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BRIEF REPORT

Factor Analysis of the Iowa Family Interaction Rating Scales

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Observational coding systems are uniquely suited for investigating interactional processes in couples and families, but their validity in diverse populations is unknown. We addressed this issue by applying factor analysis to interactional data collected from couples in low-income neighborhoods and coded with the widely used Iowa Family Interaction Rating Scales (IFIRS). Our sample of 414 low-income, ethnically diverse newlywed couples each provided 24-min samples of problem-solving and social support behavior. Interrater reliabilities were strong, and the resultant factors—reflecting positive, negative, and effective communication—were very similar to those obtained with White middle-class samples. Additionally, couples were more negative, less positive, and less effective in problem-solving conversations than in socially supportive conversations, further supporting the validity of the IFIRS in this population. We conclude by discussing the strengths and shortcomings of the IFIRS when used in a low-income, ethnically diverse population.

Keywords: factor analysis, observational coding, IFIRS, couples, low income

Observational methods have been instrumental in advancing knowledge about which aspects of communication foreshadow relationship deterioration and how couple therapies enhance interpersonal functioning (see Bradbury & Karney, 2010). However, until recently, observational data collection has occurred primarily in middle-class White couples. Because little is known about whether the same observational tools used in the past are appropriate for use in different populations, the purpose of the present study is to examine the factor structure of observational codes in the Iowa Family Interaction Rating Scales (IFIRS; Melby et al., 1998) in a sample of low-income, ethnically diverse couples. In view of the difficult contexts in which low-income couples live, and in view of emerging federal efforts to improve the marriages of low-income couples (e.g., Cowan, Cowan, Pruett, Pruett, & Wong, 2009), a close examination of the tools needed to study these couples is warranted.

Widely used in the study of couples and families, the IFIRS specifies the verbal and nonverbal criteria that define a wide range of behavioral categories. These categories permit relatively comprehensive analysis of the behavioral characteristics of individuals and dyads, and their association with individual and dyadic functioning. The IFIRS has been previously used in low-income samples (e.g., Conger et al., 2002), but efforts to validate the instrument have begun with the assumption that certain codes cluster together to form positive and negative scales without first explicitly testing that assumption (e.g., Melby, Conger, Ge, & Warner, 1995).

Thus, the first goal of this paper is to identify the factor structure of the IFIRS in a low-income sample. Factor analysis has proven useful for understanding relationships among codes in other couple-observation systems, including the Marital Interaction Coding System (MICS; Heyman, Eddy, Weiss, & Vivian, 1995), the Kategoriensystem für Partnerschaftliche Interaktion [Interaction Coding System] (KPI; Remen, Chembless, Steketee, & Renneberg, 2000), and the Couple Interaction Rating System (CIRS) and the Social Support Interaction Rating System (SSIRS) combined (Sevier, Eldridge, Jones, Doss, & Christensen, 2008). In these studies, distinct factors emerged reflecting negative behaviors (e.g., blame, disagreement, denying responsibility) and problem solving (e.g., problem definition, positive solutions), consistent with their original focus on differentiating distressed from satisfied couples. Previous work assessing the psychometric properties of the IFIRS (e.g., Melby et al., 1995) provided support for a set of codes capturing warmth and other positive behaviors, and a separate set reflecting hostility and other divisive or negative behaviors. As the IFIRS includes several problem-solving codes that are similar to those in the MICS, KPI, and CIRS, we anticipate three factors: one reflecting hostility and negativity, one reflecting warmth and positivity, and a third reflecting effective problem solving. We offer this predic-

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tion tentatively, however, as (a) codes reflecting higher levels of hostility may load on a single factor with codes reflecting low levels of warmth and positivity, (b) codes reflecting effectiveness in problem-solving may be synonymous with either high levels of positivity or low levels of negativity, and (c) the resulting factors may not be similar to those found previously, because capturing the variety of behavior seen in a diverse sample may require more or different factors.

As an additional check of the validity of the IFIRS, we compare mean levels of hostility and negativity, warmth and positivity, and effective problem solving across two interaction tasks. To the extent that couples are more negative, less positive, and less effective in the problem-solving interactions than in the social support interactions, this will suggest that IFIRS codes are sensitive to changes in behavior brought about by instructional manipulations.

