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## Toward a Standard Approach to Operationalizing Coercive Control and Classifying Violence Types

*Coercive control is central to distinguishing between Johnson's (2008) 2 main types of intimate partner violence: (a) coercive controlling violence and (b) situational couple violence. Approaches to assessing coercive control, however, have been inconsistent. Using data from 2 projects involving divorcing mothers (N = 190), the authors compared common analytic strategies for operationalizing coercive control and classifying types of violence. The results establish advantages to measuring coercive control in terms of frequency versus number of tactics, illustrate the use of both hierarchical and k-means clustering methods to identify patterns of coercive control and evaluate clustering solutions, and offer a suggested cutoff for classifying violence types in general samples of separated*

*women using the Dominance–Isolation subscale of the widely used Psychological Maltreatment of Women Inventory (Tolman, 1992). Finally, the authors demonstrate associations between types of violence and theoretically relevant variables, including frequency and severity of violence, harassment and violence after separation, fear, and perceived threat.*

A growing number of researchers acknowledge the need to move beyond the dimensions and characteristics of physical violence (e.g., frequency and severity) to make distinctions among types or contexts of intimate partner violence (IPV; Cook & Goodman, 2006; Graham-Kevan & Archer, 2003; Johnson & Leone, 2005). Central to this shift is Johnson's (2008) typology of violence, which differentiates between two main types. *Coercive controlling violence* (or *intimate terrorism*) is violence that occurs in the context of coercive control, with the use of both violent and nonviolent tactics aimed at maintaining dominance over one's partner. *Situational couple violence* results from arguments or situations that escalate to physical acts but is not part of a larger motive to control one's partner. The concept of coercive control is central to distinguishing between these types but, unlike physical violence, which is typically measured

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using the Revised Conflict Tactics Scale (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996), there is no standard approach to operationalizing coercive control, which limits comparisons and generalizability across studies. This issue is exacerbated by the lack of an established cutoff for classifying types using a standard measure of coercive control. We sought to address these methodological limitations by evaluating different approaches to operationalizing coercive control and classifying IPV types with the goal of moving toward a standard approach.

#### BACKGROUND

According to Johnson (2008), "Control is a continuum. Everyone 'controls' their partner to some extent" (p. 87). Control becomes coercive when it involves the repetitive use of tactics to regulate and dominate an intimate partner's daily life and restrict personal liberties (Stark, 2007). Studies of women reporting male IPV have demonstrated the differential effects of violence with high control (i.e., coercive controlling violence) versus low or no control (i.e., situational couple violence). For example, coercive controlling violence has been associated with more frequent and severe physical violence (e.g., Graham-Kevan & Archer, 2003; Johnson & Leone, 2005), more injury (e.g., Leone, Johnson, & Cohan, 2007), and more harassment and violence after separation (e.g., Ornstein & Rickne, 2013). Women who experience coercive controlling violence also report higher levels of fear (e.g., Felson & Outlaw, 2007) and perceived threat of future harm (Gondolf & Heckert, 2003).

Most of these studies, however, have assessed coercive control by counting how many control tactics were endorsed (i.e., a count approach). The variety of tactics an abuser may use is important to consider, but abusers are likely to draw on as many, or as few, tactics as have proven effective in asserting and maintaining dominance (Kelly & Johnson, 2008; Stark, 2007). Only a few studies have used a frequency approach, which measures how often tactics are used to control a partner (e.g., Graham-Kevan & Archer, 2003, 2008; Leone, Johnson, Cohan, & Lloyd, 2004). A risk of the count approach is (mis)classifying highly controlling abusers as "low control" when they rely on very few control tactics but enforce them relentlessly. Likewise, there is the risk of (mis)classifying low

controlling abusers as "high control" because of their rare use of a variety of different control tactics.

