How Will You Regulate My Emotions?: A Multistudy Investigation of Dimensions and
Outcomes of Interpersonal Emotion Regulation Interactions

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Abstract

Recent conceptual and empirical advances have directed attention toward interpersonal emotion regulation (IER). We conducted a series of autobiographical recall and daily diary studies to investigate a wide range of provider behaviors conveyed during IER interactions, ascertain the number of dimensions required to capture these behaviors, and then to examine associations of those dimensions with the outcomes of IER interactions. To do so, we created a new questionnaire, the Interpersonal Regulation Interaction Scale (IRIS), which can be used to obtain recipients' ratings of providers' behaviors within an IER interaction. In Study 1 ($n = 390$), an exploratory factor analysis of the IRIS yielded four dimensions, which we labeled responsiveness, hostility, cognitive support, and physical presence. Each dimension was uniquely associated with the perceived benefits of receiving IER. In Studies 2-4 (199-895), we collected multiple, diverse samples and found support for the replicability and generalizability of key findings from Study 1, including the factor structure and associations with perceived benefits. Finally, in Study 5, we examined concurrent (i.e., same-day) and prospective (i.e., next-day) associations between ratings of IER provider behaviors and a broader array of psychosocial outcomes using a daily diary approach. Across studies, our findings suggest that the outcomes of IER interactions are tied to the contents of IER interactions as reflected in the dimensions of provider behavior measured by the IRIS, with evidence that each of these dimensions convey unique information relevant to outcomes.

Keywords: Interpersonal emotion regulation; exploratory factor analysis; confirmatory factor analysis; daily diary

How Will You Regulate My Emotions?: A Multistudy Investigation of Dimensions and Outcomes of Interpersonal Emotion Regulation Interactions

In a pioneering study in which participants were interviewed about emotion regulation in everyday life, 98% of the emotion regulation instances reported occurred in a social (versus non-social) context (Gross, Richards, and John, 2006). This finding powerfully demonstrated that the most salient instances of emotion regulation in everyday life are embedded in social contexts. Yet, the vast majority of emotion regulation studies focus on individual participants in isolated settings (Campos, Walle, Dahl, & Main, 2011). To address this gap, recent conceptual and empirical advances have attended to interpersonal dimensions of emotion regulation (e.g., Gross, 2015; Niven, Totterdell, & Holman, 2009; Williams et al., 2018).

The emerging field of interpersonal emotion regulation (IER) focuses on the “slice of interpersonal interactions deliberately devoted to influencing one's own (intrinsic) or others’ (extrinsic) emotions” (Dixon-Gordon et al., 2015, p. 37; see also Niven, 2017; Reeck, Ames, & Ochsner, 2016; Zaki & Williams, 2013). This definition distinguishes between intrinsic IER (i.e., use of social interactions to regulate one’s own emotions) and extrinsic IER (i.e., regulation of others’ emotions), both of which have begun to receive attention in the empirical literature (cf. Zaki & Williams, 2013).

Whereas it has long been acknowledged that the mere presence of others can shape emotional experiences and the efficacy of emotion regulation efforts (e.g., Jakobs, Manstead, & Fischer, 1999; Schacter, 1959), IER is distinguished from these mere presence effects as a *goal-directed process* whereby two or more individuals engage in live social transactions that are motivated to regulate their own or each other’s affective states. For example, people might vent their emotions to a close friend after a frustrating day at work to down-regulate the intensity of

their negative affect (Rimé, 2009) or solicit alternative perspectives from their romantic partners after a major life event to assist efforts to reappraise the situation (Horn & Maercker, 2016). In this sense, IER provides one lens to understand many conceptually related socioemotional phenomena, such as receiving (e.g., Maisel & Gable, 2009) and providing (e.g., Lorenzo, Barry, & Khalifian, 2018) social support, venting and social sharing of emotions (e.g., Rimé, 2009), reassurance-seeking (e.g., Dixon-Gordon et al., 2018), and dyadic coping (e.g., Bodenmann, 1995) as efforts to engage in goal-directed emotion regulation (cf. Williams et al., 2018).

Emotional and Psychosocial Correlates of IER

Multiple empirical studies have suggested that IER is routinely used in daily life and can powerfully modulate emotional experiences throughout the lifespan. For example, college students regularly engaged in social sharing for the purpose of regulating both positive and negative emotions in their daily lives, and they rated this IER strategy as having as much or even more of an impact than intrapersonal emotion regulation strategies on their affective states (Heiy & Cheavens, 2014). Mother-child co-reappraisal significantly reduced the intensity of children's anger and sadness displays following a laboratory manipulation of disappointment (Morris, Silk, Morris, Steinberg, Aucoin, & Keyes, 2011). Romantic partners frequently used physical touch and positive humor in daily life in response to their partners' affective states, and the use of these interpersonal affect regulating strategies was associated with greater momentary positive affect (Debrot, Schoebi, Perrez, & Horn, 2013; Horn, Samson, Debrot, & Perrez, 2018). Finally, romantic partners were able to effectively assist their significant others' efforts to down-regulate negative affect in a laboratory emotion regulation decision-making paradigm (Levy-Gigi & Shamay-Tsoory, 2017). In other words, both experimental and naturalistic investigations indicate that IER powerfully influences affective states across relational and developmental contexts.

Considering that IER is inherently social, multiple studies have investigated links between IER and interpersonal functioning. In one of the most thorough investigations of IER and social behavior available, people who reported seeking more intrinsic IER also reported feeling more socially connected, were more likely to choose to view emotionally evocative images with another person (vs. alone), and developed a greater number of supportive relationships when followed through the first year of college (Williams et al., 2018). Likewise, the self-reported tendency to engage in more frequent co-rumination, which entails dwelling on problems and negative emotions with close others, was found to positively predict the development of closer friendships among adolescents (Rose, Carlson, & Waller, 2007). In a laboratory study of social sharing and IER, people who received comfort and validation reported feeling closer to the listener after the interaction (Pauw et al., 2017). Use of physical touch and positive humor in the service of IER was associated with increased feelings of psychological intimacy in romantic relationships in a pair of ecological momentary assessment studies (Debrot, Schoebi, Perrez, & Horn, 2013; Horn, Samson, Debrot, & Perrez, 2018). Findings from multiple studies indicate that *providing* IER likewise has demonstrable social consequences (e.g., Niven et al., 2015; Niven, Holman, & Totterdell, 2012; Niven, Macdonald, & Holman, 2012), although we focus here on *receipt* of IER. Taken together, multiple facets of IER appear tied to social connectedness.

Beyond social functioning, IER processes have been proposed to play a key role in psychological wellbeing and mental health (see Hofmann, 2014; Lopez-Perez, Ambrona, & Gummerum, 2016; Marroquin, 2011). For example, a greater number of specialized “emotionships” (i.e., relationships that fulfill emotion-specific emotion regulation needs; e.g., having one friend that you tend to turn to when you are sad and another that you tend to turn to

when you are angry) was associated with higher life satisfaction, even after adjusting for the absolute number of close relationships (Cheung, Gardner, & Anderson, 2015). Among romantic couples who had experienced a recent major life stressor, tendencies to engage in co-brooding related to more preoccupation with the stressor, ongoing functional impairment related to the stressor, and more severe depressive symptoms (Horn & Maercker, 2016). In contrast, tendencies to engage in co-reappraisal, which involves interactions that alter one's perspective on emotion eliciting events, were associated with better adjustment to major life stressors in the same study (Horn & Maercker, 2016). In a laboratory study of mother-daughter conflict conversations, the combination of high maternal problem-solving and low maternal validation moderated the relationship between daughters' negative affect and daughters' borderline personality disorder symptoms (Dixon-Gordon et al., 2016).

In addition to these cross-sectional studies, findings of several longitudinal studies likewise suggest that IER may have important ramifications for psychological health. Across two longitudinal studies, adolescents' co-rumination tendencies positively predicted internalizing symptoms and depressive episodes (Rose, Carlson, & Waller, 2007; Stone, Hankin, Gibb, & Abela, 2011). Likewise, baseline self-reported tendencies to engage in avoidance and reassurance-seeking in hypothetical interpersonal emotional scenarios predicted greater physical aggression and self-injury, respectively, over the course of a two-week daily diary study (Dixon-Gordon et al., 2018). Collectively, this literature suggests that IER has important psychosocial ramifications.

Self-Report Measures of IER

One challenge is that IER encompasses many different kinds of interactions and behaviors (Niven, Totterdell, & Holman). Commensurately, there is considerable variability in

the facets of IER that have been examined and how these facets have been operationalized. For example, whereas some researchers have focused on specific manifestations of IER, such as co-rumination (e.g., Rose, Carlson, & Wallace, 2007) or humor (e.g., Horn et al., 2018), others have focused more broadly on the frequency or perceived efficacy of IER writ-large (e.g., Williams et al., 2018).

