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Original Article

Life History Strategy and the HEXACO Personality Dimensions

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Abstract: Although several studies have linked Life History Strategy (LHS) variation with variation in the Five Factor Model personality dimensions, no published research has explored the relationship of LHS to the HEXACO personality dimensions. The theoretically expected relationship of the HEXACO Emotionality factor to LHS is unclear. The results of two studies (N = 641) demonstrated that LHS indicators form part of a factor along with HEXACO Extraversion, Agreeableness, Conscientiousness, and (marginally) Honesty-Humility. People higher on these dimensions pursue a slower LHS. Neither Openness nor Emotionality was associated with this factor. Holding LHS constant, social involvement with kin was consistently predicted by higher Emotionality and was not consistently predicted by any other HEXACO factor. These results support a view of Emotionality as part of an LHS-independent personality dimension that influences the provision and receipt of kin altruism.

Keywords: HEXACO, Life History Strategy, emotionality, kin altruism

Introduction

Theorists have recently made considerable progress integrating personality psychology with evolutionary psychology (Buss, 2009; Marsh and Boag, 2013; Michalski and Shackleford, 2010). Several theoretical approaches, not all of them mutually exclusive, show considerable potential in this regard (e.g., Lukaszewski and Roney, 2011; Nettle, 2006). In this paper, I test hypotheses derived from the Life History Strategy (LHS) approach to understanding personality variation (Belsky, Steinberg, and Draper, 1991; Figueredo et al., 2005; Kaplan and Gangestad, 2005; Rushton, 1985).

Life History Theory draws attention to the trade-offs that organisms face in allocating limited energy among the competing demands of growth, reproduction (including mating and parenting), and bodily maintenance/repair (MacArthur and Wilson, 1967; Pianka, 1970). A “slow” LHS prioritizes (1) somatic effort over reproductive effort, (2) parental and kin investment over mating effort, (3) offspring quality over offspring quantity, and (4) future reproduction over current reproduction, whereas a “fast” LHS sets

the opposite priorities. Natural selection is expected to shape suites of co-adapted traits that enable individuals to consistently pursue an LHS at a particular point on the fast-slow continuum (Rushton, 1985).

From these principles, proponents of LHS-based personality theory have formulated the following arguments. First, a slow LHS will be associated with longer-term planning (less future discounting—e.g., Wilson and Daly, 1997) than a fast LHS (Figueredo et al., 2006). Because humans are "ultrasocial" and dependent on culturally transmitted knowledge (Hill, Barton, and Hurtado, 2009), and because the reproductive payoffs to cooperative social relationships are often delayed over multi-year periods (e.g., Gurven, Allen-Arave, Hill, and Hurtado, 2000), a slow LHS in *H. sapiens* is expected to be associated with personality traits that prioritize sociality, altruism (both kin-selected and reciprocal), and adherence to social norms (Rushton, 1985). Individuals pursuing a slow LHS are expected to form stable, long-term mating relationships. Higher investment in somatic effort should lead to improved psychological health, including greater positive emotionality, less negative emotionality, and greater capacity for, and enjoyment of, intellectual effort. In contrast, a fast LHS will be associated with a focus on short-term gains (including short-term mating strategies), an antagonistic social orientation, and poorer physical and psychological health.

With respect to the Five-Factor Model (FFM: Digman, 1990; McCrae and John, 1992), this argument has generated the predictions that a slower LHS will be associated with higher levels of Conscientiousness, Extraversion, Agreeableness, Emotional Stability (the inverse of Neuroticism) and Openness to Experience. Some data support these predictions (Dunkel and Decker, 2010; Figueredo, Vásquez, Brumbach, and Schneider, 2007; Gladden, Figueredo, and Jacobs, 2009).

Though the FFM remains the most frequently used structural model of human personality, it has been challenged in recent years by the six-factor HEXACO model (Ashton and Lee, 2001, 2007; Ashton, Lee, and de Vries, 2014). Three of the HEXACO model's dimensions (Extraversion, Conscientiousness and Openness to Experience) are broadly similar to their FFM counterparts. HEXACO Emotionality and Agreeableness represent alternative rotations of FFM Neuroticism and Agreeableness. Two of HEXACO Emotionality's facets—Fear and Anxiety—also characterize FFM Neuroticism, but another Emotionality facet—Sentimentality—is associated with FFM Agreeableness. HEXACO Emotionality lacks the Angry Hostility facet included in FFM Neuroticism (see Costa and McCrae, 1995)—instead, anger-related traits (temperamentalness and irritability) characterize the low pole of HEXACO Agreeableness, whereas its high pole includes Forgiveness and Gentleness. Finally, Honesty-Humility includes the facets (the first two subsumed under FFM Agreeableness) of Sincerity, Modesty, Fairness, and Greed Avoidance.

The distinctiveness of Honesty-Humility appears to be responsible for the HEXACO model's superiority to the FFM in predicting various forms of antagonistic and exploitative attitudes and behaviors (e.g., Lee and Ashton, 2005; Lee et al., 2013). Although less work has explored the unique predictive power of Emotionality, it enables HEXACO to outperform the FFM in predicting phobic tendencies (Ashton, Lee, Visser, and Pozzebon, 2008) and "realistic" vocational interests (McKay and Tokar, 2012).