Method

Sampling

Sampling was undertaken to yield a group of participants who were first-married newlywed couples of the same ethnicity, living in low-income neighborhoods. To accomplish this, participants were recruited from Los Angeles County, a region with a large and diverse low-income population. Recently married couples were identified through names and addresses on marriage license applications. Addresses were matched with census data to identify applicants living in low-income communities, defined as census block groups wherein the median household income was no more than 160% of the 1999 federal poverty level for a four-person family. Next, names on the licenses were weighted using data from a Bayesian Census Surname Combination (BCSC), which integrates census and surname information to produce a multinomial probability of membership in each of four racial/ethnic categories (Hispanic, African American, Asian, Caucasian/Other). Couples were selected from the population of recently married couples using probabilities proportionate to the ratio of target prevalences to the population prevalences, weighted by the couple's average estimated probability of being Hispanic, African American, or Caucasian, which are the three largest groups among people living in poverty in Los Angeles County (U.S. Census Bureau, 2002). These couples were telephoned and screened to ensure that they had married, that neither partner had been previously married, and that both spouses identified as Hispanic, African American, or Caucasian.

Participants

The sample comprised the first 430 couples identified with the outlined procedures. Marriages averaged 4.8 months in duration ($SD = 2.5$) and averaged 0.6 children ($SD = 1.0$). Men's mean age was 27.9 ($SD = 5.8$) and women's mean age was 26.3 ($SD = 5.0$). Wives had a mean income of \$28,672 ($SD = \$24,549$) and husbands had a mean income of \$34,153 ($SD = \$27,094$). Twelve percent of couples were African American, 12% were Caucasian, and 76% were Hispanic, which is comparable to the proportion of people living in poverty in Los Angeles County who come from these groups (12.9% African American, 14.7% Caucasian, and 60.5% Hispanic; U.S. Census Bureau, 2002). Of the Hispanic couples, 33% spoke Spanish in their interactions and 67% spoke English, and all African American and Caucasian couples spoke English. A few interactions were not recorded because participants declined ($n = 10$) or because the equipment malfunctioned ($n = 6$), leaving 414 couples providing data for this analysis.

Procedure

Couples were visited in their homes by two trained interviewers who described the IRB-approved study and obtained written informed consent from each participant. After completing self-report measures individually, partners were reunited for three 8-min videotaped discussions. These discussions took place in a location of the couples' choosing (usually their dining room or living room) that would enable them to talk privately and without interruption. Partners were seated at a 90° angle to allow them to interact normally while remaining visible to the single camera in front of them. For the first interaction, which was designed to assess problem-solving behaviors, partners were asked to identify a topic of disagreement in their relationship and then to devote 8 min to working toward a mutually satisfying resolution of that topic. For the second interaction, which was designed to assess social support behaviors, one randomly chosen spouse was asked to "talk about something you would like to change about yourself," while the partner was instructed to "be involved in the discussion and respond in whatever way you wish." Spouses were instructed to avoid selecting or discussing any topics that were sources of tension or difficulty within the relationship. After a short break, a third discussion was held that was identical to the second discussion, with the roles reversed. Common topics included losing weight, making a career change, improving family relationships, and dealing with stress. Upon completion, couples were debriefed and paid \$75.

Measures

The IFIRS is a macrocoding system, which means that each participant is given a single score for each code at the end of the task, rather than being assigned a score for multiple, shorter time segments, or for each speaking turn, as is the case in microcoding systems. This score is determined by the coder based on the frequency and intensity with which the participant exhibits the verbal and nonverbal behavior described in the code (see Table 1). The scores range from 1 to 9, with a score of 1 indicating that the behavior did not occur. In general, a score of 3 indicates that "the behavior almost never occurs or occurs just once and is of low intensity," a score of 5 means "the behavior sometimes occurs and is at a low or moderate level of intensity," a score of 7 means that "the behavior occurs fairly consistently or is of elevated intensity," and a score of 9 means

