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Forgiveness and Psychological Adjustment Following Interpersonal Transgressions:

A Longitudinal Analysis

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Abstract

Forgiveness is often assumed to be adaptive for psychological adjustment following interpersonal transgressions. 347 individuals who had experienced a recent interpersonal transgression were surveyed on four occasions over the course of six weeks. Forgiveness was assessed with the Transgression-Related Interpersonal Motivations Inventory (McCullough et al., 1998), and psychological adjustment was assessed with scales measuring depression and rumination. Latent growth curve analyses showed that intraindividual changes in forgiveness were positively correlated with changes in adjustment. Latent difference score analyses indicated that adjustment predicted subsequent change in forgiveness, but that forgiveness did not predict subsequent change in adjustment. The results suggest that adjustment facilitates forgiveness, but not that forgiveness facilitates adjustment.

Key Words: forgiveness, psychological adjustment, latent growth curve analysis, latent difference score analysis

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The concept of forgiveness has received increased attention by researchers in personality and social psychology during the last decade (cf. Exline, Worthington, Hill, & McCullough, 2003). One reason why forgiveness attracts attention might be its prosocial character, making it a focus of the positive psychology movement (cf. Gable & Haidt, 2005; Seligman & Csikszentmihalyi, 2000). A related reason might be that, aside from its positive interpersonal effects, forgiveness is often assumed to have positive intrapersonal effects on the psychological adjustment of the forgiving individual (Baumeister, Exline, & Sommer, 1998; Enright, Freedman, & Rique, 1998; Exline et al., 2003). If forgiveness influences psychological adjustment, then it has important implications for counseling and psychotherapy following hurtful experiences. However, the empirical evidence, which we review below, does not allow for firm conclusions regarding the temporal sequence of forgiveness and psychological adjustment (see also the cautionary note by McCullough, 2000). Therefore, the aim of the present study was to investigate the relation between forgiveness and psychological adjustment through the use of longitudinal data.

In the psychological literature, several definitions of forgiveness have been proposed, but there is growing consensus that forgiveness may be defined by prosocial motivational changes towards a transgressor, consisting in a decrease in interpersonal avoidance, a decrease in revenge motivation, and an increase in benevolence (cf. McCullough et al., 1998; McCullough & Hoyt, 2002; McCullough, Worthington, & Rachal, 1997). McCullough, Fincham, and Tsang (2003) investigated this conception of forgiveness by explicitly modeling forgiveness as intraindividual changes in forgiveness indicators (avoidance, revenge, benevolence). By use of longitudinal data

and latent growth curve analyses, the authors analyzed three psychologically meaningful parameters, i.e., the intercept of the curve (interpreted as initial degree of forbearance), the slope of the curve (interpreted as trend forgiveness), and situational deviations from the curve (interpreted as temporary forgiveness). This model then allowed investigation of distinct effects of predictors (e.g., transgression severity, empathy) on the three statistical parameters. The results showed, for example, that empathy was related to forbearance and temporary forgiveness, but unrelated to trend forgiveness (adjustment indicators were not examined by McCullough et al., 2003).

Empirical Evidence on the Relation

So far, numerous studies have pointed to forgiveness being related to indicators of psychological adjustment. Correlational studies have shown that forgiveness is positively associated with mental health (Berry & Worthington, 2001), positive affect (Thompson et al., 2005), and life satisfaction (Brown & Phillips, 2005; Lawler-Row & Piferi, 2006; Thompson et al., 2005), and negatively associated with depression (Berry, Worthington, O'Connor, Parrott, & Wade, 2005; Brown, 2003; Brown & Phillips, 2005; Exline, Yali, & Lobel, 1999; Lawler-Row & Piferi, 2006; Orcutt, 2006), rumination (McCullough et al., 1998; McCullough, Bono, & Root, 2007; McCullough, Bellah, Kilpatrick, & Johnson, 2001; Suchday, Friedberg, & Almeida, 2006; Thompson et al., 2005), neuroticism (Berry et al., 2005; Berry, Worthington, Parrott, O'Connor, & Wade, 2001; McCullough & Hoyt, 2002; Walker & Gorsuch, 2002), negative affect (Thompson et al., 2005), anxiety (Exline et al., 1999; Orcutt, 2006; Thompson et al., 2005), and posttraumatic stress disorder (Witvliet, Phipps, Feldman, & Beckham, 2004).

Nearly all of the studies above employed cross-sectional designs, but longitudinal studies have also been conducted. In one longitudinal study, in which two measurements were taken at a

two-month interval, McCullough et al. (2001) found that change in forgiveness was correlated with change in rumination, but that Time 1 trait forgiveness (indicated by low vengefulness) did not predict subsequent change in rumination or life satisfaction. In contrast, a longitudinal study by Orcutt (2006) found that forgiveness predicted psychological distress measured about 8 months later, even when controlling for prior level of distress. A limitation of the study by Orcutt (2006) is that forgiveness was measured only at Time 1, disallowing testing for potential effects in the reverse direction, i.e., the effect of distress on subsequent forgiveness. Finally, McCullough et al. (2007) report on three longitudinal studies on the relation between forgiveness and rumination. Whereas in the first two studies McCullough et al. (2007) analyzed effects between concurrent measures of forgiveness and rumination (i.e., using one construct as time-varying covariate in a growth curve model for the other construct), in the third study the authors investigated prospective effects of forgiveness and rumination across a series of 21 daily assessments, controlling for prior levels of the variables. The results showed that rumination consistently predicted lower forgiveness on the next day (as indicated by avoidance and revenge), but that forgiveness less clearly predicted lower rumination on the next day (only for avoidance, but not revenge).

In three experimental studies, Karremans, Van Lange, Ouwerkerk, and Kluwer (2003) examined the effects of forgiveness on life satisfaction, state measures of positive and negative affect, and state self-esteem. Their main hypothesis was that forgiveness and psychological adjustment should be related much more strongly in relationships in which the individual is strongly committed compared to relationships with low commitment. The results of all three studies clearly supported this hypothesis. However, of interest to the present study is whether Karremans et al.'s (2003) investigations allow conclusions made regarding the effect of

forgiveness on psychological adjustment. In Study 1, participants had to recall a conflict with another person that they had forgiven vs. not forgiven. The results showed that when commitment was strong, forgiveness affected life satisfaction, positive affect, and state self-esteem. However, as discussed by Karremans et al. (2003), the effects might have been due to demand characteristics (e.g., participants might have unwittingly biased their self-reports to confirm the supposed experimenter's hypothesis). This is possible given the effects that the simple recall of a conflict episode had on a broad and trait-like variable such as life satisfaction. In Study 2, participants had to think of an existing relationship, and forgiveness was manipulated by instructing the participants to imagine that they had forgiven vs. not forgiven. The results showed that when commitment was strong, the forgiveness manipulation had significant effects on all dependent variables. However, due to the hypothetical character of the forgiveness manipulation, the possible effects of demand characteristics again need to be considered. Therefore, in Study 3, participants completed what they thought was an implicit measure of forgiveness and were given false feedback regarding whether it showed high or low forgiveness. By this manipulation, the authors sought to manipulate the true forgiveness level of the participants. The results showed that, when relationship commitment was strong, forgiveness had significant effects on positive affect, negative affect, and state self-esteem, but not life satisfaction. The results of Study 3 provide evidence for effects of forgiveness on psychological adjustment, at least for its immediate effects on well-being and affect. However, to conclude whether forgiveness also has long-term effects on adjustment or not requires longitudinal study designs.

