

**ARTICLE**

# Applicability of the Investment Model Scale in a natural-fertility population

Jeffrey Winking<sup>1</sup> | Paul W. Eastwick<sup>2</sup> | Leigh K. Smith<sup>2</sup> | Jeremy Koster<sup>3</sup><sup>1</sup>Department of Anthropology, Texas A&M University, College Station, Texas<sup>2</sup>Department of Psychology, University of California, Davis, Davis, California<sup>3</sup>Department of Anthropology, University of Cincinnati, Cincinnati, Ohio**Correspondence**Jeffrey Winking, Department of Anthropology, Texas A&M University, College Station, TX 77843.  
Email: jwinking@tamu.edu**Funding information**

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Relationship quality is a construct that is central to theories of relationships and one that is used widely by psychologists. However, all prior assessments of relationship quality have derived from samples living in industrialized nation states. Here, the authors expand the breadth of this cultural variation to examine the means, reliability, and structure of the Investment Model Scale (IMS) in a sample from a natural-fertility, subsistence-level indigenous population of Nicaragua. Results indicate that the IMS captures real variation in the quality of relationships in this sample, although explorations of internal reliability and structure suggest poorer validity. Possible reasons for this disparity are discussed, including impacts of the necessary alterations to the instrument, as well as cross-cultural differences in the nature of marriage.

**KEYWORDS**

commitment, cross-cultural research, Investment Model, marriage

## 1 | INTRODUCTION

Long-term romantic relationships are a defining feature of people's lives—just as they are a defining feature of the human species. Researchers of many disparate fields have thus taken on the task of exploring how they function, why we pursue them, how they affect us, and what predicts their dissolution (Amato & Rogers, 1997; Chapais, 2008; Coontz, 2006; Finkel, Simpson, & Eastwick, 2017). The Investment Model Scale (IMS), developed by Rusbult (1980, 1983; see also Rusbult, Martz, & Agnew, 1998), is a widely used scale that captures one's commitment to a relationship and strongly predicts future relationship dissolution. This effect is robust across numerous dimensions—gender, sexual orientation, ethnicity, and nationality (Le & Agnew, 2003; Lin & Rusbult, 1995; Rodrigues & Lopes, 2013; VanderDrift, Agnew, & Wilson, 2014). However, although such tests of the scale's robustness use diverse samples, these samples are all derived from the predominant national cultures

of nation states that have largely completed the demographic transition (Coale, 1989). Thus, an entire swath of variation in the human experience has been neglected.

Here, we extend the breadth of diversity in the IMS literature by including a sample from the Mayangna/Miskito indigenous, natural-fertility populations of eastern Nicaragua. This is a noteworthy inclusion as it is the first population (to our knowledge) to complete a measure of relationship quality that is non-WEIRD in all five respects articulated by Henrich, Heine, and Norenzayan (2010; i.e., it is a society that is not Western, Educated, Industrialized, Rich, or Democratic). Importantly, many of the characteristics that differentiate populations like the Mayangna/Miskito from more developed nations often play important roles in relationship formation and function (e.g., nearly universal early marriage and high fertility, subsistence-level economies, stark divisions of labor, etc.).

This article has two aims. First, our data address whether the Investment Model (IM), on which the IMS is based, accurately captures the nature of relationship commitment within this population. Second, we examine the impact of changes to the IMS that are necessary to translate the instrument into one that is culturally salient to the Mayangna/Miskito. This is a common challenge facing researchers who work in cultures that diverge substantially from those in which most research is conducted. It is therefore often difficult to discern whether differences in outcomes are due to true differences in how the constructs are manifested in the populations or due to shortcomings in the research instruments.

### 1.1 | The investment model

The IM is founded on the logic of interdependence theory (Kelley & Thibaut, 1978) in that individuals are presumed to use cost–benefit reasoning when making decisions relating to romantic relationships (Rusbult, 1980, 1983). In this model, individuals weigh the net value of a relationship against their expectations (which determines their satisfaction) and against available alternatives (which determines their dependence). Furthermore, a key insight of the IM is that the propensity to end a relationship is also dependent on investment in the relationship—the accumulation of social and institutional ties that bind the couple. These three factors (satisfaction, alternatives, and previous investment) contribute to one's sense of commitment to the relationship—the degree to which one is intent to stay within the relationship and the psychological attachment associated with it.

The IMS has been widely applied across a number of populations and domains and exhibits a high degree of internal reliability and predictive validity (Le & Agnew, 2003). In a meta-analysis involving 52 studies and over 11,000 participants, the three antecedent factors independently predicted commitment and combined to explain 60% of the variation in this measure (Le & Agnew, 2003). Furthermore, several studies using factor analyses have found that IMS responses are consistently structured into four independent constructs that align with the hypothesized factors (Branje, Frijns, Finkenauer, Engels, & Meeus, 2007; Rodrigues & Lopes, 2013; Rusbult et al., 1998; VanderDrift et al., 2014). Regarding predictive validity, commitment is one of the strongest predictors of relationship dissolution among a wide number of relationship, external, and individual factors that have been reported in the literature (Le & Agnew, 2003; Le, Dove, Agnew, Korn, & Mutso, 2010). Commitment also correlates with behaviors associated with relationship maintenance, such as willingness to sacrifice and to forgive, as well as entertaining “positive illusions” about one's partner (Rusbult, Olsen, Davis, & Hannon, 2004).

## 1.2 | Cross-cultural generality

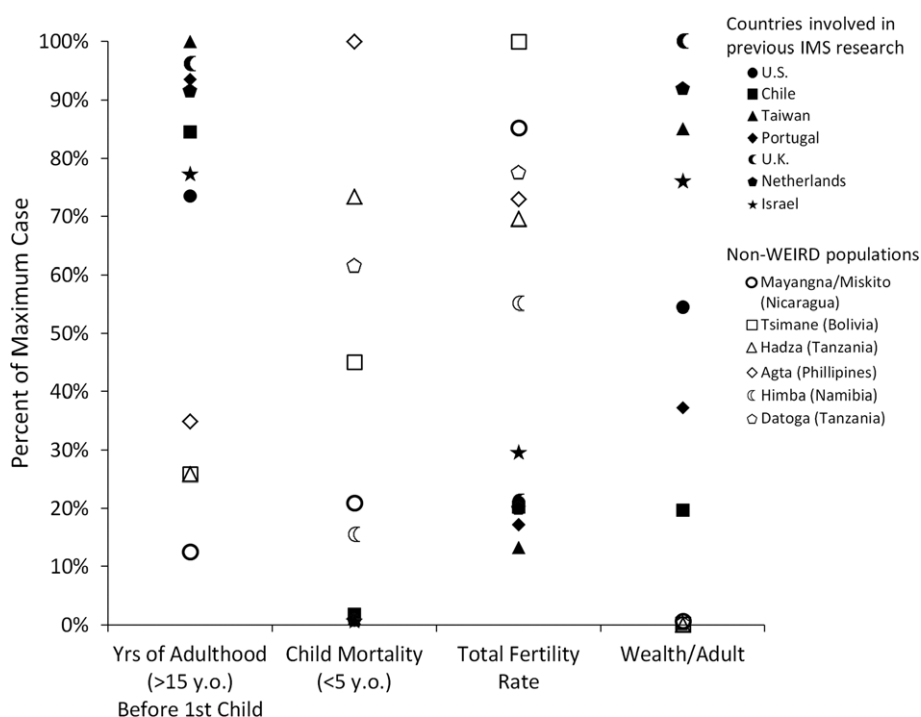
The IMS is of particular utility due to its broad generality across domains and populations. The scale has been modified and successfully applied to the measurement of nonromantic relationships (Lin & Rusbult, 1995) and even to noninterpersonal relationships, such as those of employees to a job (Farrell & Rusbult, 1981; Oliver, 1990), students to their schools (Geyer, Brannon, & Shearon, 1987), and even citizens to policies (Agnew, Hoffman, Lehmiller, & Duncan, 2007). Furthermore, researchers have established that the scale remains predictive of relationship dissolution across gender (Le & Agnew, 2003), ethnicity (Davis & Strube, 1993; Lin & Rusbult, 1995), and sexual orientation (Duffy & Rusbult, 1986).

