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Laura E. Watkins

*University of Nebraska-Lincoln*, [watlaura@gmail.com](mailto:watlaura@gmail.com)

Anna E. Jaffe

*University of Nebraska-Lincoln*, [anna.e.jaffe@gmail.com](mailto:anna.e.jaffe@gmail.com)

Lesa Hoffman

*University of Nebraska-Lincoln*

Kim L. Gratz

*University of Mississippi Medical Center*

Terri L. Messman-Moore

*Miami University*

*See next page for additional authors*

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**Authors**

Laura E. Watkins, Anna E. Jaffe, Lesa Hoffman, Kim L. Gratz, Terri L. Messman-Moore, and David DiLillo

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# The Longitudinal Impact of Intimate Partner Aggression and Relationship Status on Women's Physical Health and Depression Symptoms

Laura E. Watkins<sup>1</sup>, Anna E. Jaffe<sup>1</sup>, and Lesa Hoffman<sup>1</sup>, Kim L. Gratz<sup>2</sup>,  
Terri L. Messman-Moore<sup>3</sup>, and David DiLillo<sup>1</sup>

1. Department of Psychology, University of Nebraska–Lincoln
2. Department of Psychiatry and Human Behavior, University of Mississippi Medical Center
3. Department of Psychology, Miami University

*Corresponding author* – Laura E. Watkins, Department of Psychology, University of Nebraska–Lincoln, 238 Burnett Hall, Lincoln, NE 68588-0308, email [watlaura@gmail.com](mailto:watlaura@gmail.com)

## Abstract

Intimate partner aggression (IPA) has many detrimental effects, particularly among young women. The present study examined the longitudinal effects of IPA victimization and relationship status on physical health and depression symptoms in a sample of 375 community women between the ages of 18 and 25 years. All variables were assessed at 4 occasions over a 12-month period (i.e., 1 assessment every 4 months). Multilevel modeling revealed that IPA victimization had both between- and within-person effects on women's health outcomes, and relationship status had within-person effects when women did not report current IPA. Although IPA was generally related to greater physical health problems and depression symptoms, these findings varied depending on both the type of aggression experienced (i.e., psychological vs. physical) and relationship status (i.e., whether participants were in the same relationship or a new relationship). Findings suggest that IPA can be harmful to both physical and mental health, particularly among young women who stay in abusive relationships. Results highlight the importance of developing effective IPA intervention programs and

providing help and resources to women who are experiencing physical or psychological IPA in their relationships.

**Keywords:** intimate partner violence, depression, physical health, multilevel modeling, longitudinal

Aggression suffered by women at the hands of intimate partners can be very serious (Archer, 2000). Women who report physical intimate partner aggression (IPA) victimization can suffer significant physical harm, with injuries to the head, neck, and face being most common (Sheridan & Nash, 2007; Wu, Huff, & Bhandari, 2010). IPA also includes psychological acts, which do not result in bodily harm but include behaviors that are intended to cause emotional harm or threat of harm (e.g., threats, insulting or degrading comments directed toward an intimate partner; Lawrence, Yoon, Langer, & Ro, 2009; Murphy & Cascardi, 1999). Adding to the clinical and public health significance of this issue are findings that over one third (35.6%) of women in the United States have experienced physical violence, sexual violence, or stalking by a partner (M. C. Black et al., 2011), and past-year prevalence rates of psychological IPA average around 80% (see Carney & Barner, 2012). Further, women with any experience of IPA most often report multiple forms of IPA victimization (Thompson et al., 2006).

Physical health problems and depression are among the most common outcomes associated with IPA victimization. In addition to the physical injuries directly caused by IPA, the stress of living with the constant threat of violence can lead to physical health problems. Abundant research shows that stressors such as IPA activate the hypothalamic pituitary adrenal (HPA) axis and sympathetic nervous system for the purposes of dealing with a threat (P. H. Black, 2003; Maier & Watkins, 1998). Ongoing activation of this system can lead to impaired immune functioning (Segerstrom & Miller, 2004), increased risk for infectious diseases, autoimmune diseases, coronary artery diseases, some cancers (see Cohen, Janicki-Deverts, & Miller, 2007), and slower healing of wounds (see Glaser & Kiecolt-Glaser, 2005). Furthermore, poor health habits, including increased substance use, sleep disruption, poor nutrition, less exercise, and poorer adherence to medication regimens, have all been linked to living under conditions of chronic stress (Cohen et al., 2007; Glaser & Kiecolt-Glaser, 2005). Stressful life events are also associated with increased symptoms of depression (McGonagle & Kessler, 1990). As with physical health problems, biological abnormalities in the HPA axis produced by the chronic stress of living in an abusive relationship may contribute to depression (see Blackburn-Munro & Blackburn-Munro, 2001; Maier & Watkins, 1998). Adding to these biological factors is the possibility that the repeated threat of IPA may engender learned helplessness and associated internal, stable, and global attributions (Peterson & Seligman, 1984), which may contribute to depression in women who experience IPA (Walker, 2009).