In another experimental study, Tse and Chang (2006) found that participants in a low depression condition reported significantly greater forgiveness than participants in a high

depression condition. However, because depression conditions consisted of participants with pre-existing high and low depression scores, and depression was not experimentally manipulated, conclusions cannot be made regarding the potential causal effect of depression on forgiveness.

Finally, intervention studies can provide evidence relevant to the purpose of the present study. However, a disadvantageous design feature in some of the studies is that forgiveness interventions were compared with no-intervention control groups (Coyle & Enright, 1997; Freedman & Enright, 1996; Rye et al., 2005). Thus, although these studies have resulted in large effect sizes for adjustment indicators such as depression and anxiety (cf. Baskin & Enright, 2004), and have shown that the forgiveness interventions were effective, the no-intervention control group designs made it unclear whether the effects were caused by forgiveness or by unspecific factors of the intervention. In studies that have used alternative intervention control groups (Al-Mabuk, Enright, & Cardis, 1995; Hebl & Enright, 1993; Lin, Mack, Enright, Krahn, & Baskin, 2004; Reed & Enright, 2006), differences in effect sizes for forgiveness and alternative interventions were smaller and significant in only some of the studies. However, even studies using alternative intervention control groups do not allow attributing effect size differences to be unambiguously attributed to forgiveness, because forgiveness and alternative interventions may differ on characteristics other than forgiveness that are not controlled in the study. For example, some of the forgiveness interventions included sections focusing on shame, acceptance, or finding meaning (Al-Mabuk et al., 1995; Coyle & Enright, 1997; Freedman & Enright, 1996; Hebl & Enright, 1993; Lin et al., 2004; Reed & Enright, 2006).

To summarize, the available evidence from correlational, experimental, and intervention studies suggests that forgiveness and adjustment are significantly associated. However, the

evidence does not yield clear conclusions regarding the effects of forgiveness on psychological

adjustment or the effects of psychological adjustment on forgiveness.

<div style="text-align:center">Potential Explanations of the Relation</div>

How can the association between forgiveness and adjustment be explained? Potential

explanations can be organized regarding their underlying causal assumptions. Forgiveness might

improve adjustment, adjustment might increase forgiveness, causality might be reciprocal, or the

correlation might be spurious and caused by third factors.

First, forgiveness might foster psychological adjustment and do so in several ways. For

example, forgiveness might help one reach psychological closure with the event and thereby

decrease the frequency of event-related rumination (cf. Gold & Wegner, 1995; Martin & Tesser,

1996). Forgiveness might also reduce the individual's anger level, and thereby decrease the

frequency of negative affect. Within close relationships, forgiveness may help restore

relationship quality and thereby increase well-being (cf. Karremans et al., 2003; McCullough,

2000). Alternatively, lack of forgiveness may strengthen the victim role, i.e., strengthen

attributes of suffering, weakness, misfortune, and passivity in the victim's self-concept

(Baumeister et al., 1998).

Second, there might also be effects from adjustment to forgiveness. If the individual

experiences a decrease in psychological symptoms such as depression and anxiety, the subjective

degree of persisting harm might be decreased, and thereby reduce the need for revenge (cf.

Baumeister et al., 1998). Individuals who are dispositionally high in emotional stability might

forgive more easily because they perceive social events less negatively (cf. McCullough & Hoyt,

2002). In contrast, individuals who are still anxious about the risk of repeated hurt by the

transgressor will not be inclined to forgive but to avoid the transgressor. Moreover, ruminative

symptoms are a factor maintaining and increasing anger and revenge motivation (McCullough et al., 1998; Paleari, Regalia, & Fincham, 2005; Rusting & Nolen-Hoeksema, 1998), which inhibit forgiveness. Indeed, the studies by McCullough et al. (2007) suggested that anger mediates the relation between rumination and forgiveness.

Third, the effects between forgiveness and adjustment might be reciprocal, i.e., the psychological processes described above might take place at the same time. Finally, fourth, the correlation between forgiveness and adjustment might be spurious, i.e., accounted for by other factors, that might influence both the course of forgiveness and adjustment following hurtful experiences (e.g., neuroticism, emotion regulation).

Design of the Present Study

We investigated the relationship between the processes of forgiveness and adjustment using a data set with four repeated measurements of the two constructs. To increase the ecological validity of the analysis, we decided to survey reactions to real-world events. We used two established indicators for each of the constructs. To measure forgiveness we assessed interpersonal avoidance and revenge motivation, and to measure psychological adjustment we assessed depression and rumination.

The statistical analyses were based on structural equation modeling of intraindividual change across measurements, taking into account both the covariance structure and mean structure of the variables. In the first part of the analyses, we used latent growth curve models that allowed us to investigate the curves of forgiveness and adjustment separately, i.e., univariate models, and the relations between the curves, i.e., bivariate models (cf. Curran & Hussong, 2003). Then, in the second part of the analyses, we used latent difference score models (LDS models, cf. McArdle, 2001; McArdle & Hamagami, 2001). The advantage of bivariate LDS

models over bivariate latent growth curve models is that they allow for testing of cross-lagged effects, or *coupling* effects, between the constructs, that is, the effect of one variable on subsequent intraindividual change in the other variable. However, bivariate LDS models do not allow for clear-cut interpretation of the correlations between the growth curves, which is the reason why we conducted latent growth curve analyses first. The main advantage of bivariate LDS models over traditional cross-lagged panel models (cf. Finkel, 1995) is that LDS models also account for intraindividual change in absolute values (i.e., the mean structure of the variables).

Importantly, the study design does not allow for definite conclusions regarding causality, because as in all passive observational designs, effects between factors may be caused by unmeasured third variables and thus be spurious (cf. Finkel, 1995). Nevertheless, longitudinal analyses are useful because they can indicate whether the data are in accordance with a causal model or not.

Another important issue in longitudinal designs is the selection of an appropriate time interval between measurements, because potential effects between the constructs need time to operate (cf. Collins, 2006). Because the two longitudinal studies by McCullough et al. (2003) successfully applied latent growth curve analyses using repeated measurements of forgiveness at one-week and two-week intervals, respectively, we decided to use two-week intervals in our study.