Regarding the cross-cultural applicability of the IMS, researchers have successfully used the IMS in studies of relationships in Taiwan (Lin & Rusbult, 1995), Chile (VanderDrift et al., 2014), Portugal (Rodrigues & Lopes, 2013), the Netherlands (Van Lange et al., 1997), Israel (Koslowsky & Kluger, 1986), and the United Kingdom (Oliver, 1990). Overall, the literature suggests no constraints on IMS generality. Although these efforts represent an important step, the populations that have been included to date are all industrialized, postdemographic transition societies. Such populations, which supply the majority of participants for behavioral science research, have recently been described as WEIRD: Western, Educated, Industrialized, Rich, and Democratic (Henrich et al., 2010). This distinction is not strictly dichotomous—it simply describes a particular area within a multidimensional continuum—and although some of the countries listed above might not fit every WEIRD criterion, they all fall under this general concept. This is particularly true given recent social trends in these countries as well as the fact that study participants were recruited from universities (e.g., see Salinas, 2011; Yu & Liu, 2014). Figure 1 illustrates how the seven countries that have provided participants for IMS studies cluster together under four parameters that likely impact relationship patterns. In comparison, the Mayangna/Miskito population (used for this study) clusters with five other small-scale, non-WEIRD populations from around the world. For a number of factors, the variation between WEIRD and non-WEIRD populations is greater than that within each group.

The reliance on WEIRD populations means that much of the variance that exists in the human condition is not represented in the literature. Although non-WEIRD populations represent a diverse set of unique cultures, there are several cultural patterns that are far more common among such cultures, and many of these patterns are directly or indirectly related to the nature of romantic relationships. For instance, in small-scale societies, life histories tend to be more standardized—there are often fewer social roles to choose from, and marriage by the early 20s is nearly universal. People typically do not stay single to focus on careers or casually date a variety of partners. Upon reaching adulthood in such populations, people tend to take up the predominant subsistence strategy and start a family.

Reproduction thus begins much earlier in life, and marriages that exist for many years without children are rare. Total fertility rates of natural-fertility populations average around six children, and women spend the majority of their marital histories prior to menopause either pregnant or nursing (Bentley, Goldberg, & Jasińska, 1993). Indeed, infertility by either partner is often a culturally sanctioned and frequent cause of dissolution (Betzig, 1989).

Across non-WEIRD populations, there exists a great deal of variation in marital customs, much of which is absent in WEIRD populations. For instance, in many populations, cross-first cousins are preferred partners (e.g., father's sister's child; Chagnon, Lynch, Sherk, Hames, & Flinn, 2017), whereas in others, it is parallel first cousins (e.g., father's brother's child; Korotayev, 2000). When arranging a pairing, the tradition of offering a dowry is actually far less common than paying a bride price—a negotiated payment of resources or money from the family of the groom to that of the bride



**FIGURE 1** Population parameter estimates of seven countries that have provided samples for Investment Model Scale (IMS) research as well as six small-scale non-WEIRD populations (populations that are not Western, Educated, Industrialized, Rich, or Democratic; including the Mayangna/Miskito population detailed in this study). The six non-WEIRD populations include two hunter-gatherer, two horticultural, and two pastoral populations. The top values for the four parameters are: years of adulthood (>15 years old) before first child (Taiwan) = 15.5; child mortality (<5 years old, Agta) = 460/1,000; total fertility rate (Tsimane) = 8.9; wealth/adult (UK) = \$ 102,641. Other absolute estimates and sources are available in Table S1 in Supporting Information File S1

(Schlegel & Eloul, 1987). The marriage of a single man to multiple sisters (sororal polygyny), although jarring to Western sensibilities, is found in societies from Bolivia (Winking, Stieglitz, Kurten, Kaplan, & Gurven, 2013) to Australia (Lundeen, 1996). A common thread throughout these societies is that kin tend to play more important roles throughout the course of relationships. Because new couples often reside with kin, the quality of in-law relationships can become paramount to the success of a marital relationship. Another major difference is in the interpersonal foundations of the romantic relationships. Modern WEIRD cultures consider intimate emotional attachment the primary marker for a successful relationship and believe it to be necessary to begin a marriage (Coontz, 2006). In non-WEIRD populations, marital courtships might last a matter of days or be forgone entirely if relationships are arranged, precluding the possibility for deep emotional attachment to be a prerequisite for marriage.

Many of the characteristics that define WEIRD populations are recent in origin and evolutionarily novel, leading some to question how insights gleaned from studies of WEIRD populations reflect species-level patterns and evolved tendencies (for a review, see Henrich et al., 2010). For relationship scholars in particular, it is possible that relationship quality (as measured by the IMS) reflects an evaluative signal that evolved to motivate people to increase or decrease their involvement in a reproductive pair bond (Eastwick, Luchies, Finkel, & Hunt, 2014). Alternatively, it is possible that such

measures reflect pleasant side effects and culturally determined responses to novel situations, with little relevance to evolved tendencies (Schmitt, 2014). Cross-cultural universality is often considered an indication that a particular trait or pattern is more environmentally canalized and is more likely to have deep evolutionary roots. There is a long history in anthropology of challenging the cross-cultural universality of traits that were once thought to define all of humanity (e.g., Mead, 1928). More recently, this has included exploring empirically founded psychological phenomena, such as the Big Five personality model, among non-WEIRD populations (Gurven, Von Rueden, Massenkoff, Kaplan, & Lero Vie, 2013).

Despite the pervasive use of relationship quality measures across much literature, we are unaware of a single application of such measures in a population that is non-WEIRD in all five respects. We attempt to fill this void here by examining how well the IMS captures the nature of marital relationships among an indigenous community in Nicaragua. It is difficult to hypothesize how each subcomponent of the IM might be affected by the non-WEIRD conditions exhibited by this population, and we therefore treat this as an exploratory exercise to evaluate the scope of the broad applicability of the IMS.