A number of longitudinal studies have tested initial IPA status as a predictor of physical health or depressive symptoms at a subsequent time point. The results of these studies (which do not assess changes in IPA over time) reveal that initial reports of IPA are associated with worse health outcomes (Schei, Guthrie, Dennerstein, & Alford, 2006) and more severe depression (Ackard, Eisenberg, & Neumark-Sztainer, 2007; Ehrensaft, Moffitt, & Caspi, 2006; Newcomb & Carmona, 2004; Rich, Gidycz, Warkentin, Loh, & Weiland, 2005;

Schei et al., 2006; Taft, Resick, Panuzio, Vogt, & Mechanic, 2007; Zlotnick, Johnson, & Kohn, 2006) at follow-up. Other prospective investigations have taken a different approach by comparing ongoing IPA with cessation of IPA in relation to later health problems and depression. These studies find that ongoing IPA is associated with greater health problems (J. C. Campbell & Soeken, 1999; Sanchez-Lorente, Blasco-Ros, & Martínez, 2012). Similarly, cessation of physical IPA is associated with a reduction in depressive symptoms (Blasco-Ros, Sánchez-Lorente, & Martinez, 2010), whereas more recent experiences of IPA are associated with more severe depression (R. Campbell, Sullivan, & Davidson, 1995; La Flair, Bradshaw, & Campbell, 2012; Lindhorst & Oxford, 2008; Loxton, Schofield, & Hussain, 2006; Roberts, Klein, & Fisher, 2003). Further, psychological IPA may have unique effects on depression. In a study of newlyweds, psychological IPA predicted greater depression and anxiety even after controlling for physical IPA (Lawrence et al., 2009), suggesting the importance of examining psychological IPA in addition to physical IPA.

Although longitudinal studies support the notion that IPA victimization contributes to physical health problems and depression, most of this work has included only two time points (which cannot distinguish individual trajectories of change over time from measurement error; see Rogosa, Brandt, & Zimowski, 1982). Furthermore, with few exceptions (i.e., Lindhorst & Oxford, 2008; Sillito, 2012), studies with more than two time points have not tested within-person effects (e.g., Bogat, Levendosky, DeJonghe, Davidson, & von Eye, 2004; J. C. Campbell & Soeken, 1999), have predicted health and depression outcomes only at the final assessment (e.g., R. Campbell et al., 1995), or have assessed IPA only at the first occasion (La Flair et al., 2012). Moreover, most studies that have examined both within- and between-person effects over multiple assessments (Lindhorst & Oxford, 2008; Sillito, 2012) have not examined the effects of psychological IPA. Finally, many studies examining IPA longitudinally have been conducted within specific or at-risk samples, such as women recruited from domestic violence shelters (R. Campbell et al., 1995), adolescent mothers (Lindhorst & Oxford, 2008), pregnant women (Bogat et al., 2004), newlywed couples (Lawrence et al., 2009), and women who are married or cohabiting (Sillito, 2012). Thus, research is needed to examine both within- and between-person effects of IPA on physical health and depression in a diverse community sample of young women.

In addressing this need, we also considered whether changes in relationship status predict women's depression and physical health problems longitudinally. Extensive research has documented the benefits of being in a relationship, particularly marital relationships. Individuals who are married report less psychological distress than those who are single (Barrett, 2000; Waite & Gallagher, 2001). Moreover, evidence suggests that nonmarital intimate relationships may have mental health benefits as well, including decreased depression (Ross, 1995; Simon & Barrett, 2010). Conversely, loss of romantic relationships has been found to be associated with increased psychological distress and decreased life satisfaction (Rhoades, Kamp Dush, Atkins, Stanley, & Markman, 2011; Simon & Barrett, 2010). However, based on the literature reviewed, the benefits of being in a relationship would not be expected to extend to relationships involving IPA. Notably, though, no known studies have examined the effects of both changes in relationship status and IPA on young women's physical health problems and depression over time.

## Purpose of Current Study

In the current investigation, we examined the effects of IPA victimization and relationship status on young women's physical health and depression symptoms on four occasions over a 1-year period. Our study is noteworthy in two respects. First, the relatively brief intervals between our longitudinal assessments allowed us to examine the immediate effects of both physical and psychological IPA on women's health outcomes. Second, because relationship status and IPA were assessed at each time point, we were able to test the following between-person and within-person hypotheses.

With respect to between-person differences, based on past findings that relationships are beneficial (Ross, 1995), and loss of romantic relationships is generally related to distress (Rhoades et al., 2011), we hypothesized that among women who did not experience IPA, those who stayed in the same relationship throughout the study would experience fewer physical health problems and depression symptoms than women who changed relationship status or partners. We also expected that women who reported IPA victimization at any occasion would have greater physical health problems and depression symptoms than women who did not ever experience IPA.

As for within-person effects on women's health outcomes, we predicted a within-person effect of relationship status qualified by IPA status. Specifically, we hypothesized that women would report better outcomes (i.e., fewer physical health problems and depression symptoms) at time points when they were in a relationship and did not report current IPA (relative to time points when they were not in a relationship). We also hypothesized that the positive effects of being in a relationship would not be found for women who reported current IPA. Finally, within-person effects of IPA were examined for women who experienced IPA during the course of the study. We hypothesized that women would report relatively greater physical health problems and depression on occasions when they reported more (vs. less) frequent IPA.

