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Exploratory Analysis of the Links among Life History, Reproductive Strategy, Autism-Spectrum Quotient, and Quality of Life

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Abstract

The present study explores the links among life history, reproductive strategy, autism-spectrum quotient, and quality of life. Our 235 participants (167 women and 68 men, aged 19 - 54) filled four instruments: Life History Survey (LHSurv), MINI-K, Autism-spectrum Quotient (AQ), and Satisfaction with Life Scale (SWLS). A cluster analysis was carried out in which the respondents' answers to particular LHSurv items were used as variables in the clustering process. The next step in the analysis was to compare the delineated clusters with regard to three variables which were not included in cluster formation: the reproductive strategy (general Mini-K score), intensity of autistic traits (total AQ score) and life satisfaction level (general SWLS score). It was found that clusters formed on the basis of LHSurv results differ also in MINI-K, AQ and SWLS scores. The results show a link between such variables as reproductive strategy, autistic traits and quality of life. It seems that individuals who are raised with more financial and emotional support (including physical touch, from both parents and grandparents) end up with a slower life-history strategy, and more satisfied with their lives. These links are also reflected by individual life history, as revealed by the LHSurv instrument.

Keywords

Life History, Reproductive Strategy, Quality of Life, Autism-Spectrum Quotient

1. Life History Theory

Life History Theory (LHT) is a sub-theory formulated within evolutionary biology which describes how organisms allocate their material resources and bio-

energy to various aspects of adaptation (Figueredo et al., 2006; Figueredo, Vásquez, Brumbach, & Schneider, 2007). One of the assumptions of early Life History Theory is that two kinds of selection exist: *r*-selection and *K*-selection which influence on reproductive strategies. According to Pianka's model (1970, 1974) variable and/or unpredictable environment selects early maturity, small body size, high reproductive effort, and high fecundity (*r*-selection). Conversely constant and/or predictable environment selects for delayed maturity, large body size, and low fecundity with a large investment in each offspring (*K*-selection).

One of the most recent assumptions in LHT is that individuals' reproductive strategies (life history strategies, LHS) are based on a specific allocation (trade off) of the organism's bioenergetic and material resources. The two principal allocation channels are somatic effort, connected to corporeal survival (e.g. maintaining life functions, growth and development, as well as—in the case of humans—acquisition of knowledge, qualifications or skills), and reproductive effort, connected to producing and raising offspring (Del Giudice & Belsky, 2011; Griskevicius, Delton, Robertson, & Tybur, 2011). Within reproductive effort, one can distinguish between mating effort—obtaining and retaining a partner (e.g. intrasexual competition, and—in the case of humans—different tactics to keep a partner in the relationship, jealousy), and parental effort, when resources are allocated in such a way as to increase the offspring's chance of survival (e.g. quality of parental care). High mating effort strategy represents a fast life history, whereas the high somatic effort and parental effort strategy represents a slow life history (Figueredo, Cabeza de Baca, & Woodley, 2013; Griskevicius et al., 2011; Kirsner, Figueredo, & Jacobs, 2009) and is described as a bipolar continuum (Del Giudice & Belsky, 2011). Life History strategy correlates to a number of psychological and behavioral variables. Individuals preferring slow strategy (so called high-K individuals) are more likely to delay the start of their sex life, and are less likely to engage in risky sexual behaviors (Figueredo et al., 2006). Recent theoretical work suggests that the Dark Triad (psychopathy, narcissism, machiavellianism) may indicate a fast life strategy (Jonason, Li, Webster, & Schmitt, 2009; Jonason, Luevano, & Adams, 2012). A study which used the Arizona Life History Battery (ALHB, of which the Mini-K is an abridged equivalent) revealed that the K-Factor correlated positively with Openness, Conscientiousness, Extraversion, Agreeableness, and negatively with Neuroticism (Gladden, Figueredo, & Jacobs, 2009).