### 1.3 | The Miskito and Mayangna populations

Data for the current study were collected from two Mayangna/Miskito villages within the Bosa-was Biosphere Reserve in northern Nicaragua. The Miskito and Mayangna are closely related indigenous populations residing in the tropical lowlands of Central America. Compared to the Mayangna, the Miskito are both politically dominant and substantially more populous in the region, numbering over 100,000 individuals. Despite a history of conflict, and some current animosity, the Miskito and Mayangna commonly intermarry, trade, and work closely together on cooperative projects (Koster, 2007). The two villages include some 350 individuals with a median age of 13 years. The villages are distinct in their politics and day-to-day activities, yet they are located within a 15-min walk of one another. Although members of both ethnicities reside in each village, the larger village is culturally Mayangna and the smaller Miskito.

People in these villages raise a variety of crops, and many own cattle and other animals, which generally roam freely throughout the villages. They subsist mainly on products from their agricultural plots, harvested fish and hunted game, and varying amounts of processed foods that are brought into the communities by entrepreneurial shop owners. Most residents are able to earn some money by selling cash crops or animals or engaging in occasional wage labor, and a few have stable positions, like teacher and minister, which pay a regular salary.

In these villages, life is largely centered around the nuclear family (Koster, 2018). Related families usually reside in close proximity to one another and will interact throughout the day. Within the household, the sexual division of labor follows the historical trends seen in Western societies but is much sharper than that familiar to Westerners. Men are largely responsible for money-earning activities, heavy labor in the field, and hunting and fishing. Women, on the other hand, take care of most domestic tasks, such as food processing, sewing, and child care (Koster, Grote, & Winterhalder, 2013). Early and high fertility, as well as cultural norms and husbands' jealousies, often limit women's opportunities outside the home. However, these labor distinctions are not absolute—for instance, men and women collaborate in agricultural labor, and fathers often tend to and play with children.

Courtship often begins with teenagers visiting one another and conversing on their respective porches. Even the young adults enjoy a fair degree of autonomy in choosing their partners. Parents will often make their opinions known and might try to influence their children's romantic decisions,

but the final decisions tend to be made by the individuals themselves. Although there is a clear expectation that sex should be restricted to long-term relationships, particularly among young women, the culture is relatively tolerant of casual sex (Koster, 2011; McSweeney, 2002). Single motherhood is not uncommon and does not appear to carry substantial stigma. The beginning of marriage is not marked by any major ceremony but usually involves the man moving into the woman's family house and living with her kin. If all goes well, they have children and later build their own house. First marriages can begin in the early teens for some individuals, and the mean age at first birth is approximately 17 years for women. Some of the more religiously motivated Catholic couples consecrate their union in a small ceremony when one of the roving priests happens to be visiting, although such unions typically occur after many years of prior cohabitation and childrearing.

Marriages are moderately stable, although most individuals have histories of failed relationships early in adulthood. Similar to the United States, roughly half of marriages that begin end by the 10th year, with the vast majority of divorces occurring within the first 2 years. Within marriages, fertility is quite high—the total fertility rate is around eight children. However, recent fertility trends and reports of more widely available (and used) contraception point to the beginnings of fertility decline (Winking & Koster, 2015). Divorce later in marriage is much rarer but still happens on occasion. Under such circumstances, young children almost invariably stay with the mother.

## 1.4 | The current research

This article primarily focuses on the reliability and structure of the IMS in a natural-fertility population of Mayangna and Miskito men and women. However, as described below, the challenges of administering this scale in such a population required that we make a number of changes to it. Notably, we changed the wording of some of the items, and we administered the items aloud instead of in a written format. Therefore, we also administered several versions of the IMS on Mechanical Turk (mTurk) so that we could (a) compare the Mayangna/Miskito findings to a Western sample that had completed a nearly identical version of the IMS and (b) assess the impact of these two major changes.

## 2 | METHOD

### 2.1 | Mayangna/Miskito sample

#### 2.1.1 | Participants

A total of 98 individuals completed the IMS interview in 2014, and 100 individuals completed the interview in 2016. This total included 124 unique individuals and 74 individuals who were interviewed in both years (Table 1). For each individual, the results of their first survey are included in this article. The sample is evenly divided by gender, and individuals report an average age of 33.0 years ( $SD = 12.2$ ) and 12.4 years ( $SD = 10.6$ ) together with their partner.

#### 2.1.2 | Materials and procedure

The existing Spanish translation of the IMS (VanderDrift et al., 2014) was translated into Mayangna and Miskito by trilingual assistants (Supporting Information File S1). These assistants worked with Winking (J.W.) in order to best capture the essence of each question. Many questions had to be changed to make them culturally salient as many included aspects of Western life that were unfamiliar to community members (Table 1). While the original scale asked participants to report the degree to

**TABLE 1** Original Investment Model Scale questions and Mayangna/Miskito back-translations in italics

1. I feel satisfied with our relationship. <i>Do you live happily with your spouse?</i>
2. My relationship is much better than other relationships. <i>Do you live better with your spouse than others do?</i>
3. My relationship is close to ideal. <i>Is your life with your spouse very good?</i>
4. Our relationship makes me very happy. <i>Is your life happy with your spouse?</i>
5. Our relationship does a good job of fulfilling my needs for intimacy, companionship, etc. <i>Has your marriage given you what you want, filled your needs?</i>
6. The people other than my partner with whom I might become involved are very appealing. <i>Is there another person available to marry that you would want?</i>
7. My alternatives to our relationship are close to ideal (dating another, spending time with friends or on my own, etc.). <i>Would it be easy for you to leave your spouse (e.g., live with another partner, live with your parents, or live alone)?</i>
8. If I weren't married to my partner, I would do fine—I would find another appealing person to marry. <i>If you left your spouse, would it be easy to find another good partner?</i>
9. My alternatives are attractive to me (dating another, spending time with friends or on my own, etc.). <i>If you left your spouse, are there other options that are good (e.g., live with another partner, live with your parents, or live alone)?</i>
10. My needs for intimacy, companionship, etc., could easily be fulfilled in an alternative relationship. <i>Do you think there are other partners that could give you what you want, fill your needs?</i>
11. I have put a great deal into our relationship that I would lose if the relationship were to end. <i>If your marriage ended, are there many things that you have done/invested that you would lose (e.g., money, effort (sweat), or time)?</i>
12. Many aspects of my life have become linked to my partner (recreational activities, etc.), and I would lose all of this if we were to divorce. <i>During the marriage, have you made many things (e.g., house, friends) that you would lose if you separated?</i>
13. I feel very involved in our relationship—like I have put a great deal into it. <i>During the marriage, have you invested a lot, many things?</i>
14. My relationship with friends and family members would be complicated if my partner and I were to divorce (e.g., partner is friends with people I care about). <i>If the marriage were to end, do you think your friends and family would be put out?</i>
15. Compared to other people I know, I have invested a great deal in my relationship with my partner. <i>Compared to other people, have you worked harder/invested more in your marriage (e.g., money, effort (sweat), or time)?</i>
16. I want our relationship to last for a very long time. <i>Do you want your marriage to last into the future?</i>
17. I am committed to maintaining my relationship with my partner. <i>Have you made a promise that your marriage is going to last?</i>
18. I would not feel very upset if our relationship were to end in the near future. <i>If your marriage ends in the near future, will you not be upset?</i>
19. It is likely that I will date someone other than my partner within the next year. <i>Do you think you'll have another partner within a year?</i>
20. I feel much attached to our relationship—very strongly linked to my partner. <i>Do you think that you and your spouse are united?</i>
21. I want our relationship to last forever. <i>Do you think your marriage will last for life?</i>
22. I am oriented toward the long-term future of my relationship (e.g., I imagine being with my partner several years from now). <i>Have you planned to live with your spouse into the future?</i>