The present study extends previous research on forgiveness and psychological adjustment in several ways. First, using a design with multiple repeated measurements allowed for estimates with higher reliability compared to studies using two-wave designs. Second, in contrast to previous studies (with the exception of McCullough et al., 2007) we investigated predictive

effects between forgiveness and adjustment in both directions. Third, the application of statistical models that account not only for the covariance structure but also the mean structure of the variables increased the validity of the analyses (cf. Ferrer & McArdle, 2003).

<div align="center">Method</div>

Data Collection

The research was conducted as a web-based study. We recruited participants in two different ways. First, the study was announced in an issue of a popular German health magazine that is published monthly. Second, we advertised the study on two websites that collect information on web-based studies that are conducted in German-speaking countries. In the announcement, participants were informed that the study consisted of four repeated assessments at two-week intervals and that individual computerized feedback would be provided after the fourth assessment.

Potential participants accessed the study at a noncommercial, advertisement-free website that was located within the domain of the University of Bern. On the homepage, participants received introductory information on the purpose and procedure of the study and were informed that their data would be treated as strictly confidential and that the server was protected from unauthorized access. Participants were asked to provide an e-mail address at which they could receive e-mails containing individual links to subsequent assessment websites. Then, participants were instructed to select an autobiographical event in the last six months in which they felt strongly hurt by the behavior of their relationship partner, a family member or relative, a friend, a neighbor, or a person from the workplace or educational setting. Demographic characteristics of the participants (age, gender, education, country) and event characteristics (time since event, initial stressfulness of event, relationship to transgressor) were assessed. Finally, participants

completed scales measuring the study variables. At the second to fourth assessment, only the scales measuring study variables were given. Immediately following the fourth assessment, participants were given access to individual computerized feedback and were sent a link allowing them to reaccess the feedback over the next seven days. The feedback provided information on the longitudinal course of the study variables, educational information on the nature of the variables, and information on the individual's scores in comparison with a reference population.

Participants

The sample consisted of 347 individuals from the general community. In all, 84% of the participants came from Germany, 8% from Switzerland, 4% from Austria, and 4% from other countries. Eighty-two percent of the participants were women and 18% were men. Mean age of participants was 34.3 years ($SD = 10.8$, Range 18 to 66). Level of school education was as follows: 1% had not finished school, 23% had finished the obligatory 10 years, and 76% had completed academic track high school or university. The mean time since the event was 3.0 months ($SD = 2.0$, Range 0 to 6). The mean initial stressfulness of the event, measured on an 11-point scale ranging from 0 (*none*) to 10 (*extremely strong*), was $M = 8.8$ ($SD = 1.7$, Range 0 to 10). In 40% of the cases the transgressor was a relationship partner, in 17% a family member or relative, in 17% a friend or neighbor, in 19% a person from the workplace or educational setting, and in 7% the participants did not specify the transgressor's relationship to them.

Measures

Forgiveness. Forgiveness was assessed with the Transgression-Related Interpersonal Motivations Inventory, TRIM (McCullough et al., 1998). In the TRIM, forgiveness is operationalized as a decrease in two interpersonal motivations, avoidance and revenge. The

TRIM is a frequently used self-report measure for the assessment of forgiveness, and evidence of its reliability and validity has been reported (McCullough et al., 1998; McCullough & Hoyt, 2002). The avoidance subscale comprises seven items; the revenge subscale comprises five items. Item examples of the avoidance subscale are: "I keep as much distance between us as possible", "I live as if he/she doesn't exist, isn't around". Item examples of the revenge subscale are: "I'll make him/her pay", "I wish that something bad would happen to him/her". Participants were instructed to assess the degree to which the statements applied to their current situation. Answers were measured on a 6-point scale ranging from 0 (*not at all right*) to 5 (*completely right*). Internal consistency in this study was high and ranged from .92 to .96 for Time 1 to Time 4 (avoidance) and from .88 to .91 for Time 1 to Time 4 (revenge).

   Depression. Depression was assessed with a short form of the Center for Epidemiological Studies-Depression Scale, CES-D (for the German version, see Hautzinger & Bailer, 1993). The CES-D is a frequently used self-report measure for the assessment of depressive symptoms in non-clinical and clinical populations, and its validity has been repeatedly confirmed (cf. Eaton, Smith, Ybarra, Muntaner, & Tien, 2004). The CES-D consists of 20 items. However, to minimize the time needed to complete the web-based assessment, we reduced the scale by using only the five items that showed the highest item-total correlations, as reported in the German version. The items used were: "I felt depressed", "I felt sad", "I was happy" (reversed scoring), "I enjoyed life" (reversed scoring), and "I felt lonely". Participants were instructed to assess the frequency of their reactions from the preceding seven days. Answers were measured on a 4-point scale (0 = *seldom or not at all*, 1 = *sometimes*, 2 = *often*, 3 = *mostly*). Internal consistency in this study was high and ranged between .88 and .90 for Time 1 to Time 4.

Rumination. Rumination was assessed with the intrusion subscale of the Impact of Event Scale-Revised, IES-R (Weiss & Marmar, 1997, for the German version see Maercker & Schützwohl, 1998), which comprises seven items. The intrusion subscale of the IES-R is a frequently used self-report measure for the assessment of event-related ruminative symptoms following stressful or traumatic life events; its validity has been repeatedly confirmed (cf. Weiss & Marmar, 1997). Item examples are: "Any reminder brought back feelings about it", "I thought about it when I didn't mean to". Participants were instructed to assess the frequency of their reactions from the preceding seven days. Answers were measured on a 4-point scale (0 = *not at all*, 1 = *seldom*, 2 = *sometimes*, 3 = *often*). Internal consistency in this study was high and ranged between .83 and .92 for Time 1 to Time 4.

Procedure for the Statistical Analysis

Structural equation modeling was conducted using Amos 5 (Arbuckle & Wothke, 1999; Arbuckle, 2003). To deal with missing values, we employed the full information maximum likelihood (FIML) procedure included in Amos; methods of missing value imputation yield results that are less biased and more reliable than those yielded by conventional methods such as listwise or pairwise deletion (cf. Allison, 2003; cf. Schafer & Graham, 2002). On the individual measurement occasions, data were available for 345 participants (Time 1), 241 participants (Time 2), 213 participants (Time 3), and 206 participants (Time 4). To investigate the potential impact of attrition we reran all models without participants who dropped out of the study before the Time 4 assessment. However, the results of the analyses (coefficients, fit indices) were virtually unaltered.