Table 1
Descriptions of IFIRS Codes

Code	Description
Angry Coercion	Control attempts that include hostile, contemptuous, threatening, or blaming behavior.
Anxiety*	Emotional distress expressed as nervousness, fear, tension, stress, worry, and concern.
Assertiveness	The focal's ability, when speaking, to express self through clear, appropriate, neutral and/or positive avenues using an open, straightforward, self-confident, nonthreatening and nondefensive style.
Communication	The speaker's ability to neutrally or positively express his/her own point of view, needs, wants, etc., in a clear, appropriate, and reasonable manner, and to demonstrate consideration of the other interactor's point of view.
Contempt	A specific form of hostility characterized by disgust, disdain, or scorn of another interactor.
Denial	Active rejection of the existence of or personal responsibility for a past or present situation for which one actually is responsible or shares responsibility.
Disruptive process	Behavior that actively hinders or obstructs the problem-solving process.
Dominance	Attempts and successful demonstrations of control or influence (either positive or negative) of another interactor and/or the situation.
Effective process	Behavior that actively assists the general problem-solving process.
Endearment	Personalized and unqualified approval of another interactor's personal characteristics; approval of a global and enduring nature.
Externalized negative*	Negativity expressed in the form of anger, hostility, or criticisms regarding people, events, or things outside the immediate setting.
Group enjoyment	Extent of enjoyment, pleasure, fun, and/or satisfaction evident in the group's interaction.
Hostility	The extent to which hostile, angry, critical, disapproving rejecting or contemptuous behavior is directed toward another interactor's behavior (actions), appearance, or personal characteristics.
Humor/Laugh	Display of good-natured, nonsarcastic, lighthearted behaviors (e.g., laughter, joking, etc) that help lighten the interaction.
Interrogation	Using questions designed to elicit specific information or to make a point, rather than to invite comment.
Lecture/Moralize*	Telling another interactor how to think, feel, etc., in a way that assumes the focal is the expert and/or has superior wisdom.
Listener responsiveness	The focal's nonverbal and verbal responsiveness as a listener to the verbalizations of the other interactor through behaviors that validate and indicate attentiveness to the speaker.
Physical affection	Affectionate physical contact such as hugs, caresses, and pats.
Physical attack*	Aversive physical contact, including hitting, pinching, grabbing, etc.
Positive mood	Expressions of contentment, happiness, and optimism toward self, others, or things in general.
Sadness*	Emotional distress expressed as despondence, unhappiness, sadness, depression and regret.
Solution quality	The degree to which proposed solutions are reasonable, realistic, potentially beneficial, specific, feasible, contingent, nonexploitive, seriously offered, or achievable.
Solution quantity	The number of specific proposals/ideas suggested that present an action or change in behavior as a means for reaching a goal or solving a problem.
Verbal attack	Personalized and unqualified disapproval of another interactor's personal characteristics; criticism of a global and enduring nature.
Warmth/Support	Expressions of care, concern, support, or encouragement toward another interactor.

Note. The source of the brief descriptions is the IFIRS coding manual (Melby et al., 1998).
* Indicates code was not retained in the three-factor solution.

"the behavior occurs frequently or with significant intensity" (Melby et al., 1998, pp. 7–8.)

In the IFIRS, any given behavior can be used as evidence for more than one code. For example, if a subject was looking away from his spouse while soliciting her opinion, he would be coded for avoidant, communication, and effective process. This means that the IFIRS is more suitable for factor analysis than many other coding systems which force each behavior or speaking turn into a single code, because factor analysis assumes that one observed variable does not preclude or constrain another (Gorsuch, 1983). This shared variance between the codes allows for easier detection of possible latent variables (i.e., factors). Common factor analysis is more appropriate for use with an observational coding system than principal components analysis because it does not require the assumption of measurement without error and it has been found to provide more accurate results; therefore, principal axis factoring will be used (Gorsuch, 1983).