which they agreed with statements, this format proved awkward and difficult to consistently communicate. We therefore transformed the questions so that they directly asked how the participants felt. Furthermore, the use of the 9-point scale was not feasible as there is substantial variation in formal numeracy, and participants were unfamiliar with converting attitudes to a numerical scale. Therefore, we translated the scale to a 5-point verbal scale (*definitely no, no, maybe, yes, definitely yes*). After the translations were complete, they were back-translated by a separate assistant into Spanish, and irregularities were discussed and resolved. Unfortunately, one translation (Table 1, Question 18) resulted in a confusing negative question that led participants to interpret the scale in opposite ways. This flawed item was discovered during the 2nd year of data collection; the question was removed from analyses (including in the mTurk sample).



All interviews were conducted by J.W. in the summer of 2014 and the spring of 2016, and many of the same participants were interviewed in both rounds to allow for an assessment of stability. All married individuals within each community who were willing and able to participate were sampled. This included 124 individuals, accounting for greater than 90% of the eligible population. Most of these interviews were conducted in the participants' houses, although some were conducted in the community building. Because many participants were illiterate or barely literate, a local assistant would read the questions aloud in the participant's preferred language. In order to protect the respondent's anonymity with respect to the assistant, who was a member of the community (and others who may have been in earshot), participants would point to a pictorial prompt that included a 5-point scale. This prompt had the five scale point labels in Mayangna or Miskito written in large letters, and a blind was erected so that participants' responses could be seen only by J.W. In these populations, such scales are unfamiliar, so participants first completed five example questions, and the interviewers worked with participants to ensure they understood the task. All of the options were read aloud following each question until the participant showed that they were familiar with the five options (by frequently pointing before the options could be read aloud). If the participant was completely illiterate and exhibited difficulty in understanding the 5-point scale, the tails were covered (*definitely no*, *definitely yes*), and only a 3-point scale was used ( $N = 14$ ). These responses were coded with the same values as the 5-point scale (i.e., 2, 3, and 4). Additional interviews were conducted following the IMS data collection, and participants were compensated with the equivalent of approximately one fourth of a day's wage (US\$2.00).

## 2.2 | mTurk sample

### 2.2.1 | Participants

In 2014,  $N = 398$  participants completed a study on mTurk for \$0.25 (although the sample is limited to  $N = 63$  for most comparisons as described below). The sample included  $N = 178$  men, 219 women, and 1 nonbinary. Only participants who were currently involved in a romantic relationship were eligible; single participants were screened out. Participants reported an average age of 36.1 years ( $SD = 12.1$ ) and 10.0 years ( $SD = 9.9$ ) together with their partner. Compared to this sample, the Mayangna/Miskito sample does not significantly differ in distributions of gender or years together, but the Mayangna/Miskito participants were significantly younger,  $t(185) = -4.00$ ,  $p < .001$ . Although the mTurk participant pool differs in some ways from undergraduate participant pools (Buhrmester, Kwang, & Gosling, 2011; Goodman, Cryder, & Cheema, 2013), mTurk participants tend to respond truthfully (Rand, 2012), and study results are often comparable to those derived using conventional participant pools (Amir, Rand, & Gal, 2012; Casler, Bickel, & Hackett, 2013; Winking, 2014).

### 2.2.2 | Materials and procedure

As described above, we made many changes to the IMS contents and protocol in order to make the survey meaningful to Mayangna/Miskito participants. These included: changes in the structure and content of questions, changing from a 9-point to a 5-point scale, and having the questions read aloud one by one. In order to examine whether these changes impacted the structure of the IMS, we randomly assigned mTurk participants to one of four conditions in a  $2 \times 2$  factorial design. These conditions varied by (a) whether participants received the original IMS questions (Original) or modified questions (Modified), which were similar in content to those used in the Mayangna/Miskito sample, and (b) whether the questions were displayed as text (Text) or were read aloud in audio files (Aloud). This resulted in four conditions: (a) the control Original/Text, (b) Original/Aloud, (c) Modified/Text,



and (d) Modified/Aloud; this fourth condition most closely resembled the Mayangna/Miskito instrument. Participants in all conditions answered the items using 5-point scales; the Original versions used the standard *completely disagree* and *completely agree* endpoint anchors (with the anchor *neither agree nor disagree* at the midpoint), whereas the Modified versions used the five anchors given to the Mayangna/Miskito participants (i.e., *definitely no*, *no*, *maybe*, *yes*, *definitely yes*).

### 2.3 | Analysis strategy

Our primary analyses examined the means, internal consistency, and structure of the IMS data collected from the Mayangna/Miskito. For these analyses, we included data from each individual's first interview only, whether that was during 2014 or 2016. In addition, for these analyses, we compared the Mayangna/Miskito data to (a) the engaged/married subsample who completed the Modified/Aloud condition of the mTurk data (the closest analog to the Mayangna/Miskito data;  $N = 63$ ; see Table 2) and (b) the meta-analytic IMS results for married/engaged/cohabiting subsample reported in Le and Agnew (2003). In a set of auxiliary analyses, we examined the stability (over a 2-year period) of the  $N = 70$  individuals who provided IMS data at both time points in the Mayangna/Miskito sample, we offer some reflections on predictive validity in the Mayangna/Miskito sample, and we test the effects of the condition in the mTurk study (using the full sample) in order to assess the impact of the changes made to the instrument.

## 3 | RESULTS

### 3.1 | Primary analyses

#### 3.1.1 | Mean differences

Table 2 displays the descriptive statistics for the Mayangna/Miskito and mTurk samples. The subcomponent scores for the Mayangna/Miskito sample were significantly lower than the mTurk sample in their satisfaction, investments, and commitment but not alternatives (Table 3). In order to determine whether the  $N = 14$  Mayangna/Miskito individuals using the 3-point scale were driving these differences, we converted all mTurk and Mayangna/Miskito responses to 3-point scales (collapsing the two categories on each end). This resulted in all subcomponents scores except satisfaction being significantly lower in the Mayangna/Miskito sample, suggesting that the use of 3-point scales for minority individuals was not likely driving this effect (Table S2 in File S1).

