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ABSTRACT
Primals are beliefs about the world's character (e.g. good, safe, enticing, or alive) that are associated with well-being and behavioral patterns. But primals' developmental origins remain mysterious, hampering theoretical understanding and clinical efforts to change primals. This preregistered study of 905 families from 11 cultural groups adopts bioecological theory to examine (1) variance in primals accounted for by individual, family, and cultural differences, (2) concordance in primals within families, and (3) mean differences in primals across cultures. Results indicate most variance in primals is attributable to individual differences, but significant variance also emerges due to family and cultural differences. Positive correlations between mothers' and fathers' primals suggest assortative mating, and positive correlations between parents' and children's primals suggest intergenerational transmission. Findings shed light on primals' mysterious origins: humans do appear to somehow "rub off on each other." Clarifying this interchange can help equip clinicians to leverage primals to improve wellbeing.

Basic beliefs about the local situation that you are in are thought to function as Piagetian schemas (Piaget, 1971), thus impacting how information in that situation is interpreted and used. The result can be numerous downstream consequences, including for perception, affect, motivation, behavior, physiology, and wellbeing. For example, the belief that *this neighborhood is dangerous* theoretically should impact how loud, ambiguous "BANGS" are interpreted, adrenaline releases, risk-aversion, and more. However, the impacts of schemas about a situation are usually confined to the situation the schema concerns (e.g. the particular neighborhood). But what about beliefs that concern not a local situation, but the world as, essentially, one very large place? Janoff-Bulman (1989) was the first to make the powerful suggestion that perhaps humans hold multiple schemas about the sort of world this is. If so, each should theoretically result in

diverse, cascading influences over how people live their lives.

World beliefs have been studied for decades. By far the most studied world belief—Belief in a Just World—is the belief that the world is a karmic place where outcomes are typically deserved. This world belief has been tied to many variables related to hard work (theoretically because motivation increases if the world is expected to reward hard work), kindness (avoid being unkind if everyone "gets what's coming to them"), wellbeing (it is more enjoyable and predictable to live with perceived fairness), and blaming victims (presumably because they got what they deserved; e.g. Montada & Lerner, 1998). Political attitudes researchers have examined how the belief the social world is a dangerous place is related to authoritarianism and political conservatism (Duckit & Sibley, 2009; Perry et al., 2013). In trauma research, Shattered

Assumptions theory posits that trauma shatters World Assumptions, such as the belief the world is benevolent, and the process of trauma recovery is partly the process of recovering positive world beliefs (Janoff-Bulman, 1989). Beck premised Cognitive Behavioral Therapy—the most widespread form of talk-therapy in the world—on the idea that similar beliefs (including beliefs about the self, future, and "world"; the Cognitive Triad) influence depression (Beck et al., 1979). Even in animal research, the belief that the broader habitat is generally more abundant (versus barren) is thought to play a key role in optimizing foraging patterns—in a barren world, don't be too quick to leave a food patch (Charnov, 1976).

Clifton et al.'s (2019) empirical effort to comprehensively identify variation in world beliefs situates and summarizes much previous world belief research within a structure of "primal world beliefs" (or "primals" for brevity). This "primal" term distinguishes simple, adjectival, goal-relevant world beliefs (e.g. *the world is dangerous*) from metaphysical, incidental, or historical world beliefs (e.g. *the world is composed of 118 chemical elements*). Initial work to identify candidate primals included analyses of over 80,000 tweets and 1700 descriptions of the world in 385 of the world's most influential texts, novels, and films, and testing of 234 items in thousands of participants across 10 studies (Clifton et al., 2019). Ultimately, factor analysis revealed 26 primals in a semi-hierarchical structure. At the bottom are 22 tertiary primals, of which 17 cluster into three major secondary primals called *Safe* world belief (the belief that the world is typically safe, comfortable, and stable as opposed to dangerous; this includes, for example, Lerner's just world belief and Duckitt's dangerous world belief), *Enticing* world belief (the belief that the world is beautiful, fascinating, meaningful, and worth exploring as opposed to dull), and *Alive* world belief (the belief that the world is animated by intentionality that interacts with you and needs your help, and that there is cause to listen to the universe, as opposed to the world being mechanistic). These three major secondary primals, in turn, aggregate into one supercluster or primary primal, called *Good* - the belief that the world is a delightful place that is beautiful, fascinating, safe, abundant, full of meaning, and improvable, as opposed to bad, miserable, dangerous, ugly, and impossible to change (Clifton et al., 2019; Clifton & Yaden, 2021). See Supplemental Figure 1 for a depiction of this structure.

Primals are fairly stable across long periods of time (Ludwig et al., 2023) and strongly correlated with numerous personality, health, well-being, and life satisfaction variables (Clifton & Meindl, 2022; Lansford et al., 2024), including explaining more variance in life satisfaction, trust, and gratitude than the Big 5 personality traits (Clifton et al., 2019). In theory, primals influence many of these outcomes the same way that any schema influences outcomes: by systematically altering how information is interpreted, consistent with Janoff-Bulman's (1989) original suggestion. For example, compared to those who see the world as safer, those who see the world as dangerous estimate the same neutral faces as more likely to be criminals and angry; they also estimate a wide-range of low-incidence threats, including murder, burglary, and animal attack, as 4.2 times higher (comparing top and bottom quintiles; Kerry & Clifton, 2025). If dangerous world belief influences threat perception in this way, it should have wide-reaching consequences for behavior. This same logic could hold across several primals.

However, thus far, primals have largely been studied at the individual level, including how they correlate to individuals' circumstances and outcomes (Clifton, 2023). This is sensible; primals by definition are ways that individuals view the world, so understanding how they work within individuals is an important starting point for their study (Lansford et al., 2024). However, primals researchers have made the case that it is important to expand the research agenda to incorporate principles of developmental science to understand how individuals' primals are embedded in, and interact with, the larger family and cultural ecological contexts in which they reside (Clifton, 2020; Lansford et al., 2024). Indeed, developmental science's seminal bioecological theory proposes that any individual belief or behavior develops within a nested, complex, reciprocally interacting ecological system that includes the individual, the family they are embedded in, and the larger cultural context both the individual and family are embedded in over time (Bronfenbrenner & Morris, 2006).