According to LHT, family environment provides children up to 5 - 7 years of age with critical cues that determine their LHS (Belsky, Steinberg, & Draper, 1991; Del Giudice, 2009). Draper and Harpending (1982) suggested that paternal absence in early childhood results in accelerated sexual maturation in girls (for example earlier age of menarche), prompting them not to expect paternal investments from their future partner. This correlation has since been reproduced in multiple studies (see Belsky, 2010; see also Ellis, 2004; meta-analysis Webster, Graber, Gesselman, Crossier, & Schember, 2014). The hypothesis of the absent

father's effect on the acceleration of puberty in girls served as the basis for a broader theory of early childhood psychosocial stress (Belsky et al., 1991), namely the psychosocial acceleration theory that emphasises family-related stressors in early childhood other than the absence of biological father that also shape reproductive strategies. They include, among others, lack of spousal harmony, divorce, and poor socio-economic status. These stressors produce anxious attachment patterns that may lead to fast LHS: early reproduction, short-term pair bonds and a low level of investment in offspring. By contrast, a family environment characterised by spousal harmony and good socioeconomic status is likely to lead to slow LHS: later maturity, long-term pair bonds, greater parental investment (Belsky et al., 1991). Del Giudice (2009) developed his psychosocial stress theory in the context of attachment styles, hypothesizing i.a. that due to sex differences in life history trade-offs between mating and parenting, insecure males tend to adopt avoidant strategies, whereas insecure females are more likely to adopt anxious/ambivalent strategies (Del Giudice, 2009). A large body of evidence supports the Belsky and colleagues model (for reviews, see Belsky, 2012; Bjorklund & Ellis, 2014; Simpson & Belsky, 2008). It is interesting to note that none of the styles of attachment is better than the other in terms of the individual's adaptation and reproduction. Each of them is adaptive because they aim in their own specific way at increasing reproductive success.

2. Determinants of Life History Strategies Adopted in Our Study

Various forms of touch can be conceptualized within a number of specific dimensions. For example, Geldard (after Hertenstein, 2002) differentiated between qualities of touch that are mechanical (i.e., locus, intensity, duration, and frequency) and non-mechanical (i.e., thermal, chemical, and electrical). Studies on rodents (see Gromov, 2011) have shown that tactile stimulation from parents plays an important role in normal physiological, behavioural and neuroendocrine neonate development. Similarly, the amount of grooming directed toward the young in nonhuman primates not only keeps them physically healthy, but also provides stimulation that fosters the development of a good relationship with mother (Hertenstein et al., 2006). In humans, touch in infancy plays a vital role in emotional communication, and bonding (Hertenstein, 2002; Hertenstein et al., 2006). Empirical findings have indicated that touch from the caregiver to the infant provides security and leads to a secure relationship (see Hertenstein, Verkamp, Kerestes, & Holmes, 2006). For example Weiss, Wilson, Hertenstein, and Campos (2000) revealed that infants who received nurturing touch at 3 months were more likely to be classified as "secure" when they were 12 months old, compared to infants who received less nurturing touch. Recent discoveries show that tactile experiences in childhood (5-year-old children) might interface with the emerging "social brain"—brain circuits that support social functioning (e.g. Brauer, Xiao, Poulain, Friederici, & Schirmer, 2016).

Another factor important for the early development of tactile experience is

play fighting (rough-and-tumble play). Physical touch is at the core of this type of play and includes wrestling, grappling, kicking, tumbling and rolling on the ground, and chasing (Smith, 2009), and generally at age 7 is seen at higher rates in boys than in girls (Humphreys & Smith, 1987; see Panksepp & Scott, 2012 for a detailed review). This type of play is often thought to have evolutionary origins (Fry, 2014). Play fighting helps develop combat skills and emotion control and establish group hierarchy, strengthens friendships, and facilitates learning restrained aggression (Fry, 2014; Smith, 2009). To the best of our knowledge, so far there have been no studies within the LHT framework on the role of touch in the development of reproductive strategies.