## Method

### *Participants*

The women included in the current study were part of a larger, multisite, prospective study on emotion dysregulation and sexual revictimization among young adult women in the community. Participants included 375 women recruited from the community at four different sites in the Southern and Midwestern United States (including Mississippi, Nebraska [Lincoln and Omaha], and Ohio). Participants completed a total of four assessments (once every 4 months) over a 12-month period. To be included in the current study, participants had to report being in a committed relationship during at least one wave of data collection. Participants' mean age at Wave 1 was 21.86 years ( $SD = 2.20$ , range 18 to 25). Hispanic, Latina, or Spanish ethnicity was endorsed by 23 (6.1%) women in the sample. Self-reported race and ethnicity of the sample was 63.8% White or European American, 3.7% Asian, 3.5% American Indian, 31.9% African American, and 3.2% Other (categories were not mutually exclusive, so the total exceeds 100%).

## Measures

Relationship status was assessed at each data collection wave. Specifically, participants were asked, “Are you currently in a romantic relationship?” Participants who indicated that they were in a romantic relationship at Waves 2 through 4 were also asked, “Is this a new relationship since you last participated (about 4 months ago)?” Based on their responses to these questions, participants were assigned to one of the following categories at each wave (a) not currently in a relationship, (b) in the same relationship as the previous assessment, or (c) in a new relationship compared with the previous assessment. Relationship status was included as a predictor variable. The frequencies of relationship status at each assessment wave are reported in table 1.

**Table 1.** Descriptive Statistics for Study Variables at Each Wave of Assessment

Model variable	Wave 1 frequency	Wave 2 frequency	Wave 3 frequency	Wave 4 frequency
<b>Relationship status</b>				
No relationship	90	92	72	63
Same relationship	285 <sup>a</sup>	179	180	184
New relationship	—	56	59	42
<b>Current IPA</b>				
Physical victimization	82	39	40	31
No physical victimization	200	177	184	188
Psychological victimization	194	126	122	103
No psychological victimization	88	90	102	116
<b>Physical IPA</b>				
Low frequency	48	30	30	24
High frequency	34	9	10	7
<b>Psychological IPA</b>				
Low frequency	96	82	83	65
High frequency	98	44	39	38
	<u>Mean (SD)</u>	<u>Mean (SD)</u>	<u>Mean (SD)</u>	<u>Mean (SD)</u>
Physical health problems	0.68 (.62)	0.66 (.64)	0.54 (.55)	0.53 (.55)
Depression <sup>b</sup>	3.99 (4.62)	3.78 (4.69)	3.08 (3.99)	3.64 (4.69)

**Note:** Wave 1,  $n = 375$ ; Wave 2,  $n = 327$ ; Wave 3,  $n = 311$ ; Wave 4,  $n = 289$ . IPA = Intimate partner aggression.

a. For the first wave, this included all women in a relationship.

b. Depression scale means and standard deviations are reported instead of the means of items to enable comparison with previous studies.

IPA was assessed at each wave of data collection among participants who reported that they were currently in a romantic relationship. IPA was assessed with the 12-item physical assault and eight-item psychological aggression subscales of the Revised Conflict Tactics Scale (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Each item asks participants to rate the frequency of their partners' aggressive behaviors (e.g., “My partner slapped me”) toward them on a 7-point scale from 0 (*never*) to 6 (*more than 20 times*). Two dichotomous variables were created indicating whether participants had experienced each type of IPA (physical or psychological) at each assessment wave. The frequencies of these variables at

each wave are reported in Table 1. In order to create a frequency score, each item was recoded as the midpoint of the response category (e.g., *3 to 5 times in the past year* was scored as 4), and the mean of all items was calculated at each assessment wave. Because of the lack of variability in each of these frequency scores (i.e., the majority of participants who reported IPA victimization reported a mean of 1 or lower), we grouped responses as low (IPA mean lower than 1) versus high (IPA mean 1 or higher) frequency for physical and psychological IPA. As described in more detail in the Analytic Strategy section, both the dichotomous IPA variable and the frequency IPA score were included in analyses. At Wave 1, participants were asked to rate their partners' aggressive behaviors during the past year. During subsequent waves, participants were asked to report on aggressive behaviors occurring only during the past 4 months (i.e., since their previous assessment). In order for the scale scores to be computed, 80% of items had to be answered.

Physical health problems (an outcome variable) were assessed at each wave with the Cohen-Hoberman Inventory of Physical Symptoms – Revised (CHIPS-R; R. Campbell, Greeson, Bybee, & Raja, 2008). Participants were presented with a list of 35 commonly experienced physical symptoms (e.g., “headaches,” “dizziness,” “stomach pain,” “poor appetite”) and asked to indicate how much each health problem had bothered or distressed them during the past 4 months (including the current day), on a scale from 0 (*not at all*) to 4 (*extreme bother*). The CHIPS-R yields an overall physical health symptoms score calculated by taking the mean of all items. In order for the scale to be computed, 80% of items had to be answered. In the current study, alphas for the CHIPS-R ranged from .94 to .95 across occasions. Descriptive statistics for physical health problems are displayed in table 1.