To distinguish between IPV types in samples of abused women, researchers have used three approaches. The most common approach has been cluster analysis of controlling tactics using either hierarchical (e.g., Ward's method) or *k*-means clustering methods. A hierarchical method is recommended when exploring a new concept or when one is unsure how many clusters may be present. Researchers can use *k*-means as a way to confirm hierarchical cluster solutions (Henry, Tolan, & Gorman-Smith, 2005). Most studies that have used a hierarchical method to classify IPV types have reported two-cluster solutions—violence with high control and violence with little to no control (e.g., Leone, 2011)—and studies that have used *k*-means have specified two-cluster solutions (e.g., Graham-Kevan & Archer, 2003). A second approach has been to derive a cutoff score from a cluster analysis of control tactics. These studies have reported a cutoff score of three or more controlling behaviors as "high controlling" and two or fewer as "low controlling" (e.g., Ornstein & Rickne, 2013). Finally, some studies have used subjective cutoffs (Frye, Manganello, Campbell, Walton-Moss, & Wilt, 2006) or cutoffs derived from a previous cluster analysis using similar control tactics (e.g., Anderson, 2008). Because the selection of cutoff points has been inconsistent and based on relative (vs. absolute) levels of coercive control, results cannot be compared across studies. Cluster analysis will always produce a high and low control group, but a standard cutoff provides more confidence that clusters of high and low control are qualitatively different.

Conducting both clustering methods within the same data set is important methodologically because hierarchical cluster analysis provides cluster solutions that fit the sample and data, whereas *k*-means cluster analysis demonstrates reliability or convergence of cluster solutions across clustering methods (e.g., little to no movement of cases between cluster solutions), which establishes validity (Henry et al., 2005). Only one study of IPV types to our knowledge has reported both clustering methods (Johnson, Leone, & Xu, 2014). Furthermore, no studies have evaluated the utility of operationalizing coercive control using a count versus a frequency approach. Finally, most of this research

has been conducted with samples of women who have experienced physical violence, limiting the ability to examine nonviolent coercive control (Crossman, Hardesty, & Raffaelli, in press). Using a sample of divorcing mothers who had and had not experienced violence, we contribute to the literature in three ways: by (a) comparing count and frequency approaches to operationalizing coercive control and testing the robustness of each approach by conducting both exploratory and confirmatory cluster analyses, (b) identifying a cutoff to distinguish high from low control based on the most robust cluster solution, and (c) testing the distinctiveness of the clusters and validity of the cutoff by examining associations among IPV types and variables found to be associated with the types in prior studies (reviewed above).

## METHOD

### *Sample and Procedure*

The data we used came from two studies of divorcing mothers' experiences with coercive control and violence. The studies were designed to test an integrative theoretical model of IPV and coparenting after separation (Hardesty et al., 2012). The first, in 2009–2010, involved the same inclusion criteria, recruitment methods, and assessment as the second study, which began in 2010 and was completed in January 2014. Institutional review board approval was obtained prior to participant recruitment, and numerous precautions were taken to ensure mothers' safety and privacy. In-person interviews (two in the first study, five in the second study) were conducted with each participant at 3-month intervals. Only data from the baseline interview are used in this article.

Potential participants identified via public records in a large midwest U.S. county were sent a recruitment letter if they had a divorce filing within the past 4 months. Additional inclusion criteria were that they (a) had at least one child under age 18, (b) had custody of their child(ren) at least 25% of the time, (c) had been physically separated from their former partner for less than 3 years, and (d) could understand and speak English. The first three criteria ensured that issues of separation and coparenting were salient to respondents, such that mothers were in a parental role with respect to their children, likely to be coparenting with their former partner, and able to report on marital events that

were not in the too-distant past. The last inclusion criterion reflects budget limitations, but less than 12% of the county's population consists of immigrants and about two thirds of immigrants in the county speak English "well" or "very well" (U.S. Census Bureau, 2014). Thus, the sample is unlikely to have been biased by the exclusion of non-English speakers. Letters were sent to 804 women named in a divorce filing between September 2009 and December 2012, and 24% ( $N = 190$ ) completed the first interview. Of the 609 women who did not participate, 50 were eligible and interested but did not show up for scheduled interviews or did not respond to scheduling efforts, 36 declined to participate, 27 did not meet the criteria, and 496 never responded to recruitment efforts. We were unable to determine whether the women who did not respond met the criteria for inclusion or received our recruitment letter.