**TABLE 2** Descriptive statistics

	Mayangna/Miskito	mTurk Modified/Aloud (married or engaged)
<i>N</i>	124	63
Male	60	24
Mean age	33.0	40.6
<i>SD</i>	12.1	12.4
Range	15–65	20–68
Mean years together	12.4	15.1
<i>SD</i>	10.6	11.7
Range	0–58	0–46

**TABLE 3** Means of subcomponent scores across subcomponents in Mayangna/Miskito and mTurk Modified/Aloud sample

	Mayangna/Miskito				mTurk				$p^a$	$d/\eta^2$
	$n$	$\bar{x}$	$SD$	$\pm 95\%$	$n$	$\bar{x}$	$SD$	$\pm 95\%$		
Satisfaction	124	3.923	0.81	0.144	63	4.283	0.52	0.131	.012 <sup>b</sup>	0.034 <sup>b</sup>
Alternatives	124	2.229	0.52	0.092	63	2.327	0.74	0.186	.292 <sup>c</sup>	0.163 <sup>c</sup>
Investment	124	3.298	0.73	0.130	63	3.686	0.58	0.147	<.001 <sup>c</sup>	0.547 <sup>c</sup>
Commitment	124	4.044	0.46	0.082	63	4.576	0.46	0.115	<.001 <sup>b</sup>	0.227 <sup>b</sup>

<sup>a</sup> Test for differences between Nicaragua and mTurk samples.<sup>b</sup> Mann–Whitney/ $\eta^2$ .<sup>c</sup>  $t$  test/Cohen's  $d$ .**TABLE 4** Internal consistency in the Mayangna/Miskito and mTurk Modified/Aloud samples

	Mayangna/Miskito		mTurk		$p^a$
	$n$	$\alpha$	$n$	$\alpha$	
Satisfaction	124	0.806	63	0.768	.505
Alternatives	124	0.549	60	0.779	.014
Investment	124	0.537	63	0.562	.838
Commitment	124	0.613	60	0.797	.020

<sup>a</sup> Test for differences between Cronbach's  $\alpha$ s (Diedenhofen & Musch, 2016).**TABLE 5** Correlation matrix of subcomponents

	Mayangna/Miskito <sup>a</sup>				mTurk <sup>b</sup>				Meta <sup>c</sup>
	1	2	3	4	1	2	3	4	
Satisfaction (1) $r$ $p$	1	−0.283 .001	0.040 .657	0.523 <.001	1	−0.402 .001	0.029 .819	0.656 <.001	0.68 <.001
Alternatives (2) $r$ $p$		1	0.076 .402	−0.276 .002		1	−0.254 .044	−0.411 .001	−0.48 <.001
Investment (3) $r$ $p$			1	0.145 .108			1	0.312 .013	0.46 <.001
Commitment (4) $r$ $p$				1				1	1

<sup>a</sup>  $N = 124$  for all analyses.<sup>b</sup> mTurk sample for Modified/Aloud and limited to those married or engaged.  $N = 63$  for all analyses.<sup>c</sup> Le and Agnew (2003).  $N = 9,330$  for Satisfaction, 9,054 for Alternatives, and 9,147 for Investment. Correlations among antecedent factors were not reported.

### 3.1.2 | Internal consistency

In the Mayangna/Miskito sample, satisfaction exhibited good internal consistency, but the other three measures were weaker (Table 4). Cronbach's alpha was significantly lower in the Mayangna/Miskito sample compared to the mTurk sample for alternatives ( $p = .012$ ) and commitment ( $p = .015$ ) (Diedenhofen & Musch, 2016).

### 3.1.3 | Structure

In the Mayangna/Miskito sample, commitment was significantly correlated with satisfaction ( $r = 0.523$ ,  $p < .001$ ) and alternatives ( $r = -0.276$ ,  $p = .002$ ) but not investment ( $r = 0.145$ ,  $p = .108$ ; Table 5). We also tested whether the correlations in the Mayangna/Miskito sample were different from those in the mTurk and meta-analytical samples. The satisfaction–commitment

correlation in the Mayangna/Miskito sample is significantly lower than that reported in the meta-analysis ( $p = .007$ ), as are the alternatives–commitment correlation ( $p = .007$ ) and the investment–commitment correlation ( $p < .001$ ). There are no significant differences in the commitment correlations when comparing the Mayangna/Miskito sample to the mTurk sample or when comparing the mTurk sample to the meta-analysis.

In a regression of commitment on all three antecedent variables, satisfaction is a significant predictor, whereas investments and alternatives achieve only marginal significance (Table 6). Multicollinearity is not likely an issue as correlations among the predictors are modest (see Table 4), and the variance inflation factors (VIFs) are all less than 1.1 (O'Brien, 2007). Combined, the three subcomponents explain 31% of the variance in commitment, much lower than the average of 61% explained in the meta-analysis. In the mTurk Modified/Aloud sample, satisfaction and alternatives are significant predictors, whereas investment is not. The correlations among the predictors are slightly higher, although the VIFs are all less than 1.3. With this sample, the three variables contribute to explain 51% of the variance in commitment.

We also conducted path model estimates using structural equation modeling (SEM; in Amos v. 25.0); this procedure adjusts the standard errors of the associations to account for the unreliability of the measures (Westfall & Yarkoni, 2016). When we estimated all three paths simultaneously (i.e., we represented satisfaction, alternatives, and investment as three correlated factors and used them to jointly predict commitment), the magnitudes of the satisfaction–commitment, alternatives–commitment, and investment–commitment associations were similar to the regression analyses (Table 7). However, only the satisfaction–commitment association achieved marginal significance in the Mayangna/Miskito sample, and only the satisfaction–commitment association achieved significance in the mTurk Modified/Aloud sample. These analyses suggest that satisfaction and commitment are tightly associated in all samples, but we were likely underpowered to determine whether alternatives and investments do or do not incrementally predict commitment in the Mayangna/Miskito and mTurk Modified/Aloud samples (e.g. all three associations were significant when analyzing the full mTurk sample pooled over all conditions).

In all the analyses reported above, we calculated the satisfaction, alternatives, investment, and commitment scales as intended by the IMS in order to facilitate comparisons across samples. Here,

**TABLE 6** Regression of subcomponents on commitment

	Mayangna/Miskito <sup>a</sup>		mTurk <sup>b</sup>		Meta <sup>c</sup>	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Satisfaction	0.474	<.001	0.595	<.001	0.51	—
Alternatives	−0.152	.057	−0.104	.320	−0.22	—
Investment	0.138	.074	0.268	.006	0.24	—

<sup>a</sup>  $n = 124$ ,  $r^2 = 0.310$ , model  $p < .001$ .

<sup>b</sup>  $n = 63$ ,  $r^2 = 0.510$ , model  $p < .001$ .

<sup>c</sup>  $n = 2,331$ ,  $r^2 = 0.61$ . These represent weighted averages of standardized coefficients over multiple studies (see Le & Agnew, 2003, for references and explanation for calculation of  $r^2$ ).