Like the FFM (e.g., Denissen and Penke, 2008; Nettle, 2006), the HEXACO model has been interpreted in terms of evolved trade-offs, i.e., taking the view that along each

dimension, different trait levels entail different fitness costs and benefits (Ashton and Lee, 2007; Ashton et al., 2014). HEXACO Extraversion, Conscientiousness, and Openness are regarded as endeavor-related traits, reflecting variable investment of time and effort in social, task-related, and idea-related activities, respectively. Honesty-Humility, Agreeableness, and Emotionality are thought to govern the conduct of cooperative relationships, but in different ways. Honesty-Humility and Agreeableness are related to the management of relationships of reciprocal altruism. People higher in Honesty-Humility are more willing to forego opportunities to exploit others, whereas people higher in Agreeableness are more willing to tolerate occasional exploitation by others in relationships that are mutually beneficial overall. The theoretically generated double dissociation between Honesty-Humility and Agreeableness has been supported by an experimental study using economic games that tap variation in fairness and forgiveness (Hilbig, Zettler, Leist, and Heydasch, 2013).

Variation in emotionality is proposed to govern both the receipt and the provision of kin altruism (Ashton and Lee, 2007; Ashton et al., 2014). In this view, Emotionality's Sentimentality and Emotional Dependence facets tap variation in empathic concern and capacity for emotional attachment, while its Fear and Anxiety facets tap variation in risk-aversion as a means of safeguarding personal survival and, hence, the continued ability to invest in close kin, particularly offspring. However, no published findings have linked variation in emotionality to variation in the strength of kin ties. Testing this proposed link is one of the goals of the present study.

The HEXACO model's Emotionality-Agreeableness rotation is arguably more strongly theoretically grounded than the FFM's Neuroticism-Agreeableness rotation, even though they are equally valid psychometrically. FFM Neuroticism is glossed as heightened susceptibility to negative emotions (Digman, 1990; McCrae and John, 1992). Although the negative emotions may share a common phylogenetic ancestor in the basic emotion apprehension (Nesse, 2004), in modern humans the negative emotions serve as adaptive responses to a diverse set of challenges that have quite different antecedents, correlates, and consequences. For example, displays of anger influence others to increase their relative regard for one's welfare, and anger-proneness is positively associated with traits (physical formidability and attractiveness) that enhance individuals' abilities to confer benefits and impose costs on others (Sell, Tooby, and Cosmides, 2009). Anxiety serves the very different function of motivating vigilance and avoidance in dangerous situations (Marks and Nesse, 1994), and HEXACO Emotionality is *negatively* associated with formidability and (self-perceived) attractiveness (Lukaszewski, 2013).

To summarize my argument to this point, (1) Life History Theory, a branch of evolutionary theory, has successfully predicted variation in FFM traits (Dunkel and Decker, 2010; Figueredo et al., 2007; Gladden et al., 2009); (2) the HEXACO model has proven to be a valid alternative to the FFM in predicting a wide variety of external criterion variables (Ashton et al., 2014); (3) the HEXACO dimensions have been plausibly interpreted in adaptive evolutionary terms, yet (4) no research has linked variation in the HEXACO dimensions to variation in LHS. If Life History Theory provides a uniquely powerful organizing principle for understanding human individual differences (Figueredo, Cabeza de Baca, and Woodley, 2013; Rushton and Irwing, 2011), then variation in LHS should predict variation in the HEXACO dimensions.

For reasons described above, HEXACO Honesty-Humility, Extraversion, Agreeableness, Conscientiousness, and Openness should all be associated with a slower LHS. However, the expected relationship of Emotionality to LHS is less clear. Viewing its Fear and Anxiety facets as indicative of low-level psychological functioning resulting from low investment in somatic effort (Figueredo et al., 2007) leads to the prediction that, similarly to FFM Neuroticism, higher levels of Emotionality will be associated with a faster LHS. However, if variation in Emotionality underpins variation in the propensity to (1) provide parental investment and (2) provide and receive kin altruism (Ashton and Lee, 2001, 2007), then higher levels of Emotionality will be associated with a slower LHS, because high levels of kin altruism and parental investment are components of a slow LHS (Figueredo et al., 2005; Rushton, 1985).

Overview of the present research

Here I present the results of two studies, each using the same HEXACO instrument but different measures of LHS. In both studies, I first examine correlations between LHS measures and the HEXACO dimensions. Second, I examine the relationships between the HEXACO factors and variation in the strength of kin ties, controlling for overall LHS. In Study 1 (only), I also examine the relationships between the HEXACO factors and variation in the strength of friendship ties, controlling for overall LHS. If Emotionality is distinctly related to kin altruism, as argued by Ashton and Lee (2001, 2007), then (1) it will be the HEXACO dimension most strongly related to LHS-residualized kin involvement and (2) it will be unrelated to LHS-residualized friendship involvement.

Study 1

Materials and Methods

Participants and procedures

I conducted a power analysis to estimate adequate sample size. Gladden et al. (2009) found correlations of .25–.55 between the FFM dimensions and an extracted factor representing LHS based on the same instrument used in the present study. With a power level of .80 and an alpha of .05, a sample of 124 would be adequate to detect a correlation of .25. I conservatively chose a larger target sample size of 300, offering 335 opportunities for participation to accommodate attrition.