Mothers in the analytic sample ( $N = 190$ ; 55 from the first study and 135 from the second study) were between the ages of 20.83 and 54.67 years ( $M = 35.72$ ,  $SD = 7.28$ ) and predominantly White ( $n = 152$ , 80.0%). Twenty-three mothers (12.1%) identified as Black or African American, seven (3.7%) identified as Asian or Asian American, five (2.6%) identified as biracial, and three (1.6%) identified as Latino or Hispanic. Mothers had between one and four biological or adopted children with their former partner ( $M = 1.75$ ,  $SD = 0.75$ ) and had been physically separated for less than 1 month to 34 months ( $M = 8.05$ ,  $SD = 6.76$ ). The length of marriages to former partners ranged from 0.17 to 27.42 years ( $M = 9.60$  years,  $SD = 5.89$ ). The majority of mothers were employed full time ( $n = 108$ , 56.8%), 37 (19.5%) were employed part time, 24 (12.6%) were unemployed not by choice (e.g., due to disability, difficulty finding a job, or being laid off), and 21 (11.1%) were unemployed by choice (e.g., student). Twenty-six mothers had a high school degree or less (13.7%), 70 (36.8%) had some college, 64 (33.7%) had a bachelor's degree, and 30 (15.8%) had a master's or doctoral degree. Sample demographics in each study were comparable, with one exception: Mothers in the first study were more likely to report being unemployed at the time of the baseline interview in comparison to mothers in the second study,  $\chi^2(3, N = 190) = 11.55$ ,  $p = .009$ .

Table 1. Comparison of High- and Low-Controlling Groups on the Psychological Maltreatment of Women Inventory (PMWI) Within Frequency Versus Count Approaches (N = 190)

PMWI item	Frequency approach				Count approach			
	Low control (n = 130)		High control (n = 60)		Low control (n = 75)		High control (n = 115)	
	Range	M (SD)	Range	M (SD)	Range	M (SD)	Range	M (SD)
He monitored my time and made me account for my whereabouts.	1–5	1.76 (1.07)	1–5	3.87 (1.27)	1–5	1.33 (0.91)	1–5	3.14 (1.38)
He used our money or made important financial decisions without talking to me about it.	1–5	2.29 (1.30)	1–5	3.70 (1.44)	1–5	2.11 (1.30)	1–5	3.15 (1.47)
He was jealous or suspicious of my friends.	1–5	2.02 (1.19)	1–5	4.27 (0.99)	1–5	1.51 (0.96)	1–5	3.53 (1.30)
He accused me of having an affair with another man.	1–5	1.74 (1.11)	1–5	3.33 (1.58)	1–5	1.31 (0.77)	1–5	2.85 (1.51)
He interfered in my relationships with other family members.	1–4	1.37 (0.66)	1–5	3.92 (1.27)	1–5	1.24 (0.69)	1–5	2.78 (1.55)
He tried to keep me from doing things to help myself.	1–5	1.48 (0.75)	1–5	3.80 (1.04)	1–4	1.19 (0.56)	1–5	2.89 (1.33)
He restricted my use of the phone.	1–3	1.05 (0.26)	1–5	2.22 (1.51)	1–5	1.07 (0.46)	1–5	1.65 (1.21)
Total count of behaviors reported (maximum = 7)	0–7	2.75 (1.74)	4–7	6.03 (0.82)	0–4	1.53 (1.08)	3–7	5.25 (1.19)
Total PMWI score (maximum = 35)	7–19	11.72 (3.41)	18–35	25.10 (4.92)	7–20	9.75 (2.72)	10–35	19.99 (6.60)

Note. PMWI item values range from 1 = *never* to 5 = *always*.

### Measures

*Coercive control during marriage.* The Dominance–Isolation subscale of the Psychological Maltreatment of Women Inventory—Short Form (PMWI; Tolman, 1992), a widely used measure of coercive control, was used to measure the degree of coercive control in the last year before separation. Mothers rated how often they had experienced each of seven acts (see Table 1 for items) by their partner on a scale from 1 (*never*) to 5 (*always*). Responses were summed to calculate the frequency with which control tactics were used, for a maximum possible score of 35. Dichotomous versions of the items were created by changing responses so that 0 = “never” and 1 = “sometimes” through “always.” Then, a count of control tactics was calculated by summing the total number of tactics endorsed, for a maximum possible score of 7.