Depression symptoms were assessed at each wave with the 7-item Depression Subscale of the Depression Anxiety Stress Scales (Henry & Crawford, 2005). Women indicated how often they experienced symptoms during the previous week on a scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). The subscale includes items such as “I felt that I had nothing to look forward to.” A depression symptom score was created by taking the mean of all items. Alphas for the depression subscale ranged from .88 to .91 for the current sample across all time points. In order for the scale to be computed, 80% of items had to be answered. Descriptive statistics for depression symptoms are given in table 1.

## Procedure

Study procedures were approved by the institutional review boards of all participating institutions. A list of potential participants who met eligibility criteria (i.e., women in the eligible age range and locations) was identified through Survey Sampling International. We sent recruitment letters to women who were randomly selected from this list of potential participants. Participants were also recruited through community advertisements. In all cases, participants were recruited for a study about “life experiences and adjustment among young adult women,” without regard to sexual victimization experiences. All participants provided written informed consent.



The current study uses data from the first four waves of assessment. At Waves 1 and 3, participants completed a diagnostic interview and a series of self-report measures and laboratory tasks. These assessments were completed in the laboratories of the study sites. Waves 2 and 4 included self-report measures only, and could be completed either at home or in the laboratories of the study sites. Participants were compensated \$75 for the Wave 1 assessment, \$25 for the Wave 2 and 4 assessments, and \$50 for the Wave 3 assessment.

## Results

### *Analytic Strategy*

Individual differences in changes in physical health problems and depression symptoms across 1 year were examined with multilevel models estimated using maximum likelihood within SAS PROC MIXED, in which occasions were modeled as nested within persons. We used likelihood ratio test, in which the  $-2\Delta LL$  (difference in  $-2$  log likelihood values) between models are asymptotically chi-square distributed, to compare nested models. We first estimated a random intercept-only model to partition the between-person and within-person variation in each outcome. For descriptive purposes, the overall patterns of change in the outcomes were then examined with saturated means, unstructured variance models, in which the outcome means, variance, and covariances were estimated separately per occasion. Although we did not expect physical health problems or depression symptoms to systematically change over time, we tested this assumption with a series of unconditional growth models (i.e., models without predictors). As described in the following paragraphs, we found that we needed a combination of fixed effects of time and nonconstant covariance structures to describe illness symptoms and depression symptoms over time.

Once we found the best-fitting unconditional models for each outcome, our next goal was to examine predictors of depression symptoms and physical health problems. To control for the sampling design, we included contrasts for differences among the four sites as main effects and in interactions with time. We then examined how relationship status and both physical and psychological IPA predicted physical health problems and depression symptoms over time. Their between-person and within-person variance was represented by predictor variables as follows.

Given that relationship status was measured at each wave, individuals could be classified into one of the following categories at each wave: in no relationship currently, in the same relationship as the last wave, or in a new relationship compared with the last wave. Women were coded as being in no relationship currently if they responded “no” to the question assessing whether they were currently in a romantic relationship. Women were coded as being in the same relationship as the last wave if they responded “yes” to the question assessing whether they were currently in a romantic relationship and “no” to the question assessing whether their current relationship was new since they last participated. Women were coded as being in a new relationship if they responded “yes” to the question assessing whether they were currently in a romantic relationship and “yes” to the question assessing whether their current relationship was new since they last participated. Between-person differences were represented by a contrast that distinguished women who were

always in the same relationship across the study (= 0) from those who changed relationships or relationship status during the study (= 1). Among those women who were not always in the same relationship, nested effects of within-person changes over time were represented by two contrasts— between no relationship (= 0) and the same relationship (= 1), and between no relationship (= 0) and a new relationship (= 1).

A similar process was used to create predictors for physical and psychological IPA victimization, which were also measured at each wave. Specifically, between-person differences for each type of IPA were represented by a contrast that distinguished women with no IPA during the course of the study (= 0) from those who experienced IPA during the study (= 1). In order for current IPA to occur, women had to report that they were currently in a romantic relationship and had to have experienced IPA during the course of the study. Among those women who experienced IPA, nested effects of within-person changes at each occasion were then represented by two contrasts. One contrast was between no current IPA (= 0) and current IPA (= 1). The second contrast was between current less frequent IPA (= 0) and current more frequent IPA (= 1). This contrast variable was multiplied by the variable created for the comparison between no current IPA and current IPA, because IPA victimization had to occur in order for frequent IPA to occur. The IPA effects were also allowed to differ between women who were still in the same relationship and those who had changed relationships via interaction contrasts.

### *Descriptive Statistics*

Descriptive statistics for study variables are reported in Table 1. One hundred seventy-seven women (47.2%) reported being in the same relationship over the course of the study, and 198 women (52.8%) reported changing either relationship status or relationship partners over the course of the study. Of the 198 women who changed relationship status (i.e., either ending a relationship or beginning a new relationship) over the course of the study, 138 changed relationship status one time, 42 changed relationship status twice, and 18 changed relationship status three times.