Model fit was assessed by three fit indices that are currently recommended as most useful (Hu & Bentler, 1998, 1999; MacCallum & Austin, 2000): the Tucker-Lewis-Index (TLI), the

Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Hu and Bentler (1999) suggest that good fit is indicated by values greater than or equal to .95 for TLI and CFI, and less than or equal to .06 for RMSEA. In addition to these indices, we report χ^2-statistics and the confidence interval for RMSEA.

<div align="center">Results</div>

Preliminary Analyses

First, we investigated whether the measures we used actually assess distinct constructs. As an example, for Time 1, we conducted a common factor analysis (using principal axis factoring) with oblique rotation (using oblimin rotation with delta = 0), following the recommendations by Fabrigar, Wegener, MacCallum, and Strahan (1999). We extracted four factors, and the loading pattern matched the four scales exactly. The loadings showed a simple structure without significant cross-loadings. We concluded that the measures used in this study assessed constructs that were empirically distinct.

Table 1 shows the means and standard deviations of the scales. We analyzed the correlations between the four study variables and demographic variables (gender, age, education) for all four assessments. All of these correlations were small to zero, with values between -.22 and .11; only 6 out of 48 correlations were statistically significant. We concluded that demographic variables were generally unrelated to the study variables in this sample. Therefore, we did not analyze the effects of demographic variables in the remaining analyses.

Univariate Latent Growth Curve Analyses

The means of the forgiveness indicators (avoidance and revenge) suggested that forgiveness virtually did not change from Time 1 to Time 4 (cf. Table 1). However, the critical question was not whether there is change in sample means, but whether there is interindividual

variability in intraindividual change or not. Therefore, we conducted latent growth curve analyses based on structural equation modeling (cf. Curran & Hussong, 2003).

First, we analyzed the univariate growth curves of the study variables. The univariate model (as illustrated in the upper half of Figure 1) was based on the repeated assessment of indicators across time, in this study across four measurement occasions, with the model accounting for the covariance structure as well as the mean structure. The indicators were explained by two correlated latent variables, the intercept and the slope of the growth curve, as well as by uncorrelated errors. The loadings of the intercept were fixed to 1 and the loadings of the slope were fixed to values corresponding to the length of the time intervals, starting with 0 for the first assessment. In this study, assessments were distributed regularly over time; therefore, we fixed the loadings of the four repeated assessments to 0, 1, 2, and 3. Altogether, the fit of the univariate models was satisfactory, even if three of the RMSEA values were above the conventional cutoff value (Table 2).

Table 3 shows the means and standard deviations of the latent intercepts and slopes. The results show that the means of the intercepts deviated statistically from 0, which is trivial, but also that there was significant interindividual variability in the intercepts, indicating that the starting values of the growth curves were quite variable. Moreover, the results show that the mean slope deviated significantly from 0 for three out of four variables; for the forgiveness variables, the estimates of the means were rather low, corresponding to the change in manifest means reported in Table 1. However, the results show further that there was significant interindividual variability in the slopes of all variables. For the multivariate study of latent growth curves the latter result is crucial: even if mean intraindividual change was low, variability in intraindividual change was significant. For example, the mean slope of avoidance was close to

zero with $M = -0.03$ and did not differ significantly from 0. However, the interindividual variability of the slope was substantial with $SD = 0.27$ and differed significantly from 0. The results of the univariate latent growth curves correspond with the results of the two studies reported by McCullough et al. (2003), who also found that across five waves with one-week and two-week intervals respectively, mean forgiveness slopes were close to zero but variances in slopes were significant.

Table 3 also reports the correlations between the intercepts and slopes of the growth curves, showing that only for depression were intercept and slope significantly correlated with a medium effect size ($r = -.36$). The negative correlation indicates that individuals who started with high values at Time 1 tended to have lower slopes (i.e., stronger decreases in depression across time). However, on the whole, intercepts and slopes of the univariate growth curves were rather uncorrelated. Moreover, Table 3 shows the variance accounted for (VAF) by the models, i.e., the variance in indicators explained by the latent intercept and latent slope. The VAF values ranged from 72% to 87%, suggesting that the models fit the data well. The values are in accordance with McCullough et al. (2003), who report VAF values between 74% and 81% for linear growth curves of forgiveness.

Bivariate Latent Growth Curve Analyses

We then conducted bivariate latent growth curve analyses for the relation between the growth curves of forgiveness and adjustment, with models for all four pairs of indicators (avoidance and depression, avoidance and rumination, revenge and depression, revenge and rumination). Figure 1 illustrates the type of model analyzed (cf. Curran & Hussong, 2003). The bivariate model combines two univariate models by systematically correlating the intercept and slope variables. Variance related to specific measurement occasions might bias the results if not

explicitly accounted for; therefore, we included cross-sectional correlations between the

corresponding errors.

First, we tested whether the cross-sectional correlations between errors could be set equal

across time. If empirically justified, these constraints should be included because they increase

model parsimony. Therefore, we estimated all models both with and without constraints on the

error correlations. For all four pairs of indicators, the χ^2-difference test indicated that the equality

constraints did not significantly decrease model fit. Moreover, TLI, CFI, and RMSEA indicated

that the constrained models fit the data even better than the unconstrained models. Therefore, we

report the results for the constrained models. The fit of these models was good, with two of the

RMSEA values ranging above the conventional cutoff value (Table 2).

The crucial structural parameters of the bivariate models are given in Table 4. The

correlations between intercept and slope of the same variable (coefficients e and f in Figure 1)

were already reported above in the univariate latent growth curve analyses (Table 3); therefore,

we did not include these values in Table 4. The correlation between the intercepts (coefficient a

in Figure 1) and the slopes (coefficient b in Figure 1) were low and nonsignificant for the models

including depression (Model 5 and 7), but were medium in size and significant for models

including rumination (Models 6 and 8). All correlations between the intercept of one variable

and the slope of the other variable were small and nonsignificant (coefficients c and d in Figure

1).

Thus, for the relation between forgiveness indicators and rumination, the correlations of

the intercepts show that individuals who had high starting values in avoidance and revenge also

had high starting values in rumination. The correlations of the slopes show that individuals who

reported a decrease in avoidance and revenge across time (i.e., who experienced forgiveness)

also reported a decrease in rumination.

Latent Difference Score Analyses

The results of the bivariate latent growth curve analyses reported above do not provide

the basis for drawing conclusions about whether one of the variables predicts subsequent

changes in the other variable because the parameters of the curves are based on the identical time

interval. Therefore, to investigate the temporal sequence of forgiveness and adjustment, we

conducted bivariate LDS analyses (McArdle, 2001; McArdle & Hamagami, 2001; for

applications see, e.g., Ferrer & McArdle, 2004; Hawley, Ho, Zuroff, & Blatt, 2006; Lövden,

Ghisletta, & Lindenberger, 2005).