One of the factors associated with family environment that shape reproductive strategies is support from family members. The rate of family contact and support was shown to correlate positively with slow LHS (Olderbak, Gladden, Wolf, & Figueredo, 2014). In addition, support from non-parents, including grandparents, may be analysed in a broader context as an exclusively human phenomenon of allomothering, whereby childcare is provided by individuals other than the mother, such as fathers, grandmothers, older siblings, uncles and aunts (van Schaik & Burkart, 2010). The role of siblings seems to be interesting with relation to LHS. It may affect the reproductive success of the brother or sister in both negative and positive way. It has been shown on the basis of a large demographic dataset on preindustrial humans from Finland, that the presence of elder siblings improved the chances of younger siblings reaching the sexual maturity (Nitsch, Faurie, & Lummaa, 2013). However, after reaching sexual maturity, same-sex elder siblings' presence was associated with reduced reproductive success in the focal individual. This may explain the existence of competition among same-sex siblings. Another study showed that having younger siblings decelerates menarche (Hoier, 2003)—an important marker of female LHS.

Allomothering has a fairly straightforward function of assisting mothers in looking after their offspring and enhancing children's safety, but its less obvious benefits include positive effects on psychological development. For example, children who have plenty of opportunities to discuss their mental states with friends have a more developed theory of mind, which translates to more successful socialization (Brown, Donelan-McCall, & Dunn, 1996). In the context of LHT it is worth mentioning that individuals with slow LHS score higher than those with fast LHS on personality traits Extraversion, Conscientiousness, Agreeableness, and Emotional Stability (Manson, 2015, 2017), i.e. those that seem to be particularly important for the way their social functioning.

Another key factor is support from people who are not family members. Social support helps obtain additional resources and care, especially important in adverse circumstances. For example, social support is treated as a resource for resilience, which is an individual disposition required for positive adaptation or coping in the face of severe stress or adversity (Scoloveno, 2016). Friends contact and support correlates positively with measures of life history strategies

(Olderbak et al., 2014). The Social capital—the subscale of the High K Strategy Scale (HKSS: Giosan, 2006)—correlates negatively with age of first encounter which is an indicator of type of reproductive strategy (Copping, Campbell, & Muncer, 2014).

Another aspect recognized as important in LHT for the formation of reproductive strategies is the socio-economic status (SES) of the family of origin. SES is an index of resource availability (Griskevicius et al., 2013), a marker of exposure to harshness and unpredictability in early childhood (Mittal & Griskevicius, 2014). Childhood SES is more important for the formation of reproductive strategy than adulthood SES (Mittal & Griskevicius, 2014). In general, empirical findings suggest (see Mittal & Griskevicius, 2014 for a review) that individuals with low SES in childhood are predisposed towards a fast strategy, while those with high SES are more likely to adopt a slow one.

Within the LHT framework, correlations were found between reproductive strategy and individual health: early-life exposure to unpredictable environments is associated with a greater probability of adulthood obesity (Dittmann & Manner, 2017); young adult fast reproductive strategy explained 61% of the variance in young adult liability for substance use (Richardson et al., 2016). K-factor is also positively correlated with Covitality factor (includes i.e. general health, subjective wellbeing, positive affect; Figueredo et al., 2007), thus, slow LHS is associated with better overall psychophysical health.

There are good reasons to assume that attachment styles may be affected by autistic characteristics (Gallitto & Leth-Steensen, 2015; Pisula, 2004; Van Ijzendoorn et al., 2007). Among the main characteristics of autism spectrum disorders (ASD) are deficits in social communication, including problems in establishing social relationships: initiating and maintaining reciprocal interaction and communication with others, accompanied by a restricted range of repetitive patterns of behavior, interests, and activities (APA, 2013). The severity of impairments typical for autism varies considerably within the spectrum. Moreover, it has been shown that difficulties and characteristics similar to those found in individuals with ASD diagnosis, so called "autistic traits", may be present in their close relatives (Duvekot, van der Ende, Constantino, Verhulst, & Greaves-Lord, 2016; Jussila et al., 2015; Pisula & Ziegart-Sadowska, 2015) and in the general population (e.g. Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001; Ruzich et al., 2015). Those findings support applying the dimensional approach to the study of autistic traits. The hypothesis that autistic traits may display a continuous distribution pattern throughout the population has been tested in a number of studies (for a review see: Ruzich et al., 2015). Since there are some grounds for investigating autistic characteristics employing an evolutionary framework (see e.g. Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012), this study attempts to apply selected methods and insights gained from evolutionary life history theory.