The number of individuals reporting current physical IPA ranged from 31 to 82 across occasions, and the number of individuals reporting psychological IPA ranged from 88 to 116 across occasions. The number of women reporting IPA was highest at the first occasion. This is most likely because the first occasion measured IPA over the course of the previous year, whereas the subsequent occasions measured IPA since the last assessment (which was approximately four months). Of the 177 women who remained in the same relationship over the course of the study, 25 experienced physical IPA and 68 experienced psychological IPA at the first occasion. Physical IPA declined from the first occasion to the second occasion and then remained relatively stable across occasions for the 25 women who initially reported physical IPA, such that 11 of these women reported physical IPA at the second occasion, 11 at the third occasion, and 12 at the fourth occasion. These findings are somewhat consistent with past research demonstrating that physical IPA declines over time among couples (Fritz & O'Leary, 2004; Quigley & Leonard, 1996). A large portion of the 68 women who initially reported psychological IPA and remained in the same relationship reported psychological IPA at subsequent occasions, including 49 at the second occasion, 48 at the third occasion, and 48 at the fourth occasion.

Frequencies for adjacent time points of current IPA among women who remained in the same relationship at the subsequent occasion are displayed in Table 2. Notably, approximately half of the individuals who reported physical IPA and remained in the same relationship at the subsequent assessment reported ongoing physical IPA. Even more stability was found for psychological IPA among women who remained in the same relationship at the subsequent occasion. As shown in Table 2, women who did not report IPA and remained in the same relationship at the subsequent occasion typically did not report IPA at the subsequent occasion.

**Table 2.** Frequencies for Current IPA Among Women Who Remained in the Same Relationship at the Subsequent Occasion

IPA status at the previous occasion	Occasion 2		Occasion 3		Occasion 4	
	Current IPA	No current IPA	Current IPA	No current IPA	Current IPA	No current IPA
Physical IPA	19 (48.7%)	20 (51.2%)	13 (59.1%)	9 (40.9%)	16 (66.7%)	8 (33.3%)
No physical IPA	6 (5.3%)	108 (94.7%)	13 (11.0%)	105 (89.0%)	6 (4.6%)	124 (95.4%)
Psychological IPA	86 (84.3%)	16 (15.7%)	59 (77.6%)	17 (22.4%)	63 (78.8%)	20 (24.1%)
No psychological IPA	9 (17.3%)	43 (82.7%)	17 (26.6%)	47 (73.4%)	13 (18.3%)	58 (81.7%)

**Note:** IPA = Intimate partner aggression

### *Unconditional Models of Change Over Time*

A random intercept-only model demonstrated that the intraclass correlation, which reflects the proportion of variation because of between-person differences in the intercept, for physical health problems was .61. This correlation was significantly greater than 0,  $-2\Delta LL$  ( $df = 1$ ) = 523.83,  $p < .001$ . For depression symptoms, the intraclass correlation was .43, which was also significantly greater than 0,  $-2\Delta LL$  ( $df = 1$ ) = 250.82,  $p < .001$ . The saturated means, unstructured variance models showed mean differences across occasions for both physical health problems and depression,  $F(3, 319) = 11.87$ ,  $p < .001$ , and  $F(3, 327) = 4.66$ ,  $p < .01$ , respectively. Subsequent models controlling for effects of time were then estimated to predict these changes in means (and variances and covariances) over time before examining effects of other predictors.

Although not expected, a fixed linear time, random intercept model revealed that mean physical health problems decreased significantly across the study by  $-0.054$  per every 4 months. We then examined alternative models of residual variance and covariance to better predict their observed differences over time. The model that provided the most parsimonious prediction of the variances and covariances over time and also exhibited reasonable fit to the observed data (as indicated by the Akaike information criterion and Bayesian information criterion) included a fixed linear slope for time, a random intercept variance, heterogeneous residual variances, and two-lag residual Toeplitz (i.e., banded) correlation.

The parameters for this final unconditional model for physical health problems are given in the first set of columns in table 3.

**Table 3.** Parameter Estimates for Models Predicting Physical Health Problems over Time

Model parameter	Unconditional		Final model	
	Est	SE	Est	SE
<b>Fixed effects</b>				
Intercept	0.684***	0.031	0.622***	0.105
Linear Time	-0.053***	0.010	-0.079***	0.021
<b>Location effects</b>				
Ohio vs. Mississippi			-0.161	0.082
Ohio vs. Lincoln			-0.003	0.086
Ohio vs. Omaha			-0.153	0.091
Linear Time × Ohio vs. Mississippi			0.022	0.028
Linear Time × Ohio vs. Lincoln			0.052	0.030
Linear Time × Ohio vs. Omaha			0.074*	-0.031
<b>Between-person effects</b>				
Same relationship always vs. changed relationship (relationship status)			0.070	0.100
Never physical IPA vs. ever physical IPA			0.187*	0.085
Never psychological IPA vs. ever psychological IPA			0.117	0.099
Relationship status × physical IPA ever during study			-0.132	0.115
Relationship status × psychological IPA ever during study			-0.009	0.124
<b>Within-person effects</b>				
<b>No current relationship vs. same relationship</b>				
Relationship with no current IPA			-0.093*	0.043
Relationship with current physical IPA			-0.007	0.066
Relationship with current psychological IPA			-0.080	0.044
Relationship with more frequent physical IPA			0.009	0.089
Relationship with more frequent psychological IPA			0.035	0.056
<b>No current relationship vs. new relationship</b>				
Relationship with no current IPA			-0.041	0.046
Relationship with current physical IPA			0.061	0.142
Relationship with current psychological IPA			-0.041	0.073
Relationship with more frequent physical IPA			0.058	0.211
Relationship with more frequent psychological IPA			-0.233	0.125
<b>Women in the same relationship</b>				
No current physical IPA vs. current physical IPA			0.086	0.054
No current psychological IPA vs. current psychological IPA			0.013	0.042
Less frequent physical IPA vs. frequent physical IPA			0.016	0.079
Less frequent psychological IPA vs. frequent psychological IPA			0.116*	0.048
<b>Women in new relationship</b>				
No current physical IPA vs. current physical IPA			0.103	0.133