Exactly whether and how primals vary across families and cultures remains a mystery. If world beliefs are indeed schemas as Janoff-Bulman (1989) suggested, they should likely resist Piagetian accommodation (changing the schema to fit the information) and prefer assimilation (incorporating the new information to fit the existing schema; Piaget, 1971). Therefore, primals may not arise from family or cultural experiences in very straightforward ways. For instance, though samples of researchers and the general public expected dangerous world belief to reliably result from having experienced more danger in one's life or

living in dangerous places, several (perhaps reductive) intuitions along these lines did not bear much fruit (Kerry et al., 2024). This has contributed to several calls to cast a wider, exploratory net to determine whether or how family or cultural experiences predict the formation of primals (e.g. Clifton et al., 2019; Lansford et al., 2024). Before examining family or cultural-level predictors of primals, however, developmental scientists need to examine the extent to which primals vary at the family or cultural level (Lansford et al., 2024). If primals do not meaningfully vary at these levels, predictors at these levels will not predict differences in primals, and it will not be worth exploring whether primals are shaped by family or cultural influences any further (Deater-Deckard et al., 2018; Lansford et al., 2024). On the contrary, if primals do vary across families and cultures, then exploring family and cultural socialization practices that lead to the emergence or retention of primals will be a valuable enterprise (Lansford et al., 2024).

In the current study, we attempt to apply developmental science's bioecological model to examine how individual primal beliefs are embedded in family and cultural context. Specifically, we do so by examining classic research questions that developmental scientists answer whenever they apply the bioecological framework to new conceptual approaches within developmental psychology (Bronfenbrenner & Morris, 2006; Lansford et al., 2024). First, we examine if there is meaningful variability in primals within families and across cultures by examining the proportions of variance in primals attributable to the individual, family, and culture. Second, we explore variation in primals within families by examining correlations in primals among parents and their children. Third, we explore similarities or differences in primals across culture by examining differences in mean primal scores across 11 cultural groups in 8 nations. In so doing, we hope to build upon promising existing primals research by grounding such research in developmental science's bioecological framework (Bronfenbrenner & Morris, 2006; Lansford et al., 2024).

Research question 1: Understanding variance in primals explained by individual, family, and cultural differences

A bedrock tenet of the bioecological framework is that a belief or behavior that develops does so by being embedded in, and influenced by, family and cultural systems that surround it (Bronfenbrenner & Morris, 2006; Lansford et al., 2024). This tenet presupposes that a belief has significant amounts of variance that can be explained at the family or cultural level; if a belief does not have variance at the family or cultural level, then family- or cultural-level influences cannot affect it (Bauer & Curran, 2021). Therefore, the first step for developmental scientists to take in studying new phenomena like primals is to empirically test this presupposition (e.g. Deater-Deckard et al., 2018).

Family- and cultural-level variance in primals has not yet been evaluated, though primals research has called for such analyses (Lansford et al., 2024). Therefore, it is not clear how much variance in primals may be attributable to family- or cultural-level differences. However, primals have been demonstrated to be relatively stable over time (Clifton & Yaden, 2021) and only weakly correlated to changes in environmental context (Kerry et al., 2024; Ludwig et al., 2023). Indeed, thus far primals researchers have cautiously concluded that primals appear to be similar to schemas which, once acquired, are in practice fairly stable (Clifton, 2020; Lansford et al., 2024), though primals investigators emphasize that these conclusions are tentative and in need of further study (Clifton, 2020; Lansford et al., 2024). Nonetheless, if primals are relatively stable over time and circumstances, then the amount of variance in primals attributable to family and culture may be rather small. Indeed, this is the pattern seen in other constructs that developmental scientists consider relatively stable over time and less amenable to change, such as personality traits, where only about 5% of variance in personality traits is attributable to differences between culture, while 95% of variance is attributable to differences within culture (McCrae & Terracciano, 2008). In contrast, variance in constructs that are generally considered less stable and more amenable to change, such as parenting and child behavior, have been demonstrated to have between 4% and 19% of their variance attributable to between-culture differences and 9%-35% of their variance attributable to differences between individuals within-cultures, with the remaining variance attributable to differences within people at the individual level (Deater-Deckard et al., 2018). In the current study, we examine where primals may fall on this continuum by examining the proportion of variance in primals attributable to differences between individuals, families, and cultures.

Research question 2: Examining concordance in primals within families

If there is indeed significant variation in primals at the family level, two foundational concepts used by

developmental scientists to understand how traits and behaviors cluster in families can be used to better understand such variation. Those two foundational concepts are assortative mating and intergenerational transmission of attitudes and beliefs (Horwitz et al., 2023; Rothenberg, 2019). Assortative mating occurs when two romantic partners share similar traits, beliefs, attitudes, or other characteristics (Horwitz et al., 2023). Meta-analyses have identified assortative mating as a common phenomenon wherein romantic partners have been found to be positively correlated across a wide variety of beliefs, behaviors, and traits (Horwitz et al., 2023). To our knowledge, researchers have not yet investigated whether evidence exists for assortative mating by primals. However, it makes sense that two people who view the world in similar ways would be more likely to partner with one another both because they might explicitly share, and find commonality, in those worldviews, because they might select similar environments to reside in and be therefore more likely to meet each other, and/or because their worldviews might become more similar over time due to shared experiences. (Horwitz et al., 2023). Investigating whether assortative mating occurs for primals would do much to inform our understanding of the extent to which members of families share similar primals (Lansford et al., 2024).

Knowing whether assortative mating emerges for primals ties in closely with the examination of whether there is evidence for the intergenerational transmission of primals in families (i.e. whether parents' and their children's primals are correlated). Indeed, if romantic partners assortatively mate on the basis of specific primals, it might be more likely that they pass such primals down to their children, either through direct socialization efforts, modeling of primals, or even making it more likely that genetic predispositions that might give rise to specific primals be passed along (Clifton, 2020; Lansford et al., 2024). Indeed, many of the developmental phenomena to which primals are compared, including attachment styles and schemas, demonstrate evidence of intergenerational transmission (van IJzendoorn & Bakermans-Kranenburg, 2019). Similarly, recently published research with a population-based Swedish twin sample estimates that genetic heritability explains between 21% and 49% of variance in primals among twin pairs (Perizonius et al., 2025).

In the current study, we examine whether patterns of primal variation in families can be characterized by assortative mating and intergenerational transmission processes. In so doing, we hope to establish a foundational body of evidence behavioral geneticists and developmental scientists can build from to understand how families might influence the development and transmission of primals (Lansford et al., 2024).

Research question 3: examining differences in primals across cultures

Thus far, primals have primarily been investigated in the United States, so primals researchers have emphasized examination of variation in primals in different cultures around the world as a crucial next step in understanding primals (Clifton, 2023; Lansford et al., 2024). Existing evidence is equivocal on whether primals might show variation in different cultures. On the one hand, cultural contexts vary in myriad ways in their norms, resource availability, communication practices, and ways of living (Lansford et al., 2024). If primals are shaped by transactions with these diverse environments (as suggested by bioecological theory), then people living in diverse cultural contexts should have primals that differ significantly from one another (Lansford et al., 2024). For example, perhaps people living in cultures where religion is more prominent are more likely to see the world as alive, versus mechanistic, and people living in cultures with more rigid family roles are more likely to see the world as hierarchical.