Videotapes were scored by 16 trained coders. Coders—five of whom were native Spanish speakers—coded only in their native language. Coders participated in 10 hr of training per week for 3 months and were required to pass written and viewing tests at an 80% accuracy level before coding tapes. The criterion scores used to judge coder accuracy were determined by expert coders at the Institute for Social and Behavioral Research at Iowa State University, where

the IFIRS was developed. During the coding process, coders also participated in 2 hr of continuing training each week, which consisted of a variety of structured activities (e.g., coding a tape as a group and watching examples of specific codes) designed to minimize drift and to ensure continued fidelity to the IFIRS codes.

Coders viewed each of the interaction tasks three to four times using the Noldus Observer XT coding software, using the built-in capabilities to note behaviors of both spouses. When they had completed viewing an interaction, coders used their recorded notations to tabulate the frequency and intensity of each type of behavior, and then used this information to assign a score for each spouse for each code, using the criteria from the IFIRS coding manual (Melby et al., 1998).

To assess reliability, 20% of the videos were randomly assigned to be coded by two coders chosen at random from the pool of 16 coders. The coders' scores were compared, and any discrepancies were resolved by both coders working together to produce the final set of scores used for the reliability tapes (see Table 2 for intraclass correlation coefficients).

Results

Exploratory Factor Analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy (husbands, KMO = .79; wives, KMO = .77) and Bartlett's test of sphericity (husbands, $\chi^2(300) = 3796$, $p < .001$; wives, $\chi^2(300) = 3751$, $p < .001$), indicated that the use of the factor model was appropriate (Gorsuch, 1983). Principal axis factor analysis was applied to the 25 codes, which were formed by averaging each individual's scores for each code across the three discussion tasks, to investigate their latent structure. The scree plot suggested three factors for husbands and for wives (Cattell, 1966), which explained 35.7% of the total variance for husbands and 34.7% of the total variance for wives. Adding a fourth factor accounted for only an additional 3.6% of the variance for husbands and 5.1% for wives, and was not indicated by the scree plot. Oblique (promax) rotation of the factors indicated that the strongest correlation among the factors was −.38 for husbands and .33 for wives, which are sufficiently large to demonstrate that the promax rotation should be interpreted, rather than using an orthogonal (varimax) rotation. Table 3 presents the promax factor structures and proportions of variance explained by each factor in the three-factor structure.

Any code that loaded above .30, as suggested by Floyd and Widaman (1995), was considered to be adequately related to the factor. This procedure resulted in three readily interpretable factors that are nearly identical in husband and wives. The first factor was comprised of hostility, contempt, disruptive process, denial, angry coercion, dominance, verbal attack, and interrogation, with the addition of externalized negative in husbands, and lecture/moralize in wives.

Table 2
Descriptive Statistics for IFIRS Codes

Code	Husband			Wife		
	Mean	*SD*	ICC	Mean	*SD*	ICC
Dominance	3.48	1.32	.49	3.67	1.39	.57
Interrogation	2.52	1.13	.44	2.56	1.14	.53
Lecture/Moralize*	2.25	1.17	.47	2.26	1.17	.43
Disruptive process	2.23	1.26	.33	2.06	1.16	.42
Denial	1.68	0.89	.29	1.45	0.71	.57
Hostility	1.61	0.98	.68	1.85	1.03	.58
Externalized negative*	1.34	0.67	.55	1.28	0.52	.42
Contempt	1.31	0.64	.37	1.39	0.67	.50
Angry coercion	1.12	0.39	.54	1.17	0.45	.22
Verbal attack	1.09	0.32	.47	1.15	0.37	.19
Physical attack*	1.05	0.24	.47	1.18	0.55	.42
Listener responsiveness	4.38	1.14	.34	4.40	1.13	.35
Positive mood	2.77	1.22	.47	2.67	1.17	.38
Humor/Laugh	2.78	1.29	.77	2.93	1.19	.74
Group enjoyment	2.65	1.34	.36	2.65	1.34	.36
Warmth/Support	2.22	1.08	.70	2.00	0.96	.75
Physical affection	1.42	0.80	.78	1.45	0.82	.76
Endearment	1.14	0.38	.50	1.11	0.30	.54
Communication	4.87	1.19	.37	4.89	1.11	.47
Solution quality	4.36	1.36	.45	4.49	1.40	.54
Assertiveness	4.52	1.34	.41	4.64	1.26	.57
Effective process	3.79	1.05	.44	3.93	1.03	.45
Solution quantity	3.26	1.43	.49	3.47	1.54	.57
Anxiety*	3.00	1.30	.50	3.20	1.27	.48
Sadness*	1.33	0.61	.41	1.56	0.77	.40

