to better health outcomes. For example, PA promotes psychological resources like resilience and mindfulness, and physiological resources like increased vagal tone (see Fredrickson, 2013, for a review).

One important pathway through which PA facilitates reduced stress and improved health is through the accrual of interpersonal resources. There is a vast literature connecting PA to a range of positive relationship processes and outcomes including the development and regulation of relationships (Shiota et al., 2004), increased relationship quality (e.g., Griffith et al., 2019; Lyubomirsky et al., 2005; Ramsey & Gentzler, 2015), and increased social connectedness (e.g., Fredrickson et al., 2008; Kok et al., 2013; Steptoe et al., 2008). Thus, PA facilitates feeling close to and connected with other people, outcomes which, in turn, have robust links to stress and health outcomes (Cohen & Wills, 1985; Holt-Lunstad et al., 2010; Robles et al., 2014). Indeed, the availability of close, positive relationships may fundamentally change the way people think about and manage a stressor, and may ultimately lead to more interpersonal, rather than individual, coping strategies.

One interpersonal coping strategy that may be particularly influenced by PA is communal coping. Like many interpersonal coping theories (e.g., common dyadic coping; Bodenmann, 2005) communal coping emphasizes mutual effort and collaboration to address a stressor. However, communal coping is distinct from many of these theories in that it also involves a shared appraisal of a stressor. Shared appraisal, the cognitive component of communal coping, captures how someone fundamentally views a problem; it consists of one person viewing a stressor as shared with a close other, even if the problem objectively belongs to an individual. Shared stressor appraisal, measured directly via self-report or indirectly through "we-talk," has been linked to better health and wellbeing (e.g., Helgeson et al., 2019; Robbins et al., 2013; Rohrbaugh et al., 2008). Communal coping as a whole, defined as the combination of shared appraisal and collaboration, has been linked to positive outcomes across a variety of circumstances, including natural disasters (Afifi et al., 2012), addiction (Rentscher et al., 2017), within Palestinian refugee camps (Afifi et al., 2016), and among people with diabetes (see Helgeson et al., 2018, for a review).

Communal coping is a particularly desirable process in the context of diabetes because the behavioral demands of diabetes (e.g., diet, exercise, monitoring blood glucose levels, medication adherence) may be best addressed from a joint perspective and via joint efforts. Understanding the conditions and processes that give rise to this coping method could thus inform valuable intervention work. Communal coping theory identifies relationship quality as a likely antecedent, as couples who are closer may be more likely to

perceive a stressor as shared and address problems as a team. However, researchers have noted that empirical evidence for the antecedents to communal coping is scarce, as extant research is largely retrospective and cross-sectional in nature or has examined only the downstream effects of communal coping (Helgeson et al., 2018). Research on interpersonal coping more broadly has identified relationship characteristics like length, stability, or quality as conditions that give rise to interpersonal coping (Staff et al., 2017). Because PA has shown robust links to interpersonal resources, including relationship quality, we propose that PA may serve as an important antecedent to communal coping. We hypothesize that PA may independently predict both the shared appraisal and collaboration aspects of communal coping, and we describe our rationale for these predictions below.

First, there is evidence that suggests PA should lead to a cognitive shift towards appraising a stressor as shared by changing one's perceptions of the boundary between the self and others. One study found that PA prospectively predicted feelings of self-other overlap among new college roommates, as measured using the Inclusion of Other in Self scale (IOS; Aron et al., 1992; Waugh & Fredrickson, 2006). This suggests that PA may induce a more flexible view of the boundaries between the self and others. This finding is consistent with a robust line of research linking PA to cognitive flexibility and the ability to view new and creative associations between typically unrelated things (Isen, 2008). Similarly, findings from the intergroup bias literature suggest that PA alters the perceptions of boundaries between groups (Dovidio et al., 1998, 2000). For example, one study found that PA increased inclusive group representations: participants in a PA condition were more likely to view two experimentally manipulated groups as a single, superordinate group than those in a neutral affect condition (Dovidio et al., 1995). This again points to PA breaking down boundaries between entities that might otherwise be considered distinct. Because PA is related to this cognitive flexibility and malleability of perceived boundaries, it may precipitate shared appraisal of a stressor. That is, to the extent that PA causes the boundary between the self and one's partner to be de-emphasized, it may follow that one person's stressor becomes the couple's stressor.

There are also several ways in which PA could facilitate collaboration. Sometimes referred to as the behavioral component of communal coping, collaboration involves joint problem solving and mutual effort to manage the problem. A considerable body of research has shown PA to broaden momentary attention and cognition and facilitate problem-solving abilities (D'Zurilla et al., 2011; Fredrickson, 2013; Isen, 2008). When PA is experienced repeatedly over time, these momentary experiences build on each other, resulting in the accrual of stable problem-solving abilities or resources (Fredrickson, 1998, 2013). Thus, in conjunction with PA's tendency to increase shared appraisal and social engagement, PA is likely to contribute to the joint problem solving and strategy development that underly collaboration.