*Fear during marriage.* Mothers’ degree of fear in the last year before separation was assessed

with the Women’s Experiences of Battering Scale (Smith, Earp, & DeVillis, 1995). Mothers indicated how much they agreed with each of 10 items that describe how their partner made them feel (e.g., “He made me feel unsafe even in my own home,” “He could scare me without laying a hand on me”) on a scale of 1 (*disagree strongly*) to 6 (*agree strongly*). A total score was calculated by summing responses for a maximum possible score of 60, with higher scores indicating higher levels of fear.

*Violence and injury during marriage and after separation.* Eleven items from the Physical Assault subscale of the CTS2 and two items from a modified version of the Sexual Coercion subscale of the CTS2 (Goodman, Dutton, Weinfurt, & Cook, 2003) were used to measure frequency of violence. Only direct physical assault items were included (e.g., slammed against a wall, forced sexual intercourse). Threatening behaviors were excluded. Nine items from the Physical Assault and Sexual

Coercion subscales were used to measure the number of severe violent acts (e.g., choked, beat up) that occurred during marriage. Six items from the Injury subscale of the CTS2 were used to measure the frequency and number of injuries. Mothers reported whether they had ever experienced each of the 13 violent acts, nine severe acts, or six injuries during marriage. When mothers responded “yes,” they were asked to indicate how often each violent act or injury had occurred: “once,” “twice,” “3–5 times,” “6–10 times,” or “10 or more times.” Response ranges were averaged (e.g., 3–5 times = 4 times), and 10 or more times was treated as 10. Responses were summed to create a maximum possible score of 130 for physical violence and 60 for injury. For severity of violence, “yes” responses were summed, for a maximum possible score of 9.

The same items were used to measure violence and injury after separation. Mothers reported whether each violent act or injury had occurred since they had physically separated from their partner. A total count each for violent acts and injuries (or “yes” responses) was calculated.

*Fear after separation.* One item was created to measure fear: “Since you physically separated, how often have you been afraid of your former partner?” Response items ranged from 0 (*never*) to 4 (*very frequently*).

*Harassment after separation.* Harassment in Abusive Relationships: A Self-report Scale (Sheridan, 2001) was used to assess frequency of postseparation harassment. Mothers indicated how often former partner had engaged in 23 behaviors (e.g., “leaves me threatening messages,” “sits in his car outside my home”) on a scale that ranged from 0 (*never*) to 4 (*very frequently*). Responses were summed for a maximum possible total score of 92. Higher scores indicate more frequent harassment.

*Perceived threat of future harm.* The IPV Threat Appraisal (Dutton, Goodman, Lennig, Murphy, & Kaltman, 2006) scale was used to assess mothers’ perceptions of the likelihood of 16 violent, nonviolent, or child-related threats (e.g., physical assault, attempts to take away children) by former partners in the next 3 months on a scale of 1 (*low risk*) to 5 (*high risk*). Responses were summed for a possible total score of 80; higher scores indicate higher perceived threat.

### *Plan of Analysis*

To explore distinctions between high and low patterns of coercive control, we conducted a hierarchical cluster analysis of the seven items on the PMWI with item responses scored in two different ways. First, the frequency approach used the PMWI items with the frequency responses intact (from 1 [*never*] to 5 [*always*]). The second approach used a dichotomous version (0 or 1 to indicate absence or presence of each tactic) of each PMWI item (the count approach). Hierarchical cluster analysis using Ward’s method was used in each approach to identify clusters of former partners who have similar control profiles, with squared Euclidian distance as the proximity measure. Items were standardized using *z* scores. The agglomeration schedule and dendrogram were inspected to identify the number of cluster solutions. Theoretical discussions followed to ensure that the number of clusters and cluster centers were identified and interpreted in the most conceptually meaningful way.