In contrast, recent primals work has found that differences in socioeconomic status, health, gender, neighborhood safety, and wealth do not seem to shape primals (Kerry et al., 2024), and that primals about safety were not significantly altered by the COVID-19 pandemic (Ludwig et al., 2023). Therefore, it may be that people's primals are not easily changed by such naturally occurring events regardless of their cultural contexts. In the current study, we directly examine the extent to which primals vary across cultural contexts by examining differences in mean levels of seven primals across 11 cultural groups in eight countries (Colombia, Italy, Jordan, Kenya, the Philippines, Sweden, Thailand, and the United States). These countries represent contexts that vary widely with respect to sociodemographic factors. For example, 27% of the population in the Philippines subsists on less than $3.65 per day compared to 2% or less of the population in Italy, Sweden, and the United States (World Population Review, 2025). The countries also vary widely in cultural dimensions of power distance (hierarchy among individuals within the society), individualism, motivation toward achievement, uncertainty avoidance, long-term orientation, and

indulgence versus restraint in controlling their behaviors to conform to the ways they were raised (Hofstede Insights, 2025). In addition, these countries vary in "looseness" and "tightness" in terms of how much tolerance there is for deviation from cultural norms (Gelfand et al., 2011). In the present study, culture is largely equated with country, although in Italy, we treated two geographic regions as two cultural groups, and in the United States, we treated three racial/ethnic groups as three cultural groups. In Italy, regional differences are pronounced, with north and central Italy (Rome in our sample) more socioeconomically advantaged and individualistic than southern Italy (Naples in our sample) (Bacchini et al., 2024). In the United States, ethnic and racial identity often form the basis of within-country cultural groups (Umaña-Taylor, 2024). The purpose of recruiting families from these countries and cultural groups within countries was to create an international sample that would be diverse with respect to a number of sociodemographic and psychological characteristics. Ultimately, this diversity provided us with an opportunity to examine our research questions in a sample that is more generalizable to a wider range of the world's populations than is typical in most research to date. Differences across countries and cultural groups within countries may be related to specific primals.

Which primals to study

It would be difficult to examine variance, family concordance, and cultural differences in all 26 primals in a single paper. Therefore, *a priori,* we focused this investigation on seven primals: *Good, Safe, Enticing, Alive, Abundant, Progressing,* and *Hierarchical.* We decided to examine *Good, Safe, Enticing,* and *Alive* because these four are the higher-order primals within which 17 other primals fall (see Supplemental Figure 1). Collectively, these four primals account for most of the variance in primals, are most highly correlated to developmental outcomes, and tend to be focal primals examined in primals research (e.g. links with wellbeing, life satisfaction; Clifton et al., 2019, 2021).

The other three primals we study were *Abundant, Progressing,* and *Hierarchical.* We decided to study these three additional primals because their potential correlates varied most widely across the cultural groups we studied. For instance, the cultural groups we studied rank between 8th and 147th in the world on the Human Development Index, which captures national levels of education, mortality, and income (UNDP, 2019). Therefore, if the availability of resources within a culture shapes people's perception of the world's abundance, the wide variance of such resources in our cultural groups affords us the opportunity to capture these differences in perceptions of abundance across culture. Similarly, the cultures in our study vary widely in their ability to curb poverty and prevent violence in their societies across the last 20 years (e.g. parent corporal punishment has been outlawed in Kenya, while perceptions of police violence and discrimination have increased in the United States; Alampay et al., 2022). Therefore, if culture shapes people's perceptions of whether the world is progressing we should be able to capture this phenomenon in our data. Finally, cultures in this study vary widely in how hierarchically they are structured. In many of our cultures, multigenerational families live together, older members head the family, and collectivist values predominate, whereas in other cultures, families are nuclear or single-parent in structure and individualistic values predominate (Gorla et al., 2024; Lansford et al., 2021). If culture shapes people's perception of whether the world is hierarchical, we should be able to capture that phenomenon as well.

Current study

The current study examines primals in 905 families from 11 cultural groups in 8 countries to examine primals within developmental science's bioecological framework. Specifically, we endeavor to uncover 1) whether primals meaningfully vary at the family and cultural level, 2) whether family-level variation might be characterized by assortative mating and intergenerational transmission processes, and 3) whether cultural variation can be captured by differences in primals across cultures.

Method

Participants

The current sample consists of 905 families that answered questions about primals from the Parenting Across Cultures (PAC) project, a study that examines associations between parenting and adolescent and young adult development in numerous cultural groups around the world (Lansford et al., 2021). At the time primals were measured, the sample included youth ($n = 903, M_{age} = 22.76$ years, $SD = 1.03$; 53% females), their mothers ($n = 815$, $M_{age} = 54.17$ years, $SD = 6.02$), and their fathers ($n = 607, M_{age} = 54.05$ years, $SD = 5.96$) from Medellín, Colombia ($n = 80$); Naples ($n = 82$) and Rome ($n = 98$), Italy;

Zarqa, Jordan ($n = 93$); Kisumu, Kenya ($n = 88$); Manila, Philippines ($n = 83$); Trollhättan/Vänersborg, Sweden ($n = 68$); Chiang Mai, Thailand ($n = 72$); and Durham, NC, United States ($n = 80$ Black, $n = 91$ White, $n = 70$ Latino).

Procedure

Participants were originally recruited into the longitudinal study through primary schools. Letters describing the study were sent home from school with children when they were age 8, on average. Parents were asked to sign and return the letter if they were willing to be contacted (in some countries) and contacted by phone to follow up on the letter (in other countries). Children were sampled from public and private schools serving high-, middle-, and low-income families in the approximate proportion to which these income groups were represented in the local population. These sampling procedures resulted in an economically diverse sample that ranged from low income to high income within each site. Sampling included families from each country's majority ethnic group, except Kenyan Luo (13% of the population) and equal proportions of Black, White, and Latino U.S. families. SES was sampled in proportions representative of each city in which participants were recruited. Measures were administered in the predominant language of each data collection site, following forward- and back-translation, cultural adaptation, and meetings to resolve any item-by-item ambiguities in linguistic or semantic content (Erkut, 2010). For the present study, parents and youth provided informed consent at the time primals surveys were administered in 2023 when youth were age 22, on average. With the exception of three fathers who chose to participate in writing or in oral interviews in a location of their choosing with an interviewer who was a trained research assistant (a student or staff member at the local university), measures were completed by participants on their own *via* Qualtrics surveys sent to participants' mobile phones or email. The measures took approximately 1 hour to complete. Families were given modest monetary compensation for participating or compensated in other ways (e.g. with book store vouchers or movie tickets) deemed appropriate by local Institutional Review Boards.