Participants consisted of 335 anonymous U.S. residents recruited from Amazon's Mechanical Turk (AMT) (see Buhrmester, Kwang, and Gosling, 2011). Each participant received $1.50 as compensation. The survey itself was administered through SurveyMonkey. To minimize bogus responses, I embedded two items with factually correct answers within the instruments. Nineteen respondents gave incorrect answers to one or both of these questions, and two other respondents declined to answer substantial numbers of items (8 and 13, respectively) within a single scale of one of the instruments. The remaining 314 participants (61.8% female) ranged in age from 18 to 72 (M = 34.94; SD = 11.40).

Measures

The Arizona Life History Battery (ALHB: Figueredo, 2007) is a 199-item self-report instrument consisting of eight scales drawn from various original sources (Barrera, Sandler, and Ramsay, 1981; Brennan, Clark, and Shaver, 1998; Brim et al., 2000). Seven of the scales measure distinct aspects of LHS. The 20-item Insight, Planning, and Control (IPC) scale (with a 7-point Likert response scale ranging from "disagree strongly" to "agree strongly") includes items such as "I am good at figuring out how things will turn out." The 26-item Parent Relationship Quality scale (13 items for each biological parent) poses questions such as "How much time and attention did they give you when you needed it?" and provides a 4-point response scale ranging from "not at all" to "a lot." The Family Contact/Support and Friends Contact/Support scales (15 items each, with the same 4-point response scale as the Parent Relationship Quality scale) include items such as "During the past 12 months, about how many times have they come to your house?" The 50-item General Altruism scale (with a 7-point Likert response scale from "disagree strongly" to "agree strongly") includes subscales measuring altruism toward own children (example: "I always drop my plans when my children seem troubled"), other genetic kin (example: "I spend a great deal of time per month giving informal emotional support to my blood relatives"), friends (example: "I would take a friend into my home if they could not afford to live alone"), and the community (example: "I frequently volunteer time or money to social causes that I support"). The 17-item Religiosity scale (with a 7-point Likert response scale from "disagree strongly" to "agree strongly") includes items such as "I frequently attend religious services." The 36-item Secure Attachment to Romantic Partners (Experiences in Close Relationships: ECR; Brennan et al., 1998) scale includes three subscales, which respectively measure Secure, Anxious, and Avoidant Attachment (the latter two subscales being reverse scored). Exemplary items from the three respective subscales are "I am very comfortable being close to romantic partners," "I worry a lot about my relationships," and "I prefer not to show a partner how I feel deep down." Responses are given on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree." The eighth ALHB scale, the Mini-*K*, contains 20 items tapping general features of all seven LHS facets.

The eight indicators converge on a single multivariate latent construct, the *K-Factor* (Gladden et al., 2009; Wenner, Bianchi, Figueredo, Rushton, and Jacobs, 2013), which can be estimated as the mean of the *z*-scores of the seven scales excluding the Mini-*K* (Figueredo, 2007). Because 51.6% of the participants completed none of the eight items of the Altruism toward Children subscale, and because there was very little variation among those who did complete them, I deleted this subscale from analyses.

The HEXACO-60 (Ashton and Lee, 2009), a shorter version of the HEXACO Personality Inventory—Revised (Ashton and Lee, 2008), comprises 10 items measuring each of the six HEXACO dimensions. Each facet of each dimension is covered by 2–3 items. The 5-point scale ranges from "strongly disagree" to "strongly agree." The HEXACO-60 dimensions have been found to show adequate (1) scale reliability, (2) correlations of self-report with observer-report scores, and (3) theoretically expected correlations with FFM dimensions (Ashton and Lee, 2009).

For the Emotionality factor, which is of particular interest in the present study, exemplary items measuring each of its four facets are "I would feel afraid if I had to travel in bad weather conditions" (Fear), "I sometimes can't help worrying about little things"

(Anxiety), "when I suffer from a painful experience, I need someone to make me feel comfortable" (Dependence) and "I feel like crying when I see other people crying" (Sentimentality).

Statistical analyses

For missing responses (0.35% of the ALHB responses, 0.43% of the HEXACO-60 responses), I substituted the mean value for that item. Item responses were converted to *z*-scores before calculating scale scores and running correlations and regression analysis. ALHB scales scores and HEXACO facet scores were calculated as the mean score across all items comprising that scale or facet. HEXACO factor scores were calculated as the mean score among that factor's four facets. Sex differences between correlation coefficients were tested using Fisher's *r*-to-*z* transformation. Except where noted, no significant sex differences were found. All analyses were carried out using Stata 13.1. All tests of significance are two-tailed.