To verify the robustness of the clustering results, we performed two additional steps suggested by Henry et al. (2005). First, we tested the stability of the cluster solutions across clustering methods by performing a *k*-means cluster analysis on the same seven PMWI items for each of the two approaches (frequency and count). Then we used the cluster solutions and CTS2 data to classify mothers into Johnson’s (2008) types of violence (i.e., coercive controlling violence and situational couple violence) as well as a group who reported no marital violence but high coercive control (“nonviolent coercive control”) and no marital violence and low coercive control (“no violence/low control”). The validity of the cluster solutions was evaluated through a multivariate analysis of variance (MANOVA) with pairwise comparisons of the resulting groups on the following variables that have been shown to differ by type of IPV: frequency and severity of violence, injury, harassment and violence after separation, fear, and perceived threat of future harm. The MANOVAs controlled for mother’s age. We used independent-samples *t* tests to compare the violence groups on the frequency of violent acts and injuries during marriage and the number of severe acts during marriage because the two nonviolent groups, by definition, did not have marital violence present.

To allow comparability with prior studies, which have typically involved only women who

experienced physical violence, all analyses were replicated within the subsample of mothers who reported violence during marriage.

## RESULTS

### *Objective 1: Comparing Count and Frequency Approaches and Testing Their Robustness*

*Frequency approach (full sample, N = 190).* The hierarchical cluster analysis (Ward's method) of the PMWI items scored using the frequency approach revealed a large increase in the agglomeration index between the one- and two-cluster solutions (1323, 791) followed by much smaller changes thereafter (674, 569, etc.), suggesting that a two-cluster solution was optimal. The two clusters were theoretically interpretable and meaningful. Cluster 1 ( $n = 130$ , 68.4%) represented a low-controlling group, with mothers reporting a mean of 11.79 ( $SD = 3.55$ , range: 7–20) out of 35 on the PMWI. Cluster 2 ( $n = 60$ , 31.6%) represented a high-controlling group, with mothers reporting a mean of 17.95 ( $SD = 24.95$ , range: 17–35) on the PMWI. To test the stability of the hierarchical cluster solutions, a  $k$ -means cluster analysis with a two-cluster solution was performed on the same seven PMWI items. As shown in Table 1, Cluster 1 ( $n = 130$ , 68.4%) represented a low-controlling group, with mothers reporting a mean score of 11.72 ( $SD = 3.41$ , range: 7–19). Cluster 2 ( $n = 60$ , 31.6%) represented a high-controlling group, with mothers reporting a mean score of 25.10 ( $SD = 4.92$ , range: 18–35). Only eight (4.2%) of the 190 cases changed cluster classifications between the hierarchical cluster solution and the  $k$ -means cluster solution, suggesting that the solutions were quite stable across clustering methods.

*Count approach (full sample, N = 190).* Hierarchical cluster analysis revealed a large increase in the agglomeration index between the one- and two-cluster solutions (297, 218) followed by smaller changes thereafter (182, 162, etc.), again suggesting that a two-cluster solution was optimal. Cluster 1 ( $n = 100$ ; 52.6%) represented a low-controlling group, with mothers reporting a mean of 2.27 ( $SD = 1.57$ , range: 0–5) on the PMWI. Cluster 2 ( $n = 90$ ; 47.4%) represented a high-controlling group, with mothers reporting a mean of 5.47 ( $SD = 1.29$ , range: 2–7) on

the PMWI. To confirm the hierarchical cluster solutions, we performed a  $k$ -means cluster analysis with a two-cluster solution. As shown in Table 1, Cluster 1 ( $n = 75$ , 39.5%) represented a low-controlling group, with a mean of 1.53 ( $SD = 1.08$ , range: 0–4) PMWI tactics. Cluster 2 ( $n = 115$ , 60.5%) represented a high-controlling group, with a mean of 5.25 ( $SD = 1.19$ , range: 3–7) tactics. Forty-one (21.5%) of the 190 cases changed classifications between the hierarchical cluster solution and the  $k$ -means cluster solution, suggesting that the solutions using the count approach were unstable across clustering methods and thus prone to issues of reliability.