This variability is reflected in extant measures of IER. To our knowledge, six such IER measures have been published, all of which are self-report scales. The first of these chronologically, the Co-Rumination Scale, was developed to assess tendencies to encourage friends to ruminate and to receive encouragement to ruminate from friends (Rose, 2002). In a similar vein, the Co-Brooding and Co-Reappraisal in Couples scale was developed for dyadic studies of romantic relationships; each member of the dyad is asked to answer questions designed to measure the extent to which both partners respond with co-brooding or co-reappraisal when they or their partner are in a bad mood (Horn & Maerker, 2016).

Whereas these first two scales examine both the provision and receipt of IER (intrinsic and extrinsic IER), the Difficulties in Interpersonal Regulation of Emotion scale (DIRE; Dixon-Gordon et al., 2018) probes how people would regulate their own emotions in hypothetical interpersonal situations, including tendencies to vent emotions, seek reassurance, accept emotions, and avoid emotions. In a similar vein, the Interpersonal Emotion Regulation Questionnaire (IERQ; Hofmann, Carpenter, & Curtis, 2017) examines attitudes toward, preferences for, and reasons to seek intrinsic IER, including desires to enhance positive affect, facilitate perspective taking, be soothed, and have adaptive responses modeled socially.

In contrast to the more strategy-specific scales, the Emotion Regulation of Others and Self scale (EROS; Niven, Totterdell, Stride, & Holman, 2011), seeks to assess broad tendencies

to use either “affect-improving” (e.g., focusing on positive aspects of the situation) or “affect-worsening” (e.g., focusing on personal shortcomings) strategies when regulating one’s own emotions (i.e., *intrapersonal* emotion regulation) and others’ emotions (i.e., *extrinsic* IER).

Finally, the Interpersonal Regulation Questionnaire (IRQ; Williams et al., 2018) assesses broad tendencies to seek IER and the perceived efficacy of IER for positive and negative emotions.

Notwithstanding progress in assessment, none of these measures cover a broad range of behaviors, such as conveying empathy, problem-solving, or reassurance, that we expect might be relevant to the outcomes of IER interactions. This is an important gap given that the enactment of specific behaviors, such as criticism and contempt, during emotionally evocative interactions (e.g., Gottman & Levenson, 2000) and partners’ perceptions of responsiveness in close relationships (see Reis & Gable, 2015) are robust predictors of psychosocial outcomes, that may, in turn, shape future behavioral transactions (e.g., IER recipients’ decisions to seek or not seek IER in the future). Therefore, we aimed to investigate a wide range of behaviors provided during IER interactions, to model the underlying dimensions, and to examine associations of those IER dimensions with outcomes of receiving IER.

The Current Studies

In the present series of studies, we collected autobiographical recall and daily diary data from multiple, diverse samples. We aimed to understand how many distinct dimensions characterize receivers’ experiences of IER interactions and to develop a valid and useful measure of these dimensions, the Interpersonal Regulation Interaction Scale (IRIS). We validated this measure against multiple psychosocial outcomes of IER interactions.

To begin, we generated an item set by drawing on existing research on IER and related topics (e.g., Duprez et al., 2014; Niven, Totterdell, & Holman, 2009; Pauw et al., 2017), and

through consultation with four experts on (interpersonal) emotion regulation, empathy, mood dysregulation, and coping. Then, we asked undergraduates ($n = 318$) to identify any unclear or confusing items and to answer open-ended questions about helpful and unhelpful forms of IER. These data were used to revise and extend the item set. Then, we collected data from a second undergraduate sample ($n = 390$), conducted an exploratory factor analysis to assess the number of distinct dimensions, and, as a preliminary test of validity, examined correlations between the IER factor scores and individual difference variables and perceived benefits of IER interactions (Study 1). In Studies 2-4 ($ns = 199$ -895), we evaluated multigroup confirmatory measurement and regression models to assess the replicability and generalizability of key findings from Study 1 across community and clinical samples. In Study 5 ($n = 77$), we used daily diaries to examine concurrent and prospective associations between receipt of various forms of IER and perceived benefits of those IER interactions, daily stress, wellbeing, and social disconnection, and subsequent seeking of IER.

Initial Item Generation and Revision

Based on reviews of the conceptual and empirical literature and conversations with experts in conceptually overlapping fields, 18 items were written to cover: 1) problem-focused coping (e.g., advice, problem-solving); 2) cognitive reappraisal (e.g., alternative interpretations of situations); 3) distraction; 4) empathy and validation; 5) encouraging social sharing/venting; 6) physical presence; 7) sympathy; 8) reciprocity; and 9) hostility. We recruited a sample of 318 undergraduates (73% female, 22% non-Hispanic white, $M_{\text{Age}} = 20$, $SD_{\text{Age}} = 3.1$) to refine these initial items and to generate additional items. Participants were asked to respond to four open-ended questions. In the first two, participants described the most helpful and unhelpful things that other people do during IER interactions. For the second two, participants were prompted to

recall a recent instance of receiving IER and to provide brief written descriptions of the situation that resulted in their receiving IER and the IER that they received. Next, participants were asked to provide ratings for each of the 18 original IRIS items in relation to that instance of IER (1 = *They didn't do this at all*; 9 = *They did a lot of this*), as well as an optional 19th prompt to specify other provider behaviors. Finally, participants were asked to nominate any items that were unclear, confusing, or otherwise difficult to answer. [B&VS1]

We reviewed participants' responses to ascertain the comprehensiveness and clarity of the initial item set. We extracted keywords from the open-ended items (i.e., most helpful responses, most unhelpful responses, description of the IER received, and other provider responses described) and computed frequencies for these keywords. Participants nominated a broad range of behaviors as particularly helpful or unhelpful, and 27 new items were added to the revised item set to capture frequently cited provider behaviors that appeared distinct from those covered in the initial item set. Items that were nominated by more than five percent of the sample as unclear, confusing, or difficult to answer were revised or removed from the item set. The resulting revised IRIS comprised 43 items.

Study 1: Exploratory Factor Analysis and Correlates

In Study 1, we conducted exploratory factor analyses of the revised, 43-item IRIS and an initial validation of the exploratory factors. More specifically, we considered (1) discriminant validity and (2) associations with perceived benefits of the IER interaction.

Regarding discriminant validity, IER has been described as overlapping with, but distinct from, related domains, such as coping and social support (Dixon-Gordon et al., 2015). Indeed, one criticism of IER research is that it may merely recapitulate research in these more well-trod domains. Therefore, one of our aims was to ascertain the degree to which our IER factors

overlapped statistically with already well-characterized domains, including positive and negative affectivity, intrapersonal emotion regulation strategies and emotion dysregulation, perceived social support, social connection, and coping self-efficacy. Although we expected experiences of IER to be associated with these domains, we hypothesized that these correlations would be of only modest magnitude, which would provide initial evidence of discriminant validity.

Perhaps the most central test of the IER factor scores is whether they are associated with the outcomes of IER interactions. To examine this, we asked participants about the consequences of their IER interactions, including not only the impact of the interaction on their affective state, but also other socioemotional consequences, such as feeling more or less close to the IER provider. We evaluated the degree to which our IER factor scores were uniquely associated with these perceived benefits.

Method

Participants. Participants were 404 undergraduates at a large public university who were 18 years of age or older and able to read and write fluently in English who participated in exchange for partial course credit. Data from 14 participants were eliminated from analyses due to incompleteness or careless responding (i.e., failing to correctly respond to at least 80% of attention check items), resulting in 390 valid cases for analyses (60.7% female; 22% non-Hispanic white; $M_{\text{age}} = 20$, $SD_{\text{age}} = 3.3$).

Procedures and measures.^[B&VS2] Participants completed informed consent procedures and study questionnaires online on Qualtrics. After completing informed consent, participants were asked several questions about their experiences of receiving IER in general (e.g., frequency of receipt and perceived helpfulness). Then, participants were asked to recall “the most recent time” that they received “emotional support” from someone else, which we defined as “a time when

someone else tried to help you manage your emotions or feel better.” To emphasize the motivated component of intrinsic IER, participants were encouraged to “think about times when you wanted to feel more or less positive, more or less negative, or more or less calm, and someone else tried to help you” and were given several examples of IER to facilitate their recall of relevant interactions. Participants were instructed to recall the most recent IER interaction regardless of whether this interaction was actually helpful. Participants were asked to briefly describe the events that led to their receiving IER in an open-ended fashion and then to answer a series of questions about the lead-up to receiving IER. Next, participants were asked to complete the revised 43-item IRIS to assess the behaviors that providers conveyed during the recalled IER interaction. For each item, participants were asked to respond on a scale from 1 (*They didn’t do this at all*) to 9 (*They did a lot of this*). These autobiographical recall procedures, including the definition of IER and the specific questions, were pilot tested as part of the initial item generation and revision process (see above).