Primal world beliefs measure

Primals were assessed using the PI-18 (Clifton & Yaden, 2021, 18 item shortened version of the Primals

Inventory) which measures the beliefs the world is *Good* (e.g. "Most things in the world are good"), *Safe* (e.g. "I tend to see the world as pretty safe"), *Enticing* (e.g. "No matter where we are, incredible beauty is always around us"), and *Alive* (e.g. "The universe needs me for something important"). We also administered twelve additional items examining *Abundant* (e.g. "The world is an abundant place with tons and tons to offer"), *Hierarchical* (e.g. "Most things can be organized into hierarchies, rankings, or pecking orders that reflect true differences among things"), and *Progressing* (e.g. "On the whole, the world is getting worse") primals from the original primals measure (i.e. the PI-99; Clifton et al., 2019). Participants were asked to rate how much they agree with 30 statements on a $0 = $ *Strongly disagree* to $5 = $ *Strongly agree* scale. The PI-18 instrument is a brief version developed from the 99-item Primals Inventory, which measures 26 basic (i.e. primal) beliefs about the general character of the world (Clifton et al., 2019; Clifton & Yaden, 2021; see Supplemental Figure 1). After reversing negative belief items, we created the primals scores by averaging participants' answers (αs for *Good* = .79 for youth, .79 for mothers, .75 for fathers; for *Safe* = .70 for youth, .68 for mothers, .66 for fathers; for *Enticing* = .71 for youth, .69 for mothers, .72 for fathers; for *Alive* = .70 for youth, .59 for mothers, .63 for fathers; for *Abundant,* = .71 for youth, .73 for mothers, .71 for fathers; for *Hierarchical* = .72 for youth, .73 for mothers, .62 for fathers; for *Progressing* = .80 for youth, .79 for mothers, .81 for fathers).

Importantly, 15 of these 21 primals' internal consistency measures met or exceeded the threshold of $\alpha = .70$ indicating acceptable internal consistency (Nunnally & Bernstein, 1994), whereas the other 6 primals' (mother and father reports of *Safe,* mother reports of *Enticing,* mother and father reports of *Alive,* and father reports of *Hierarchical*) internal consistency measures reside in the "questionable" internal consistency range between .60 and .70 that can be interpreted, but with caution (Nunnally & Bernstein, 1994). Correlations that include measures with questionable internal consistency can be attenuated (Nunnally & Bernstein, 1994). Yet, even in spite of that threat, the 6 primals reports that demonstrated questionable internal consistency still were statistically significantly correlated with other measures in analyses presented below in manners consistent with the 15 primals measures that demonstrated strong internal consistency. Therefore, such questionable internal consistencies does not appear to impact the inferences derived from them, and they appear to be appropriate

for interpretation. Nevertheless, it is still possible that significant correlations involving these 6 primals measures may be attenuated, and caution is therefore warranted in interpreting results accompanying these 6 particular primals measures below.

Additionally, in line with other cross-cultural investigations (e.g. Rothenberg et al., 2021), we utilized the alignment method (Muthén & Asparouhov, 2014) to examine the extent to which each primals measure demonstrated measurement invariance across groups. All primals across all reporters demonstrated acceptable measurement invariance in intercepts and factor loadings, indicating that it was appropriate to compare mean differences in primals across cultures (see Supplemental Methods: Investigating Measurement Invariance for more detail).

Control variables

As noted in the Analytic Plan, youth gender and age, as well as the highest number of years of education either parent completed (a proxy for socioeconomic status) were controlled for in applicable analyses.

Analysis plan

First, we explored the extent to which variance in each primal is attributable to differences between cultures, differences between families within a culture, and individual reporter differences within family. To do so, in accordance with expert recommendations (Bauer & Curran, 2021), we used restricted maximum likelihood estimation procedures to estimate "empty" random effects ANOVAs *via* the Proc Mixed procedure in SAS (SAS Institute Inc, 2015). These models included random intercepts at the cultural and family level, and were three-level models, with level 1 modeling differences in primal variance across individuals within families, level 2 modeling differences in primal variances across families within cultures, and level 3 modeling differences in primal variances across cultures (Bauer & Curran, 2021).

Second, we explored concordance in primals within families. To do so, we explored correlations in primals between mothers and fathers to investigate the extent to which assortative mating on primals was present. Additionally, we explored correlations in primals between both parents and their youth to investigate the extent to which intergenerational transmission of primals had occurred.

Third and finally, to explore whether mean primal scores varied across cultures, we utilized generalized

linear mixed models specifying a normal distribution and an identity link function using the "proc genmod" function in SAS (SAS Institute Inc, 2015). We ran 7 models, one for each primal. Within these models, the cultural group a person belonged to was used to predict primals scores. The primal reporter (i.e. youth, mother, and father) as well as youth gender, youth age, and the highest number of years of schooling either parent completed was controlled in all models to ensure that cultural differences emerged above and beyond reporter differences in primals. For the cultural group comparison, contrast codes were used to compare the average primal score in each cultural group to the overall primal mean score across all cultural groups. Nesting of reporters within families and families within countries was accounted for in the modeling process by including family ID and country ID as repeated (i.e. random) effects (Cameron & Trivedi, 2009).

Our study was adequately powered to answer our research questions (see Supplemental Methods: Investigating Power to Detect Effects for further detail).

Preregistration

The study rationale, design, measures, and some of the study's analytic plan and research questions were pre-registered (https://osf.io/kmzaj?view_only=755a3c58a0634728bb202f2c71ae47b3). The study research questions and analytic procedures that were not pre-registered consisted of the exploration of differences in correlations among reporters and differences in means across cultures. Those two research questions were added by recommendation after preliminary results were presented at a conference. Data are available upon reasonable request from the first author.

Results

Table 1 reports mean levels of primals by cultural group and reporter.