*Comparison of the high- and low-controlling groups on PMWI.* To examine the validity of the cluster solutions, the high- and low-controlling groups resulting from the  $k$ -means clustering method were compared on each PMWI item (see Table 1). For descriptive purposes, we also examined the total PMWI score and the total number of tactics on the PMWI across the frequency and count approaches for the full sample (see Table 1). Mean scores for all seven items were higher in the high-controlling group than low-controlling group across both approaches. Within the count approach there was substantial overlap in total PMWI scores for the low- and high-controlling groups (i.e., PMWI scores 10–20 are included in both the high- and low-controlling groups); in contrast, the ranges overlapped by only 2 points in the frequency approach (i.e., PMWI scores 18 and 19 are included in both high- and low-controlling groups). Because IPV studies often use samples of abused women only, we replicated these analyses in the violence-only subsample; similar patterns were observed (results not shown).

### *Objective 2: Identifying a Cutoff*

The first set of analyses provided substantial support for operationalizing coercive control using a frequency approach. Specifically, the replicability and stability of the cluster solutions across the two clustering methods (exploratory vs. confirmatory) provided evidence that the frequency approach yields a more trustworthy solution. In other words, the lack of stability across clustering methods for the count approach casts doubt on the reliability of using this measurement approach. Therefore, we conducted the remaining analyses using scores from the frequency

Table 2. Distribution of Psychological Maltreatment of Women Inventory (PMWI) Scores by Cluster Membership (N = 190)

Cluster membership	Total PMWI score									
	14	15	16	17	18	19	20	21	22	23
High control ( $n = 60$ )	0.0	0.0	0.0	0.0	3.3	8.3	10.0	6.7	8.3	8.3
Low control ( $n = 130$ )	5.5	8.5	3.9	6.9	3.9	1.5	0.0	0.0	0.0	0.0

Note. Cluster membership is based on a  $k$ -means two-cluster solution. Table values are percentages.

approach. We examined the ranges of PMWI values to determine the appropriate cutoff that minimized misclassification (see Table 2). A cutoff score of 19 or greater for high control was selected to be conservative when classifying “high controllers” and to minimize misclassification. Only four (2.1%) of the 190 cases could be “misclassified” using a cutoff score of 19 (vs. seven cases, or 3.7%, for a cutoff score of 18). These four cases were reviewed and discussed before the cutoff decision was made.

### Objective 3: Testing the Distinctiveness of the Clusters and Validity of the Cutoff

As a further test of validity, we classified mothers into Johnson’s (2008) types of violence and examined the characteristics of the resulting groups. First, mothers were coded as “violence” and “no violence” on the basis of their responses to the Physical Assault and Sexual Coercion subscales on the CTS2. Specifically, mothers with a score of 0 were coded “no violence” and mothers with a score of 1 or greater were coded “violence,” as measured by the CTS2. Then, mothers were coded as “little to no control” or “high control” using the cutoff of 19 on the PMWI. Mothers were classified into four mutually exclusive groups: (a) no violence and little to no control (no violence/low control,  $n = 73$ ), (b) violence and little to no control (situational couple violence,  $n = 57$ ), (c) no violence and high control (nonviolent coercive control,  $n = 12$ ), and (d) violence and high control (coercive controlling violence,  $n = 48$ ).

*Comparison of IPV types.* Next, we compared groups on a set of theoretically relevant variables. A MANOVA, controlling for age, revealed a significant multivariate main effect of violence type, Wilks’s  $\lambda = 0.43$ ,  $F(24, 516.86) = 7.36$ ,  $p = .00$ , partial  $\eta^2 = .25$ . Follow-up univariate main effects were examined. Results of all comparisons are shown in Table 3. Rather than discuss all significant findings in detail, we focus

on those that are most relevant to the goals of this article.