Participants also completed questionnaires to capture conceptually related domains, including positive and negative affectivity, intrapersonal emotion regulation, general self-efficacy, and perceived social support (see descriptions below). The order of these questionnaires was randomized. All procedures for this and the following studies were approved by the Institutional Review Board before data collection.

Perceived benefits of IER interactions. Participants were asked six items that we designed to capture socioemotional consequences of receiving IER: 1) helpfulness, 2) affective valence, 3) self-regard, 4) connectedness to the IER provider 5) ability to cope with the situation, and 6) sense of control over emotions. Each item was rated on bipolar scales ranging from 1 (*very unhelpful* or *very negative* or *much worse*) to 9 (*very helpful* or *very positive* or *much*

better). In the item generation pilot study described above, these six items were highly correlated with one another (inter-item *rs* from .42 to .68). Therefore, for the present study, we summed these six items to form a composite scale reflecting perceived benefits of IER interactions, which showed good internal consistency ($\alpha = .87$).

Positive and negative affectivity. The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) is among the most commonly used measures of the established Big Five personality dimensions. Given our focus on affectivity, we included only the 16 items corresponding to extraversion and neuroticism (e.g., Gross, Sutton, and Ketelaar, 1998). Participants are asked to respond to items on a Likert scale ranging from 1 (*Disagree strongly*) to 5 (*Agree strongly*). Internal consistencies were good for extraversion ($\alpha = .81$) and neuroticism ($\alpha = .85$) in the current study.

Emotion dysregulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report scale that asks respondents to indicate how frequently they experience a range of emotional problems, including difficulties accepting emotions, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, perceived ineffectiveness of emotion regulation strategies, and lack of emotional clarity, on a five-point scale (1 = *almost never* [0-10%], 5 = *almost always* [91-100%]). The DERS demonstrates good internal consistency, internal consistency, and convergent and divergent validity (Gratz & Roemer, 2004; Staples & Mohlman, 2012; Weinberg & Klonsky, 2009; Bardeen & Fergus, 2014). For example, DERS scores have been found to mediate the relationship between personality disorders and interpersonal difficulties, such as aggression (Scott et al., 2014). Consistent with prior studies, all items were summed to create a single emotion dysregulation score, which demonstrated excellent reliability ($\alpha = .94$).

Emotion regulation strategies. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is designed to measure individual differences in two specific intrapersonal emotion regulation strategies: cognitive reappraisal (six items) and expressive suppression (four items). Respondents are asked to rate each of the 10 items on a Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). Internal consistencies were good for both reappraisal ($\alpha = .87$) and suppression ($\alpha = .81$) in the current study.

Social support. The Interpersonal Support Evaluation List-12 (ISEL-12; Cohen, 2008) is intended to measure perceived social support. Respondents are asked to read a series of statements and indicate whether they are *definitely false*, *probably false*, *probably true*, or *definitely true*. The ISEL-12 comprises three four-item subscales that reflect the availability of advice and guidance (appraisal support), empathy and acceptance (belonging support), and material assistance (tangible support); however, a single factor reflecting overall social support has been shown to fit the data equally well (Cohen, 2008; Merz et al., 2014), so items were summed to create a social support composite. The ISEL-12 total score has been shown to have good internal consistency and convergent validity (Cohen, 2008; Merz, 2014), and internal consistency was good in the current sample ($\alpha = .87$).

Social disconnection. The Revised UCLA Loneliness Questionnaire (R-UCLA; Russell, 1996) is a 20-item self-report measure designed to measure feelings of loneliness and social disconnection. Respondents indicate the frequency with which each of 20 statements apply to them (1 = *Never*, 4 = *Often*). Items were summed to create a single loneliness score (cf. Cramer & Barry, 1999). The UCLA Loneliness Questionnaire has been shown to demonstrate high internal consistency, high test-retest reliability, and good concurrent and convergent validity (Cyranowski et al., 2013), and scores on the R-UCLA have been shown to predict symptoms of

social anxiety and depression (Lim et al., 2016; Cacioppo et al., 2010), poorer social interactions and higher stress appraisals (Hawkley et al., 2003), and all-cause mortality (Rico-Uribe et al., 2018). Internal consistency was excellent in the current study ($\alpha = .93$).

Demographic questionnaire. Respondents completed demographic items, including age, gender identity, ethnicity, relationship status, approximate family income, and perceived socioeconomic status.

Data analytic plan. We examined univariate distributions for all variables and examined inter-item correlations for the 43 IRIS items as a preliminary test of item-level redundancy. Next, we conducted exploratory factor analysis using maximum likelihood. Given that we expected providers' IER responses to systematically co-vary (e.g., more empathic providers would be less hostile), we selected an oblique factor rotation (oblimin), which allows factors to be correlated with one another. The decision about the number of factors to extract was guided by Horn's (1965) parallel analysis (PA), Revelle & Rocklin's (1979) Very Simple Structure (VSS) criterion, Velicer's (1976) Minimum Average Partial (MAP) criterion, and Ruscio & Roche's (2012) comparison data (CD) technique; specifically, we sought convergence among these multiple indices, which has been shown to yield more accurate factorization (Ruscio & Roche, 2012). Items that demonstrated low primary factor loading or high factor cross-loading were sequentially eliminated from the item set until a conceptually interpretable simple structure was achieved (Osbourne, Costello, & Kellow, 2008). Robust measures of overall model fit were computed, and we calculated bootstrapped 95% confidence intervals for item factor loadings to ascertain the degree of uncertainty in the point estimates of the factor loadings. Factor scores were estimated such that the correlations between the obliquely rotated factors were preserved (ten Berge et al., 1999).

To assess discriminant validity, we calculated zero-order correlations of the IER factor scores with the individual differences measures described above. Next, we calculated zero-order and partial correlations (adjusting for the individual differences measures) between the factor scores and perceived benefits. To examine unique associations of the factor scores with outcome of the IER interactions, we calculated a multiple regression model with perceived benefits composite scores as the DV and the factor scores entered as simultaneous IVs.

All analyses were conducted in R (R Foundation for Statistical Computing, Vienna, Austria) version 3.5.1. Exploratory factor analyses were implemented with the *psych* package.

Results^[B&VS3]

Exploratory factor analysis. The absolute values of the inter-item correlations among the items ranged from .00-.72 (mean $r = .26$), indicating substantial variability in the extent of overlap among the items. Following the removal of 15 items that demonstrated low communality, failed to load adequately onto a primary factor, or showed excessive factor cross-loading, PA, VSS, MAP, and CD all converged on a four-factor solution, which demonstrated adequate fit (RMSEA = .06; RMSEA 90% CI = [.052, .064]; TLI = .91) and structure (mean item complexity = 1.1; Hofmann, 1977; cf. Pettersson & Turkheimer, 2010). Factor loadings for the final four-factor EFA solutions are reported in Table 2. We interpret the four factors as reflecting the degree to which providers conveyed *responsiveness* (11 items; containing items related to caring, understanding, and validation; cf. Reis & Gable, 2015), *hostility* (7 items), *cognitive support*¹ (7 items), and *physical presence* (3 items). Cumulatively, these four factors explained 65% of the variance. The four factors were modestly to moderately inter-correlated (r s from .07 to .42).

¹ This third factor contains concepts that have received various labels across areas of study, including problem-focused coping, informational support, co-reappraisal, perspective-taking, and cognitive responses to social sharing.

Preliminary analyses. We assessed the degree to which factor scores varied as a function of demographic characteristics, including gender, income, subjective socioeconomic status, age, and ethnicity. In point-biserial correlations, gender was not significantly related to perceived hostility ($r = .10, p = .06$) or cognitive support ($r = -.05, p = .33$), but was significantly associated with responsiveness ($r = -.21, p < .001$) and physical presence ($r = -.11, p = .04$), such that women tended to report that IER providers were more responsive and more physically present than did men. Higher hostility was associated with lower family income ($r_s = -.15, p = .003$) and perceived socioeconomic status ($r_s = -.12, p = .02$), whereas responsiveness, cognitive support, and physical presence were not significantly correlated with income ($r_s < |.08|, ps > .14$) or socioeconomic status ($r_s < |.005|, ps > .93$). No significant associations of factor scores with age were detected ($rs < |.10|, ps > .05$).

We also evaluated mean differences across ethnicity for the three ethnic groups that comprised sufficiently large subsamples for comparison (i.e., Caucasian/White, Hispanic/Latinx, and Asian). There were no significant differences between these ethnic groups for responsiveness, cognitive support, or physical presence; however, there was a significant mean difference for hostility, $F(2, 182) = 3.24, p = .04$. Post-hoc contrasts indicated that this difference was primarily driven by Caucasian participants reporting receipt of greater hostility than Asian participants.