No current psychological IPA vs. current psychological IPA			< 0.001	0.082
Less frequent physical IPA vs. more frequent physical IPA			-0.003	0.206
Less frequent psychological IPA vs. frequent psychological IPA			-0.192	0.129
Variance components				
Random intercept variance	0.186***	0.021	0.139***	0.018
Assessment Wave 1 residual variance	0.203***	0.020	0.215***	0.021
Assessment Wave 2 residual variance	0.215***	0.026	0.224***	0.026
Assessment Wave 3 residual variance	0.133***	0.019	0.143***	0.020
Assessment Wave 4 residual variance	0.113***	0.015	0.102***	0.014
Lag 1 residual correlation	0.262***	0.065	0.315***	0.059
Lag 2 residual correlation	0.156*	0.065	0.194**	0.060

Note: Est = estimate; IPA = Intimate partner aggression

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

With regard to depression symptoms, the mean at Wave 3 appeared lower than at each other wave; a model including a random intercept and a fixed effect for the difference of Wave 3 from the other waves indicated that mean depression symptoms were indeed significantly lower at Wave 3 by 0.107. We again examined alternative models of residual variance and covariance to better predict their observed differences over time, but only needed to add heterogeneous residual variances to improve fit. Parameters for this final unconditional model for depression symptoms are given in the first set of columns in table 4.

### *Conditional Models of Change Over Time*

The final unconditional models of change over time described previously were used as the baseline to which all subsequent predictors were added. To describe effect size, an  $R^2$  for the explained variance of each outcome was calculated as the square of the correlation between the actual outcomes and the outcomes predicted by the model fixed effects. Results from the final models for physical health problems and depression symptoms are shown in the second set of columns in tables 2 and 3, respectively. Final model results are described in the following paragraphs with respect to the study hypotheses; the process of building to the final models is summarized first.

The location effects accounted for an additional 1.74% of the overall variance in physical health problems and 2.54% of the overall variance in depression symptoms. We then examined the between-person and within-person main effects of relationship status. These relationship status effects accounted for an additional 0.11% of the overall variance in physical health problems and 0.59% of the overall variance in depression symptoms. Next, we added the main effects for whether physical and psychological IPA had ever occurred and whether physical and psychological IPA had occurred at each wave, as well as the interactions of IPA status with relationship status. These physical and psychological IPA effects accounted for an additional 5.26% of the overall variance in physical health problems and 4.92% of the overall variance in depression symptoms. Finally, we added the main effects of physical and psychological IPA frequency at each wave. The IPA frequency

effects accounted for an additional 0.40% of the overall variance in physical health problems and 1.70% of the overall variance in depression symptoms. No significant interactions with time were found for any predictor.

**Table 4.** Parameter Estimates for Models Predicting Depression Symptoms over Time

Model parameter	Unconditional		Final model	
	Est	SE	Est	SE
<b>Fixed effects</b>				
Intercept	0.549***	0.027	0.598***	0.107
Time: Waves 1, 2, and 4 vs. Wave 3	-0.107***	0.029	-0.020	0.060
<b>Location effects</b>				
Ohio vs. Mississippi			-0.232	0.071
Ohio vs. Lincoln			0.049	0.074
Ohio vs. Omaha			-0.069	0.078
Time × Ohio vs. Mississippi			-0.093	0.079
Time × Ohio vs. Lincoln			-0.119	0.083
Time × Ohio vs. Omaha			-0.029	0.089
<b>Between-person effects</b>				
Same relationship always vs. changed relationship (relationship status)			0.034	0.104
Never physical IPA vs. ever physical IPA			0.194*	0.087
Never psychological IPA vs. ever psychological IPA			0.020	0.101
Relationship status × physical IPA ever during study			-0.121	0.116
Relationship status × psychological IPA ever during study			0.098	0.125
<b>Within-person effects</b>				
<b>No current relationship vs. same relationship</b>				
Relationship with no current IPA			-0.090***	0.055
Relationship with current physical IPA			-0.175*	0.085
Relationship with current psychological IPA			-0.168**	0.056
Relationship with more frequent physical IPA			-0.016	0.110
Relationship with more frequent psychological IPA			0.014	0.071
<b>No current relationship vs. new relationship</b>				
Relationship with no current IPA			-0.111	0.063
Relationship with current physical IPA			0.048	0.190
Relationship with current psychological IPA			-0.189	0.099
Relationship with more frequent physical IPA			-0.254	0.285
Relationship with more frequent psychological IPA			-0.095	0.167
<b>Women in the same relationship</b>				
No current physical IPA vs. current physical IPA			0.014	0.068
No current psychological IPA vs. current psychological IPA			0.022	0.054
Less frequent physical IPA vs. frequent physical IPA			0.159	0.096
Less frequent psychological IPA vs. frequent psychological IPA			0.182**	0.062