Looking first at variations due to level of control, we see that mothers in the no violence/low control group reported significantly lower levels of harassment, perceived future threat, and fear during marriage than did those in the non-violent coercive control group. In other words, among mothers who did not experience IPV, differences in coercive control were linked to outcomes in theoretically predicted ways. In regard to the two violence groups, independent-samples  $t$  tests revealed that frequency of marital violence and injury and number of severe violent acts in marriage were significantly higher for mothers who experienced coercive controlling violence as opposed to situational couple violence. The results of the MANOVA revealed four differences: the coercive controlling violence group reported more frequent harassment and higher levels of perceived future threat and fear during marriage and after separation. To ensure that these differences were not the result of differences in marital violence, we conducted post hoc tests to compare the two violence groups while controlling for frequency and severity of marital violence. The results were identical to those reported in Table 3, suggesting that the group differences reflect the control context rather than differences in violence.

*Post hoc analyses.* To examine whether a cutoff determined on the basis of only the mothers who reported violence would be more meaningful or better capture “true” high coercive control, we conducted one final set of analyses. Using the same procedures as with the full sample, a cutoff score of 21 or greater for high control was determined to be most appropriate for the violence-only sample. This cutoff was applied to the full sample, and mothers were classified into the same four groups. The MANOVA and independent-samples  $t$  tests described above were replicated. The results were similar to those reported above when applying a cutoff of 19.

Table 3. Group Comparisons on Variables of Interest

Variable	Test statistic	Low-control groups				High-control groups			
		Group 1: No violence/low control ( <i>n</i> = 73)		Group 2: Situational couple violence ( <i>n</i> = 57)		Group 3: Nonviolent coercive control ( <i>n</i> = 12)		Group 4: Coercive controlling violence ( <i>n</i> = 48)	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Frequency of marital violence <sup>a</sup>	2.28*			9.91	12.34			16.48	17.09
Frequency of marital injury <sup>a</sup>	2.87*			1.70	2.75			4.44	6.56
Number of severe violent acts in marriage <sup>a</sup>	2.57*			0.89	1.23			1.58	1.51
Number of violent acts since separation	2.98*	0.00	0.00 <sup>2,4</sup>	0.21	0.56 <sup>1</sup>	0.00	0.00	0.23	0.75 <sup>1</sup>
Number of injuries since separation	1.26	0.00	0.00	0.05	0.29	0.00	0.00	0.08	0.35
Frequency of harassment since separation	16.69*	1.75	2.77 <sup>2,3,4</sup>	5.84	6.19 <sup>1,4</sup>	6.08	5.85 <sup>1,4</sup>	10.22	9.22 <sup>1,2,3</sup>
Perceived future threat	13.66*	20.33	5.52 <sup>2,3,4</sup>	25.70	9.34 <sup>1,4</sup>	28.33	8.97 <sup>1</sup>	30.89	12.15 <sup>1,2</sup>
Fear during marriage	42.95*	19.90	10.75 <sup>2,3,4</sup>	30.58	12.71 <sup>1,3,4</sup>	42.50	10.39 <sup>1,2</sup>	43.71	13.28 <sup>1,2</sup>
Fear after separation	17.07*	0.27	0.67 <sup>2,4</sup>	0.72	0.96 <sup>1,4</sup>	0.75	0.97 <sup>4</sup>	1.46	1.20 <sup>1,2,3</sup>

Note. Numeric superscripts reflect differences between the group in that column and the groups designated by the superscript ( $p < .05$ ).

<sup>a</sup>Marital violence and injury variables are only applicable to the violence groups. Differences between Groups 2 and 4 on these variables were evaluated with *t* tests. Group differences for all other variables were examined using a multivariate analysis of variance with pairwise comparisons, controlling for mothers' age.

\**F* or *t* value significant at  $p < .05$ .

To examine the predictive utility of the two clustering methods, we ran multinomial logistic regressions to compare the strength and patterns of associations between groups based on the count versus frequency approach. The analyses provided further evidence for the advantage of the frequency approach based on the proportion of variance accounted for in each model (49.5% in the count model and 54.1% in the frequency model). In addition, there was a significant improvement in  $-2$  log likelihood model fit between the count and frequency approach  $\chi^2(15, N = 190) = 32.54, p < .01$ . The results of post hoc analyses are available on request.