In addition to these demographic variables, we also computed correlations of factor scores with several questions about IER efforts and interactions. These correlations are reported for descriptive purposes in supplementary online materials (see Tables S1 and S2).

Discriminant validity. We tested whether IER factors were substantially overlapping with individual differences in positive and negative affectivity, intrapersonal emotion regulation

and emotion dysregulation, social support and social disconnection, and coping self-efficacy. As shown in Table 2, correlations were in the range of $|.10|$ to $|.44|$ with measures of social functioning (R-UCLA and ISEL) and of $|.01|$ to $|.32|$ with measures of affectivity, emotion regulation and coping (BFI, ERQ, DERS, and GSE). The median effect size across these measures was $r = .15|$.

Perceived benefits of IER interactions. Next, we tested relationships of the four factor scores with perceived benefits of the IER interaction. As shown in Table 3, the magnitudes of the zero-order correlations were medium-to-large, and these associations were not substantively diminished in partial correlations that adjusted for the discriminant variables (i.e., positive and negative affectivity, intrapersonal emotion regulation and emotion dysregulation, perceived social support and social disconnection, and coping self-efficacy).

To evaluate the unique associations of the factor scores with perceived benefits, we computed a multiple regression model. Responsiveness ($b = .46, p < .001$), cognitive support ($b = .25, p < .001$), and physical presence ($b = .14, p < .001$) were uniquely and positively associated with perceived benefits, whereas hostility was negatively associated with perceived benefits ($b = -.18, p < .001$). Collectively, the four factors explained more than half of the variance (adjusted $r^2 = .54$) in ratings of perceived benefits.

Discussion: Study 1

We developed a scale to capture a wide range of IER behaviors, and exploratory factor analysis identified four separable dimensions along which these behaviors varied, which we labeled responsiveness, hostility, cognitive support, and physical presence. This factor structure partially recapitulates a theoretical distinction described by Rimé (2009), wherein listeners may offer comfort and validation (termed socio-affective support) or meaning and reappraisal (termed

cognitive support) in response to socially shared emotions. Of interest, however, our findings suggest that hostile responses and communicated physical presence form distinct factors (e.g., as opposed to hostility being subsumed into the low end of responsiveness).

Those dimensions were distinct from individual differences in socioemotional functioning and robustly correlated with outcomes of IER interactions. More specifically, these four IER dimensions explained substantial and unique variance in the perceived benefits IER interactions, and these associations were not substantially diminished when we controlled for individual differences in social and emotion functioning. This finding suggests that IRIS ratings are not redundant with these individual differences with respect to understanding the outcomes of IER interactions. The responsiveness dimension accounted for a particularly large proportion of the explained variance, suggesting that perceived responsiveness may be a particularly important constituent of receivers' evaluations of IER interactions (cf. Reis & Gable, 2015). [B&VS4]

One important limitation of these findings is that several interesting behaviors were not retained in the 28-item IRIS. These behaviors include distraction/attention redeployment, reassurance, expressions of confidence, and humor. Of interest, the items relating to these domains were removed because they evinced low factor loadings—*not* because they showed high cross-loading—so it is plausible that these items in fact reflect distinct dimensions that were undersampled in our item set. In addition, the dimensions that we extracted may collapse across potentially important conceptual distinctions, such as the distinction between informational support and co-reappraisal. One question, then, is the degree to which statistical overlap between conceptually distinct behaviors reflects actual co-occurrence of certain behaviors (e.g., co-reappraisal may often be paired with informational support) versus recipients' insensitivity to these distinctions.

Limitations notwithstanding, initial findings were promising. We were able to identify a brief item set that captured key dimensions of IER behavior. Those dimensions showed robust and unique links with the perceived benefits of IER, even when accounting for individual differences in emotionality and social function. Collectively, these findings provide evidence 1) that people track multiple, distinct features of IER interactions; 2) that responsiveness and hostility are separable, suggesting that single IER interactions may frequently contain both positive (i.e., responsive) and negative (i.e., hostile) provider behaviors; and 3) that each of these features contains unique information relevant to the outcomes of IER interactions.

Studies 2-4: Multigroup Confirmatory Factor Analysis

A crucial next step was to assess whether the observed IRIS factor structure is replicable and generalizable. Therefore, in Studies 2-4, we collected autobiographical recall data using procedures identical to Study 1 from three samples: a larger undergraduate sample recruited in an identical manner to those in Study 1 ($n = 946$, Study 2), an adult online community sample ($n = 200$; Study 3), and a clinical sample of adults who were seeking treatment online for problems with anger and emotionally impulsive aggression ($n = 200$; Study 4). We used these three samples to conduct a confirmatory factor analysis within a structural equation modeling framework, using multiple group procedures to ascertain whether the measurement model generalized across the three samples. In addition, we attempted to replicate the multiple regression model examining the perceived benefits of IER interactions [B&V55][SJ6].

Method

Participants. Participants in the three studies were undergraduates (Study 2; 67% female; 25% non-Hispanic white; $M_{\text{age}} = 20$, $SD_{\text{age}} = 3.5$), adult volunteers recruited online (Study 3; 62.7% female; 54.5% non-Hispanic white; $M_{\text{age}} = 24.5$, $SD_{\text{age}} = 9.7$), and adults seeking

treatment for emotional impulsivity and aggression (Study 4; 75.1% female; 59.7% non-Hispanic white; $M_{\text{age}} = 37.5$, $SD_{\text{age}} = 12.2$), respectively. Undergraduate participants received partial course credit in exchange for their participation. Adults in the treatment seeking sample were paid for their participation. All participants were at or over the age of 18. As in Study 1, participants were omitted from analyses if they failed to provide complete data or if they were identified as careless responders using the same criteria as Study 1. Accordingly, the final sample sizes for analyses were 895 (Study 2), 199 (Study 3), and 201 (Study 4).

Procedures and measures. Procedures for the current study were identical to those described for Study 1. Participants completed other measures and procedures that were specific to the larger studies from which these samples were drawn; however, these additional measures and procedures were not incorporated into our data analyses and so will not be discussed further.

Data analysis. We specified a measurement model based on the exploratory factor analysis from Study 1. The four factors were specified as covarying latent variables. Each of the 28 indicators (i.e., IRIS items) was specified to load onto one and only one of these latent variables based on the primary factor loadings observed in Study 1, and no covariances among the indicators were specified. We examined invariance of the measurement model across the three samples as a test of generalizability. This involved computing a series of nested models in which the latent variable loadings, intercepts, and finally means were progressively constrained to be constant across the samples (Meredith, 1993). We considered change in CFI and RMSEA across these three models (compared to the unconstrained configural model) as indices of measurement variance. Then, we computed standardized path estimates and robust model fit parameters. We de-emphasized the chi-square test as a model fit index due to the relatively large sample sizes involved.

To test whether the associations with the perceived benefits of IER interactions would replicate, we evaluated a path model in which the four latent variables reflecting provider behaviors were specified as conjoint regressors. The dependent variable, the perceived benefits of the interaction, was specified as a latent variable with the six single-item probes of perceived benefits from Study 1 specified as the corresponding indicators. We assessed whether model fit was reduced when the latent variable loadings and path estimates were constrained to be invariant across samples as a preliminary test of moderation. [B&VS7]

All models were estimated using maximum likelihood with robust standard errors (“mlr”). All analyses were conducted in R using the lavaan and semTools packages.

Results

Confirmatory factor analysis. The confirmatory configural model demonstrated adequate fit (robust SRMR = .07, robust CFI = .91, robust RMSEA = .07 [.064, .071]). As depicted in Figure 1, all path estimates were significant ($ps < .001$) and ranged from .58 to .85.

As described above, we examined the invariance of the measurement model across the three samples. Compared to the configural model, even the most constrained models did not substantially diminish fit (delta CFI = .01, delta RMSEA = .001), indicating that the measurement model was highly invariant across groups. Comparable gender differences were observed as in Study 1, such that women tended to report greater responsiveness and physical presence than men.

Perceived benefits of the interaction. To examine the relationships between the four latent variables and perceived benefits, we entered perceived benefits as a latent variable with the same six probes as in Study 1 used as indicators. Paths were specified between the four IRIS factor latent variables and the new perceived benefits latent variable. The overall model

demonstrated adequate fit (robust SRMR = .06, robust CFI = .90, robust RMSEA = .06 [.062, .067]). As shown in Figure 2, responsiveness ($b = .43, p < .001$), hostility ($b = -.19, p < .001$), and cognitive support ($b = .32, p < .001$) were significantly and uniquely associated with perceived benefits, whereas physical presence was not ($b = .03, p = .31$).

We examined the invariance of this structural model across samples, particularly the invariance of the path estimates. Significant invariance was observed when the model was constrained (delta CFI = .009, delta RMSEA = .001), indicating parallel associations between the IRIS factors and perceived benefits across the three samples.