In examining the link of PA to communal coping, it is important to distinguish how an individual's coping is impacted by both their own emotions (actor effects) and their significant other's emotions (partner effects). For example, when a couple member experiences PA (actor effect), they might more easily view diabetes as shared and engage with their partner by communicating stress related to diabetes, problem solving, and

enacting shared plans to manage the disease. On the other hand, if that same person observes that their partner is in a positive mood (partner effect), they may view their partner as more open and able to share the burden of the disease and to collaborate to manage it, regardless of their own mood.

At the same time, the coping experience of the person with diabetes (the patient) is likely to be distinct from that of their significant other. Because PA is thought to be more protective at higher levels of stress (i.e., stress buffering model; Pressman & Cohen, 2005), and patients may be more distressed by their illness than significant others, it follows that actor and partner PA might be more influential for patient communal coping than significant other communal coping.

To address whether PA leads to communal coping, the present study employed a daily diary design in which persons with type 2 diabetes and their significant others (SOs) reported their mood, shared appraisal, and collaboration daily for 2 weeks. We distinguished the effects of trait PA (i.e., stable, dispositional affect) from those of state PA (i.e., more transitory mood states). Trait PA was measured by averaging an individual's daily mood scores, and state PA was measured as an individual's daily deviation from their average, an approach which has been recommended in the affect literature (Merz & Roesch, 2011). Past research has typically measured trait PA via retrospective recall measures, but these methods are cognitively challenging (e.g., requiring participants to synthesize long-term mood trends) and prone to recency and saliency bias. Overall, daily diary methods are viewed as an improvement over retrospective recall methods, as the latter are susceptible to error across a number of domains, including mood (e.g., Matthews et al., 2018; Shiffman et al., 1997).

Research that examines PA must necessarily contend with the fact that there is some overlap with negative affect (NA), although these two constructs are generally agreed to be distinct and not opposite ends of a bipolar continuum (Diener & Emmons, 1984). Given this overlap, as recommended by others (Pressman et al., 2019), we control for NA when investigating the effects of PA to better understand the independent predictive power of PA.

A considerable limitation to the affect and interpersonal coping literature is an overreliance on White participants and the assumption that findings generalize to Black or other historically marginalized populations. However, there is evidence that White and Black people differ in relationship and coping processes (Assari & Lankarani, 2018; Basinger & Hartsell, 2021; Lincoln et al., 2003). This assumption of generalizability is particularly problematic for diabetes research as Black communities experience higher burden of illness due to systematic racism in health care and related societal structures (Chow et al., 2012). In this study, we aimed for our sample to be approximately half Black and half White so that we could examine whether our findings held across both Black and White participants.

The present study

The purpose of the present study was to assess whether PA, independent of NA, predicted both the shared appraisal and collaboration components of communal coping as assessed

during 14 days of daily diary surveys among couples in which one person has type 2 diabetes. First, we tested whether the relations between PA and communal coping emerged cross-sectionally at both the trait (between-person) and state (within-person) levels, distinguishing between actor and partner effects. We predicted that actor state and trait PA as well as partner state and trait PA would be cross-sectionally associated with increased shared appraisal and collaboration. Next, we tested lagged relations to determine if state PA on one day predicted greater shared appraisal and collaboration the next day, as this would suggest a causal link between PA and communal coping. To rule out the reverse causal sequence, we also assessed whether collaboration and shared appraisal on one day predicted next-day PA. Further, we examined if the effects of PA on shared appraisal and collaboration differed for patients versus SOs, hypothesizing that actor and partner PA would more strongly predict patient than SO communal coping. A final, exploratory study goal was to assess whether the links between PA and shared appraisal or PA and collaboration differed for White versus Black participants. No a priori hypotheses were proposed for this goal.

Method

The present study was part of a larger study on the implications of communal coping for relationships and health among people with type 2 diabetes and their romantic partners. Full study details have been documented elsewhere (Zajdel & Helgeson, 2020). The present study used only the daily diary portion of the larger study, as well as demographic and illness data collected at baseline.

Participants

Participants were 198 romantic couples in which one person had been recently diagnosed with type 2 diabetes (referred to throughout as the patient) and the SO did not have diabetes. Couples were married (72.7%) or cohabitating (27.3%) and lived in the United States. Two couples were in female/female relationships, one couple was in a male/male relationship, and the remainder were in male/female relationships. As mentioned above, we aimed for roughly equal numbers of Black and White participants: 55.1% of patients were White and 44.9% were Black. Patient ages ranged from 25 to 82 (M = 53.3, SD = 11.3), and SO ages ranged from 24 to 83 (M = 53.2, SD = 12.2). More than half (61%) of participants reported household incomes less than $60,000. Full demographic and illness characteristics are presented in Table 1.

Recruitment

See Zajdel & Helgeson (2020) for detailed recruitment procedures. Briefly, participants were recruited from the community through mass advertising, hospital registries, and health fairs. A total of 210 couples completed the full study, but three couples were dropped from analyses: one couple was intoxicated during the study, one couple was determined to not be romantic partners, and one person had type 1 diabetes. Of the 207

Table 1. Demographic variables by role: Percentages or M (SD). n = 198.