Results

Descriptive analyses

The ALHB scales were all positively correlated with each other (mean $r = .26$, range = .09–.53). Family Contact/Support was significantly ($p < .01$) positively correlated with every other ALHB scale except for ECR, $r(314) = .08$, $p > .05$. Table 1 shows Cronbach's alphas (from unstandardized responses) and correlations between the ALHB scales and the HEXACO factors. HEXACO Extraversion (*r*s = .20 to .55), Agreeableness (*r*s = .17 to .40) and Conscientiousness (*r*s = .06 to .49) were positively correlated with most or all of the ALHB scales, and were strongly positively correlated with the Mini-*K* and the overall *K-Factor*. Honesty-Humility was less strongly positively related to the ALHB scales, while Openness was uncorrelated with the *K-Factor* and inconsistently related to the more specific scales. Emotionality was positively correlated with the Mini-*K*, Family Contact/Support, General Altruism, and Religiosity, and was negatively correlated with the ECR. Disaggregating the ECR into its three subscales revealed that Emotionality was strongly positively correlated with Secure Attachment, $r(314) = .21$, $p < .001$, and marginally negatively correlated with Avoidant Attachment, $r(314) = .10$, $p = -.073$ (women: $r[194] = -.19$; men: $r[120] = .07$; Fisher's *r*-to-*z* transformation test, $p = .025$), but was strongly positively correlated with Anxious Attachment, $r(314) = .40$, $p < .001$. Table 2 shows the correlations between the four Emotionality facets and the ALHB scales. Dependence and Sentimentality were generally positively related to the ALHB scales, Anxiety was generally negatively related to them, and Fear was generally unrelated to them.

The correlation between the mean of the ALHB scale scores and the mean of the Extraversion, Agreeableness, and Conscientiousness scores was substantial, $r(314) = .66$, $p < .001$, but not high enough to suggest that the ALHB adds nothing to the measurement of LHS beyond these personality dimensions.

Table 1. Scale reliabilities and correlations between Arizona Life History Battery scales and the HEXACO factors (Study 1)

HEXACO factors	H	E	X	A	C	O
Cronbach's α	.75	.81	.86	.83	.75	.80
ALHB scales						
K-Factor	.18**	.08	.61***	.42***	.30***	.08
Mini-K (α = .80)	.28***	.17**	.52***	.39***	.32***	-.01
Quality of parental relationships (α = .93)	-.03	.03	.23***	.17**	.14*	-.05
Contact and support from family (α = .93)	.05	.19***	.20***	.24***	.09	0
Contact and support from friends (α = .94)	.02	-.01	.43***	.17**	.08	.15**
Experiences in close relationships (α = .95)	.25***	-.11*	.51***	.35***	.24***	0
Altruism (α = .92)	.14*	.13*	.51***	.40***	.24***	.23***
Insight, planning, control (α = .90)	.14*	-.04	.55***	.33***	.49***	.19***
Religiosity (α = .96)	.20***	.14*	.24***	.20***	.06	-.11

Note. *p < .05; **p < .01; ***p < .001; H = Honesty-Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness. *K-factor* = the mean of the other ALHB scales, excluding the Mini-K.

Table 2. Correlations between Arizona Life History Battery scales and HEXACO Emotionality facets (Study 1)

Emotionality facets	Fear	Anxiety	Dependence	Sentimentality
ALHB scales				
K-Factor	.00	-.23***	.16**	.27***
Mini-K (α = .80)	.09	-.15**	.21***	.31***
Quality of parental relationships (α = .93)	.02	-.16**	.11*	.10
Contact and support from family (α = .93)	.09	.02	.22***	.24***
Contact and support from friends (α = .94)	-.11*	-.13*	.09	.10
Experiences in close relationships (α = .95)	-.11*	-.33***	-.01	.09
Altruism (α = .92)	.01	-.09	.10	.32***
Insight, planning, control (α = .90)	-.05	-.25***	.00	.14*
Religiosity (α = .96)	.13*	-.06	.12*	.19***

Note. *p < .05; **p < .01; ***p < .001. Sex differences: Dependence and Contact and support from friends, women: r(194) = .00; men: r(120) = .29; Fisher's r-to-z transformation test, p = .011; Anxiety and Altruism, women: r(194) = .00; men: r(120) = -.30; Fisher's r-to-z transformation test, p = .008; Anxiety and Insight, planning, control, women: r(194) = -.17; men: r(120) = -.39; Fisher's r-to-z transformation test, p = .04.

Kin involvement independent of LHS variation

To examine whether HEXACO Emotionality uniquely predicts variation in the provision and receipt of kin altruism, I first constructed a Synthetic Kin Involvement scale from relevant ALHB items. This scale included the 15 items of the Family Contact/Support Scale and the 7 items of the Altruism toward Kin subscale. Cronbach's α for this 22-item scale was .93. I then regressed this Kin Involvement Scale on the remainder of the ALHB, specifically on the mean of the Parent Relationship Quality, IPC, Friends Contact/Support, ECR, Religiosity, and General Altruism (minus its seven Altruism toward Kin items) scales. Residuals from this regression ($\beta[314] = .76 \pm .09$, $p < .001$) represent the degree of involvement with kin independent of variation in the remainder of the ALHB scales—i.e., independent of variation in LHS. A multiple regression analysis using the six HEXACO dimensions as independent variables revealed that both Emotionality and Agreeableness positively predicted LHS-residualized kin involvement (see Table 4 under the "Study 1" column). Women scored higher on Emotionality than men ($M \pm SD_{women} = .20 \pm .58$, $M \pm SD_{men} = -.32 \pm .51$, $t[311] = 8.04$, $p < .001$, $d = .95$), but controlling for sex in this multivariate model did not qualitatively change the relationships between the HEXACO dimensions and LHS-residualized kin involvement. Furthermore, all four Emotionality facets were significantly positively correlated with LHS-residualized kin involvement (Fear: $r[314] = 0.15$, $p < .01$; Anxiety: $r[314] = .17$, $p < .01$; Dependence: $r[314] = 0.21$, $p < .001$; Sentimentality: $r[314] = .20$, $p < .001$).