Note. $N = 414$ couples. Codes are presented by scale (Negativity, Positivity, Effectiveness), then by frequency (for husbands). ICC = intraclass correlation coefficient (type 1,1). For this analysis, codes were collapsed across the three discussion tasks. Group enjoyment assigns one score to the couple as a dyad.
* Indicates code was not retained in the factor.

Table 3
Factor Loadings for Exploratory Factor Analysis of IFIRS Codes

Variable	Husbands			Wives		
	1	2	3	1	2	3
Hostility	**.92**	−.31	−.19	**.89**	−.20	−.31
Disruptive process	**.73**	−.30	−.32	**.67**	−.22	−.33
Contempt	**.72**	−.26	−.15	**.68**	−.20	−.21
Denial	**.61**	−.23	−.15	**.54**	−.24	−.11
Angry coercion	**.59**	−.19	−.08	**.52**	−.05	−.09
Dominance	**.52**	−.15	.26	**.55**	−.02	.13
Verbal attack	**.47**	−.14	−.16	**.44**	−.07	−.24
Interrogation	**.38**	−.08	.18	**.42**	−.06	.02
Externalized negative	**.35**	−.01	−.03	.25	−.03	−.10
Physical attack	.22	.05	.01	.24	.10	−.17
Sadness	.18	−.07	−.14	.12	−.04	−.20
Group enjoyment	−.26	**.72**	.15	−.20	**.68**	.17
Positive mood	−.19	**.61**	.31	−.21	**.68**	.26
Warmth/Support	−.18	**.61**	.21	−.03	**.61**	.12
Humor/Laugh	−.05	**.54**	.16	−.07	**.50**	.09
Physical affection	−.04	**.48**	.07	.08	**.51**	.01
Listener responsiveness	−.43	**.46**	.36	−.41	**.49**	.27
Endearment	−.13	**.45**	.14	−.05	**.39**	.11
Effective process	−.29	.37	**.73**	−.19	.33	**.70**
Solution quality	−.03	.16	**.64**	.04	.06	**.70**
Communication	−.45	.51	**.64**	−.45	.53	**.63**
Solution quantity	.03	.10	**.64**	.10	.02	**.66**
Assertiveness	−.38	.43	**.62**	−.35	.47	**.62**
Anxiety	.23	−.01	−.26	.19	−.04	−.31
Lecture/Moralize	.24	−.13	.25	**.37**	−.02	.13
% Variance explained	19.0%	10.2%	6.5%	17.3%	10.1%	7.4%

Note. $N = 414$ couples. Numbers in bold indicate codes retained in the factor. Dodes are presented by highest loadings for husband. Group enjoyment assigns one score to the couple as a dyad. On the basis of the loadings, the interpretive labels for the factors are as follows: Factor 1 = Negativity, Factor 2 = Positivity, Factor 3 = Effectiveness. For this analysis, codes were collapsed across the three discussion tasks. Factor loadings were extracted with principal axis factoring with promax rotation.

All of these codes indicate a negative or hostile tone of the interaction (e.g., insulting and interrupting their spouse), so we labeled this factor Negativity. The second factor consisted of group enjoyment, warmth/support, positive mood, humor/laugh, physical affection, endearment, and listener responsiveness. These codes indicate a positive emotional content to the interaction (e.g., sharing in jokes, complimenting their spouse), so we labeled this factor Positivity. The third factor included solution quantity, solution quality, effective process, assertiveness, and communication. These codes indicate that the couple is working toward a resolution of the problem or issue at hand (e.g., proposing possible solutions, soliciting their spouse's opinion), so we labeled this factor Effectiveness.