	Patient	Significant other (SO)
Age	53.3 (11.3)	53.1 (12.2)
Female	43.9%	56.6%
Race		
White	55.1%	56.9%
Black	44.9%	43.1%
Education		
Less than high school	4.1%	4.5%
High school graduate	27.9%	29.3%
Some college	16.8%	16.7%
2-year college graduate	24.9%	15.2%
4-year college graduate	12.2%	22.7%
Postgraduate education	13.2%	11.6%
Years since diagnosis	1.91 (1.7)	—
Patients on insulin	24.2%	—
Percent married	72.7%	
Length of marriage or cohabitation	18.8 (14.9)	
Income		
Less than $20,000	13.6%	
$20,000–$39,000	23.2%	
$40,000–$59,000	24.2%	
$60,000–$79,000	14.6%	
$80,000–$99,000	11.6%	
Greater than $100,000	12.6%	

couples who completed the full study, seven patients and nine SOs did not have daily diary data. Of these, three patients and three SOs completed multiple surveys on the same day, instead of one survey per day; two patients and two SOs lost the iPads provided for conducting the daily surveys; one patient's data was accidentally deleted, two SOs could not read the surveys; one patient and one SO did not complete the daily diaries due to a death in the family, and one SO missed too many surveys to be included. Thus, diary data from 198 couples were used for the present study.

Procedure

Participants completed initial study activities either at Carnegie Mellon University (28%) or at home (72%). These activities included the informed consent process followed by in-person interviews with study personnel. As the present study used only demographic and illness information from this initial survey, the measures administered during the interview will not be described here. At the end of the interview, the daily diary portion of the study was described. Patients and SOs were each emailed a brief survey at the end of

the day for 14 days; they were instructed to complete these surveys separately and were provided iPads to facilitate doing so. These surveys asked about the participant's daily mood, diabetes collaboration, and the extent to which they viewed diabetes as shared. Overall, study compliance was high: patients completed a mean of 12.33 days (SD = 1.66), and SOs completed a mean of 12.27 days (SD = 1.89) of the 14 daily diary surveys[1].

Daily diary measures

Communal coping was measured by assessing shared appraisal and collaboration separately. To assess shared appraisal, patients were asked "When you thought about diabetes today, did you view diabetes as "our problem" (shared by you and your partner equally), or mainly your own problem?" Patients responded (1) completely my problem, (2) mostly my problem, or (3) both of our problem. For SOs the question was rephrased such that it asked about their partner's diabetes. SOs responded (1) completely my partner's problem, (2) mostly my partner's problem, or (3) both of our problem. Higher numbers therefore indicated greater diabetes shared appraisal for both patients and SOs.

To assess collaboration, both patients and SOs were asked, "How much did you and your partner work TOGETHER to take care of diabetes today?" Participants responded from (1) none of the time, to (5) all of the time.

Mood was assessed using an adjective rating scale (Usala & Hertzog, 1989). Participants were asked, "Think about how much each word describes how you have felt TODAY;" response options ranged from (1) not at all, to (5) a lot. PA was assessed with the well-being subscale, which included three adjectives: "happy," "pleased," and "cheerful." Negative affect was assessed with the depression ("depressed," "sad," "unhappy") and anxiety ("nervous," "anxious," "relaxed") subscales; a face-valid anger subscale was created for this study, and included the items "angry," "annoyed," and "mad." Reliability was assessed using variance component analysis (Bolger & Laurenceau, 2013). The PA, depression, and anger scales were found to have sufficient reliability (PA: R_C = .79 for both patients and SOs; depression: patient R_C = .79, SO R_C = .76; anger: patient R_C = .81, SO R_C = .79). The reliability of the anxiety scale was poor (patient R_C = .49, SO R_C = .52). Upon inspection of the three items, we discovered that the item "relaxed" (reverse-scored) detracted from the reliability of the scale. Thus, it was removed. As this left only two items in the subscale, variance component analysis could not be conducted; the aggregates of the remaining two items were correlated at r = 0.76 ($p < .001$) for patients and r = .74 ($p < .001$) for SOs. All three negative affect subscales were then averaged together to create an overall scale of daily negative affect (R_C = .85 for patients, R_C = .83 for SOs).

Analysis plan

All analyses were performed using R 4.1.0 (R Core Team, 2021) and the nlme package (v3.1-152, Pinheiro et al., 2021).

First, covariates were determined by independently testing the demographic and illness variables in Table 1 for associations with PA, shared appraisal, and collaboration.

Variables that were significantly associated with PA and either shared appraisal or collaboration were included in subsequent analyses as statistical controls.

Hierarchical linear modeling was used to capture the nested structure of the data (repeated measures within persons) and to examine the effects of both level-1 (within-person) PA and level-2 (between-person) PA on communal coping. Between-person PA was measured as a participant's mean PA across the 14 days and was grand mean centered; within-person PA was the participant's daily PA and was person mean centered (Bolger & Laurenceau, 2013). Therefore, between-person PA reflected an individual's average PA compared to others in the study (i.e., trait PA), and within-person PA reflected an individual's daily deviation from this average (i.e., state PA). Given the dyadic structure of the data, Actor Partner Interdependence Modeling (APIM) was used to investigate the effects of actor (one's own) and partner (one's partner's) PA on one's own coping. Note that actor/partner designations are independent of role (patient vs. SO): both patients and SOs serve as both actors and partners.