## DISCUSSION

We evaluated different approaches to operationalizing coercive control and classifying IPV types with the goal of moving toward a standard

approach. First, we established the advantages of using a frequency versus a count approach to measuring coercive control by using both hierarchical and *k*-means clustering methods to test the reliability of clustering solutions. Our results provide substantial support for operationalizing coercive control by the frequency, rather than number, of tactics used by a partner. The hierarchical cluster solutions were largely confirmed for the frequency approach, whereas there was substantial instability of cluster solutions in the count approach (roughly 4% vs. 21% changed groups based on clustering method, respectively). The *k*-means analyses also revealed an unusually high number of high-controlling cases (60.5% of the sample) resulting from the count approach, a proportion that is unlikely in a general sample (Johnson, 2008). Finally, there was substantial overlap in total PMWI scores



between the two cluster solutions for the count approach, which suggests that the number of high controllers may be inflated through this approach by including partners who used a range of different behaviors at a very low frequency.

These results call into question the reliability and validity of operationalizing coercive control by the number of tactics used and the limitation of relying on only one clustering method to create high- and low-controlling groups. Evaluation of the robustness and stability of clustering solutions is recommended through replication with a larger sample but is not always possible. Replication across clustering methods by conducting both hierarchical and *k*-means cluster analysis is a practical and acceptable alternative (Henry et al., 2005). Indeed, issues of stability in our results for the count approach would not have been detected had we conducted only one cluster analysis. Thus, we recommend that future studies classifying types of IPV use both clustering methods to ensure stable clustering solutions.

Second, we suggest a cutoff of 19 for classifying IPV types using a widely used measure of coercive control. As demonstrated in our literature review, researchers have previously applied different cutoffs obtained through a variety of methods. These studies have added to our empirical understanding of coercive control, but the inconsistent approaches used limit our ability to compare findings and build on prior studies. Although replication of our cutoff in diverse, larger, and more representative samples is needed to establish reliability, our study provides a foundation from which to start.

Third, our results contribute to the substantive literature on IPV by providing further evidence of the centrality of coercive control for making sense of differences in IPV experiences, namely, frequency and severity of violence, harassment and violence after separation, fear, and perceived threat of future harm. These results were consistent with theory and prior research on IPV types, as reviewed earlier. Nonetheless, studies are needed that specifically focus on situational couple violence in the postseparation context, given that our results suggest greater distress for these mothers compared to mothers without violence and control. Similarly, as suggested by Anderson (2008), our results point to the importance of considering coercive control in relationships without violence.

Contributions should be considered in the context of study limitations. The results for

mothers with nonviolent coercive control should be interpreted with caution given the small number of them, which limited power. Moreover, our results are generalizable only to women with children ending their marriages. Mothers, however, may be particularly vulnerable to violence and harassment after separation due to continued contact with former partners related to children (Hardesty & Ganong, 2006). Given the recent call for examining IPV types among separated women in general samples (Johnson et al., 2014), the nature of our sample may be particularly relevant to future work in this area. Also, selection bias may mean that the most highly controlled mothers were underrepresented in our sample. Waltermarer, Ortega, and McNutt (2003) found that severely abused women were less likely to participate in in-person interviews; however, they sampled current partners, who may have more concerns about retribution. Finally, our results are based on mothers' reports only. Women have been shown to report higher rates of victimization than their male partners, but research has demonstrated men's tendency to minimize their use of violence (Graham-Kevan & Archer, 2003).

Despite limitations, our results add to the growing body of research indicating the importance of distinctions among types of IPV. A number of scholars have called for the application of violence types to practice and policy efforts. For example, Hardesty, Haselschwerdt, and Johnson, 2012; Jaffe, Lemon, and Poisson (2003); and Kelly and Johnson (2008) have advocated tailoring interventions (e.g., batterer interventions, parent education for divorcing parents) and child custody decisions in family courts to types of violence for more effective outcomes. For these efforts to be fruitful, continuing research using a standard approach to operationalizing coercive control and classifying IPV types is necessary. This will enable better comparisons across studies, further development and validation of violence types, and greater synthesis of findings and their implications for policy and practice.

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