Discussion

The results of Studies 2-4 suggest that the IRIS factor structure is replicable and generalizes beyond undergraduates to a community sample and a sample of adults with clinically relevant problems with emotion dysregulation. As in Study 1, the IRIS factors were moderately correlated with one another; nevertheless, findings from Studies 2-4 affirm that at least three of the four IRIS factors contribute unique and statistically significant variance to the perceived benefits of IER interactions, with physical presence being the lone exception. Tests of multiple group invariance of the path estimates suggested that the relationships between the IRIS dimensions and perceived benefits did not vary as a function of sample, suggesting that these associations are generalizable.

Study 5: Daily Diary

Across Studies 1-4, we employed an autobiographical recall paradigm to gauge people's experiences of IER in everyday life. Autobiographical recall paradigms, however, have important limitations. As an event recedes into even the recent past, memory for that event may become less accurate, particularly for dynamic processes, such as shifts in affect before versus

after receiving IER. In addition, there may be biases in the events that participants recall or choose to report (e.g., only recalling interactions that were either very helpful or very unhelpful) such that the sample may not be representative of the set. Bearing in mind these limitations, in Study 5, we used a daily diary paradigm. This method allowed us to collect data soon after interactions occurred to reduce recall and selection biases. Of more import, this approach allowed us to consider prospective relationships between receiving IER and psychosocial functioning. For example, whereas we could imagine that greater use of intrinsic IER might be cross-sectionally associated with *greater* negative affect (e.g., because IER is disproportionately sought by people who are experiencing more distress), each IER interaction might nevertheless result in significant amelioration of distress. As such, understanding temporal dynamics is essential for unpacking the antecedents and consequences of IER and for evaluating the extent to which effects of IER interactions may be sustained on the scale of days.

Therefore, we recruited undergraduate participants to complete an electronic diary each night for three weeks. We created single-item prompts for the four IRIS dimensions, as well as two additional items for constructs that had appeared to be statistically distinct but were not retained in the original exploratory factor analyses: distraction and expressions of confidence. Our aim was to examine the unique associations of these six provider behaviors, with five outcomes: 1) perceived benefits of IER, 2) daily wellbeing, 3) daily perceived stress, 4) daily social disconnection, and 5) likelihood of seeking IER on the next day. We included this broader set of outcomes to gauge whether the dimensions we had identified were linked to more global psychological outcomes than whether people perceive any given IER interactions as beneficial. Although one might expect some coherence between the perceived benefits and daily psychosocial functioning, we also reasoned that the associations might not be entirely parallel

across these outcomes, particularly given how multiply determined these broader psychosocial outcomes are. Based on the results of Studies 1-4, we hypothesized that multiple provider responses would be associated with the perceived benefits of IER interactions, but that responsiveness would demonstrate the most robust association. We expected that receipt of effective IER would be associated with greater wellbeing and social connection, less perceived stress, and a higher likelihood of seeking IER on the next day; however, we were agnostic about which IRIS dimensions would be differentially associated with each of these outcomes. Finally, we hypothesized that the associations with the perceived benefits of the interaction (a proximal outcome) would be larger than associations with more global (and therefore more distal) outcomes, such as daily wellbeing.

Method

Participants and procedures. Participants were 90 undergraduates (62% female, 18.6% non-Hispanic white; $M_{\text{age}} = 21.6$; $SD_{\text{Age}} = 5.6$) at or over the age of 18 who were able to read and write fluently in English and who attended a large public university. All participated in the study in exchange for partial course credit. Participants were required to have regular access to a smartphone to complete the diaries. Thirteen participants were excluded from analyses because they did not report any instances of IER in nightly diaries, primarily due to poor adherence in this subset of participants, who completed only 5 daily diaries on average. Exclusion of these 13 participants yielded 77 valid participants for analyses. On average, participants completed 15 (71%) daily diaries and reported receiving IER on 4.5 of those days, yielding 338 valid instances of IER for analyses.

Participants completed informed consent procedures and a baseline questionnaire battery online using Qualtrics as part of a larger protocol on emotion regulation. Nightly diaries were

programmed in LifeData (LifeData LLC, Marion, IN), and completed using the associated RealLife Exp smartphone app. Participants received a push notification on their smartphone every night for 21 days at 9:30 PM and had until midnight to respond to the notification. As there is a dearth of available data on the frequency of visible intrinsic IER receipt in daily life, we selected a three-week time interval, which is within the standard range for daily diary studies (Gunthert & Wenzel, 2012).

Measures

Nightly diaries. For each nightly diary, participants were asked to indicate whether someone had *tried* to provide them with “emotional support” during the past day. Participants were provided with the same definition of emotional support as in our prior studies. Participants who indicated that they had had at least one IER interaction during the day were instructed to respond to a series of follow-up questions about the interaction that they could remember most clearly, regardless of whether this was the most helpful interaction. These follow-up questions included questions about the IER providers’ behavior (see below). Participants who indicated that they had not receiving IER were asked a series of questions about any strategies that they had used to self-regulate their negative emotions during the day. We implemented this branching logic so that participants would not be incentivized to deny IER receipt to avoid follow-up questions. Regardless, all were asked parallel questions about the outcomes of their emotion regulation efforts and responded to the same total number of questions.

IER provider behavior. Brief prompts covered each of six provider behaviors, including the four IRIS subscales and two additional behaviors that we expected might also be distinctive based on the original exploratory factor analyses (Study 1). That is, participants were asked to indicate whether IER providers had 1) been *physically present* for them: “were present for you;

communicated that they were available for you in the moment; offered a comforting gesture (e.g., a pat on the shoulder, a smile, a hug)”; 2) conveyed *responsiveness*: “really listened to what you were saying; tried to understand or empathize with your feelings”; 3) *expressed confidence*: “expressed confidence in your abilities to handle the situation or your feelings”; 4) provided *cognitive support*: “provided factual information, help with problem-solving, or advice; suggested an alternative interpretation or perspective”; 5) provided *distraction*: “helped you get out of your head, shift your attention away from your feelings or the situation; encouraged you to engage in pleasant or relaxing activities (e.g., go for a walk, listen to music)”; and 6) expressed *hostility*: “responded harshly, angrily, critically, or dismissively”. Each prompt was rated on a Likert scale ranging from 1 (*Definitely false*) to 5 (*Definitely true*).

IER outcomes. Participants were asked to evaluate perceived benefits of their IER interactions using probes that closely resembled those used in Studies 1-4. Specifically, participants were asked to assess the following consequences of receiving IER using bipolar scales that ranged from 1 (*Much Worse* or *Much Less*) to 10 (*Much Better* or *Much More*): 1) affective benefits, 2) self-regard, 3) connectedness with the IER provider, 4) coping ability, 5) emotional control, and 6) likelihood of future IER seeking. As before, we summed these items to create a single perceived benefits composite (all inter-item repeated measures $rs \geq .50$).

In addition to these probes covering the outcomes of IER interaction *per se*, we also included indices of daily psychosocial adjustment and mental wellbeing. These included three items to assess daily wellbeing (single items for optimism, experienced wellbeing, and life satisfaction; $\alpha = .85$), four items to assess daily perceived stress ($\alpha = .86$; Perceived Stress Scale-4, Cohen, Kamarck, & Mermelstein, 1983), and three items to assess daily feelings of social disconnection ($\alpha = .91$; Hughes et al., 2004). Participants were also asked to report

the peak intensity of negative affect experienced on that the day (1 = *Not at all intense*; 10 = *Extremely intense*), which we included as a proxy for need for regulation.

Data Analysis

As preliminary analyses, we first calculated repeated measures correlations to evaluate the degree to which ratings each of the six provider behaviors were distinct from the other five (Bakdash & Marusich, 2017). We also computed intraclass correlations to assess the extent to which ratings of the six provider behaviors varied within versus between participants.

Then, to accomplish our central aim, we computed a series of parallel random-intercept linear mixed effects models, each of which included all six of the provider behaviors as independent variables to probe for unique associations. For the daily outcome variables of perceived stress, daily wellbeing, and social disconnection, we planned to examine both concurrent (i.e., same day) associations and time-lagged (i.e., next day) predictions. For example, we computed a time-lagged model of social disconnection at time T (i.e., today) as predicted by social disconnection and provider behaviors at time T-1 (i.e., yesterday). In the case of our behavioral outcome variable of future IER-seeking, which was a dummy-coded binary outcome (0 = *No*, 1 = *Yes*), we computed a generalized linear mixed effects model using the logit link function to evaluate associations between provider behaviors at T-1 and the likelihood of seeking IER at T, adjusting for the peak intensity of negative emotions at T (as a proxy for need for regulation). These time-lagged analyses constitute a more temporally stringent test of the associations of interest, which one would expect to decay over time, particularly in the face of other daily experiences beyond single instances of receiving IER. When participants failed to respond to a diary on consecutive nights, lagged variables were considered missing to ensure that the lag interval was held constant.