ICCs, the proportion of variance due to between-couple effects, were calculated for shared appraisal (ICC = .19) and collaboration (ICC = .42) and showed sufficient variability both between- and within-couples to support multilevel modeling (Bolger & Laurenceau, 2013).

The effects of PA on shared appraisal and collaboration were assessed separately. Thus, four primary models were estimated, with PA predicting (1) same-day shared appraisal, (2) same-day collaboration (i.e., cross-sectional models), and (3) next-day shared appraisal and (4) next-day collaboration (i.e., lagged models). We estimated each model in three steps. In step one, only the PA variables (actor within- and between-person PA; partner within- and between-person PA), role, and time (day of diary period) were included. In step two, covariates were added, including actor within- and between-person NA and partner within- and between-person NA. As discussed above, we controlled for NA so as to identify the unique effects of PA, beyond the effects of the shared variance between PA and NA. We present NA findings for completion, but they were not the focus of this study. In step three, we added interaction terms between role and each of the four PA variables to assess whether the relation between PA and the outcomes depended on whether the person was a patient or an SO. In the lagged models, we additionally controlled for the previous day's outcome.

In all models, intercepts were allowed to randomly vary across couples, as were the slopes for role and time[2]. We then tested if the effects of actor and partner within-person PA should be allowed to randomly vary. However, doing so did not alter results and in some instances resulted in convergence errors indicating overfitting of the model. Thus, we selected the more parsimonious approach with only intercept, role, and time as random. Additionally, because days close together are likely to be more similar to each other, we controlled for autocorrelation of level-1 residuals in all models.

We then tested the alternate causal model by examining if shared appraisal or collaboration on one day predicted increased next-day PA, controlling for same-day PA. Shared appraisal and collaboration were parsed into within- and between-person effects using the procedure above and were entered into the model along with the covariates to

predict next-day PA. Interactions between role and shared appraisal and between role and collaboration were then added.

Finally, we conducted exploratory analyses to see if the relation of PA to shared appraisal and collaboration differed for Black versus White participants. Interactions between actor race and each of the four PA variables (actor within- and between-person PA, partner within- and between-person PA) were entered into the fully adjusted models predicting both same-day and next-day shared appraisal and collaboration.

Because these analyses were not the primary aim of the parent study, post-hoc sensitivity analyses were conducted to determine the size of effects the existing data were powered to detect given our models. For shared appraisal, simulations showed approximately 80% power to detect standardized β coefficients of 0.10 for between-person effects, 0.02 for within-person effects, 0.29 for between-person interactions, and 0.06 for cross-level interactions. For collaboration, simulations showed approximately 80% power to detect standardized β coefficients of 0.10 for between-person effects, 0.03 for within-person effects, 0.27 for between-person interactions, and 0.08 for cross-level interactions.

Results

Covariate selection

Age emerged as the only demographic or illness variable from Table 1 that was linked to both PA and either shared appraisal or collaboration. Older participants reported more PA and more collaboration; we therefore statistically controlled for age as well as NA in step two of our analyses.

Cross-sectional links of positive affect to communal coping

In step one of the shared appraisal model, both actor and partner within-person PA were associated with greater shared appraisal (see Table 2). That is, when either an individual or their partner had higher PA than usual, the individual reported greater shared appraisal. Additionally, actor between-person PA was associated with greater shared appraisal, indicating that people who generally experienced greater PA also tended to experience greater shared appraisal. However, after including the covariates in step two, only the partner within-person PA association remained. Additionally, actor within- and between-person NA were associated with reduced shared appraisal. Partner between-person PA had no effect on shared appraisal in either step.

In step one of the collaboration model, actor within- and between-person PA and partner within- and between-person PA were positively associated with same-day collaboration. These effects remained even after controlling for age and NA in step two. Thus, individuals who are generally high in PA, as well as individuals whose partners are generally high in PA, tend to report greater diabetes collaboration. Further, on days when either an individual or their partner experienced more PA than usual, the individual reported greater collaboration that same day. Our first hypothesis that PA would be cross-

Table 2. Cross-sectional analyses: Unstandardized beta coefficients and standard errors.