Figure 2 shows the models that were analyzed. Like the latent growth curve models, LDS

models are based on repeated assessments of indicators across time, with the models accounting

for the covariance structure as well as the mean structure. However, in LDS models the

indicators are explained by latent true score variables (denoted as *tx* and *ty*, respectively, in

Figure 2) and errors. The true score variables (except for Time 1), in turn, are explained by the

latent true scores on the preceding assessment and by latent difference scores (denoted as *dx* and

dy, respectively, in Figure 2). Importantly, the LDS model does not include disturbance terms for

the true scores, which means that the latent difference scores explain the entire true score

variance that is not explained by the autoregressor. The true score at Time 1 is entirely explained

by a latent intercept variable given that no autoregressor is available.

The LDS model accounts for two types of change. First, as in the latent growth curve

analyses, the model includes a latent slope variable (that accounts for constant change in the

variables across time). The slope variable has a constant effect on all difference scores; for

identification purposes, in this study the parameter had to be fixed to 1 (cf. McArdle, 2001).

Given that the LDS model also includes latent intercepts and covariances between all slopes and

intercepts, all parts of latent growth curve models are represented in the LDS model. However, in

addition to latent growth curve models, LDS models also account for a second type of change,

self-feedback, which is represented by the effects from the true score at one assessment on the

difference score at the next assessment (coefficients bx and by in Figure 2). Finally, the bivariate

LDS model includes cross-lagged coupling effects between the true scores of one variable and

the latent difference scores of the other variable (coefficients cx and cy in Figure 2). The

coupling effects indicate whether intraindividual change in one variable is explained by the true

score of the other variable measured on the preceding assessment, controlling for constant

change and self-feedback. The means and variances of slopes in LDS models are not equivalent

to means and variances of slopes in latent growth curve models, because the LDS model includes

additional effects on the latent difference scores. To identify the model, in this study the error

variances had to be set equal across time within constructs (cf. McArdle, 2001). In LDS models,

standardized path coefficients are not applicable, and therefore we report the unstandardized

coefficients, their significance levels, and standard errors (cf. McArdle, 2001; McArdle &

Hamagami, 2001).

    We analyzed four LDS models, consisting of one model for each pair of forgiveness and

adjustment indicators. The fit of each model was good (Table 2). The main parameters are

reported in Table 5. Several estimates in this table are of interest. First, the self-feedback effects

were significant in all models. Thus, aside from the constant change that is explained by the

growth curve part of the LDS models, there is evidence for self-feedback effects in forgiveness

and adjustment. Second, of crucial interest for the purposes of the present study are the coupling

effects of forgiveness and adjustment. The results show that, for all pairs of indicators, adjustment had a significant effect on change in forgiveness, but forgiveness had no significant effect on change in adjustment. Third, the standard errors are predominantly small, indicating that the parameters have been estimated with sufficient precision. As an exception, the means and variances of the latent slopes have somewhat larger standard errors (for similar relatively large standard errors of slope parameters see Lövden et al., 2005). Thus, these estimates should be interpreted with caution.

We tested whether the fit of the bivariate LDS models was significantly better than the fit of the bivariate latent growth curve models, as suggested by the fit indicators in Table 2. When error variances are set equal across time within constructs, the bivariate latent growth curve model is nested within the bivariate LDS model, allowing for testing the χ^2-difference. First, we conducted overall χ^2-difference tests, which indicated a significantly better fit of the LDS models compared to that of latent growth curve models, for all four pairs of indicators (all ps < .01, with $df = 4$). Second, we conducted stepwise χ^2-difference tests, which allowed assessing the difference between latent growth curve models and LDS models in more detail. The results, which are reported in Table 6, showed that LDS models fit better due to the inclusion of not only self-feedback effects, but also the coupling effects of adjustment on forgiveness, for all four pairs of indicators. It should be noted that even if the inclusion of self-feedback effects for avoidance resulted in nonsignificant improvement in fit (cf. Step 1 in Table 6), self-feedback effects for avoidance were significant in the final LDS models (as reported above). Therefore, to prevent biased estimates for other coefficients, we included self-feedback effects for avoidance in all models using this indicator.

Figure 3 illustrates the results of the bivariate LDS models by plotting the model-implied means of forgiveness and adjustment. The graphs demonstrate the impact of the coupling effect on the expected trajectory by displaying model-implied means both with coupling effect (solid lines) and without coupling effect (dashed lines). Each row displays two graphs that are based on the identical LDS model (e.g., the graphs in the first row are based on the model for avoidance and depression, Model 9). For example, Figure 3A shows the expected trajectory of avoidance as a function of whether the coupling effect of depression is accounted for or not. The solid line indicates that the model-implied means are stable across time when the coupling effect is accounted for, corresponding to the observed sample means. The dashed line indicates that, without accounting for the coupling effect, the model-implied means would significantly decrease across time. In contrast, Figure 3B shows that the expected trajectory of depression is only slightly influenced by the fact of whether the coupling effect is accounted for or not.

The other graphs in Figure 3 show a similar picture (Figure 3C through 3H). Figure 3G illustrates that the coupling effect of rumination on revenge was smaller compared to the other models (cf. Table 5). However, the size of this coupling effect might have been limited due to the relatively low sample mean of revenge. In addition, despite its smaller size, the coupling effect of rumination on revenge was significant, in contrast to the coupling effect of revenge on rumination. Overall, the graphs illustrate that the expected trajectory of forgiveness is significantly affected by adjustment, but that the expected trajectory of adjustment is barely affected by forgiveness. The graphs also offer an interpretational solution to the apparent paradox that the rate of change is affected in a variable that basically does not change at the sample level. The observed stability of the forgiveness indicators might be due to the continuous influence of lack of adjustment.

Discussion

In this study, we investigated the relation between forgiveness and psychological adjustment following interpersonal transgressions using a longitudinal data set with four repeated measurements. The sample consisted of 347 adults who had experienced an interpersonal transgression within the last six months. The severity of the transgressions was substantial, as suggested by the participants' ratings of the initial stressfulness of the event.

First, univariate latent growth curve analyses showed that there was significant interindividual variability in intraindividual change in forgiveness and adjustment. Second, bivariate latent growth curve analyses revealed that intraindividual change in forgiveness was significantly correlated with change in one of the adjustment indicators (rumination) but not the other (depression). Third, bivariate LDS analyses showed that forgiveness indicators did not predict subsequent intraindividual change in adjustment indicators, but that adjustment indicators (both depression and rumination) predicted subsequent change in forgiveness indicators. Thus, in this study, adjustment, but not forgiveness, was the leading force in the bivariate relationship between forgiveness and adjustment. Model fit of the growth curve analyses was good; however, model fit of the LDS models was better. The univariate and bivariate latent growth curve models nevertheless provided important information on the means and variability of the growth curve parameters (i.e., latent intercepts and slopes), as well as on the correlations between these parameters.