Table 3. Multiple regression analysis of relationships between HEXACO factors (independent variables) and LH-residualized kin involvement (dependent variable)

Independent variable	Study 1		Study 2	
(HEXACO factor)	β±*SE*	*p*	β±*SE*	*p*
Honesty-Humility	-.16±.11	.14	-.04±.10	.66
Emotionality	.43±.09	< .001	.31±.09	< .001
Extraversion	-.11±.09	.22	.40±.09	< .001
Agreeableness	.31±.10	.002	.00±.09	.97
Conscientiousness	-.14±.13	.28	-.13±.10	.19
Openness	.01±.09	.93	.13±.09	.17

Variation in Emotionality might be related to a propensity for close social relationships generally, rather than kin relationships specifically. To examine this possibility, I constructed an LH-residualized friendship involvement score using analytical methods parallel to those used to construct the LHS-residualized kin involvement score described above. First, I constructed a Friendship Involvement scale consisting of the 5 Friends Contact items, the 10 Friends Support items, and the 14 Altruism toward Friends items. This 29-item synthetic scale had a Cronbach's α of .94. I then regressed this scale on the remainder of the ALHB, specifically on the mean of the Parent Relationship Quality, IPC, Kin Contact/Support, ECR, Religiosity, and General Altruism (minus its 14 Altruism toward Friends items) scales. Residuals from this regression ($\beta[314] = .84 \pm .08$, $p < .001$)

represent the degree of involvement with friends independent of variation in the remainder of the ALHB scales. A multiple regression analysis using the six HEXACO dimensions as independent variables revealed that both Extraversion ($\beta[314] = .42 \pm .09$, $p < .001$) and Openness ($\beta[314] = .34 \pm .09$, $p < .001$) predicted LHS-residualized friendship involvement, whereas Emotionality was unrelated to LH-residualized friendship involvement ($\beta[314] = .07 \pm .09$, $p = .77$).

Discussion

These results indicate that variation in LHS, as measured by the ALHB, only accounts for variation in some of the HEXACO dimensions. People pursuing a slower LHS were more Extraverted, Agreeable, and Conscientious, and somewhat more Honest and Humble, than those pursuing a faster LHS. However, neither Emotionality nor Openness was significantly associated with the *K-factor* extracted from the ALHB., These results contrast with research showing that all five FFM factors vary with LHS (Dunkel and Decker, 2010; Figueredo et al., 2007; Gladden et al., 2009).

The strongest positive relationship of Emotionality to an ALHB scale was with Family Contact and Support, whereas its strongest negative relationship was with Experiences in Close Relationships. The latter finding appeared to be largely driven by the strong positive correlation between Emotionality and Anxious Attachment. This is unsurprising in view of (1) widely demonstrated associations between FFM Neuroticism and Anxious Attachment (Noftle and Shaver, 2006) and (2) the content of Emotionality's Dependence facet. These findings raise the possibility of a trade-off between the capacity to maintain emotionally close kin ties (enhanced by higher Emotionality) and the capacity to maintain secure attachments with romantic partners (diminished by higher Emotionality).

Finally, a synthetic Kin Involvement scale, incorporating appropriate items from the Family Contact/Support and Altruism scales, was positively related to Emotionality and to Agreeableness, but to no other HEXACO factors, after partialling out the effects of the remaining ALHB scales. Scores on all four Emotionality facets were positively correlated with LHS-residualized kin involvement. In contrast, LHS-residualized friendship involvement was unrelated to Emotionality.

A limitation of this study is that the ALHB is only one of several validated measures of LHS (Dunkel and Decker, 2010). Although the ALHB shows high internal reliability and external validity (reviewed by Figueredo et al., 2013), some questions may be raised about the face validity of two of its scales. First, the romantic attachment style variation measured by the ECR scale is related to, but is not isomorphic with, the mating effort vs. parenting effort trade-off as conceptualized by Life History Theory. Second, only a minority of the 20 items in the Insight, Planning, and Control scale pertain directly to variation in future discounting, another key element in the suite of LHS-relevant psychological traits. Another weakness of the ALHB is its lack of reverse-keyed items in all scales except the ECR, raising the possibility of acquiescent response bias (Ray, 1983). To address these concerns, I conducted a second study using instruments that directly measure interest in short-term mating (Jackson and Kirkpatrick, 2007) and future time perspective (Zimbardo and Boyd, 1999), and that contain reverse-keyed items.