Research question 1: Understanding variance in primals explained by individual, family, and cultural differences

Figure 1 depicts the percentage of variance in each primal attributable to differences between cultural groups (in blue), differences between families within cultural groups (in orange), and differences between individuals (in green). The majority of variance in all

Table 1. Primal world beliefs across reporters and culture.

| | Primal world belief | | | | | | | | | | | | | | | | | | | | |
| | Good | | | Safe | | | Enticing | | | Alive | | | Abundant | | | Hierarchical | | | Progressing | | |
	M	F	Y	M	F	Y	M	F	Y	M	F	Y	M	F	Y	M	F	Y	M	F	Y
Whole sample	3.16	3.16	2.99	2.83	2.86	2.52	3.43	3.43	3.35	3.18	3.11	3.14	3.43	3.51	3.34	2.82	2.94	2.85	2.37	2.46	2.21
Colombia	3.46	3.44	3.39	3.15	2.98	2.99	3.68	3.71	3.67	3.50	3.53	3.47	3.70	3.69	3.56	3.18	3.15	2.85	2.56	2.63	2.45
Naples, Italy	2.92	3.11	2.95	2.45	2.80	2.40	3.39	3.51	3.51	2.90	2.86	2.98	3.50	3.80	3.45	2.84	2.99	2.74	1.60	2.05	1.86
Rome, Italy	3.10	3.14	2.88	2.69	2.77	2.33	3.47	3.59	3.46	2.89	2.62	2.70	3.48	3.63	3.27	2.63	2.77	2.71	1.99	2.08	1.60
Jordan	2.78	2.77	2.85	2.63	2.55	2.53	2.88	2.89	3.05	3.22	3.23	3.35	3.13	3.12	3.21	3.08	3.19	3.16	2.61	2.47	2.42
Kenya	3.12	3.05	3.16	2.88	2.71	2.79	3.09	3.13	3.28	3.61	3.53	3.67	3.12	3.19	3.31	3.42	3.18	3.36	2.62	2.45	2.80
Philippines	3.30	3.34	2.90	2.96	3.05	2.36	3.43	3.51	3.21	3.64	3.49	3.32	3.56	3.67	3.24	3.26	3.26	2.95	2.91	2.89	2.38
Sweden	3.35	3.28	3.03	3.17	3.27	2.81	3.80	3.76	3.40	2.18	1.64	2.44	3.31	3.36	3.29	1.58	1.99	2.35	2.44	2.37	2.13
Thailand	3.03	3.03	2.62	2.81	2.87	2.24	3.16	3.13	2.86	3.36	3.29	3.06	3.38	3.33	3.11	3.07	3.14	3.00	2.76	2.72	2.31
US Black	3.06	3.16	2.93	2.53	2.72	2.32	3.42	3.47	3.31	3.20	3.39	3.22	3.27	3.43	3.33	2.79	2.71	2.92	1.97	2.38	1.93
US White	3.49	3.45	3.07	3.07	3.11	2.50	4.00	3.90	3.61	2.84	2.83	2.77	3.80	3.98	3.59	1.92	2.30	2.15	2.21	2.58	2.04
US Latino	3.31	3.23	3.16	2.94	2.93	2.58	3.62	3.48	3.61	3.18	3.14	3.25	3.50	3.47	3.39	2.75	3.01	2.79	2.45	2.38	2.38

Note. M: Mother report; F: Father report; Y: Youth Report. Range for all Primal World Beliefs is 0–5, with higher scores indicating greater endorsement of belief.
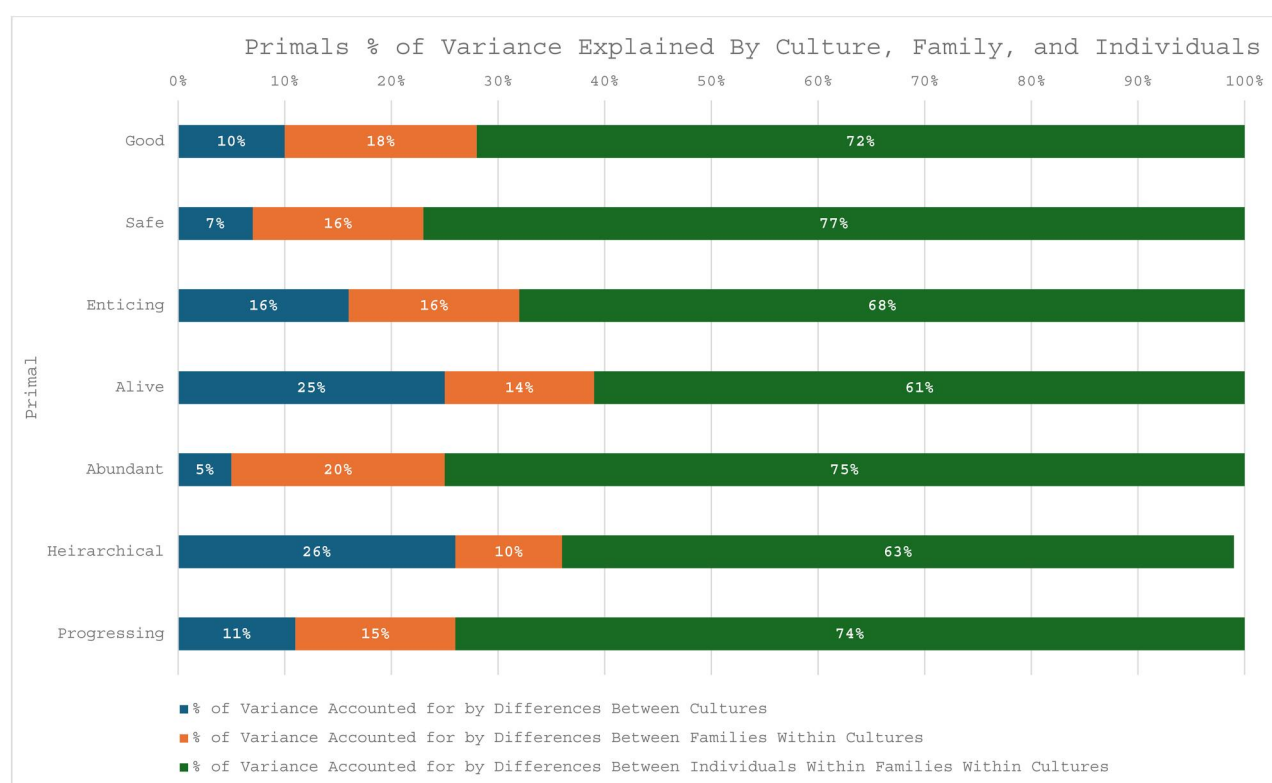
Figure 1. Percentage of variance explained in each primal by culture, family, and individuals.

primals is accounted for by individual differences (between 61%−77% across primals; Figure 1). For most primals, differences between families accounted for the second largest portion of variance (between 10%−20% across primals), and differences between cultures accounted for the smallest portion of variance (between 5 and 26% across primals). There were three exceptions to this trend. For the *Enticing*, *Alive*, and *Hierarchical* world beliefs, equal or larger portions of variance were accounted for by differences between cultures compared to differences between families. Variance accounted for at each of the three levels for

each primal can be found in Figure 1. Intraclass correlations (ICCs) are reported on a primal-by-primal basis in the Supplemental Results: Reporting ICCs section of the Supplemental Materials.