Women in new relationship				
No current physical IPA vs. current physical IPA			0.159	0.178
No current psychological IPA vs. current psychological IPA			-0.078	0.112
Less frequent physical IPA vs. more frequent physical IPA			-0.301	0.278
Less frequent psychological IPA vs. frequent psychological IPA			0.094	0.172
Variance components				
Random intercept variance	0.173***	0.018	0.141***	0.016
Assessment Wave 1 residual variance	0.254***	0.024	0.241***	0.023
Assessment Wave 2 residual variance	0.242***	0.024	0.259***	0.026
Assessment Wave 3 residual variance	0.172***	0.019	0.160***	0.018
Assessment Wave 4 residual variance	0.279***	0.028	0.263***	0.027

Note: Est = estimate; IPA = Intimate partner aggression

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

#### *Between-person effects*

As hypothesized, physical IPA had significant between-person effects on both outcomes. Specifically, physical health problems across the study were higher by 0.187 ( $p < .05$ ), and depression symptoms across the study were higher by 0.194 ( $p < .05$ ), in women who had ever experienced physical IPA (compared with women who had never experienced physical IPA). Contrary to our expectations, however, physical health problems and depression symptoms did not differ between women with, versus without, psychological IPA. Likewise, among women who did not experience IPA during the study, physical health problems and depression symptoms did not differ between those who stayed in the same relationship throughout the study and those who changed relationship status or partners. Finally, the interactions between relationship status and both physical and psychological IPA were not significant, suggesting that, contrary to expectations, the effects of staying in the same relationship did not vary as a function of the occurrence of IPA.

#### *Within-person effects*

We hypothesized that women would report significantly better outcomes on occasions when they were in a relationship (either the same relationship as the previous time point or a new relationship) and did not report current IPA (relative to occasions when they were not in a relationship). Our findings partially supported this hypothesis. Specifically, on occasions when women were in the same relationship as the previous time point and did not report current IPA, they reported significantly better outcomes. At these times, physical health problems were lower by 0.093 ( $p < .05$ ) and depression symptoms were lower by 0.190 ( $p < .001$ ). Likewise, when predicting physical health problems, the effect of being in the same relationship was not significant when women reported current physical or psychological IPA. Contrary to expectations, however, on occasions when women were in the same relationship as the previous time point, their depression symptoms were signifi-

cantly lower than on occasions when they were not in a relationship even when they reported current IPA, with depression symptoms lower by 0.175 ( $p < .05$ ) when experiencing current physical IPA and 0.168 ( $p < .01$ ) when experiencing current psychological IPA. Nonetheless, the effect of being in the same relationship on depression symptoms was not significant when women experienced current *frequent* physical or psychological IPA. Finally, and contrary to expectations, on occasions when women were in a new relationship from the previous time point and reported no current IPA, their physical health problems and depression symptoms did not differ from occasions when they were not in a relationship (an effect that remained nonsignificant when women reported current IPA or frequent IPA).

As described in the Analytic Strategy section, within-person IPA effects for women who experienced IPA during the course of the study were allowed to differ between women who remained in the same relationship and those who had changed relationships. Although we did not hypothesize differences between these two groups, we found different within-person IPA effects for the two groups. Specifically, at time points when women were in the same relationship as the previous time point and reported experiencing more (vs. less) frequent psychological IPA, they reported significantly greater physical health problems by 0.116 ( $p < .05$ ) and significantly greater depression symptoms by 0.182 ( $p < .01$ ). In contrast, women who reported experiencing more (vs. less) frequent psychological IPA but were in a new relationship, compared with the previous occasion, did not report worse outcomes. Additionally, women's physical health problems and depression symptoms were not significantly worse on occasions they reported more frequent physical IPA (for either type of relationship status).

## Discussion

The current study extends prior research by examining the effects of IPA victimization and relationship status on physical health problems and depression longitudinally among a diverse community sample of young adult women. Findings generally supported our hypotheses, in that IPA victimization was related to greater physical health problems and symptoms of depression. However, these findings varied depending on the type of IPA victimization experienced (i.e., physical vs. psychological) and women's relationship status. These findings, their clinical implications, and suggestions for future research are discussed in the following paragraphs.

Women who experienced physical IPA victimization during at least one time point over a 1-year period reported greater physical health problems and depression symptoms than women who did not experience IPA during that year. This finding is consistent with previous research that has repeatedly shown that women experience detrimental physical and mental health effects from IPA victimization (Ackard et al., 2007; Ehrensaft et al., 2006; Schei et al., 2006). Although physical IPA victimization had a betweenperson effect on physical health problems and depression symptoms, psychological IPA did not. This may be because of the inclusion of women who had only experienced one act of minor psychological aggression in the victimization group. More frequent or more severe acts of psychological aggression may be necessary to negatively impact physical and mental health.