Power considerations. As published literature and our pilot data failed to provide a sufficient basis for *a priori* estimation of model parameters to conduct simulated power analyses (see Lane & Hennes, 2018), we relied on standard recommendations for multilevel tests of fixed effects derived from Monte Carlo simulations, which generally converge on a level-2 sample size of 50 (Bell et al., 2014; Maas & Hox, 2005). Although we surpassed this recommendation, the final sample is relatively small, especially given the relatively low base rate of IER in our sample and the number of regressors examined. Therefore, we followed data analytic recommendations for multivariate modeling with small samples, including using REML estimation and the Kenward-Roger adjustment of the F statistic, to conduct more conservative inferential tests that limit inflation of Type I errors (McNeish, 2017).

We conducted all analyses in R. Repeated measures correlations were implemented with the `rmcorr` package (Bakdash & Marusich, 2017). Mixed effects models and their associated bootstrapped confidence intervals were calculated with the `lme4` package using restricted maximum likelihood (REML) estimation. P-values were estimated with the `lmerTest` and `pbkrTest` packages using the Kenward-Roger approximation (Kenward & Roger, 1997). Pseudo- r^2 values were computed for the mixed effects models with the `MuMIn` package (Nakagawa & Schielzeth, 2013).

Results

Preliminary analyses. We computed null random-intercept models to confirm the appropriateness of mixed effects models. As expected, a significant proportion of the variance was accounted for by the random intercept. These null models also yielded estimates of the intraclass correlations for ratings of the six provider behaviors. These intraclass correlations were modest (ranging from .17 for cognitive support to .37 for hostility), indicating considerable

within-participant variability across IER interactions. As shown in Table 4, ratings of the six provider behaviors were significantly correlated with one another; across the board, however, these repeated measures correlations were small-to-medium in magnitude (all $r_s < .45$), indicating acceptable separability at the bivariate level.

We also considered the degree to which our outcome variables were correlated with one another. As shown in Table 4, perceived benefits ratings were significantly correlated with daily wellbeing, but not with daily perceived stress or daily social disconnection. Daily perceived stress and daily wellbeing were highly correlated with one another, suggesting that these two variables contained substantially redundant information. Based on this result, we combined these two variables to form a composite measure of psychological wellbeing—with higher scores reflecting greater wellbeing and less stress and lower scores reflecting lower wellbeing and more stress—before proceeding with mixed effects modeling to minimize redundancy.

Mixed effects models. Three parallel random-intercept mixed-effects models were computed to examine the *concurrent* associations of the six provider behaviors with three dependent variables: perceived benefits, same-day psychological wellbeing, and same-day social disconnection. Three additional mixed effects models were computed to examine *time-lagged* associations of the six provider behaviors with three dependent variables: next-day psychological wellbeing, next-day social disconnection, and next-day IER-seeking.

Perceived benefits of the interaction. As shown in Table 5, five of the six behaviors were significantly and uniquely associated with concurrent ratings of perceived benefits, with the lone exception being expressions of confidence ($p = .08$). The magnitude of the association with responsiveness was substantially larger than that of any of the five other behaviors, as indicated by the bootstrapped 95% confidence intervals. Collectively, the six provider behaviors captured

nearly half of the variability in perceived benefits (marginal pseudo- $r^2 = .47$), with the full model including the random intercept capturing approximately 69% of the variability.

Psychological wellbeing. Of the six provider behaviors, only cognitive support was uniquely associated with same-day psychological wellbeing ($b = .12$, bootstrapped 95% CI = [.2, .22], $p = .03$). To evaluate time-lagged associations, we evaluated a second, parallel model, with *next-day* (i.e., T2) wellbeing as the DV. Adjusting for T1 wellbeing, none of the partner behaviors significantly predicted next-day wellbeing. The six provider behaviors accounted for 4% and 5% of the variability in same-day and next-day wellbeing, respectively. Model parameters are reported in Table 6.

Social disconnection. Of the six provider behaviors, only hostility was uniquely associated with same-day feelings of social disconnection ($b = .38$, bootstrapped 95% CI = [.01, .74], $p = .04$). In our parallel model with *next-day* social disconnection as the DV, T1 hostility again significantly predicted T2 social disconnection ($b = .55$, bootstrapped 95% CI = [0.17, .90], $p = .005$), even adjusted for T1 social disconnection. The six provider behaviors accounted for 35% and 32% of the variability in same-day and next-day social disconnection, respectively. Model parameters are reported in Table 7.

Next-day IER seeking. We used a random-intercept mixed effects logistic regression model to evaluate whether the six provider behavior ratings at T1 significantly predicted the likelihood of seeking IER on the next day (T2). Of the six provider behaviors, only T1 responsiveness was significantly associated with an increased likelihood of seeking IER on the next day (OR = 1.63, 95% CI = [1.06, 2.53]). This association survived adjustment for the T1 perceived benefits of the interaction and T2 self-reported peak intensity of negative affect, a proxy for need for regulation. Collectively, ratings of the six provider behaviors accounted for

approximately 10% of the variance in next-day seeking (Tjur's $D = .10$). Model parameters are reported in Table 8.

Discussion: Study 5

In line with prior research and with the results of Studies 1-4, findings of Study 5 indicate that IER receipt is commonplace in the daily lives of college students, occurring several times a week on average, and is associated with an array of socioemotional outcomes. In line with our expectations, ratings of the different types of IER behaviors were only moderately correlated, which further indicates that participants can distinguish between these behaviors. Whereas significant mean differences between participants were observed in ratings of each of the provider behaviors and perceived benefits, there was considerable within-participant variability across interactions as well. This finding highlights the importance of considering features of the transaction that may account for this variability, such as provider behavior.

With respect to our hypotheses regarding outcomes, ratings of responsiveness significantly and most closely covaried with the perceived socioemotional benefits of IER interactions. Responsiveness also was the only provider responses that significantly predicted the likelihood of participants seeking interpersonal regulation on the next day. This prospective association between responsiveness and next-day IER seeking survived adjustment not only for the peak intensity of negative affect (a proxy for need for regulation), but also for the perceived benefits of the prior day's IER interaction. This finding suggests that perceptions of responsiveness may be a better predictor of future IER-seeking than perceived benefits.

Responsiveness was not the only dimension of importance, however. Four of the five other provider responses contributed additional unique variance to the model of perceived benefits above and beyond ratings of responsiveness, with the lone exception being expressions

of confidence. With respect to psychosocial functioning measured at the daily level, unique associations emerged between cognitive support and wellbeing and between hostility and social disconnection. Whereas the association between cognitive support and wellbeing was relatively modest, the association between hostility and social disconnection was more pronounced in that it emerged in both concurrent and prospective analyses. This finding suggests that encountering a harsh response in the course of receiving IER may exert a powerful and lasting influence on social connectedness.

Overall, these data validate the need to consider specific dimensions of IER interactions, in that multiple provider behaviors appear to contribute unique variance to the perceived benefits of IER interactions and to differentially relate to various psychosocial outcomes. When considering findings across outcomes, it appears that although individuals tended to view responsiveness as most tied to perceiving IER as beneficial—and therefore also to being motivated to seek out IER on subsequent days—hostile responses play a central role in feelings of social disconnection.

General Discussion

Studies 1-5 collectively demonstrate the importance of closely examining the contents of individual IER interactions and the psychosocial consequences of these interactions. In Study 1, we identified four distinct dimensions within the final 28-item IRIS: responsiveness, cognitive support, hostility, and physical presence. Each of these factors were uniquely associated with our key outcome, perceived benefits of receiving IER. In Studies 2-4, we replicated this four-factor structure and demonstrated that it generalized to more diverse samples, including individuals with clinically relevant difficulties with regulation of emotional impulses. We also replicated our key Study 1 finding that these dimensions are robustly correlated with the perceived benefits of

IER interactions, although physical presence was not uniquely associated with perceived benefits in this confirmatory analysis. Study 5 used a daily diary approach to examine the associations of these same facets of IER, as well as distraction and expressions of confidence, with same-day and next-day psychosocial outcomes. Again, we observed robust associations, particularly with perceived benefits and social disconnection, and further support for the substantive specificity of the different dimensions of IER. Taken together, our findings suggest that people can differentiate among IER interactions in terms of the degree to which IER providers convey responsiveness, hostility, cognitive support, and physical presence; that these perceptions can be captured in an easily administered questionnaire, the IRIS; and that ratings of these dimensions of IER are distinct from individual differences in affectivity and are tied to important socioemotional outcomes.