The three factors had high levels of interrater reliability (ICCs ranged from .74 to .83 for husbands and .73 to .81 for wives) and internal consistency (coefficient α ranged from .74 to .80 for husbands and .74 to .78 for wives). These strong ICCs are notable in that much of the measurement error indicated by low ICCs in some of the individual codes appears to have been eliminated by aggregating the codes at this superordinate level. Intercorrelations between factors ranged from −.20 to .21 for husbands and −.13 to .26 for wives, suggesting that the scales are reasonably distinct though not entirely orthogonal (see Table 4). Factors correlated in expected ways, and similarly for men and women: Negativity and Positivity are inversely related, and Effectiveness correlates directly with Positivity and inversely with Negativity.

Mean Differences

As a further test of the validity of the IFIRS, we tested for mean differences in Negativity, Positivity, and Effectiveness across interaction tasks. If the IFIRS codes are sensitive to changes in a couple's behavior across different types of tasks, then this would provide additional evidence for the validity of the IFIRS coding system in this population. To accomplish this, we calculated each participant's average score for Negativity, Positivity, and Effectiveness during each social support task and the problem-solving task. We then averaged each participant's scores on each factor scale across the two social support tasks. Paired-samples *t*-tests comparing participants' scores in the social support and problem-solving tasks indicated that, as predicted, participants showed significantly more Positivity in the social support tasks (husbands, $M = 2.56$, $SD = .74$; wives, $M = 2.55$, $SD = .70$) than the problem-solving task (husbands, $M = 2.16$, $SD = .86$; wives, $M = 2.11$, $SD = .88$), husbands $t(413) = 10.74$, $p < .001$, $d = 0.50$, wives $t(413) = 11.94$, $p < .001$, $d = 0.56$. Participants also showed significantly more Effectiveness in the social support tasks (husbands, $M = 4.29$, $SD = 1.00$; wives, $M = 4.37$, $SD = 1.02$) than

Table 4
Correlations, Reliability, and Descriptive Statistics of Scales Formed From Factor Analysis

Variables	1	2	3	Alpha	ICC	Mean (*SD*)
1. Positivity	.82**	−.13**	.26**	.74	.81	2.45 (.65)
2. Negativity	−.20**	.55**	−.12*	.78	.73	1.95 (.58)
3. Effectiveness	.21**	−.16**	.51**	.78	.80	4.29 (.93)
Alpha	.74	.80	.78			
ICC	.83	.74	.74			
Mean (*SD*)	2.47 (.67)	1.82 (.56)	4.16 (.93)			

Note. $N = 414$ couples. Values for the husbands are below the diagonal; values for the wives are above the diagonal; correlations between husband and wife are on the diagonal. Alphas, ICCs, and means for husbands are presented in the horizontal rows, and alphas, ICCs, and means for wives are presented in the vertical columns. ICC means intraclass correlation coefficient (type 1, k). For this analysis, codes were collapsed across the three discussion tasks.
* $p < .05$. ** $p < .01$.

the problem-solving task (husbands, $M = 3.95$, $SD = 1.09$; wives, $M = 4.12$, $SD = 1.13$), husbands $t(413) = 6.85$, $p < .001$, $d = 0.33$, wives $t(413) = 4.38$, $p < .001$, $d = 0.23$. Finally, participants displayed significantly more Negativity in the problem-solving task (husbands, $M = 2.16$, $SD = .91$; wives: $M = 2.20$, $SD = .89$) than the social support tasks (husbands, $M = 1.74$, $SD = .54$; wives: $M = 1.77$ $SD = .51$), husbands $t(413) = -11.29$, $p < .001$, $d = 0.56$, wives $t(413) = -11.70$, $p < .001$, $d = 0.59$. These results demonstrate that this method of aggregation of the IFIRS is sensitive to the different behaviors that emerge in social support and problem-solving tasks.