**TABLE 7** Standardized paths predicting commitment in a structural equation model

	Mayangna/Miskito		mTurk		mTurk (full)	
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Satisfaction	0.676	.071	0.681	<.001	0.505	<.001
Alternatives	−0.081	.573	−0.078	.532	−0.189	<.001
Investment	0.130	.376	0.359	.208	0.317	<.001

we report a series of exploratory factor analyses (principal axis factoring with promax rotation) to determine whether the 21 satisfaction, alternatives, investment, and commitment items indeed formed the four IMS factors. To determine the optimal number of factors, we used a visual examination of the scree plot as well as parallel analysis, which assesses the degree to which the eigenvalues differ from those generated from random data sets (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Both approaches suggest that four factors best characterize the Mayangna/Miskito data, but the factors themselves do not exactly parallel the intended IMS structure. Although the first three factors roughly map onto the antecedent subcomponents (i.e., satisfaction, alternatives, and investments), commitment is distributed across the three factors, and the fourth factor consists of four items that span the alternatives, investments, and commitment components (Table 8). The somewhat unexpected factor structure in the Mayangna/Miskito was likely not due to the changes we made to the instrument as suggested by exploratory factor analyses of the mTurk data: The four conditions did not differ appreciably in their scale structure (Table S3a–d and included commentary in File S1). Indeed, four factors emerged in all four conditions, and for each condition, the four factors mapped onto the hypothesized subcomponents except for a single item (a different question in each condition).

### 3.2 | Auxiliary analyses

#### 3.2.1 | Mayangna/Miskito IMS stability

For the stability analyses, two couples were removed from the sample due to major changes in their relationship statuses that took place between the 2 years (see below, under Mayangna/Miskito

**TABLE 8** Factor loadings from exploratory factor analysis of Mayangna/Miskito sample

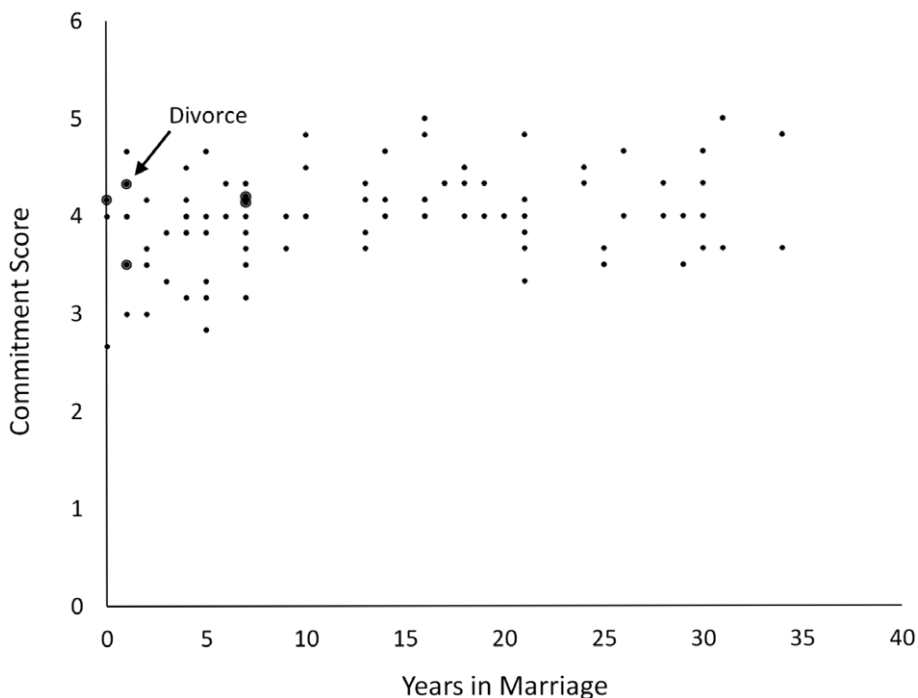
	Item	F1	F2	F3	F4
Satisfaction	1	<b>0.855</b>	−0.016	0.111	−0.281
	2	<b>0.649</b>	0.008	−0.030	−0.183
	3	<b>0.580</b>	−0.103	−0.041	0.178
	4	<b>0.573</b>	−0.133	−0.059	0.078
	5	<b>0.671</b>	0.136	0.026	0.095
Alternatives	6	−0.256	0.213	0.135	<b>0.330</b>
	7	−0.240	<b>0.463</b>	−0.084	0.036
	8	0.029	<b>0.620</b>	−0.071	−0.120
	9	−0.016	<b>0.353</b>	−0.005	−0.086
	10	0.077	<b>0.454</b>	0.211	−0.106
Investment	11	0.002	0.127	<b>0.628</b>	0.042
	12	0.127	−0.100	<b>0.556</b>	−0.015
	13	−0.090	−0.142	0.330	<b>0.335</b>
	14	0.004	0.052	<b>0.457</b>	0.139
	15	−0.158	−0.174	<b>0.227</b>	0.051
Commitment	16	−0.004	−0.091	0.178	<b>0.333</b>
	17	<b>0.445</b>	0.060	−0.163	0.381
	18	—	—	—	—
	19	0.123	<b>0.516</b>	−0.052	0.033
	20	<b>0.568</b>	0.173	0.090	0.227
	21	<b>0.478</b>	−0.032	0.040	0.365
	22	0.123	−0.077	−0.048	<b>0.560</b>

*Note.* Bolded numbers represent the greatest factor loading for each question.

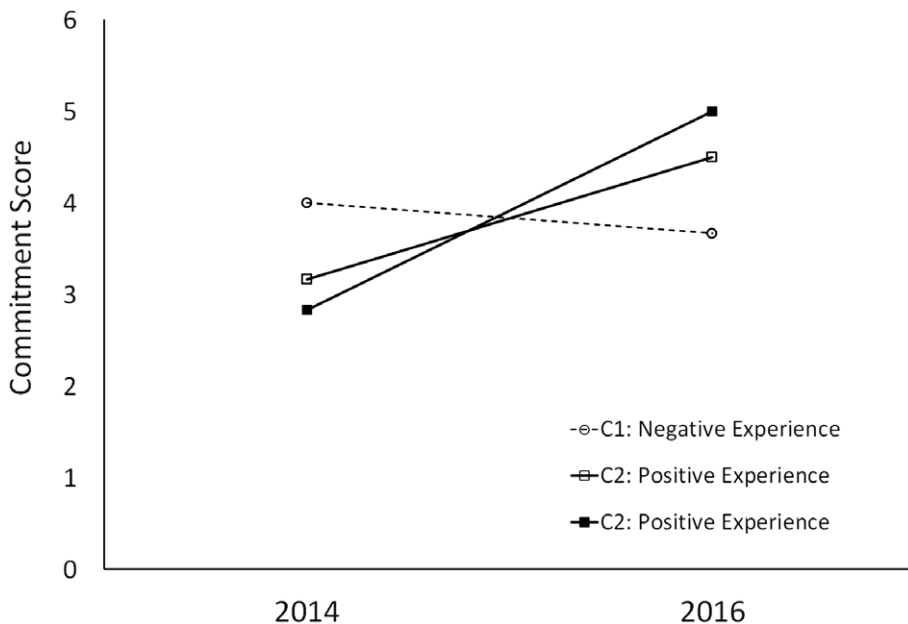
Predictive Validity). The correlations for satisfaction ( $r = 0.388$ ,  $n = 70$ ,  $p < .001$ ) and alternatives ( $r = 0.449$ ,  $n = 70$ ,  $p < .001$ ) across the 2 years are both significant, although the correlation between commitment scores is only marginally so ( $r = 0.236$ ,  $n = 70$ ,  $p = .049$ ), and investment scores exhibited no significant association ( $r = 0.046$ ,  $n = 70$ ,  $p = .703$ ). It should be noted that although long test–retest intervals are generally preferred in order to eliminate the effects of memory, it would be expected that such a long interval (2 years) with a potentially dynamic measure would result in much lower levels of stability.