The present study will attempt to explore the relationships among life history,

reproductive strategy, autistic traits and quality of life. In addition, the aim of the study is to analyze selected social experiences in early childhood in relation to the aforementioned variables. The insufficiently explored issue of tactile stimulation and touch modality in the family interactions and among peers, seen from the evolutionary perspective will be a special focus of interest in our study. It may seem, that although our membership to the mammalian linkage is obvious, such an important aspects of human development as touch and related phenomena are still somewhat neglected.

3. Method

3.1. Participants

There were 235 study participants; 167 women and 68 men, aged 19 - 54 (M = 27.52; SD = 9.90). Participants were recruited from the students cohort at the University of Rzeszów and the University of Warsaw.

3.2. Instruments

The examination procedure involved measuring the history of life of an individual, reproductive strategy, the autism-spectrum quotient, and the quality of life. Four instruments were administered: a structured survey designed for the purpose of this study (Life History Survey), the Mini-K questionnaire, the Autism-spectrum Quotient and the Satisfaction with Life Scale.

The Life History Survey (LHSurv), developed for the purpose of this study, comprises 29 questions pertaining to the study participant's family situations and childhood experiences. This is a non-standardized tool, developed in order to retrieve memories from the childhood period as well as some other qualitative measures concerning present characteristics of the respondent's life. Since our study is by its nature an exploratory one, we have accepted all the limitations and risks related to such instruments as extensively analyzed by Schwarz and Sudman (1994). LHSurv consists of items addressing the following areas: family health history, family support, physical contact with family members and peers experienced in childhood, life success, sex life, and social relations. The study participant assesses the frequency of their experiences of each of the above by indicating their answer on a 5-point Likert scale (Very rarely, Rarely, Moderately, Often, Very often). **Appendix 1** shows the complete survey form.

The Mini-K (Figueredo et al., 2006) is an abridged version of the Arizona Life History Battery (ALHB; Figueredo, 2007), comprising 20 items, which serves as a tool for measuring the K-Factor connected to the individual's life history. The Mini-K Short Form involves items pertaining to insight, planning and cognitive control, parent-child relationship, attachment style, and relations with the community. The use of the form does not provide a direct diagnosis of the study subject's ecological environment; it only facilitates drawing general and indirect conclusions. By underlining an item on a 7-point scale from −3 to +3, the study subject indicates to what extent they agree or disagree with a given statement (−3

= disagree strongly, +3 = agree strongly). The participant's final score is calculated as a sum of the answers provided. High scores indicate a slow reproductive strategy, whereas low scores indicate a fast reproductive strategy. In the present study, we used a Polish version of the Mini-K (Figueredo et al., 2006) translated by Anna Czarna (Jonason, Li, & Czarna, 2013). The reliability of the Polish version of the scale is α = 0.76 (Czarna, Jonason, Dufner, & Kossowska, 2016).

The Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985; Polish adaptation by Juczyński, 2009) is a questionnaire designed for testing adult individuals and groups. The scale encompasses five statements. The study participant uses a seven-point scale to assess the extent to which each of the statements pertains to their life (1 = totally disagree; 7 = totally agree). The result is a general indicator of life satisfaction, with the reliability estimation 0.87 (Juczyński, 2009).

Autism-Spectrum Quotient (AQ), Baron-Cohen et al. (2001) is a quantitative measure of autistic traits in the general population. The scale spans 50 statements to which subjects respond on a 4-point Likert scale (1—definitely agree, 2—slightly agree, 3—slightly disagree, 4—definitely disagree). In half of the statements, the diagnostic answer is "agree", and in the other half "disagree". One point is awarded for each diagnostic answer. The total score ranges from 0 to 50 points, with higher scores suggesting a greater magnitude of autistic traits. There are five subscales in AQ: Social Skills, Communication Skills, Attention Switching, Imagination and Attention to Detail. For the purpose of the present study, the Polish version of AQ (Pisula et al., 2013) was used. Currently available data from research on the properties of this scale indicates that measurement reliability for the total score is satisfactory, 0.71 (Pisula et al., 2013), and therefore total AQ scores were used here.