Study 2

Materials and Methods

Participants and procedures

Participants consisted of 356 anonymous USA residents recruited from AMT. Each participant received $1.40 as compensation. I used SurveyMonkey's IP address blocking feature, along with a warning in the description of the AMT task, to prevent Study 1 participants from participating in Study 2. Seven participants failed to complete the survey, and 22 gave incorrect answers to one or both of the embedded liar-detector items. The remaining 327 participants (48.6% female) ranged in age from 18 to 73 (M = 36.04; SD = 12.67).

Measures

As in Study 1, participants were presented with the HEXACO-60 (Ashton and Lee, 2009). They also completed the Synthetic Kin Involvement Scale from the ALHB (Figueredo, 2007), which is described in the Results section of Study 1.

The remaining three instruments have been shown by Dunkel and Decker (2010) to adequately measure particular aspects of LHS variation. The Short-Term Mating Orientation Scale (STMO: Jackson and Kirkpatrick, 2007) consists of 10 items (with accompanying 7-point Likert response scale from "strongly disagree" to "strongly agree") that measure interest in short-term mating. Items include "I could easily imagine myself enjoying one night of sex with someone I would never see again." Scores on this scale are reversed to enable calculation of a mean *z*-score across the three LHS instruments.

The Future Time Perspective (FTP) subscale of the Zimbardo Time Perspective Inventory (ZTPI: Zimbardo and Boyd, 1999) contains 13 items measuring the degree to which future goals direct current behavior. For each item, respondents are asked "How characteristic or true is this of you?" and are provided with a 5-point Likert response scale anchored by "very uncharacteristic" and "very characteristic." Items include "It upsets me to be late for appointments."

The Expected Lifespan item (Dunkel and Decker, 2010) is a single question: "If you had to guess, at what age do you think you will die?" Answers were recorded in years.

Statistical analyses

Statistical procedures in Study 2 were identical to those in Study 1.

Results

Descriptive analyses

FTP and (reversed) STMO were significantly positively correlated, $r(327) = .19$, $p < .001$, and FTP and estimated age at death were significantly positively correlated, $r(327) = .17$, $p < .01$) but (reversed) STMO and estimated age at death were uncorrelated, $r(327) = .09$, $p > .05$. Table 5 shows Cronbach's alphas (from unstandardized responses) and correlations between the three LHS measures and the HEXACO factors, as well as correlations between the HEXACO Emotionality facets and the three LHS measures. HEXACO Agreeableness and Conscientiousness were correlated as predicted with all three

LHS measures, Extraversion was positively correlated with FTP and Estimated Age at Death, Honesty-Humility was correlated as predicted with STMO and FTP, and Emotionality was positively correlated with (reversed) STMO. The mean of the three LHS measures was strongly positively correlated with Conscientiousness, Extraversion, Honesty-Humility, and Agreeableness, weakly but significantly correlated with Emotionality, and uncorrelated with Openness. Among the Emotionality facets, only Fear and Sentimentality were associated with more than one of the three LHS indicators: Both were positively correlated with FTP and (reversed) STMO.

Table 4. Scale reliabilities and correlations between Life History Strategy indicators and the HEXACO factors (Study 2)

LHS indicators	Short-term mating orientation (reversed)	Future time perspective	Estimated age at death	Mean of LHS indicators
Cronbach's α	.96	.82	---	---
HEXACO factors				
Honesty-Humility (α = .73)	.34***	.14*	.02	.25***
Emotionality (α = .80)	.26***	.09	-.09	.12*
Extraversion (α = .84)	.04	.21***	.31***	.29***
Agreeableness (α = .83)	.18**	.15**	.15**	.24***
Conscientiousness (α = .79)	.18**	.73***	.13*	.43***
Openness (α = .80)	-.06	.05	.01	.00
Emotionality facets				
Fear	.27***	.12*	-.03	.17**
Anxiety	.08	.06	-.26***	-.09
Dependence	.19***	-.08	.01	.08
Sentimentality	.21***	.12*	-.02	.15**

Note. *p < .05; **p < .01; ***p < .001. Sex differences: Extraversion and Estimated age at death, women: r(159) = 0.18; men: r(168) = .42; Fisher's r-to-z transformation test, p = .017, Agreeableness and Estimated age at death, women: r(159) = .00; men: r(168) = .26; Fisher's r-to-z transformation test, p = .017; Extraversion and mean LHS score, women: r(159) = 0.16; men: r(168) = .42; Fisher's r-to-z transformation test, p = .008.

Kin involvement independent of LHS variation

The Synthetic Kin Involvement Scale (Cronbach's α = .92) was significantly predicted by mean LHS indicator score, $\beta(327) = .24 \pm .07$, $p < .001$). A multiple regression analysis using the residuals from this regression as the dependent variable and the six HEXACO dimensions as independent variables revealed that both Emotionality and Extraversion positively predicted LHS-residualized kin involvement (see Table 4 under the "Study 2" column). Women scored higher on Emotionality than men ($M \pm SD_{women} = .27 \pm .54$, $M \pm SD_{men} = -.26 \pm .53$, $t[324] = 9.00$, $p < .001$, $d = .99$), but controlling for sex in this multivariate model did not qualitatively change the relationships between the HEXACO dimensions and LHS-residualized kin involvement. Three of the Emotionality facets were significantly positively correlated with LHS-residualized kin involvement: Fear, $r(327) = 0.12$, $p < .05$, Dependence, $r(327) = 0.16$, $p < .01$, and Sentimentality, $r(327) = .14$, $p < .01$. Anxiety was uncorrelated with LHS-residualized kin involvement, $r(327) = -.08$, $p > .05$.