### 3.2.2 | Mayangna/Miskito predictive validity

Although 2 years was not sufficient time to formally examine predictive validity (i.e., how the scale predicts relationship dissolution) with such a small sample, a few changes did take place in the Nicaraguan communities that may be reflected in the IMS data. Three couples did divorce during the period between 2014 and 2016, which included five individuals who had completed the scale in 2014. However, their commitment scores did not appear to deviate substantially from average levels (Figure 2). In addition, two couples who participated in both years experienced substantial changes to the statuses of their marriages. Because of the small sample, it is not possible to describe the details of these events without sacrificing anonymity. One couple went through a mutually beneficial step in their relationship, whereas in the other, one member clearly enacted a negative step. The changes in commitment scores accurately reflected these changes (Figure 3). Finally, of the 59 couples for whom both spouses were interviewed, the alternatives scores were significantly correlated between husbands and wives ( $r = 0.552$ ,  $p < .001$ ), and satisfaction scores ( $r = 0.188$ ,  $p = .150$ ) and investment scores ( $r = 0.220$ ,  $p = .091$ ) trended in that direction. Commitment scores, however, showed no association ( $r = 0.063$ ,  $p = .635$ ).



**FIGURE 2** Commitment scores by years in marriage and divorce status



**FIGURE 3** Commitment score changes among those experiencing changes in marital status

**TABLE 9** mTurk descriptive statistics

	Original/Text	Original/Aloud	Modified/Text	Modified/Aloud
<i>N</i>	103	93	103	99
Male	49	38	43	48
Age	36.1	34.4	36.6	37.0
<i>SD</i>	12.1	11.8	11.8	12.5
Range	19–65	19–73	20–72	18–73
Years together	9.6	9.4	10.2	10.7
<i>SD</i>	8.8	10.1	9.7	11.1
Range	0–41	0–53	0–45	0–46

### 3.2.3 | mTurk analysis by condition

The mTurk sample consisted of 398 individuals who were relatively evenly distributed across the four conditions (Table 9). The samples did not significantly differ across numerous demographic variables: age, sex, relationship status, or relationship length. Results suggest that the modifications to the instrument do have some significant impacts on mean levels. To explore differences in distributions for the four indices, Mann–Whitney tests were used for satisfaction and commitment due to a non-normal distribution, whereas *t* tests were used for alternatives and investment. Although there were no significant impacts of having the questions read aloud, the investment and commitment scores were significantly lower in at least one condition compared to the control condition (Table 10). Furthermore, internal consistency is lower in the Modified/Aloud condition for satisfaction ( $\alpha = 0.764$ ,  $p < .001$ ) and investments ( $\alpha = 0.581$ ,  $p = .042$ ; Table S4 in File S1). However, only in investment does it approach a poor level; all other alphas are greater than 0.70.

Compared to the control condition, the other conditions do not differ in the strength of the correlations between the antecedent factors and commitment (Table S5 in File S1). In analyses regressing



**TABLE 10** Means of subcomponent scores across conditions for mTurk sample

	Original/Text			Original/Aloud			Modified/Text			Modified/Aloud		
	$\bar{x}$	<i>SD</i>	<i>p</i>	$\bar{x}$	<i>SD</i>	<i>p</i>	$\bar{x}$	<i>SD</i>	<i>p</i>	$\bar{x}$	<i>SD</i>	<i>p</i>
Satisfaction	4.04	0.93	—	3.80	1.06	.81 <sup>a</sup>	4.29	0.78	.27 <sup>a</sup>	4.28	0.61	.64
Alternatives	2.57	0.89	—	2.68	0.85	.40 <sup>b</sup>	2.35	0.88	.07 <sup>b</sup>	2.50	0.80	.53 <sup>b</sup>
Investment	3.94	0.82	—	3.85	0.84	.47 <sup>b</sup>	3.71	0.79	.04 <sup>b</sup>	3.55	0.61	<.01 <sup>b</sup>
Commitment	4.42	0.73	—	4.41	0.76	.84 <sup>a</sup>	4.34	0.69	.17 <sup>a</sup>	4.30	0.71	.04 <sup>a</sup>

Note. For Original/Text, Original/Aloud, Modified/Text, and Modified/Aloud,  $n = 103, 93, 103$ , and  $99$ , respectively.

<sup>a</sup>  $t$  test for difference from Original/Text.

<sup>b</sup> Mann–Whitney for difference from Original/Text (due to nonnormality of distribution).

commitment on the antecedent subcomponents, all subcomponents were highly significant independent predictors of commitment except for investment in (surprisingly) the control condition (Table S6 in File S1).

## 4 | DISCUSSION

The results for the Mayangna/Miskito sample were promising with respect to the applicability of the IMS, yet the various measures clearly indicated that the constructs are less well defined in this sample compared to earlier studies. In addition to lower levels of the subcomponent scores overall, the data exhibited weaker associations between the antecedent components and commitment (when compared to the meta-analytical data), as well as a structure that less clearly maps onto the four subcomponents. There are a number of possibilities for this pattern of data, which we explore below.

The results of the mTurk study suggested that the data exhibit a comparable structure regardless of condition, and internal consistency levels were acceptable for all except investment in the Modified/Aloud condition. Thus, the modifications likely do not account for the differences exhibited by the Mayangna/Miskito sample. Our use of mTurk potentially provides a blueprint for other researchers working with non-WEIRD populations and attempting to use instruments originally validated with WEIRD participant populations. Often, anthropologists have limited access to large participant pools at universities, and mTurk offers a useful alternative to test the impacts of the inevitable changes to instruments.

One possible explanation for the inconsistent results is that the exercise itself was too foreign to this population to elicit meaningful responses. For instance, a number of the participants struggled with the ordinal scale. Many efforts were made to explain the scale, including a set of examples, reading through each option through multiple questions, and removing the two tails (*definitely yes* and *definitely no*) if the participant was having major difficulty. Despite this, there were cases in which participants clearly did not use the full range of answers, instead vacillating between two options. There was no significant difference, however, between the proportion of participants in the Mayangna/Miskito sample who used all five response options (37.2% of 110) and that of the mTurk pooled sample (44.0% of 398,  $\chi^2 = 1.582$ ,  $p = .208$ ).