As reviewed in the introduction, previous studies on forgiveness and adjustment had not allowed firm conclusions to be made about the temporal sequence of the constructs. The results of the present study suggest that the association between forgiveness and adjustment is not due to

beneficial effects of forgiveness on adjustment, but rather due to the facilitation of forgiveness by adjustment.

Clearly, however, these results need to be cross-validated in further longitudinal studies on forgiveness and adjustment that use other samples, measures, and study designs. The generalizability of results from a single study is of course limited. For example, future studies should employ other indicators of forgiveness and adjustment. In this study, we used indicators measuring low levels of forgiveness and adjustment (interpersonal avoidance, revenge motivation, depression, rumination) exclusively. It would have been desirable to include also a positive measure of forgiveness, such as a scale measuring benevolence towards the transgressor as described by McCullough and Hoyt (2002). However, we believe that the lack of a positive forgiveness measure is not a critical shortcoming of the study, because the available evidence suggests that the scales measuring avoidance and revenge are strongly correlated with the benevolence scale. For example, in the study by McCullough and Hoyt (2002), benevolence and avoidance were correlated with -.79, and benevolence and revenge with -.55. Like forgiveness, adjustment should also be measured in future studies with positive indicators, such as life satisfaction and positive affect, even if the measures used here have been shown in previous studies to be valid indicators of the underlying constructs. Also, because we exclusively used self-report measures, future studies could use informant reports on forgiveness and psychological adjustment, thereby increasing the validity of the measurement.

Another methodological limitation is that, at Time 1, time since the event was not identical for participants but ranged within the first six months after the event. To test for any effect of time since the event we reran the analyses using the subsample of those participants for whom the time since the event was not greater than 2 months ($N = 174$ for the subsample vs. $N =$

347 for the full sample). For all models, the results for the subsample (i.e., coefficients, fit indices) were very similar to the results for the full sample. Nevertheless, it would be highly desirable in future studies to collect data of participants with a fixed amount of time since the transgression, preferably as close to the event as possible (or even with assessments of adjustment before the event). This would provide for the modeling of individual trajectories of forgiveness and adjustment processes relative to the exact date of the event.

The statistical models used to analyze the temporal sequence of the constructs, the LDS models, have been introduced only recently in the literature (McArdle, 2001; McArdle & Hamagami, 2001). Because of the relative newness of these techniques, conclusions from this study have to be drawn with caution. Nevertheless, statistical theory and empirical indicators of model fit suggest that LDS models provide for a more valid description of longitudinal data than latent growth curve models and cross-lagged panel models (cf. Ferrer & McArdle, 2003). Likewise, in this study, LDS models consistently fit the data better than latent growth curve models.

The present study does not allow strong causal inferences, because the effect of adjustment on subsequent change in forgiveness may have been caused by unmeasured third variables (cf. Finkel, 1995). Nevertheless, the results are consistent with a causal model in which adjustment affects forgiveness. Therefore, the results have implications for the design of future experimental studies that test the causality of the relation: experimental studies should not only investigate potential effects of forgiveness on adjustment, but also of adjustment on forgiveness. Likewise, the results have implications for the design of intervention studies, which should more rigorously test whether effects of forgiveness interventions are due to the forgiveness aspect of

the intervention or to other factors that are included in the forgiveness intervention (e.g., promotion of acceptance and finding meaning).

Future studies might test whether the effect of adjustment on forgiveness is due to the influence of third variables. Factors that account for spuriousness of the effect might be located within personality (e.g., neuroticism) or within the situation (e.g., continuing threat or harm by the transgressor). Future studies might also investigate possible mediators of the effect of adjustment on forgiveness. For example, the effect might be mediated by a decrease in anger, as suggested by the results of the three studies by McCullough et al. (2007). In particular, low rumination about the hurtful experience may promote reduction of anger at the transgressor, resulting in a decrease of interpersonal avoidance and revenge motivation.

If future research corroborates that forgiveness is not a determinant of psychological adjustment following transgression, psychologists may remove pressure from victims who struggle with forgiveness by informing them that forgiveness is not a necessary condition of recovery from the hurtful experience. At times, victims may deem forgiveness inadequate, especially if the transgression was serious and if the transgressor did not regret his behavior. However, the change in psychological adjustment of the forgiving individual is only one criterion among others that may be considered when assessing the benefits and risks of forgiveness. Even if forgiveness does not improve the adjustment of the individual, forgiveness may nevertheless be a valuable and moral choice given its potential effects on the adjustment of transgressors and the quality of interpersonal relationships.

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Table 1

Means and Standard Deviations of Measures

	Time 1		Time 2		Time 3		Time 4	
Assessment	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Forgiveness								
Avoidance	2.46	1.58	2.52	1.63	2.54	1.72	2.47	1.84
Revenge	0.92	1.21	0.93	1.22	0.89	1.25	0.90	1.29
Adjustment								
Depression	1.73	0.82	1.37	0.80	1.34	0.86	1.18	0.81
Rumination	1.81	0.66	1.43	0.74	1.25	0.78	1.08	0.80

Note. Response scales ranged from 0 to 5 for forgiveness indicators, and from 0 to 3 for

adjustment indicators.

Table 2

Fit Indices of the Models Tested

Model	χ^2	*df*	TLI	CFI	RMSEA	90%-CI of RMSEA
Univariate Latent Growth Curve Models						
1. Avoidance	9.8	5	.99	1.00	.053	.000 - .101
2. Revenge	26.1**	5	.96	.98	.111	.071 - .154
3. Depression	26.5**	5	.92	.96	.111	.072 - .155
4. Rumination	24.9**	5	.93	.96	.107	.068 - .151
Bivariate Latent Growth Curve Models						
5. Avoidance and Depression	40.3**	21	.98	.99	.051	.026 - .075
6. Avoidance and Rumination	43.5**	21	.98	.99	.056	.032 - .079
7. Revenge and Depression	64.0**	21	.95	.97	.077	.056 - .099
8. Revenge and Rumination	64.1**	21	.95	.97	.077	.056 - .099
Bivariate LDS Models						
9. Avoidance and Depression	43.2**	23	.98	.99	.050	.026 - .073
10. Avoidance and Rumination	35.6*	23	.99	.99	.040	.006 - .064
11. Revenge and Depression	51.6**	23	.97	.98	.060	.038 - .082
12. Revenge and Rumination	42.9**	23	.98	.99	.050	.026 - .073

Note. TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square

Error of Approximation; CI = confidence interval; LDS = latent difference score.

p < .05. ***p* < .01.