Discussion

Consistent with the results of Dunkel and Decker (2010), the three LHS measures used in Study 2 (STMO, FTP and Estimated Age at Death) were not nearly as strongly inter-correlated as were the ALHB scales in Study 1. The relations of the HEXACO dimensions to the LHS indicators were broadly similar to the results of Study 1. Extraversion, Agreeableness, and Conscientiousness were strongly positively associated with a slower LHS. So was Honesty-Humility, unlike in Study 1. Emotionality was weakly but significantly associated with a slower LHS, whereas Openness was unrelated to LHS. Compared to Study 1, Extraversion was much less strongly associated, and Conscientiousness somewhat more strongly associated, with LHS. This is unsurprising considering the different areas of emphasis in the LHS measures used in the two studies. The ALHB is tilted toward Extraversion-related content: the Friends Contact and Support, Family Contact and Support, and Altruism scales partly tap variation in the enjoyment of social situations, and the IPC scale partly taps a propensity toward positive affect. Gladden et al. (2009) found that FFM Extraversion was the personality dimension most strongly correlated with the ALHB-derived *K-factor*. In contrast, among the Study 2 LHS instruments, the FTP is saturated with Conscientiousness-related content, whereas, consistent with the findings of Bourdage, Lee, Ashton, and Perry (2007), there was no correlation between the STMO and Extraversion. Interestingly, Conscientiousness is the FFM personality trait most closely linked to actual longevity (Friedman, Kern, Hampson, and Duckworth, 2014), a variable with strong face validity as an LHS indicator.

As in Study 1, Emotionality predicted variation in LHS-residualized kin involvement. However, in contrast to Study 1, Extraversion also predicted variation in LHS-residualized kin involvement, whereas Agreeableness did not. This difference may also be partly attributable to the different emphases in the LHS measures used in the two studies. People who enjoy social activity generally are also, all else being equal, more likely to enjoy socializing with kin. Unlike in Study 1, which used an LHS instrument that absorbed most of the variance in Extraversion, the Study 2 LHS factor excluded a considerable portion of Extraversion variance, leaving it available to be associated with the LHS-residualized kin involvement measure.

General Discussion

This research has addressed two questions. First, how are the HEXACO personality dimensions related to variation in Life History Strategy? Second, does HEXACO Emotionality predict closeness of kin ties, as predicted by Ashton and colleagues (Ashton and Lee, 2007; Ashton et al., 2014)?

Two studies, using different measures of LHS, produced roughly similar results. People pursuing a slower LHS were found to be consistently more extraverted, agreeable, conscientious, and honest and humble than people pursuing a faster LHS. Openness was consistently unrelated to LHS. Emotionality was unrelated to LHS as measured by the ALHB, and weakly positively related to LHS as measured by the STMO, FTP, and Estimated Age at Death (though the two correlation coefficients do not differ significantly).

The relationships among LHS, extraversion, and mating orientation are somewhat unclear in the existing literature. Variation in extraversion is partly explained by variation in physical attractiveness and physical formidability (Lukaszewksi and Roney, 2011), which in turn reflect better phenotypic condition (see also Gangestad and Simpson, 2000). These associations seem consistent with the view (Figueredo et al., 2007) that extraversion forms part of a slow LHS. However, the picture is complicated by theory and data showing that extraversion (Nettle, 2005; but see Bourdage et al., 2007, and the present study) and male physical strength and attractiveness (Lukaszewski, Larson, Gildersleeve, Roney, and Haselton, 2014) are associated with uncommitted mating orientation, which is thought to form part of a fast LHS. A possible solution to this conundrum is Lukaszeski et al.'s (2014) finding that committed mating orientation, which is unrelated (or weakly inversely related – Jackson and Kirkpatrick, 2007) to uncommitted mating orientation, is not predicted by physical strength or attractiveness. Lukaszeski et al. (2014) speculate that variation in committed mating orientation, but not variation in uncommitted mating orientation, is driven by variation in LHS. In other words, it is likely that people following a slow LHS typically maintain long-term mating relationships, but (particularly if they are attractive and, if male, formidable) may also pursue opportunities for short-term mating relationships. A limitation of the present study is that it did not include the Long-Term Mating Orientation scale of Jackson and Kirkpatrick's (2007) multi-dimensional instrument.

The slight differences between FFM Openness as measured by the NEO-PI (Costa and McCrae, 1995) and HEXACO Openness as measured by the HEXACO-60 (Ashton and Lee, 2009) (e.g., HEXACO Openness lacks a Feelings facet) seem inadequate to account for the difference between the results of this study and the results of other studies (Dunkel and Decker, 2010; Figueredo et al., 2007; Gladden et al., 2009) that found that FFM Openness is associated with a slower LHS. However, both theoretical and empirical considerations should lead to renewed debate about the relationship between openness and LHS. For example, in societies that enforce restrictions on consensual non-marital sex, and on purportedly related practices such as recreational drug use, openness to unconventional ideas about these topics may be linked to a faster LHS (Kurzban, Dukes, and Weeden, 2010). People who are more scientifically and artistically creative tend to be more arrogant, pretentious and disagreeable than less creative people (Feist, 1998). Future research should seek to separate the relationships of the various openness facets to LHS, and to examine whether any of them are curvilinearly related to LHS, such that people of intermediate openness pursue the slowest LHS.