		Shared appraisal			Collaboration		
		PA only	NA only	Full model	PA only	NA only	Full model
		β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
—	Role	0.79 (0.05)***	0.79 (0.05)***	0.79 (0.05)***	0.12 (0.06)†	.11 (.06)†	0.12 (0.06)†
—	Time	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***
Actor	State (WP) PA	0.04 (0.01)***	—	0.01 (0.01)	0.12 (0.02)***	—	0.10 (0.02)***
	Trait (BP) PA	0.11 (0.03)**	—	0.06 (0.04)	0.45 (0.06)***	—	0.44 (0.07)***
Partner	State (WP) PA	0.03 (0.01)**	—	0.03 (0.01)*	0.07 (0.02)***	—	0.06 (0.02)**
	Trait (BP) PA	0.04 (0.03)	—	0.01 (0.04)	0.20 (0.06)**	—	0.21 (0.07)**
Actor	State (WP) NA	—	-0.08 (0.01)***	-0.07 (0.02)***	—	-0.12 (.03)***	-0.05 (0.03)†
	Trait (BP) NA	—	-.20 (0.05)***	-0.15 (0.06)**	—	-0.39 (.09)***	-0.04 (0.10)
Partner	State (WP) NA	—	-0.02 (.01)	0.00 (0.01)	—	-0.08 (0.03)**	-0.03 (0.03)
	Trait (BP) NA	—	-0.08 (0.05)	-0.06 (0.06)	—	-0.17 (0.09)†	0.06 (0.10)
—	Age	—		0.00 (0.00)	—	—	0.00 (0.00)

Note. WP = within-person; BP = between-person.
*$p < .05$, **$p < .01$, ***$p < .001$, †$p < .1$.

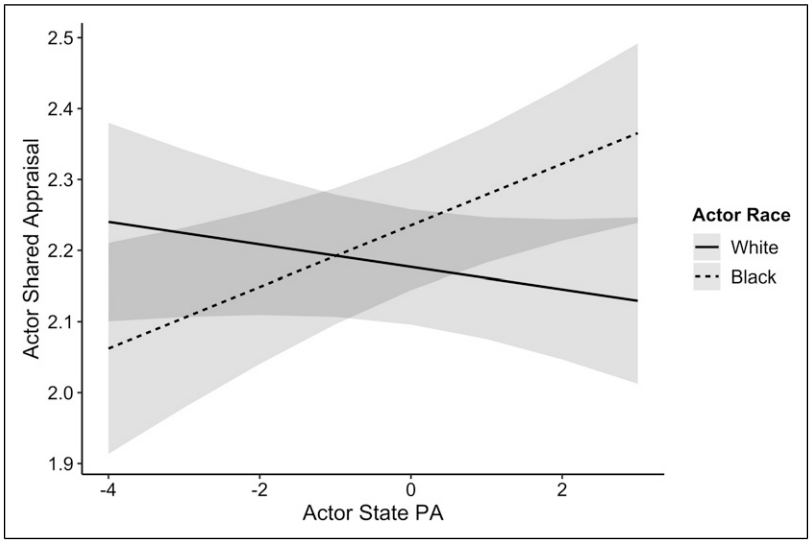

Figure 1. Actor state PA is related to increased shared appraisal for Black participants but not White participants.

sectionally linked to shared appraisal and collaboration was therefore partially supported for shared appraisal and fully supported for collaboration.

To better understand the overlap in the predictive abilities of PA versus NA, exploratory models were run which included role, time, and the four NA predictors (Table 2). In line with the fully adjusted model, actor within- and between-person NA predicted reduced shared appraisal. Thus, the effects of actor PA observed in step one likely stemmed from the shared variance between actor PA and NA, but NA showed a unique predictive ability beyond this overlap. The model predicting collaboration showed a different pattern: actor state and trait NA and partner state NA predicted reduced collaboration when PA was absent from the model, but these effects disappeared in the fully adjusted model. These effects confirm that PA uniquely predicts collaboration, but the shared variance between PA and NA does so as well.

Role was associated with shared appraisal, such that SOs tended to report more shared appraisal than patients. The association between role and collaboration trended in the same direction but was not significant. When interactions of PA with role were added in step three, no interaction effects emerged.

A significant interaction emerged between actor race and actor within-person PA in the cross-sectional shared appraisal model ($\beta = 0.06$, $p < .01$). Similarly, a significant interaction emerged between actor race and actor within-person PA in the cross-sectional collaboration model ($\beta = 0.09$, $p < .05$). Simple slopes revealed that actor within-person PA was positively associated with shared appraisal for Black participants ($\beta = .03$, $p < .05$), but there was no relation for White participants ($\beta = -.01$, $p > .1$; see Figure 1). The

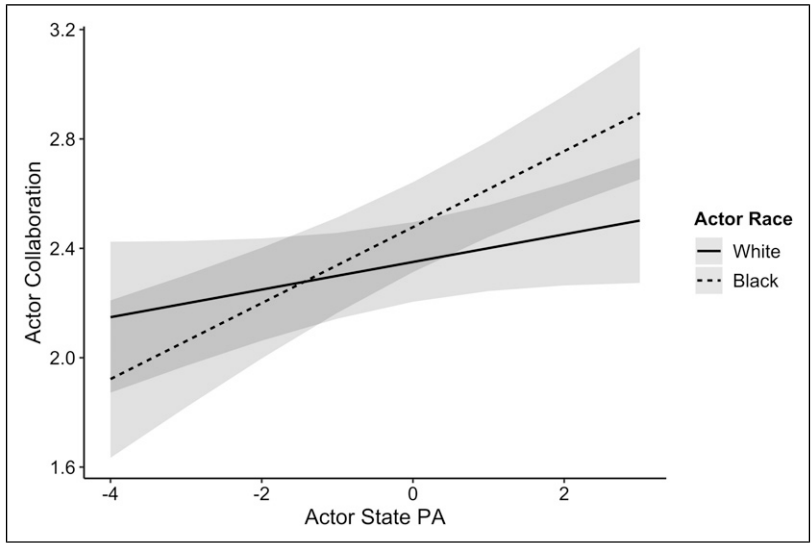

Figure 2. Actor state PA is related to increased collaboration for Black participants but not White participants.

same was true for collaboration: actor within-person PA was associated with increased collaboration for Black participants ($\beta = 0.14$, $p < .001$), but not for White participants ($\beta = .05$, $p > .1$; see Figure 2). No other interactions between race and PA emerged.