Table 3

Univariate Latent Growth Curve Models: Parameter Estimates for Intercepts and Slopes

Model	Intercept		Slope		*r* of intercept and slope	VAF
	M	*SD*	*M*	*SD*		
Forgiveness						
1. Avoidance	2.50**	1.43**	-0.03	0.27**	.12	87%
2. Revenge	0.95**	1.08*	-0.04**	0.14*	.10	86%
Adjustment						
3. Depression	1.69**	0.72**	-0.16**	0.17**	-.36**	72%
4. Rumination	1.77**	0.53**	-0.23**	0.16**	.11	73%

Note. VAF = variance accounted for (by the model).

p < .05. **p* < .01.

Table 4

Bivariate Latent Growth Curve Models: Correlations between Intercepts and Slopes

	Coefficients as denoted in Figure 1			
Model	*a*	*b*	*c*	*d*
5. Avoidance and Depression	.13	.07	.15	-.18
6. Avoidance and Rumination	.28**	.36**	.08	.00
7. Revenge and Depression	.10	.16	.25	-.09
8. Revenge and Rumination	.22**	.37*	.15	.03

*p < .05. **p < .01.

Table 5

Bivariate LDS Analyses: Estimates of Coefficients

Parameter	Model			
	9. Avoidance and depression	10. Avoidance and rumination	11. Revenge and depression	12. Revenge and rumination
Regression Coefficients				
Self-Feedback bx	-0.25 (0.13)*	-0.32 (0.12)**	-0.84 (0.07)**	-0.83 (0.07)**
Self-Feedback by	-0.43 (0.10)**	-0.41 (0.06)**	-0.42 (0.10)**	-0.41 (0.06)**
Coupling cx	0.34 (0.15)*	0.28 (0.10)**	0.30 (0.09)**	0.18 (0.06)**
Coupling cy	-0.04 (0.09)	0.05 (0.08)	-0.10 (0.09)	0.09 (0.08)
Means				
FOR Intercept	2.46 (0.08)**	2.46 (0.09)**	0.92 (0.06)**	0.92 (0.06)**
ADJ Intercept	1.72 (0.04)**	1.81 (0.04)**	1.72 (0.04)**	1.82 (0.04)**
FOR Slope	0.09 (0.39)	0.34 (0.33)	0.28 (0.15)	0.46 (0.12)**
ADJ Slope	0.58 (0.27)*	0.27 (0.21)	0.56 (0.16)**	0.31 (0.11)**
Variances				
FOR Intercept	2.13 (0.19)**	2.15 (0.19)**	1.32 (0.11)**	1.31 (0.11)**
ADJ Intercept	0.50 (0.05)**	0.31 (0.03)**	0.50 (0.05)**	0.31 (0.03)**
FOR Slope	0.29 (0.16)	0.35 (0.18)	0.96 (0.18)**	0.92 (0.17)**
ADJ Slope	0.10 (0.05)*	0.11 (0.02)**	0.12 (0.05)*	0.11 (0.03)*
FOR Error	0.31 (0.02)**	0.31 (0.02)**	0.16 (0.01)**	0.16 (0.01)**
ADJ Error	0.18 (0.01)**	0.13 (0.01)**	0.18 (0.01)**	0.13 (0.01)**

Note. Numbers in parentheses represent standard errors of estimates. Coefficients b_x, b_y, c_x, and c_y as denoted in Figure 2. LDS = latent difference score; FOR = forgiveness indicator; ADJ = adjustment indicator.

*p < .05. **p < .01.

Table 6

Bivariate LDS Models: Stepwise Test of Self-Feedback Effects and Coupling Effects

	Decrease in χ^2 by inclusion of paths			
Model	Step 1: *bx*	Step 2: *by*	Step 3: *cx*	Step 4: *cy*
9. Avoidance and Depression	1.4	10.1**	4.7*	0.2
10. Avoidance and Rumination	1.4	30.3**	7.2**	0.4
11. Revenge and Depression	31.4**	10.8**	9.7**	1.3
12. Revenge and Rumination	34.3**	26.9**	8.1**	0.9

Note. For each row, the initial model is the bivariate LDS model without self-feedback paths (*bx* and *by* set to zero) and without coupling paths (*cx* and *cy* set to zero). The χ^2-difference tests indicate whether the stepwise inclusion of a path significantly decreases the χ^2 value of the model (i.e., improves model fit). For all χ^2-difference tests, *df* = 1. Coefficients *bx*, *by*, *cx*, and *cy* as denoted in Figure 2. LDS = latent difference score.

p < .05. **p* < .01.

Figure Captions

Figure 1. Model illustrating the bivariate latent growth curve analyses.

Figure 2. Model illustrating the bivariate latent difference score (LDS) analyses. For purposes of clarity, cross-sectional correlations of errors, which are included in the model at all measurement occasions, are only shown for Time 4.