3.3. Procedure

Measurements were taken individually. The study was granted approval by the Ethics Committee of the Institute of Psychology of the Polish Academy of Sciences. The study was anonymous, and the subjects could withdraw from it at any time.

4. Results

A multi-dimensional approach was adopted to analyze the results. At the initial stage, a cluster analysis was carried out in which the respondents' answers to particular LHS items were used as variables in the clustering process. At this stage, the K-means method of clustering was used. Subsequently, a comparative analysis of delineated clusters was conducted by means of one-way ANOVA (single factor: cluster). This analysis was applied to those variables which had not been included in the clustering process, that is, satisfaction with life, autistic traits, and reproductive strategy.

Phase I. Cluster Analysis. This analysis was conducted on the scores ob-

tained from the Life History Survey (items 7 to 29). Three clusters, characterized in Table 1, were delineated on the basis of elbow method.

Appendix 2 shows the characteristics of clusters delineated according to the value of variables used in the clustering process.

The next step in the analysis was to compare the delineated clusters with regard to three variables which were not included in cluster formation, that is, autistic characteristics (AQ score), life satisfaction level (SWLS score), and reproductive strategy (Mini-K score). To measure the statistical relevance of the differences between the delineated groups, an ONEWAY ANOVA was performed (factor: clustering, three values) for the above-mentioned dependent variables. The results of ANOVA along with Tukey HSD Post-hoc Test are shown in Table 2.

Table 1. Major characteristics of extracted clusters.

	N	Within sum of squares
Cluster 1	74	3351.39
Cluster 2	99	3886.20
Cluster 3	62	2729.88

Table 2. Results of ANOVA of: mini-K, SWLS, AQ scales across clusters.

Cluster	N	mini-K		SWLS		AQ	
		Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Cluster_1	74	27.297	12.714	20.419	5.729	15.851	4.722
Cluster_2	99	32.313	10.777	21.434	4.204	15.131	4.302
Cluster_3	62	22.968	13.941	18.516	4.423	17.323	5.530
Total	235	28.268	12.822	20.345	4.913	15.936	4.844
ANOVA		$F(2, 234) = 11.3608$, $p < 0.0001$, $\tilde{\eta}^2_{\text{partial}} = 0.089$		$F(2, 234) = 7.0879$, $p < 0.001$, $\tilde{\eta}^2_{\text{partial}} = 0.058$		$F(2, 234) = 4.0188$, $p < 0.05$, $\tilde{\eta}^2_{\text{partial}} = 0.034$	

Tukey HSD Post-hoc Test

mini-K

Cluster_1 vs Cluster_2: Diff = 5.0160, 95%CI = 0.5621 to 9.4699, p = 0.0229

Cluster_1 vs Cluster_3: Diff = −4.3290, 95%CI = −9.3191 to 0.6611, p = 0.1036

Cluster_2 vs Cluster_3: Diff = −9.3450, 95%CI = −14.0391 to −4.6509, p = 0.0000

SWLS

Cluster_1 vs Cluster_2: Diff = 1.0150, 95%CI = −0.7207 to 2.7507, p = 0.3535

Cluster_1 vs Cluster_3: Diff = −1.9030, 95%CI = −3.8477 to 0.0417, p = 0.0566

Cluster_2 vs Cluster_3: Diff = −2.9180, 95%CI = −4.7473 to −1.0887, p = 0.0006

AQ

Cluster_1 vs Cluster_2: Diff = −0.7200, 95%CI = −2.4534 to 1.0134, p = 0.5905

Cluster_1 vs Cluster_3: Diff = 1.4720, 95%CI = −0.4700 to 3.4140, p = 0.1759

Cluster_2 vs Cluster_3: Diff = 2.1920, 95%CI = 0.3652 to 4.0188, p = 0.0139

Cluster #2 was found to score higher in Mini-K than clusters #1 and #3. SWLS scores of cluster #2 were found higher than those of cluster #3, and AQ scores lower than in cluster #3. Cluster #3 has shown lower Mini-K scores than cluster #2, SWLS scores lower than in cluster #2, and AQ scores higher than in cluster #2. Cluster #1 was found to score lower in Mini-K than cluster #2. Both SWLS and AQ scales did not differentiate this cluster from the other two clusters.