Emotionality was not consistently related to LHS. One interpretation of this finding is that it exposes a weakness of the HEXACO model rather than a weakness of LHS-based personality theory. In this view, Emotionality unjustifiably combines facets reflecting low-level psychological functioning (Anxiety and Fear) and hence a fast LHS (Figueredo et al., 2007) with facets reflecting the capacity for close, mutually supportive social relationships (Dependence and Sentimentality), consistent with a slow LHS (Ashton and Lee, 2007; Ashton et al., 2014). This interpretation generates the prediction that both Anxiety and Fear will be associated with a faster LHS. But in fact, in Study 1, the Fear facet was uncorrelated with the *K-factor*, whereas in Study 2, the Fear facet was significantly positively correlated with FTP and strongly significantly positively correlated with (reversed) STMO. Moreover, other research has demonstrated Emotionality's psychometric and theoretical coherence (Ashton and Lee, 2007) and its superior utility to FFM scales in predicting relevant external criterion variables (Ashton et al., 2008; McKay and Tokar, 2012).

An alternative interpretation, tentatively supported by the findings reported here, is that HEXACO Emotionality forms one part of an evolutionarily important dimension of personality variation that is orthogonal to LHS. Some of the variation in the strength of kin social relationships reflects LHS variation, as shown here by ALHB Family Contact/Support's strong inter-correlations with all but one (the ECR) of the other ALHB scales (see also Figueredo et al., 2007; Gladden et al., 2009). In the present study, Family Contact/Support was strongly positively correlated with Extraversion and Agreeableness. People who enjoy social activity and who are more willing to tolerate occasional exploitation are likelier to maintain closer kin ties, compared to more introverted and unforgiving people, but these propensities are not specific to kin—they apply to unrelated social partners as well. But another portion of the variation in the strength of kin social relationships is attributable to variation in Emotionality, as predicted by Ashton and Lee (2001, 2007). Isolating this portion of the variation in kin involvement, by holding LHS constant, reveals that it is positively correlated with three of the four Emotionality facets (Study 2) or all four (Study 1). Furthermore, across the two studies, Emotionality was the only HEXACO dimension consistently related to LHS-residualized kin involvement.

Research has revealed a large body of diverse findings supporting the utility of Life History Theory for explaining the covariation of human personality, social and health-related traits (Figueredo et al., 2013). However, it is becoming apparent that some evolutionarily significant personality variation is orthogonal to LHS-linked variation (Gladden et al., 2009; Wenner et al., 2013). The results of the present study should be interpreted in this framework.

This study has several limitations. Neither of the LHS instruments measured primary Life History variables (e.g., birth spacing, age at first reproduction). Only self-report data were collected. Self-report and observer report (i.e., by a person who knows the target well) have complementary strengths and biases (Ashton and Lee, 2010). Using the shorter HEXACO-60 (Ashton and Lee, 2009) reduces confidence in the facet scores, each of which is based on only 2–3 items. Participants consisted exclusively of U.S. residents. Human personality structure varies across the literate populations that have been studied using the lexical method (Ashton and Lee, 2001). A recent study (Gurven, von Rueden, Massenkoff, and Kaplan, 2013) indicates that even greater variation emerges when non-literate small-scale societies are also considered. However, poor self- and other-report

agreement in a similar study (Bailey et al., 2013) suggests caution regarding the use of self-report rating scales in populations unfamiliar with them.

Although Ashton and Lee's (2001, 2007; Ashton et al., 2014) argument linking harm avoidance with kin altruism is plausible in state-level societies, it may be less applicable to non-state societies in which a key form of kin altruism is the willingness to engage in high-risk violent confrontations on behalf of relatives (e.g., Chagnon and Bugos, 1979). A helpful refinement of the evolutionary significance of high emotionality is that, rather than facilitating kin altruism generally, it motivates people to limit potential harm to themselves and their close kin. Which particular forms of kin altruism occur will also depend on the actor's other personality traits as well as the situation.

A final, general concern is that social desirability bias may distort ALHB responses (Figueredo et al., 2005) and possibly other LHS measures, because the traits associated with a slow LHS are valued in contemporary Western societies. As a complementary method to self-report instruments, researchers may wish to measure core LHS traits using choice tasks with real monetary stakes, e.g., future discounting tasks (Wilson and Daly, 2004), economic games that tap altruism or trust (Camerer, 2003), and gambling games (e.g., Suhr and Tsanadis, 2007). For measuring traits related to the mating/parenting trade-off, techniques such as eye-tracking tasks (e.g., Cárdenas, Harris and Becker, 2013) can circumvent social desirability bias. Another promising approach is to measure naturally occurring LHS-related behavior patterns using methods such as intermittent audio sampling of daily life (Mehl and Pennebaker, 2003).

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