Lagged effects of positive affect on communal coping

In step one of the lagged shared appraisal model, neither actor nor partner within-person PA were associated with next-day shared appraisal (see Table 3). However, when covariates were included in step 2, actor within-person PA predicted increased next-day shared appraisal. Additionally, actor within-person NA predicted increased next-day shared appraisal. That is, on days when an individual reported either more PA or more NA, they reported greater shared appraisal the following day.

There were no effects of partner within-person PA on next day shared appraisal. There were no effects of actor or partner within-person PA on next-day collaboration, regardless of inclusion of covariates. Our second hypothesis that actor and partner within-person PA would be linked to next-day shared appraisal and collaboration was therefore partially supported for shared appraisal but not supported for collaboration.

We again fit exploratory models including NA, role, time and the lagged dependent variable as predictors to probe the interplay between PA and NA in the lagged models (Table 3). Mirroring the PA findings, actor within-person NA did not predict next-day shared appraisal when PA was absent from the model but did in the fully adjusted model. Thus, the shared variance of PA and NA did not predict shared appraisal, but the unique variances of both predicted greater shared appraisal. For collaboration,

Table 3. Lagged analyses: Unstandardized beta coefficients and standard errors.

		Shared appraisal			Collaboration		
		PA only	NA only	Full model	PA only	NA only	Full model
		β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
—	Role	0.56 (0.04)***	0.56 (0.04)***	0.56 (0.04)***	0.11 (0.06)*	.11 (.06)†	0.11 (0.06)*
—	Time	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)†	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
—	Lagged DV[a]	0.29 (0.02)***	0.30 (.02)***	0.29 (0.02)***	0.14 (0.02)***	0.13 (.02)***	0.13 (0.02)***
Actor	State (WP) PA	0.02 (0.01)	—	0.03 (0.01)**	-0.04 (0.02)†	—	-0.02 (0.02)
	Trait (BP) PA	0.08 (0.03)***	—	0.05 (0.03)†	0.39 (0.05)***	—	0.38 (0.06)***
Partner	State (WP) PA	-0.01 (0.01)	—	-0.01 (0.01)	-0.01 (0.02)	—	0.00 (0.02)
	Trait (BP) PA	0.04 (0.02)	—	0.01 (0.03)	0.16 (0.05)**	—	0.17 (0.06)**
Actor	State (WP) NA	—	0.02 (0.01)	0.04 (0.02)**	—	0.07 (0.03)*	0.06 (0.03)†
	Trait (BP) NA	—	-0.14 (0.04)***	-0.10 (0.04)*	—	-0.36 (0.08)***	-0.05 (0.09)
Partner	State (WP) NA	—	0.01 (0.01)	0.01 (0.02)	—	0.01 (0.03)	0.00 (0.03)
	Trait (BP) NA	—	-0.06 (0.04)	-0.04 (0.04)	—	-0.13 (0.08)	0.06 (0.09)
—	Age	—		0.00 (0.00)	—		0.00 (0.00)

Note. WP = within-person; BP = between-person.
*$p < .05$, **$p < .01$, ***$p < .001$, †$p < .1$
[a]Previous day's dependent variable: collaboration or shared appraisal, depending on model.

actor within-person NA predicted greater next-day collaboration when PA was excluded from the model. However, this effect can largely be accounted for by PA, as the finding only trended towards significance in the full model.

Consistent with the cross-sectional models, there were no interactions between role and PA.[3] As such, our third hypothesis that PA would have the strongest links to communal coping among patients was not supported.

There were no interactions between PA and race in the lagged models.

Reverse lagged effects: Effects of communal coping on positive affect

Neither actor nor partner within- or between-person shared appraisal predicted next-day PA. Actor between-person collaboration predicted increased PA ($\beta = .18$, $p < .001$), but actor within-person collaboration did not. There were no effects of partner within- or between-person collaboration on next-day PA. There were no interactions between role and shared appraisal or between role and collaboration in predicting next-day PA.

Discussion

In this study we proposed that PA would predict communal coping among couples in which one person has type 2 diabetes because of PA's ability to foster positive interpersonal resources and expand cognition and problem-solving abilities. We examined the relations of an individual's PA and their SO's PA to shared appraisal and collaboration at both the trait (between-person) and state (within-person) levels. Results partially supported our hypotheses and provide preliminary evidence for the role of PA in communal coping. However, the findings were not consistent across models, and several patterns emerged that warrant further consideration.