Limitations and Future Directions^[B&VS8]

Across all five studies, we focused specifically on receivers' subjective experiences of IER interactions and especially their experiences of providers' responses. We see this focus on subjective experience as aligned with the important role of appraisals of partners' behaviors (cf. Bradbury & Fincham, 1990) and perceived responsiveness (cf. Reis & Gable, 2015) in close relationships. Nonetheless, our findings open the door to intriguing questions about the extent to which IER receivers' perceptions are grounded in enacted behavior or reflect more idiosyncratic (e.g., Tanner et al., 2018) or relationship-specific judgments (cf. Lakey & Orehek, 2011). Future studies could use observational methods to address questions about enacted behaviors.

One particular drawback of focusing on subjective experience is that some IER moments may not be captured. More subtle instances of IER—for example, those in which the IER provider is cognizant that they are providing support, but the receiver remains unaware—may

yield different associations with our outcomes of interest, as suggested by past research on visible versus invisible social support (e.g., Howland & Simpson, 2010). Other research questions pertain to providers' perceptions of their own behavior. Such questions include the concordance of providers' and receivers' reports, as well as the psychosocial consequences of providing different IER responses. For example, one question is whether *conveying* responsiveness bolsters feelings of closeness, paralleling the effect of *receiving* responsiveness and prior findings in research on empathy and synchrony (e.g., Cwir, Carr, Walton, & Spencer, 2011). In summary, use of dyadic designs in which the behavior and the subjective experience of the receiver and the provider can be captured in tandem will be a crucial step in this line of research.

Conclusion

Beyond general questions about whether intrinsic IER is sought or believed to be effective, our research suggests that it is important to consider the content of IER interactions, including the degree to which IER providers convey responsiveness, hostility, cognitive support, and their physical presence. Our newly developed scale, the Interpersonal Regulation Interaction Scale (IRIS), provides a mechanism to do so quickly, and the factor structure appears to generalize across undergraduates, adults in the community, and treatment-seeking adults. These dimensions appear to be substantively separable, suggesting, for example, that many IER interactions contain both positive (e.g., responsive) and negative (e.g., hostile) elements as opposed to being strictly positive or strictly negative. Crucially, these dimensions of IER are tied to multiple psychosocial outcomes, with specific facets of IER being differentially associated with outcomes. For example, responsiveness appears to be core to perceptions of the benefits of IER interactions, as well as people's likelihood of seeking IER on subsequent days, while

hostility is more robustly linked to social disconnection, not just on the day of IER receipt but persisting into the next day. Likewise, even after adjusting for responsiveness and hostility, receipt of cognitive support was consistently associated with the perceived benefits of IER interactions across all five studies, suggesting that there are other relevant behaviors beyond those that reflect the valence of the interaction.

We do not claim that the identified dimensions fully capture all of the consequential IER behaviors in which providers may engage, nor that these dimensions reflect all of the conceptually meaningful distinctions among these behaviors; rather, we see these dimensions as reflecting important distinctions that IER receivers draw when they are evaluating IER interactions and that appear to be differentially related to important socioemotional outcomes. Indeed, we hope that our findings will spur further research that carefully characterizes the features of IER in order to understand how those features relate to meaningful psychosocial outcomes.

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Table 1.

EFA item loadings and inter-factor correlations for the final 28-item IRIS (n = 390)

Item	Responsiveness	Hostility	Cognitive Support	Physical Presence
“Encouraged me to share my feelings with them”	.80	-.07	-.08	-.11
“Made an effort to listen to me”	.75	-.13	-.04	-.03
“Let me vent my emotions”	.73	-.06	-.02	-.02
“Understood my feelings”	.72	.02	.11	.01
“Let me know that my feelings were understandable or legitimate”	.71	.02	.06	.04
“Comforted or consoled me”	.68	.02	.05	.17
“Expressed sympathy or concern”	.65	.06	-.01	.05
“Agreed with my opinion of the situation”	.64	.08	-.01	-.09
“Took an interest in my feelings”	.61	.01	.07	.15
“Were honest with me”	.49	-.08	.17	-.04
“Communicated their love or positive regard for me”	.48	-.01	.04	.24
“Expressed anger or hostility toward me”	.01	.83	-.03	-.03
“Ignored or invalidated my feelings”	-.05	.79	-.09	-.04
“Expressed resentment toward me”	.00	.76	.03	.02
“Laughed at me”	.11	.75	-.07	-.02
“Told me I was being too emotional”	-.04	.71	.10	-.02
Criticized my response to the situation”	-.14	.68	.14	-.01
“Were overwhelmed by my feelings”	-.01	.64	-.02	.13
“Helped me to solve the problem”	-.03	-.01	.77	-.01
“Gave me advice”	.09	-.02	.73	-.16
“Helped me to make a plan”	.00	.00	.72	.07
“Suggested alternative interpretations of the situation”	-.07	-.03	.71	.01
“Helped me to see the situation in a new light”	-.05	-.01	.70	.02
“Helped me to see a silver lining”	.15	.12	.50	.17
“Reminded me of the good things that I have”	.21	.07	.45	.12

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“Communicated their thoughts and feelings through physical contact (for example, a pat on the shoulder, a hug)”	-.03	.01	-.02	.93
“Conveyed their availability through body language (for example, eye contact, facial expressions, body posture)”	.03	-.04	-.01	.75
“Let me know that they were physically present with me”	.24	.00	.16	.50
	(1)	(2)	(3)	(4)
(1) Responsiveness		-0.42	0.40	0.36
(2) Hostility			0.11	0.07
(3) Cognitive Support				0.22
(4) Physical Presence				

Note. Primary factor loadings are in bold. Ratings were on a nine-point scale from 1 = *They didn't do this at all* to 9 = *They did a lot of this*. Items were presented in a random order. Zero-order correlations among factor scores are reported at the bottom of the table.

Table 2.

Zero-order correlations between IRIS factor scores and discriminant measures (N = 390)

	BFI-E	BFI-N	UCLA	ERQ-R	ERQ-S	DERS	ISEL	GSE
Responsiveness	.20***	-.07	-.44***	.14**	-.27***	-.27***	.43***	.25***
Hostility	-.01	.03	.28***	-.04	.23***	.32***	-.41***	-.13*
Cognitive Support	.22***	-.15**	-.32***	.13*	-.14**	-.17***	.20***	.22***
Physical Presence	.15**	-.10*	-.13*	.04	-.06	-.07	.10*	.12*

Note. BFI-E = BFI Extraversion subscale; BFI-N = NFI Neuroticism subscale; UCLA = Revised UCLA Loneliness Scale; ERQ-R = Emotion Regulation Questionnaire Reappraisal subscale; ERQ-S = Emotion Regulation Questionnaire Suppression subscale; DERS = Difficulties with Emotion Regulation Scale; ISEL = Interpersonal Support Evaluation List-12; GSE = General Self-Efficacy Scale.

Table 3.

Zero-order and partial correlations between IRIS factor scores and perceived benefits (N = 390)

	Perceived Benefits	
	Zero-Order	Partial
Responsiveness	.69***	.62***
Hostility	-.34***	-.25***
Cognitive Support	.45***	.37***
Physical Presence	.35***	.32***

Note. Partial correlations controlled for all of the discriminant variables: BFI Extraversion subscale; NFI Neuroticism subscale; Revised UCLA Loneliness Scale; Emotion Regulation Questionnaire, Reappraisal and Suppression subscales; Difficulties with Emotion Regulation Scale; Interpersonal Support Evaluation List-12; General Self-Efficacy Scale.

Table 4.

Repeated measures and intraclass correlations for daily diary ratings of provider behaviors and psychosocial outcomes (N = 77; k = 338)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	ICC
(1) Distraction	–	.10	.10	-.05	.22***	.12	.29***	-.04	.04	.01	.30
(2) Responsiveness		–	.44***	-.24***	.42***	.24***	.63***	.02	.03	.07	.32
(3) Expressions of Confidence			–	-.18**	.26***	.30***	.40***	-.07	.08	.02	.20
(4) Hostility				–	-.06	.03	-.21***	-.07	-.05	.27***	.37
(5) Physical Presence					–	.05	.39***	.01	.07	.03	.27
(6) Cognitive Support						–	.32***	-.15*	.13*	-.09	.17
(7) Perceived Benefits							–	-.10	.19**	-.07	.41
(8) Daily Perceived Stress								–	-.69***	.33***	.41
(9) Daily Wellbeing									–	-.39***	.36
(10) Daily Social Disconnection										–	.45

Notes. *** $p < .001$, ** $p < .01$, * $p < .05$. ICC = intraclass correlation.

Table 5.

Estimates for effects of provider response ratings on perceived benefits of receiving IER (N = 77)

	β	95% CI	p
Distraction	.17	.10, .25	<.001
Responsiveness	.39	.30, .48	<.001
Expressions of Confidence	.07	-.01, .15	.08
Hostility	-.08	-.16, -.01	.04
Physical Presence	.10	.03, .18	.01
Cognitive Support	.14	.07, .21	<.001

Table 6.