Table 4 presents the correlations and descriptive statistics of the three scales for husbands and wives. Paired samples *t*-tests revealed no significant gender differences in the mean levels of Positivity, $t(413) = 1.01$ $p = .313$, $d = 0.03$. However, husbands and wives did differ significantly on their levels of Negativity, $t(413) = -4.907$, $p < .001$, $d = 0.23$, and Effectiveness, $t(413) = -2.721$, $p = .007$, $d = 0.13$, such that wives displayed more Negativity and more Effectiveness. Husband and wife Positivity were highly correlated ($r = .82$), which indicates that Positivity is likely a reciprocal process in which one spouse is highly likely to display Positivity when their spouse does. This explains the lack of significant difference between husbands and wives on this scale. Negativity and Effectiveness were only moderately correlated ($r = .55$ and $r = .51$, respectively) between husbands and wives, indicating that these behaviors occur more independently from the spouse's behavior and are therefore significantly different between spouses, although the effect sizes are small.

Discussion

The purpose of this paper was to examine the factor structure of interactional data from low-income, ethnically diverse couples coded with the IFIRS. A secondary goal was to explore meaningful mean differences in the factors across different types of discussion tasks. The results indicated that there are three underlying types of communication behavior in low-income couples: Negativity (accounting for hostility and anger within the interaction), Positivity (accounting for expressions of warmth and closeness within the interaction), and Effectiveness (accounting for evidence that the couple is working toward a resolution of their issue). Couples were also found to be more negative, less positive, and less effective in problem-solving conversations than in social support conversations, suggesting that it is more difficult to discuss and resolve a relationship problem than it is to discuss non-marital personal concerns and goals.

The results of this study are similar to previous factor analytic studies of coding systems. Two of the three factors identified here, Negativity and Effectiveness, correspond to factors found in the MICS, KPI, and CIRS/SSIRS. The KPI Negativity factor comprises blaming, insults, and negative solutions (justification, criticism, and negative solution, respectively), all of which were included in our Negativity factor (denial, verbal attack and disruptive process, respectively). The MICS Hostility factor comprises behaviors such as put down, criticize, and disapprove, which were also included in our Negativity factor in the codes verbal attack and hostility. The Negativity factor in the CIRS/SSIRS comprises belligerence, contempt/disgust, anger/frustration, blame, defensiveness, and pressure for change, all concepts that are also present in our Negativity factor (dominance, contempt, hostility, denial, and angry coercion).

Also, the Constructive Problem Discussion factor in the KPI and the Problem-Solving Focus factor in the MICS comprise codes that capture clarification of the problem and positive solutions (labeled Problem Description and Positive Solution, respectively, in both coding schemes), while the Problem Solving factor in the CIRS/SSIRS comprises codes that capture negotiation, making agreements, offering solutions, and offering instrumental support. All of these concepts were included in our Effectiveness factor (solution quantity, solution quality, effective process). Finally, our Positivity factor is similar to the Positivity factor found in the CIRS/SSIRS. The CIRS/SSIRS Positivity factor comprises codes for affection, offering emotional support, and humor, all of which are included in our Positivity factor (physical affection, warmth/support, and humor/laugh). In

sum, although the couples studied here were much less affluent than couples typically recruited for couple observation research, their behaviors appear to be organized along highly similar dimensions.

Several strengths of this work are worth noting. First, previous studies of the IFIRS focused only on couple problem solving (e.g., Melby et al., 1995). Our study included tasks focused on the marital relationship (problem-solving task) and on personal goals (social support tasks). Because the two tasks elicited different types of behaviors (e.g., more positivity and less negativity in the social support tasks), this allowed us to examine the underlying structure of couple interaction behaviors using a broader range of behaviors than had been previously studied. Second, sampling from a low-income population allows the structure of the IFIRS to be tested in this often overlooked population. Third, the codes contained in the Positivity and Effectiveness factors were identical in husbands and wives, and the makeup of the Negativity factor was nearly identical between husbands and wives. This high degree of similarity indicates that the underlying structure of the IFIRS is highly stable across partners.