Shared appraisal

While actor state and trait PA predicted greater same-day shared appraisal, these effects were not significant after the inclusion of NA as covariate. Instead, actor state and trait NA emerged as the significant predictors, with greater NA associated with less shared appraisal. Thus, while it appears that people who report more PA report greater shared appraisal, and that on days when someone experiences more PA than usual they also report more shared appraisal, these findings are due to the overlap of high PA with low NA. Instead, our findings showed that people who tend to report more NA report less shared appraisal, and on days when someone experiences particularly high NA they report even less shared appraisal than usual. This suggests either that perceiving less shared appraisal puts one in a bad mood, or that experiencing negativity changes how one perceives their available social resources. Because NA was not part of our a priori hypotheses, we do not wish to overinterpret these findings and instead suggest this as an area of future research.

However, we found that an individual's own state PA on one day predicted a more shared appraisal of diabetes the following day, supporting the hypothesized directionality.

Interestingly, one's own state NA similarly predicted greater shared appraisal the following day. It is worth underscoring that these links of an individual's state affect to their next-day shared appraisal were not significant without both PA and NA in the model, and that an individual's state PA and state NA both predicted increased next-day shared appraisal. This complicated pattern of findings may suggest certain conditions or individual characteristics that determine whether a positive versus a negative mood state leads an individual to view a stressor as shared. However, at this point it's not clear what moderating variable might account for these effects, and we do not wish to overinterpret this finding.

In contrast to these actor findings, partner state PA was cross-sectionally associated with greater shared appraisal with or without NA in the model. That is, on days when one's partner reports greater PA, one is more likely to perceive diabetes as a shared stressor. However, because directionality cannot be determined in the same-day finding for partner state PA, it may be that having greater shared appraisal than you typically do makes your partner happier; i.e., PA may be the outcome rather than the cause. While possible, it seems unlikely that one's partner would be able to reliably detect such subtle changes in one's own cognition from day to day—much less that they could detect large enough changes to alter their own mood. Further, when we assessed bidirectional effects, we found no indication that actor or partner shared appraisal on one day predicted PA the following day.

That partner PA predicts same-day shared appraisal but one's own PA predicts next-day shared appraisal suggests that partner PA gives a more immediate cue for shared appraisal than does one's own PA. The social functional view of emotions, in which positive emotions displayed by one's partner communicate affiliative intent and collective agency (Keltner & Haidt, 1999; Shiota et al., 2004) would stipulate that your partner's expression of positive emotions communicates that they are willing and able to share your burden, thus encouraging you to share the stress of daily diabetes management. On the other hand, if you are experiencing PA but your partner is not, you may be motivated to share your burden but experience uncertainty as to whether your partner would be receptive to this. In this case, it would take more time for you to overcome this uncertainty and shift the way you think about the disease.

Of note, the effects of PA on shared appraisal did not differ between patients and SOs, as there were no interactions between PA and role. However, SOs overall reported greater shared appraisal than did patients, a finding which aligns with previous research (Helgeson et al., 2019).

Collaboration

The evidence linking PA to collaboration was more consistent than the findings for shared appraisal. Cross-sectionally, both trait and state PA were linked to greater collaboration—even when accounting for NA. Not only did people with higher average PA collaborate more, but people whose partners had higher average PA also tended to collaborate more. Further, on days when either an individual's own mood or their partner's mood was happier than usual, they reported more collaboration. In addition, actor state and trait NA

and partner state NA were associated with lower levels of collaboration when PA was not in the model, but these effects completely disappeared when PA was included in the model. These findings show that the links of NA to lower collaboration are due to the overlap of high NA with low PA. However, these associations did not hold up longitudinally: neither actor nor partner state PA predicted next-day collaboration. This pattern of findings was the same for both patients and SOs.

These results suggest that collaboration is driven by immediate contextual cues rather than by effects from the previous day. Collaboration may be highly situation specific, meaning that a concrete behavioral demand is necessary for it to occur. In this case, collaboration would be more influenced by the immediate environment, including one's current mood, than by more distal effects from the prior day. There are several mechanisms through which PA might operate to facilitate collaboration. For example, research shows that PA leads to increased self-disclosure (Forgas, 2011) and help-seeking (Straszewski & Siegel, 2018), improved communication (Cunningham, 1988; Nelson, 2016), and problem-focused coping (Ben-Zur, 2009; Pavani et al., 2016). When people are in a good mood, they are more likely to engage with their social circle and tackle their stressors in a problem-focused way. Future work should examine these potential mechanisms.

Given the cross-sectional nature of the collaboration findings, we cannot rule out the possibility that it is in fact collaboration that engenders PA rather than the reverse. However, consistent with the shared appraisal findings, we found no evidence in our reverse-lag models that collaboration on one day predicted PA the next day.

Exploration of the interaction between race and positive affect

Exploratory analyses revealed that the relation between one's own daily PA and same-day communal coping depended on the participant's race. Specifically, actor state PA was associated with greater shared appraisal and collaboration among Black participants but not White participants. These findings point to a few possible interpretations. The first is supported by the stress buffering hypothesis of positive affect (Pressman & Cohen, 2005), which states that PA is most protective at higher levels of stress. To the extent that Black people experience greater distress in managing diabetes (i.e., from systemic racism and structural barriers to care), PA may be particularly protective for them. Alternatively, given the cross-sectional nature of these findings, communal coping may be the predictor rather than the outcome of this process. In this case, these findings might reflect the importance of family involvement and support among Black families (Lincoln et al., 2003).