Research question 2: Examining concordance in primals within families

Correlations in primals across reporters can be found in Table 2. All correlations were significant and positive at the $p < .001$ level. If one member of a family endorsed a primal more strongly, other members of

the family were also likely to do so. In addition, there was widespread evidence for both assortative mating by primals and the intergenerational transmission of primals. With regards to assortative mating, mother and father primals were significantly positively correlated for all 7 primals, and these correlations were all medium-to-large in effect size (ranging from $r = .32$ to .44). To put the strength of assortative mating in this sample in perspective, all of these correlations are as high or higher than the correlation between engaging in therapy and experiencing subsequent well-being ($r = .32$; Meyer et al., 2001).

With regards to intergenerational transmission of primals, all correlations between mothers and their youth (ranging from $r = .21$ to $r = .33$) and fathers and their youth (ranging from $r = .12$ to $r = .34$) were significant and positive for all 7 primals, and these correlations were all small-to-medium in effect size. To put the strength of intergenerational transmission in this sample in perspective, all of these correlations were as high or higher than the correlation between low level lead exposure and reduced child IQ ($r = .12$; Meyer et al., 2001).

Research question 3: Examining differences in primals across cultures

Mean primal scores across cultures are reported in Table 3. Cultures falling significantly below the overall mean on a primal are highlighted in red, and cultures rising significantly above the overall mean on a primal are highlighted green. Most cultures significantly differed from the overall mean for each primal. We describe the results by primal below (also see Table 3).

Examining *Good* world belief, the Naples, Rome, Thailand, and Jordan cultural groups scored significantly below the grand mean, whereas the U.S. White, U.S. Latino, and Colombian cultural groups scored significantly above the grand mean. Examining the *Safe* primal, the Naples, Rome, U.S. Black, and Jordan groups scored significantly below the grand mean, whereas the Sweden and Colombian cultural groups scored significantly above the grand mean. Examining the *Enticing* primal, the Kenyan, Thai, and Jordan groups scored significantly below the grand mean, whereas the U.S. White, U.S. Latino, and Colombia groups scored significantly above the grand mean. Examining the *Alive* primal, the Naples, Rome, Sweden, and U.S. White groups scored significantly below the grand mean, whereas the Kenya, Philippines, Colombia, U.S. Latino and Jordan groups scored significantly above the grand mean. Examining the *Abundant* primal, the Kenya, Thailand, Jordan, and Sweden groups scored significantly below the grand mean, whereas the Naples, U.S. White, and Colombia groups scored significantly above the grand mean. Examining the *Hierarchical* primal, the Sweden and U.S. White groups scored significantly below the grand mean, whereas the Kenya, Philippines, Thailand, Colombia, and Jordan groups scored significantly above the grand mean. Examining the *Progressing* primal, the Naples, Rome, and U.S. Black groups scored significantly below the grand mean, whereas the Kenya, Philippines, Thailand, Colombia, and Jordan groups scored significantly above the grand mean.

Table 2. Correlations in primal world beliefs across reporters.

Primal	Mother-Youth	Father-Youth	Mother–Father
Good	.25***	.22***	.43***
Safe	.21***	.12***	.37***
Enticing	.28***	.27***	.44***
Alive	.33***	.34***	.41***
Abundant	.21***	.24***	.32***
Progressing	.27***	.13**	.35***
Hierarchical	.28***	.28***	.43***

Note. ***$p < .001$.

Table 3. Cultural group means and differences in primal world beliefs.

	Primal world belief						
	Good	Safe	Enticing	Alive	Abundant	Hierarchical	Progressing
Whole sample	3.10	2.72	3.40	3.14	3.42	2.86	2.33
Colombia	3.43	3.04	3.68	3.50	3.65	3.05	2.54
Naples, Italy	2.98	2.53	3.46	2.92	3.56	2.85	1.82
Rome, Italy	3.02	2.57	3.50	2.74	3.44	2.70	1.86
Jordan	2.80	2.57	2.94	3.27	3.15	3.14	2.50
Kenya	3.11	2.80	3.17	3.61	3.21	3.33	2.63
Philippines	3.16	2.76	3.37	3.48	3.47	3.14	2.71
Sweden	3.21	3.06	3.64	2.14	3.32	1.98	2.31
Thailand	2.88	2.61	3.04	3.23	3.26	3.06	2.58
US Black	3.03	2.49	3.39	3.25	3.32	2.83	2.04
US White	3.34	2.90	3.85	2.82	3.79	2.10	2.26
US Latino	3.23	2.79	3.58	3.20	3.45	2.83	2.40

Note. Bolded values significantly different from whole sample mean at $p < .05$, even after controlling for differences among reporters, youth gender and age, and parent years of education. Red highlighting indicates country value is significantly lower than whole sample mean at $p < .05$. Green highlighting indicates country value is significantly higher than whole sample mean at $p < .05$.

Notably, only Colombians endorsed all seven primals studied here at rates significantly above the grand mean.

Additionally, models controlled for youth gender, youth age, parent years of education, and reporter type (i.e. mother, father, youth) when exploring differences in means across cultures. Although exploratory and not a central analysis in the current study, with few exceptions across most primals, parents reported significantly higher primal scores than youth did (see Supplemental Results: Comparing Mean Primal Scores for Mothers, Fathers, and Youth for further detail).

Discussion

This cross-cultural study uses developmental science's bioecological framework to examine the extent to which primals vary according to family and cultural circumstances. The current study found that the majority of variance in primals was accounted for by individual differences, followed by family and cultural differences, and that there was significant variation in primals at both the family and cultural level. Additionally, the current study found evidence for both assortative mating according to primals (*via* significant positive correlations between mother and father primals) and intergenerational transmission of primals (*via* significant positive correlations between parents' primals and those of their children). Finally, the current study found cultural variation in mean levels of primals. Most cultures varied from the overall mean when examining individual primals. We elaborate on each of these findings, and their implications for studying primals within developmental science, below.