While the resultant factors are statistically robust and theoretically interpretable, some caveats of this study should also be noted. First, our newlywed sample reported high levels of satisfaction with their relationship, which may have led to a lower base-rate of negative codes and a higher rate of positive codes. Our sample also did not include Asian American couples, which make up the fourth largest racial/ethnic group living in poverty in Los Angeles. Further research with more established and more diverse couples would clarify whether the same factor structure exists within these couples. Second, the three-factor model accounts for only 35% of the variance, which is less than the 50% suggested as a minimum by Streiner (1994). While this value is lower than the 50% variance explained by the factor solution of the KPI (Remen et al., 2000) and the 68% variance explained by the factor solution of the CIRS/SSIRS (Sevier et al., 2008), it is greater than the 21% variance accounted for by the factor solution of the MICS (Heyman et al., 1995). The somewhat low percent variance accounted for indicates that there are codes included in the analysis that are weakly correlated with the other codes. Indeed, anxiety and sadness do not load on any factor and may be capturing a different construct, such as the participant's internal emotional experience, that would have appeared in the factor structure if there were other similar codes in the IFIRS. Finally, while significant differences were found in individuals' behavior across the social support and problem-solving tasks, the effect sizes were only small to moderate. Given that the interaction tasks occurred back to back within a span of less than 30 min, it is not surprising that the participants' behavior remained similar across the tasks, with only small, but significant, changes occurring based on the type of discussion.

In sum, using the IFIRS coding system, the current study indicates that a three-factor model characterizes the communication behavior in low-income couples, similar to the factors found in other coding systems. Use of the IFIRS in low-income, ethnically diverse couples will allow for meaningful comparisons of couple interactions across different populations. Continued analysis of research tools in diverse populations will strengthen efforts to understand and reduce the high rates of relationship distress that these couples face.

References

Bradbury, T. N., & Karney, B. R. (2010). *Intimate relationships.* New York, NY: Norton.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1,* 245–276. doi:10.1207/s15327906mbr0102_10

Conger, R. D., Wallace, L. E., Sun, Y., Simons, R. L. McLoyd, V. C., & Brody, G. H. (2002). Economic pressure in African American families: A replication and extension of the family stress model. *Developmental Psychology, 38,* 179–193. doi:10.1037/0012-1649.38.2.179

Cowan, P. A., Cowan, C. P., Pruett, M. K., Pruett, K., & Wong, J. J. (2009). Promoting fathers' engagement with children: Preventive interventions for low-income families. *Journal of Marriage and Family, 71,* 663–679. doi:10.1111/j.1741-3737.2009.00625.x

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 7,* 286–299. doi:10.1037/1040-3590.7.3.286

Gorsuch, R. L. (1983). *Factor Analysis* (2nd ed.). Hillsdale, NJ: Erlbaum.

Heyman, R. E., Eddy, J. M., Weiss, R. L., & Vivian, D. (1995). Factor analysis of the marital interaction coding system (MICS). *Journal of Family Psychology, 9,* 209–215. doi:10.1037/0893-3200.9.2.209

Melby, J., Conger, R., Book, R., Rueter, M., Lucy, L., Repinski, D., . . . Scaramella, L. (1998). *The Iowa Family Interaction Rating Scales* (5th ed.). Unpublished document, Iowa State University, Institute for Social and Behavioral Research.

Melby, J. N., Conger, R. D., Ge, X., & Warner, T. D. (1995). The use of structural equation modeling in assessing the quality of marital observations. *Journal of Family Psychology, 9,* 280–293. doi:10.1037/0893-3200.9.3.280

Remen, A. L., Chembless, D. L., Steketee, G., & Renneberg, B. (2000). Factor analysis of the English version of the Kategorien-system für Partnerschaftliche Interaktion [Interaction Coding System]. *Behaviour Research and Therapy, 38,* 73–81. doi:10.1016/S0005-7967(99)00046-7

Sevier, M., Eldridge, K., Jones, J., Doss, B. D., & Christensen, A. (2008). Observed communication and associations with satisfaction during traditional and integrative behavioral couple therapy. *Behavior Therapy, 39,* 137–150. doi:10.1016/j.beth.2007.06.001

Streiner, D. L. (1994). Figuring out factors: The use and misuse of factor analysis. *Canadian Journal of Psychiatry/La Revue canadienne de psychiatrie, 39,* 135–140.

U.S. Census Bureau. (2002). *Summary Population and Housing Characteristics: California.* Washington, DC: U.S. Government Printing Office.

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