Given the exploratory nature of these findings, we offer these potential interpretations with caution and encourage future research to continue to investigate the impact of race on communal coping and related relationship outcomes. However, these findings align with past research that has found differences in relational processes and outcomes across racial (Basinger & Hartsell, 2021) and socioeconomic groups (Karney, 2021). Overall, our findings underscore the importance of recruiting diverse participants in relationship research so as to directly compare how relationship processes unfold across different

groups rather than assuming that findings from White middle class couples represent universal relationship patterns.

Limitations, strengths, and conclusions

Before concluding we note several study limitations. First, a daily diary design in which measurements are taken once per day may have limited our ability to detect the temporal effects of interest. To better tease apart the timescales at which shared appraisal and collaboration arise from PA, a shorter time lag between measurements may be necessary. For example, employing ecological momentary assessments (EMA) in which participants are assessed multiple times per day may provide a more fine-grained understanding of these temporal relations. Importantly, an EMA methodology may further help identify directionality, particularly concerning the association between PA and collaboration as these findings were entirely cross-sectional.

Additionally, our measurement of PA was somewhat limited in that we only assessed a single, mid-arousal positive emotion: well-being or happiness. As this study involved secondary analysis of an existing dataset, we were unable to select a measure of PA that captures a broader range of positive emotions. Future research should employ a more comprehensive measure of PA to investigate whether there are unique effects of different positive emotions on coping tendencies. In particular, given the strong link between high-arousal PA and health outcomes (Pressman et al., 2019; Pressman & Cohen, 2005), future work should assess PA at different levels of arousal, from calm to excitement, and examine their distinct links to communal coping. Furthermore, measuring trait PA as an average of just 2 weeks of daily diaries may not have fully captured participants' dispositional affect; future research may benefit from aggregating over a longer period of time.

Additionally, future research should investigate potential pathways through which PA may operate on communal coping. In particular, examination of relationship quality or other relational characteristics as mediators may clarify how these effects come about and may position these findings in the broader literature on PA and relationships. Finally, our findings point to NA as a potentially important predictor of shared appraisal; we recommend these findings be replicated in a confirmatory context.

Strengths of this study include the addition of NA as a covariate in all models, which allowed for the examination of the unique effects of PA rather than the effects of the shared variance between PA and NA. Additionally, our sample consisted of roughly half Black and half White participants, a notable strength as type 2 diabetes disproportionately impacts people of color, yet research has historically oversampled White participants. Our community sample was also diverse in terms of age, education, and income levels. We also had a very high rate of daily diary compliance among this diverse sample.

In sum, findings for the links of PA and NA to shared appraisal were complicated and depended on whether the effect was due to the actor or partner, and whether the effect was cross-sectional or across days. Cross-sectional links of actor affect to shared appraisal revealed NA to be the unique predictor, with the links of actor PA to shared appraisal accounted for by NA. However, this was not the case for partner affect—partner PA

emerged as a unique predictor of same-day shared appraisal. Longitudinally, both actor state PA and NA predicted increases in next-day shared appraisal, an unexpected finding that merits further investigation. For collaboration the picture was more clear, with actor and partner state and trait PA showing cross-sectional links to collaboration, regardless of the inclusion of NA. However, these findings did not hold up longitudinally.

This study is among the first to explore the role of PA in facilitating communal coping and interpersonal coping strategies more broadly. Findings suggest that PA and collaboration are interconnected, with the causal direction being unclear and an avenue for future research. In contrast, PA may set the stage for perceiving a stressor to be shared. The difference between these findings might be attributable to the distinction between the cognitive nature of shared appraisal and the behavioral nature of collaboration. That is, it may take more time for someone to meaningfully change the way they think about their disease, whereas diabetes management behaviors—which are likely more situation specific—might rely on more proximal cues and thus change more quickly.

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Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was not pre-registered. The data used in the research are available. The data can be obtained at: https://osf.io/f9mce/ or by emailing: fhorner@andrew.cmu.edu. The materials used in the research are available. The materials can be obtained at: https://osf.io/f9mce/ or by emailing: fhorner@andrew.cmu.edu.

Notes

1. Due to an error with the daily diary surveys, 10 patients and 11 SOs completed 15 days of surveys. These extra days of data were retained for these analyses.
2. The lagged shared appraisal model failed to converge when time was included as random; thus time was only included as a fixed effect in this model.
3. Exploratory analyses examining state/trait interactions were also assessed in both the cross-sectional and lagged models. Interactions of actor state and actor trait PA and of partner state and partner trait PA were examined simultaneously in each of the four models. In the model predicting same-day collaboration, a significant interaction between actor state and actor trait PA emerged, such that the relation between state PA and collaboration was stronger when trait PA high ($\beta = .06$, $SE = .03$, $p = .034$). No other state/trait interactions were significant.

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