Figure 3. Model-implied means of forgiveness (left column) and adjustment (right column), derived from the bivariate latent difference score (LDS) analyses. The graphs illustrate the impact of the coupling effect on the expected trajectory by displaying model-implied means both with coupling effect (solid lines) and without coupling effect (dashed lines). Each row displays two graphs that are based on the identical LDS model (e.g., the graphs in the first row are based on the model for avoidance and depression, Model 9).
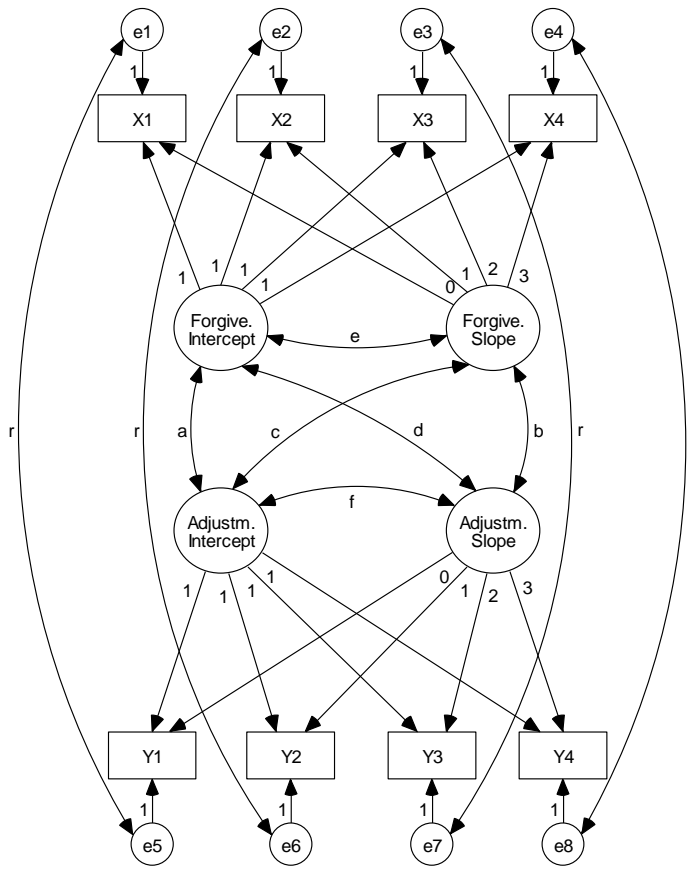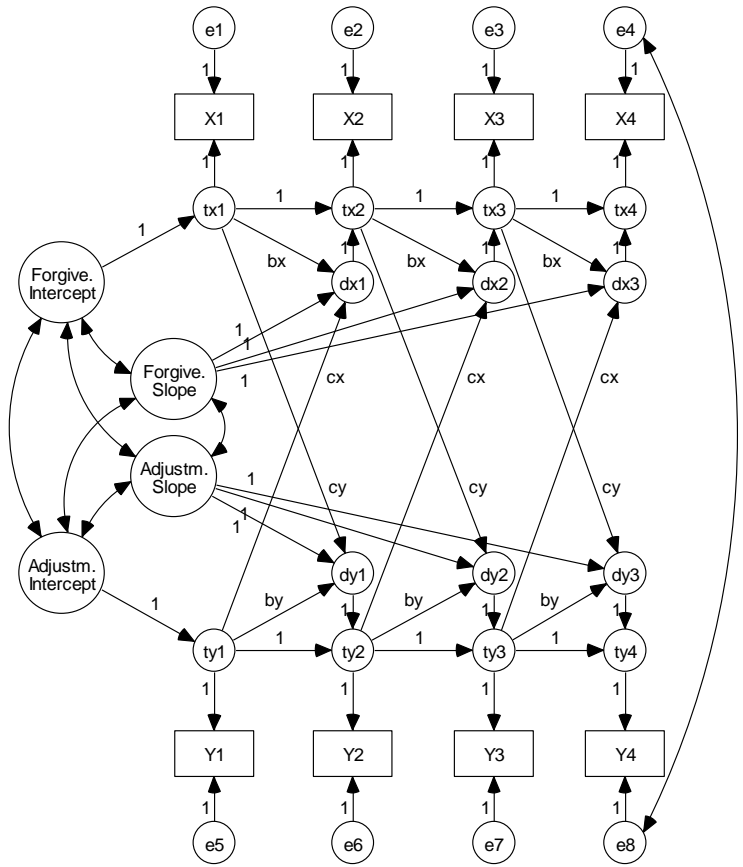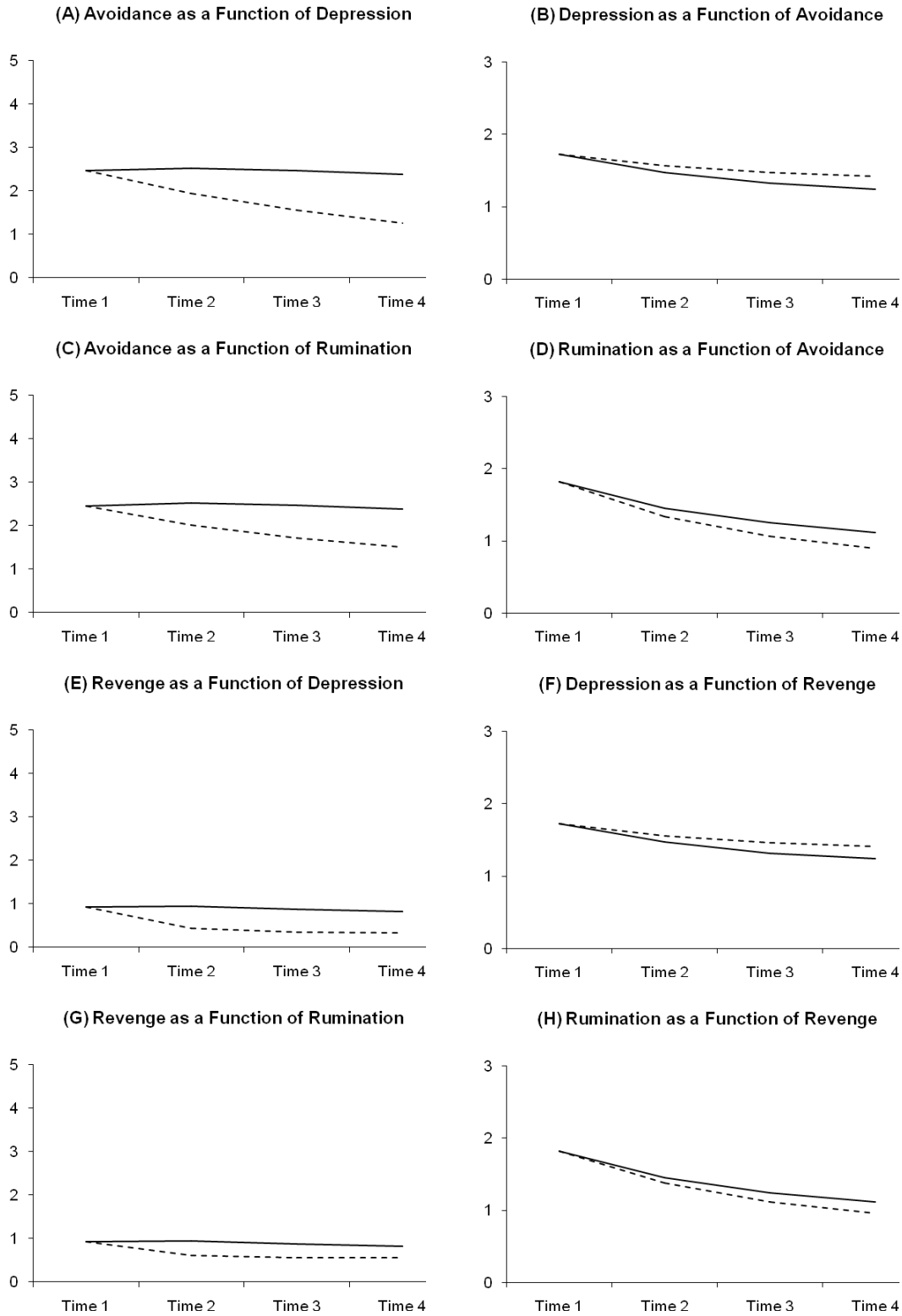
Figure 1

Figure 2

(A) Avoidance as a Function of Depression

(B) Depression as a Function of Avoidance

(C) Avoidance as a Function of Rumination

(D) Rumination as a Function of Avoidance

(E) Revenge as a Function of Depression

(F) Depression as a Function of Revenge

(G) Revenge as a Function of Rumination

(H) Rumination as a Function of Revenge

Figure 3