Research question 1: understanding variance in primals explained by individual, family, and cultural differences

We took an initial step in applying bioecological systems theory to primals research by examining whether significant amounts of variance in primals can be explained at the family and cultural levels, because bioecological systems theory posits that developmental phenomena are embedded in, transact with, and are affected by family and cultural contexts (Bronfenbrenner & Morris, 2006). We found that, as is true with most beliefs and behaviors (e.g. Deater-Deckard et al., 2018), the vast majority of variance in primals is accounted for by individual differences, which suggests that individual characteristics may play a large role in shaping primals. Clifton et al. (2020)

have hypothesized as such, when they speculated that primals might form in part due to relatively stable individual differences that emerge early in life for idiosyncratic reasons. Clifton and his colleagues suggest that these relatively stable, idiosyncratic individual differences might be the reason that primals may be "schema-like" (Kerry et al., 2024).

Nevertheless, it is notable that for all primal studied, significant portions of variance are attributable to differences between families (between 10%–20%) and cultures (between 5%–26%). The proportions of variance attributable to family and culture exceed those found in studies of personality traits (McCrae & Terracciano, 2008), and seem to align more closely to the proportion of variance attributable to between- and within-culture differences for parenting and child behaviors (Deater-Deckard et al., 2018). This suggests that though primals may be similar to personality traits in being relatively stable over time and across situations (Clifton, 2023; Lansford et al., 2024), family and cultural forces may be more likely to account for variance in primals compared to personality traits. Our analyses suggest that searches for predictors of primals at the family and cultural level are worthwhile and may lead to the identification of predictors of how primals form or what maintains them (Lansford et al., 2024). For instance, both *Alive* and *Hierarchical* had more than 25% of their variance accounted for by differences between cultures. We wonder whether cultural norms around religious involvement (for *Alive*) and collectivism and familism (for *Hierarchical*) might explain part of this portion of variance and explore this possibility further below in our discussion of cultural differences in primals.

Taken together, these findings have practical implications for identifying which levels of a person's ecological surroundings would be most fruitful to engage in attempting to shape primals or design primals-based interventions. For instance, primals like *Good*, *Safe*, and *Abundant* are associated with greater well-being (Clifton et al., 2019; 2021) and also have comparatively larger majorities of their variance accounted for at the family level compared to the cultural level. Therefore, for these specific primals, family-level socialization practices or interventions might be most fruitful in shaping primal development.

Research question 2: Examining concordance in primals within families

Developmental scientists often identify assortative mating and the intergenerational transmission of

beliefs or behaviors as two foundational processes that enable beliefs or behaviors to cluster within families (Horwitz et al., 2023; Rothenberg, 2019). Evidence from the current study indicates that both of these processes may be at work in accounting for variation between families in primals. Significant positive correlations in all primals between mothers and fathers provide evidence for assortative mating by primals, and significant positive correlations in all primals between parents and children provide evidence for the intergenerational transmission of primals.

Numerous mechanisms could account for assortative mating by primals. Perhaps the most intuitive is that two people may explicitly share their worldview, find that they share the same worldview, and become more attracted to one another and therefore more likely to partner based on that worldview (Horwitz et al., 2023). For instance, a person who views the world as good (versus bad) may be much more likely to find another person who sees the world as good as a potential mate, due to their optimism and shared life outlook. Alternatively, assortative mating on primals might also take place because two partners' shared primals influence similar personalities, behaviors, and values that attract them to each other (even if both people are unaware of their primals). Both of these selection-based explanations assume that the correlations between mothers' and fathers' primals observed in this study remain relatively stable over time and existed when their relationship was initiated. Assortative mating on primals might also take place because people who share similar worldviews might select similar environments to inhabit, and meet each other within those environments (Horwitz et al., 2023). For instance, two people who see the world as enticing might both be frequent hikers (due to their view of the world as beautiful and worth exploring; Clifton & Kim, 2020) and might meet each other and partner due to such shared interests. Two partners may also assortatively mate on primals because they become more similar to each other over time in their primals due to shared expereinces, as happens with partner personality traits (Lewis & Yoneda, 2021) and well-being (Jones et al., 2017). In other words, partners' primals may "rub off" on one another. This explanation assumes that the correlations between mothers' and fathers' primals observed in this study might be the result of a strengthening process over time, as parents share experiences. Importantly, future longitudinal work is needed to further parse apart these explanations for how partners assortatively mate based on primals; stable correlations over time would indicate people select partners based on primals, whereas strengthening correlations over time would indicate parenting partners' primals "rub off" on each other as they undergo similar experiences.

Similarly, several mechanisms could account for the intergenerational transmission of primals. Primals could be transmitted across generations due to direct parent socialization efforts, where parents attempt to teach their children their worldview (Clifton & Meindl, 2022; Lansford et al., 2024). For instance, one recent study found that many parents reported it was important for them to teach their children that the world is dangerous in order to protect them (Clifton & Meindl, 2022). Explicit instruction about primals, however, is perhaps not widespread. Primals could also be transmitted across generations due to parent modeling (Lansford et al., 2024). For instance, if the two hypothetical people who viewed the world as enticing mentioned above continue to go on hikes and travel to naturally beautiful places with their children, perhaps their children may relish those shared family activities and come to view the world as enticing as well. Primals could also potentially be transmitted across generations due to genetic predispositions that inform the development of primals. For instance, infants born with an approach-oriented temperament may elicit more interactions with their parents from an early age, experience their early world as secure, and consequently begin to view the world as safe, whereas infants born with an inhibited temperament may elicit fewer interaction with their parents, experience the world as less secure, and consequently begin to view the world as dangerous (Rothenberg, 2019; van IJzendoorn & Bakersmans-Kraneburg, 2019).

Future prospective longitudinal work can disentangle each of these mechanisms. Such studies can examine the extent to which early-life socialization and modeling predict intergenerational transmission of primals (Lansford et al., 2024). Though this study provides preliminary evidence for assortative mating by, and intergenerational transmission of, primals, there is still much to learn by applying a developmental perspective to primals research.

Ultimately, these results have important implications for identifying who might be especially important socialization agents that can help shape primals to promote wellbeing. For instance, given preliminary evidence for intergenerational transmission of primals, if one is interested in shaping primals in youth, it might be worthwhile to engage their parents in reflecting upon their own primals and brainstorming ways they can inculcate adaptive primals in their

youth (Lansford et al., 2024). Similarly, if one is interested in shaping primals in an adult, it might be useful to recruit their romantic partner as a socialization agent, given preliminary evidence for assortative mating by primals.