Table 3 contains a descriptive summary of clusters characteristics combining both LHS items and AQ, SWLS, and Mini-K scales.

5. Discussion

The results show that there is a link between such variables as reproductive strategy (LHS), autistic traits and quality of life. The data collected with the Life History Survey, constructed for the purpose of this study, showed that the social experiences of study participants, retrieved retrospectively, exhibit a very diverse nature.

Although the cluster analysis produced three-cluster solution, for the purpose of the discussion, two clusters appear to be of particular relevance—clusters 2 and 3. They seem to occupy the two poles of the axis, while the cluster 1 presents some intermediate characteristics. It appears that a high investment (emotional and financial) from grandparents, good economy situation of the family of origin, less siblings, strong emotional bond with parent, average and intensive

Table 3. Descriptive summaries of characteristics of extracted clusters.

CLUSTER #	LHS
Cluster 1	Low level of grandparents' financial support, average level of grandparents' interest in the study participant's development; average economic situation of the family of origin, average number of siblings, average emotional bond with parents, average level of physical contact with family members (for example hugging with parents and kissing with grandparents), more varied and frequent physical contact with siblings, frequent physical contact with peers of both sexes, good assessment of school-social life (childhood). Mini-K scores lower than in cluster #2. SWLS scores did not differentiate this cluster from the other two clusters. AQ scores did not differentiate this cluster from the other two clusters.
Cluster 2	High level of grandparents' financial support, high level of grandparents' interest in the study participant's development, good economic situation of the family of origin, less siblings, strong emotional bond with parents, physical contact with all family members: average—with regard to certain forms of contact (for example patting with parents and siblings), frequent—with regard to other forms of contact (for example kissing with parents, grandparents and hugging with parents, grandparents and siblings), physical contact with peers of both sexes: often average—with regard to certain forms of contact (for example patting, tickling, friendly embrace with same and other-sex peers) and often poor in other (for example, wrestling with peers of both sexes), average assessment of school-social life (childhood). Mini-K scores higher than in clusters #1 and #3. SWLS scores higher than in cluster #3. AQ scores lower than in cluster #3.
Cluster 3	Average level of grandparents' financial support, low level of grandparents' interest in the study participant's development, bad economic situation of the family of origin, more siblings, attenuated emotional bond with parents, low level of physical contact with all family members (for example kissing, patting with parents and grandparents and stroking with siblings), physical contact with peers of both sexes: often rare—with regard to certain forms of contact (for example patting, stroking), often average—with regard to other forms of contact (for example wrestling, arm wrestling), poor assessment of school-social life (childhood). Mini-K scores lower than in cluster #2. SWLS scores lower than in cluster #2. AQ scores higher than in cluster #2.

physical contact with parents, grandparents and siblings (cluster 2), are correlated with a high Mini-K scores, low level of autistic characteristics and higher quality of life; this translates into a preference for long-lasting relationships, and a reproductive strategy geared towards high parental investment. A lack of interest from grandparents, low level of family origin income, more siblings, poor physical contact with all family members (cluster 3) are associated with high levels of autistic characteristics, a reproductive strategy geared towards mating effort rather than parenting effort and low level of quality of life. It must be noted that we are not in a position to propose any cause-effect hypothesis in this regard. The Life History Theory stresses the importance of the characteristics of the family environment as a potential indicator influencing LHS—high-quality parental care shapes a secure attachment style, and this functions as a sign that the local environment is safe, which in turn leads to a slow reproductive strategy (see: Simpson & Belsky, 2008). Ellis (2004) believes that parental investments are perceived by the child as a hint that regulates the duration of childhood: high-quality parental care prolongs childhood, while poor-quality parental care shortens this stage, with the child sooner becoming independent of their parents. Family relationships providing support and maintenance may reduce the negative influence of a harmful environment on the child. As recent research (Sung, Simpson, Griskevicius, Kuo, Schlomer, & Belsky, 2016) shows, girls who spent the first 5 years of their life in a low-income family environment but developed a secure style of attachment to their mothers, were "protected" from entering the reproductive stage of their life prematurely. The parents' personality traits are also of considerable importance: parents scoring high on the GFP (General Factor of Personality extracted from the Big Five dimensions: Openness, Conscientiousness, Extraversion, Agreeableness, Emotional Stability) provide their children with more emotional support, which indicates a slow reproductive strategy (van der Linden, Figueredo, de Leeuw, Scholte, & Engels, 2012). Chisholm (1993) believes that the style of parental care provides the child with hints on the basis of which the child estimates the mortality ratio in the local environment. In a risky environment, with a high mortality ratio, parents become insensitive to their children's needs, and children display behaviors geared towards earlier reproduction and higher mating efforts. For instance, it has been demonstrated that women reporting their own family environment in early life as fraught with various relationship problems started menstruating and gave birth to their first child at an earlier age, and had a shorter life expectancy (Chisholm, Quinlivan, Petersen, & Coall, 2005).