With regard to within-person effects, psychological, but not physical, IPA had significant within-person effects on physical health problems and depression. Specifically, for women who were in the same relationship as the previous time point, greater physical health problems and depression symptoms were reported at times when they experienced more versus less frequent psychological IPA. These findings are consistent with prior work showing that the detrimental physical and mental health effects of psychological IPA can go above and beyond the effects of physical IPA (Lawrence et al., 2009; Williams, Richardson, Hammock, & Janit, 2012). Notably, however, whether IPA occurred at each time point was not related to increased problems. These findings suggest that whereas the frequency of psychological IPA is related to increased difficulties, the occurrence of IPA may not matter within persons. Contrary to our hypotheses, the within-person effects of physical IPA were unrelated to physical health problems or depression. However, as described in the previous paragraph, physical IPA did have between-person effects. The lack of within-person effects for physical IPA may be because our sample of community women reported relatively low levels of physical IPA victimization. Future research could examine the within-person effects of physical IPA frequency among a clinical or domestic violence shelter sample.

Notably, the within-person effects for psychological IPA frequency were found only among women who were in the same relationship as the previous assessment; within-person effects of IPA were not found among women who had changed to a new relationship. These findings were contrary to our prediction that IPA would be related to increased physical health problems and depression regardless of relationship status. However, if IPA contributes to physical and mental health partly through its impact on the HPA axis, then it may be the chronic “wearing down” of this system that leads to increases in health problems and depression. This process may only occur if women stay in the same abusive relationship over time. These findings suggest that staying with an abusive partner is harmful and likely to result in increased physical health problems and depression over time.

Contrary to expectations, among women who did not experience IPA, those who were in the same relationship throughout the study did not experience lower physical health problems and depression than those who changed relationship status (i.e., changing partners, going from being in a relationship to being single, going from being single to being in a relationship). Although ending a relationship has been shown to cause distress and decreased life satisfaction (Rhoades et al., 2011), the group of women in this study who changed relationship status included women who changed partners and those who began a new relationship. The heterogeneity of the changed relationship status group may have prevented us from finding differences from the group of women who stayed in the same relationship throughout the study. However, we did find that women reported lower physical health problems and depression symptoms on occasions when they were in the same relationship as the previous assessment and did not report current IPA. This finding is consistent with past research suggesting that being in a lasting relationship that does not involve IPA has beneficial effects among young women (Barrett, 2000; Ross, 1995; Waite & Gallagher, 2001). Importantly, though, the beneficial effects of staying in the same relationship generally did not extend to women who reported current IPA.

Findings from the current study have important clinical and policy implications. Results suggest that both physical and psychological IPA can have a detrimental impact on young women's physical and mental health, with psychological IPA being particularly problematic for women who stay in the same relationship over time. This study consisted of a diverse community sample of young adult women who were not helpseeking, suggesting the importance of outreach and prevention efforts targeting young women in the community. In particular, these results highlight the potential important role of health care providers (both primary health care and mental health providers) in identifying both physical and psychological IPA among young women. Although several professional groups, such as the Institute of Medicine, the Association of Women's Health, and the American Academy of Family Physicians, advocate screening women for interpersonal violence, the consistency and quality of this practice varies across treatment providers (Bradley, Smith, Long, & O'Dowd, 2002; Rhodes et al., 2007). Universal screening programs for sexual violence have been shown to be cost-effective and to facilitate engagement in mental health treatment (Kimerling, Street, Gima, & Smith, 2008), suggesting that targeting IPA with this type of universal program may also be beneficial. Engaging women who have experienced interpersonal violence in mental health treatment may also help prevent future IPA (Iverson et al., 2011).

Although this study established important longitudinal relationships between IPA and physical health problems and depression, its limitations should be acknowledged. First, we relied on participants' self-reports of IPA, physical health, and depression symptoms, which may be subject to bias related to poor recall or socially desirable responding. We also examined an overall score of physical health problems. Future research should investigate more specific health outcomes. Furthermore, although many of the examined effects were significant, it is worth noting that effect sizes were generally small. Further research is needed to determine whether these findings are replicable. In addition, IPA was assessed from only one partner's perspective. Whereas respondents are more likely to report victimization than perpetration in their relationships (Simpson & Christensen, 2005), reporting victimization could still be subject to underreporting. Moreover, given findings that much IPA in nonclinical samples is bidirectional (Langhinrichsen-Rohling, Misra, Selwyn, & Rohling, 2012), it is likely that a subset of the women in our sample engaged in IPA perpetration as well. In the absence of this information, the effects of IPA victimization versus perpetration on women's outcomes cannot be determined. Future studies would benefit from collecting IPA victimization and perpetration information from both partners. Finally, although a strength of our study was our use of a diverse community sample, not many of our participants experienced frequent physical IPA. Therefore, the effects of physical IPA frequency may be more pronounced within a clinical sample.

Despite these limitations, the current study extends prior research by demonstrating both between- and within-person effects of IPA victimization on physical health problems and depression. Results also highlight the importance of developing effective IPA prevention and early intervention programs. Increased knowledge and recognition of this significant problem may help to reduce the number of young women affected by IPA victimization.

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