Estimates for effects of provider response ratings on daily wellbeing and stress (N = 77)

	Same-Day (T1)			Next-Day (T2)		
	β	95% CI	<i>p</i>	β	95% CI	<i>p</i>
Distraction	.04	-.04, .14	.35	.09	-.00, .18	.07
Empathic Responding	-.03	-.17, .13	.73	.05	-.11, .22	.51
Expressions of Confidence	.09	-.05, .21	.16	.00	-.13, .12	.96
Harsh Responding	.05	-.09, .17	.45	-.10	-.23, .02	.15
Physical Presence	.06	-.04, .16	.27	-.01	-.11, .09	.83
Practical Responding	.10	.01, .20	.04	.08	-.02, .18	.11
T1 Stress and Wellbeing				0.28	.18, .37	<.001

Table 7.

Estimates for effects of provider response ratings on daily social disconnection (N = 77)

	Same-Day (T1)			Next-Day (T2)		
	β	95% CI	<i>p</i>	β	95% CI	<i>p</i>
Distraction	.08	-.18, .31	.52	.25	-.02, .53	.06
Empathic Responding	.22	-.19, .67	.31	-.08	-.53, .38	.73
Expressions of Confidence	.01	-.32, .31	.95	.00	-.38, .38	.99
Harsh Responding	.38	.01, .74	.04	.55	.17, .90	.005
Physical Presence	.01	-.27, .30	.93	-.08	-.39, .22	.63
Practical Responding	-.22	-.51, .10	.09	-.07	-.37, .20	.61
T1 Loneliness				.30	.19, .42	<.001

Table 8.

Estimates for effects of provider response ratings on likelihood of next-day IER seeking (N = 77)

	OR	95% CI	<i>p</i>
T1 Distraction	1.10	.85, 1.41	.47
T1 Responsiveness	1.68	1.03, 2.76	.03
T1 Expressions of Confidence	1.10	.77, 1.58	.60
T1 Hostility	1.16	.82, 1.64	.40
T1 Physical Presence	.90	.67, 1.21	.48
T1 Cognitive Support	.99	.75, 1.32	.97
T1 Perceived Benefits	.95	.62, 1.45	.80
T2 Peak Emotional Intensity	1.18	1.05, 1.33	.004

Figure 1.

Schematic representation of the confirmatory measurement model.

Note. Rsp = Responsiveness; Cgn = Cognitive Support; Hst = Hostility; Phy = Physical

Presence. All estimates are standardized.

Figure 2.

Schematic representation of the confirmatory regression model.

Note. Rsp = Responsiveness; Cgn = Cognitive Support; Hst = Hostility; Phy = Physical Presence; Bnf = Perceived Benefits. All estimates are standardized. The left-hand portion of the measurement model was omitted for legibility; however, the IRIS latent variables were formed in the same way as in Figure 1.

How Will You Regulate My Emotions?: A Multistudy Investigation of Dimensions and
Outcomes of Interpersonal Emotion Regulation Interactions

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Supplementary Online Material (SOM)

This file contains additional descriptive analyses and Tables S1 and S2.

Supplementary Descriptive Analyses

Introduction and method. Using data collected as part of Study 1, we examined the degree to which the IRIS factors were associated with variables related to seeking out and receiving IER, including both individual and situational differences in IER. These analyses were exploratory, and so we included them here for descriptive purposes.

Individual differences in IER. We gathered data to examine the degree to which the IRIS subscales, which are interaction-specific, cohere with people's more trait-like reports of IER receipt. Participants in each of our autobiographical recall studies were asked to rate the frequency and effectiveness of their receipt of IER "in general." Participants also rated the frequency and effectiveness of specific IER provider behaviors, some of which corresponded to the IRIS dimensions.

Situational differences in IER. As the IRIS was designed to measure individual IER interactions, we expected the subscale scores to be sensitive to situational factors. For example, a given provider behavior might be evaluated differently depending on whether the provider is a close friend or a distant acquaintance. Accordingly, as part of the autobiographical recall procedure, participants were asked questions about the interaction that were unrelated to providers' behavior, including: affective valence immediately prior to IER interaction, significance of the emotionally evocative event that prompted IER receipt, self-reported desire for IER before receiving IER, whether IER was sought explicitly (vs. received IER without specifically seeking it; dummy-coded as 1 and 0, respectively), desire for specific partner responses, and psychological closeness with the provider. We examined the extent to which IER

dimensions fluctuated with these interaction-specific variables to assess possible connections between these situational factors and receivers' experiences of IER.

Results and discussion. Participants who reported receipt of more responsiveness, cognitive support, and physical presence and less hostility during a recent IER interaction (IRIS subscales) tended to report that they sought IER more frequently and viewed IER as more effective in general. There was also some evidence of coherence of the IRIS scores with ratings of the frequency and effectiveness of specific provider behaviors in that correlations between corresponding factor score-ratings pairs tended to be moderate, median $r = .35$, whereas non-corresponding pairs showed more modest correlations, median $r = |.16|$.

With respect to situational factors, the extent to which IER was desired appeared to be moderately tied to ratings of responsiveness, suggesting that people may be less receptive to responsiveness when they feel more negatively about the prospect of receiving IER. Likewise, greater psychological closeness with the provider was associated with greater responsiveness, and perceiving the triggering event as more significant was associated with more responsiveness and more cognitive support. Receivers who reported that their affective valence was relatively less negative immediately before IER receipt or who reported that they were relatively direct in communicating their desire for IER also tended to report that they encountered more hostile responses from providers. As above, there was some evidence for coherence between the extent to which participants indicated that IER providers had conveyed specific behaviors (IRIS factor scores) and participants' ratings of the extent to which they were looking for providers to convey those same behaviors (median r s = $.43$ and $|.18|$ for corresponding pairs vs. non-corresponding pairs, respectively), although this could also partially reflect participants having retrospectively re-evaluated what they wanted in light of the response that they actually received.

Table S1.

Zero-order correlations of IRIS factor scores with general frequency and receipt of IER behaviors (N = 390)

IER score	Frequency					Effectiveness				
	Overall	Responsive	Hostility	Cognitive	Presence	Overall	Responsive	Hostility	Cognitive	Presence
Responsive	.33	.39	-.26	.21	.34	.33	.38	-.21	.26	.35
Hostility	-.17	-.16	.45	-.01	-.17	-.13	-.43	.40	-.26	-.43
Cognitive	.19	.26	.00	.31	.27	.21	.07	.07	.26	.09
Presence	.11	.16	-.02	.15	.17	.13	.07	-.01	.01	.13

Note. Correlations above .10 are significant at $p < .05$ (uncorrected). Responsive = Responsiveness; Cognitive = Cognitive support; Presence = Physical presence. Participants were asked to indicate how often they receive IER and the efficacy of receiving IER “in general.” They were also asked to indicate the frequency and effectiveness of specific partner responses, including some that corresponded to the observed IRIS factors. Recall that the IRIS factor scores reflect the degree to which responsiveness, hostility, cognitive support, and physical presence were conveyed *during a single IER interaction*. Correlations between self-reported frequency and efficacy of receiving specific partner response types and corresponding IRIS factor scores are bolded for emphasis.

Table S2.

Zero-order correlations between IRIS factor scores and interaction-specific variables (N = 390)

	Affect. Valence	Event Signif.	IER Desire	IER Sought?	Closeness	Directness	Desire, Responsive	Desire, Hostility	Desire, Cognitive	Desire, Presence
Responsive	-.12	.27	.40	.25	.31	.00	.40	-.21	.18	.40
Hostility	.21	-.09	-.25	-.10	-.16	.21	-.33	.57	-.03	-.33
Cognitive	.12	.19	.11	.14	.14	.18	.18	.10	.45	.18
Presence	.02	.10	.15	.05	.10	.09	.22	.03	.08	.21

Note. Correlations above .10 are significant at $p < .05$ (uncorrected). Responsive = Responsiveness; Cognitive = Cognitive Support; Presence = Physical Presence; Affect. Valence = Affective valence prior to receiving IER; Event Signif. = Perceived significance of the events that prompted IER receipt; IER desire = desire to receiving IER after the events that prompted IER receipt; Closeness = closeness with the provider; Directness = How directly desire for IER was communicated to the provider. Support Sought was coded 0 = *No*, 1 = *Yes*, where no indicates that IER was received without being explicitly sought. Desire (Responsive, Hostility, Cognitive, Presence) refers to ratings of the degree to which participants wanted providers to engage in certain behaviors during the specific IER interaction in question. Correlations between desire for specific partner behaviors and corresponding IRIS factor scores, which reflect the degree to which those behaviors were conveyed as part of the same interaction, are bolded for emphasis.