Parents report higher primals scores than their children

Although not a primary analysis in the current study, parents scored significantly higher on most primals than their children. Parents saw the world as *Good*, *Safe*, *Enticing*, *Abundant*, and *Progressing* at higher levels than their children. This finding is notable, because higher scores on each of these primals are associated with greater life satisfaction, well-being, and health (Clifton et al., 2019, 2021). This trend for parents to endorse primals at a higher rate may be an age effect; people view the world more positively as they get older (Poulin & Cohen Silver, 2008). Alternatively, it may be a cohort effect; perhaps parents born in the 1970s and 1980s are happier than their children born around 2000 (who came of age during a time of tremendous worldwide stress due to the COVID-19 pandemic). This trend bears further monitoring as happiness in young people in several world regions seems to be declining over the past 15 years (Helliwell et al., 2024), and we know happiness is correlated with primals (Clifton & Meindl, 2022).

Research question 3: differences across cultures in primals

No matter the primal investigated, most of the 11 cultural groups examined in this study significantly differed on that primal from the overall mean across all cultural groups. That primals vary in their mean levels of endorsement across cultural contexts may suggest that there are particular aspects of culture that may shape or maintain primals (Lansford et al., 2024). Yet, the cultural norms or characteristics that might drive why some cultures were significantly higher or lower in primals in our sample were not immediately clear for most primals. For instance, it is not as if cultures with higher socioeconomic status, better health outcomes, or greater safety were exclusively those that scored highest on the *Good* or *Safe* primals (a finding that aligns with prior work that did not find differences in primals across levels of socioeconomic status or health; Kerry et al., 2024).

However, we do offer tentative hypotheses for some patterns of differences in primals across cultures. First, families from cultures where active religious participation is more normative as measured in our sample (i.e. Colombia, Jordan, Kenya, Philippines and U.S. Black and Latino participants, where families reported among the highest levels of religious participation in our sample) generally saw the world as more alive (i.e. that the world is animated by intentionality, and that there is meaning in, and cause to listen to, the universe; Clifton et al., 2019), whereas families from cultures where religious participation is less normative (Rome and Naples, Italy; Sweden; and U.S. White participants, where families reported lower levels of religious participation in our sample) saw the world as more mechanistic. Given that most major religions teach that the world is overseen by a deity, deities, or cycle or reincarnation, it makes sense that cultures that more actively participate in religion see the world as alive and being actively controlled by such religious processes.

Additionally, it is notable that cultures that are more collectivist in nature, likely to live in multigenerational homes, and high in family obligations (e.g. Colombia, Jordan, Kenya, Philippines, and Thailand; Gorla et al., 2024) see the world as more hierarchical, whereas more individualistic cultures (e.g. Sweden; U.S. White participants) see the world as less hierarchical. In many collectivist cultures, hierarchy is integral to cultural norms of devotion to one's family (e.g. respect for and deference to one's elders; Lansford et al., 2021), and the current results support that such cultures see the world as hierarchical. These and other predictors need further study in prospective longitudinal investigations to understand if they shape or maintain differences in primals across cultures (Lansford et al., 2024).

Notably, current findings that mean levels of primals vary across cultures have implications for identifying where targeting specific primals might have the greatest impact on well-being promotion at the cultural level. If certain cultures are uniquely likely to endorse high levels of particular primals, then promoting primals within that cultural space might have a uniquely powerful impact on well-being. Indeed, cultural normativeness theory (Deater-Deckard & Dodge, 1997) demonstrates that people holding beliefs and enacting subsequent behaviors aligned with cultural norms often experience greater wellbeing within that cultural context compared to people who believe and act outside of cultural norms. Identification of primals that are both a) relatively more normative

within a cultural context as evidenced by higher mean endorsement of such primals in that context and b) associated with well-being could allow applied developmental researchers to identify which primals to promote in which cultural contexts to enhance adaptive development (Lansford et al., 2024).

Primals' place in wider psychological perspective

Given attempts by primals researchers to integrate primals research with applied developmental research, it is also worthwhile to consider the current study in wider psychological perspective. Primals Theory attempts to "stand on the shoulders of giants" by integrating past research of broad beliefs about the world that shape human behavior (including Belief in a Just World, Shattered Assumptions, and beliefs underpinning Cognitive Behavioral Therapy; Beck et al., 1979; Janoff-Bulman, 1989; Montada & Lerner, 1998) into an organized, hierarchical framework of world beliefs that people hold.

The current study demonstrates that primals adhere to several tenets of developmental science's bioecological theory. For instance, primals do seem embedded in and potentially responsive to family and cultural context, as evidenced by variation across those contexts. Additionally, primals show potential for reciprocal associations between romantic partners and from parents to children, given assortative mating and intergenerational correlations. Moreover, primals show evidence that cultures value primals differently, given mean differences observed in this study.

This support for primals as developmental phenomena situated in bioecological theory is crucial. We would argue that until recently much primals research pointed to primals being stable and trait-like, and perhaps less modifiable by outside influences (Kerry et al., 2024; Ludwig et al., 2023). Results from the current study characterize primals as perhaps more malleable and schema-like with the potential to vary across family and cultural context, and with some evidence of socialization effects. In this way, the current study moves primals from being considered theoretical constructs that are potentially more akin to traits, and recharacterizes them using bioecological theory as potentially more modifiable phenomena across families, cultures, and ontogeny.

Strengths, limitations, and conclusions

The current study has numerous strengths, including its use of a large, cross-cultural sample; its examination of primals across mothers, fathers, and youth; and its preregistered design. However, the study also has numerous limitations that are important to highlight. Unfortunately, mother, father, and youth reports of primals have thus far only been collected at a single time point, and investigating how or whether primals change over time across reporter or culture would add greater insight into the processes studied here. Additionally, cultural groups in this study only represent a limited subsample of the numerous cultural groups that exist worldwide, and participants are representative of the cities, but not nations in which they reside. Therefore, generalizability of study findings is limited, and future work could examine similar questions in more places and with nationally representative samples. Finally, the current study examines proportions of variance in primals accounted for by individual, family, and cultural forces, but does not actively examine which individual, family, and cultural-level predictors might predict such variance. Future studies can build on this work to improve specificity in prediction.

In spite of these limitations, the current study contributes to existing literature, which has struggled to identify experiential sources of variation in primals, by grappling with differences in primals across families and cultures, as called for by primals researchers (Lansford et al., 2024; Ludwig et al., 2022). The present study provides evidence that significant variance in primals is attributable to individual, family, and cultural differences, making the study of family and cultural predictors of primals worthwhile. The present study also provides preliminary evidence for the occurrence of assortative mating by, and intergenerational transmission of, primals, and further uncovers differences in mean levels of primals across cultural contexts. By examining how primals may be embedded in family and culture, we hope to advance understanding of how primals are formed and maintained by adopting the principles and approaches of developmental science.

Disclosure statement

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