Another possibility is that the item translations did not accurately capture the nature of the original questions. Translation was not a simple task. For instance, in the original instrument, Item 7 reads, “My alternatives to our relationship are close to ideal (dating another, spending time with friends or on my own, etc.).” This item would not be culturally sensible to Mayangna/Miskito participants if it were simply translated word for word. Dating is not a common practice, and “spending time with friends” is not seen, in any way, as an alternative to a marital relationship. The phrasing of the item

was also confusing to participants who are not as accustomed to answering how much they agree or disagree with awkwardly worded hypothetical survey statements. After some discussion with native assistants, the culturally appropriate alternatives to a marital relationship were determined to be to find another partner, to live with one's parents, or to live on one's own (something that is rare but does happen). Along with changing the question to a clearer yes/no format, the question was translated to "Would it be easy for you to leave your spouse (e.g., live with another partner, live with your parents, or live alone)?" Although the results of the mTurk study provide reassurance that the alterations did not substantially impact the meaningfulness of the scale, it is still possible that they affected the results among the Mayangna/Miskito population.

#### 4.1 | Impacts of Mayangna/Miskito marital patterns on IM

The need for substantial translations and the persistent reduction in the reliability of the measures point to limitations of the IMS. However, these issues do not necessarily reflect on the validity of the IM, which simply might not be captured in this population using the existing scale. The regression analyses do offer some support for the key predictions of both interdependence theory and the IM—that satisfaction, alternatives to a relationship, and previous investments collectively influence commitment. Even with satisfaction included in the model, alternatives and investment were marginally significant predictors of commitment in the Mayangna/Miskito sample. However, the variation explained by the entire model was only half that explained in studies using WEIRD samples (Le & Agnew, 2003). Furthermore, using an SEM approach, the confidence intervals widen, and alternatives and investments are no longer significant predictors. The current results recommend caution in presuming that alternatives and investments uniquely predict commitment in this non-WEIRD population; nevertheless, given that SEM generally requires larger sample sizes, strong disconfirming evidence will have to await a more highly powered test than the one we offered here.

Although it is possible that the limitations reside only with the scale, we must also consider limitations with the model. There are clearly similarities between the Miskito/Mayangna manifestation of marriage and those of modern Western cultures. Infidelity and not getting along are the two most commonly listed causes of divorce, many (young) couples exhibit displays of affection, and husbands and wives can often be seen cooperating in household tasks. Despite these similarities, however, there are several important differences, which might hamper the application of the IM to this population.

The alternatives to a marital relationship are very different and quite circumscribed in Mayangna/Miskito culture. This is largely due to the fact that within the household, there exists a division of labor that is far more severe than that found in modern Western cultures. The husband and wife roles complement one another quite well, such that each member is, to a large degree, dependent on the other. For instance, when asked why divorce is hard, participants reported that, for women, it is difficult because the children typically stay with them, and they are overburdened without husbands to perform the male-specific tasks, such as building a house and earning money. Men, on the other hand, are reported to primarily suffer because they feel bad for abandoning their family and because they have no one to cook or wash clothes for them. Alternatives therefore consist largely of other living arrangements that fulfill basic needs.

Furthermore, previous investments appear to have less to do with perceptions of what has been put into a relationship and far more to do with mounting responsibilities and the costs of abandoning those responsibilities. High fertility is the norm, and a couple who has been married for 10 years can expect to have about four children by that time, which would undoubtedly impact any contemplation of divorce. Furthermore, the life history trajectory of the Miskito/Mayangna is much more standardized compared to Western trajectories, in which nearly all individuals are married with children and

growing their own crops by their early 20s. Thus, personal investments in a marital relationship might not even register as something to contemplate—among this population, it is simply considered life.

Finally, although satisfaction exhibited the strongest association with commitment, it too is likely manifested differently. For instance, it might have less to do with the interpersonal relationship itself than it does with the outcomes of that relationship. The Western view of marriage privileges this interpersonal relationship between the husband and wife and measures marital success by the strength of the romantic bond that unites the couple. This view is somewhat of a cross-cultural outlier (Coontz, 2006). In many other cultures, marriage is primarily a reproductive, economic, and familial arrangement in which romantic love often develops, but for which it is not the defining element. For instance, in a corollary to this study, participants were asked how likely they would be to divorce a partner given a number of different scenarios, which included things like partner sterility or infidelity. Of the eight scenarios, not being in love with their partner was the *least* likely to elicit a positive response, with only approximately half of men and women saying they would be likely to divorce if this were the case (Winking, unpublished data). This is compared to nearly 70% of individuals saying they would be likely to divorce if they did not get along with their in-laws and 80% saying they would be likely to do so if their partner was lazy.

The trajectories and structure of relationships differ as well. Couples rarely begin their marriages alone and often reside with the wife's family for the first several years before constructing a house of their own. Husbands are therefore integrated not only into a new relationship but into an entirely new household that is functioning with numerous members. Satisfaction and commitment might thus be perceived as it relates to the household as a whole.

Given the cultural diversity surrounding marital relationships, it might seem overly optimistic to expect a single instrument or even a single model to equally predict marital longevity across all populations. If we were to develop an instrument from the perspective of Mayangna/Miskito culture, without the constraint of trying to make it comparable to previous IM measures, there would likely be much more substantial changes. We might focus more on the number and ages of children, the proximity and availability of kin with established households (with whom divorcing parties could live), how well participants believe their partners fulfill their sex-specific responsibilities, and the quality of any in-law relationships.

## 4.2 | Conclusion

Ultimately, although the IMS clearly captures real variation in the nature of relationships in this population, it is equally clear that it does so with less effectiveness than applications to WEIRD populations. In this sample, satisfaction and commitment subcomponents appear to be closely related constructs that might ultimately prove predictive of future marital outcomes. Alternatives and investment, which exhibited poorer internal consistency and weaker associations with commitment, might include too many overly generalized items that require more substantial modifications to be meaningful in this population. Moreover, these subcomponents may simply not be as germane to considerations of divorce. Factors that are far less variable in this population compared to other populations, such as the presence of children and their increasing number through time, might swamp the impacts of such concepts as “previous investment.”

Future research will hopefully demonstrate the degree to which the IMS is predictive of relationship dissolution in non-WEIRD populations. Furthermore, it would be worth exploring alternative IMS' that better reflect the variance in patterns of relationship formation and maintenance. For instance, one could imagine a handful of instruments that all capture the nature of the IM subcomponents, and researchers could choose the appropriate scale according to the manner by which

relationships are culturally constructed in their participant population. Finally, we encourage the inclusion of non-WEIRD populations in psychological research in general. These populations represent a large portion of the variance in the human condition, and many of the population characteristics that are more common among them defined all of humanity for most of its existence. Describing a particular pattern as “cross-culturally robust” while neglecting such populations privileges WEIRD cultures as the norm. On the other hand, validating that an effect also extends across a wide variety of non-WEIRD populations lends much greater weight to the possibility that researchers have uncovered a fundamental truth about human psychology.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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