The present study supports our theoretical view that physical contact between family members is an important element which influences the direction of LHS. Tactile contact between people plays a crucial part in governing their well-being (Gallace & Spence, 2010). Research shows that interpersonal tactile stimulation is an effective way of influencing social behaviors in humans, such as gaining the compliance of another individual, or when trying to persuade someone to do

something, in affecting people's attitudes toward specific actions, in creating bonds between couples or groups, and in strengthening romantic relationships. What is interesting, as demonstrated in pediatric research, human touch—in the form of massage—increases the growth rate in low-birth-weight neonates and regulates their sleep patterns (see for review Field, 2004). To sum up, a rich, frequent, and intensive tactile contact with family members seems to enhance somatic effort and shape a slow LHS reproductive strategy, which is a sign of investment in the child's physical and emotional development. On the contrary, poor, rare physical contact between child and adults in the family is likely to result with the development of the fast LHS.

One of the major differences is the relationship with grandparents, who actively support (or do not support) the development of their grandchildren. As mentioned, grandparents play an important role as allomothers in childcare. Tinsley's and Parke's study (1987) showed that more contact with grandmothers and grandfathers have positive influences on infant mental development.

It is possible to hypothesize that various forms of support from grandparents (e.g. financial, emotional, educational) create an additional family "resource budget" that can be directed at the child's somatic effort—growth and development, acquisition of knowledge, qualifications or skills and thus shape the slow LHS.

The presented research also indicates the role of siblings in the development of reproductive strategy. Individuals with fewer siblings are people with higher scores in Mini-K (slow reproductive strategy, and people with more siblings with lower scores in Mini-K (pane of reproductive strategy), so it seems that the rivalry between siblings for parental resources (Trivers, 1974, see also Nitsch et al., 2013) stimulates the development of fast strategy, which is in accordance with other studies—having younger siblings decelerates menarche (Hoier, 2003).

In our study, no effect of physical contact with peers was found on the development of reproductive strategy, quality of life or AQ scores. Both in the case of 2 and 3 cluster, the intensity of contacts with peers of both sexes in childhood was medium or rare. Therefore, it seems that physical contact within the family and not with their peers plays a decisive role in relation to these variables. It is possible however, that the role of tactile stimulation and touch mediated peer interactions play the more profound role during the mid- and late adolescence, when the sexual component emerges as a key factor (Fortenberry, 2013; Rathus, Nevid, & Fichner-Rathus, 2011). For example, women who experienced their sexual debut between the ages of 14 and 18 show greater relative acceleration of LH speed during this period than women who had not debuted by age 18 (Dunkel & Lukaszewski, 2015).

Our study has also demonstrated a link between reproductive strategy (measured by the Mini-K) and the subjective sense of satisfaction with life—higher levels of satisfaction were reported by people representing the slow reproductive strategy, while lower satisfaction was reported by those representing the fast

strategy. The results obtained are in line with conclusions reached in other studies (Figueredo et al., 2007), in which a positive correlation was found between the K-Factor and the general covitality factor, which is "positively charged" *inter alia* by wellbeing, good health, and positive affectivity, and "negatively charged" by negative affectivity and the presence of symptoms of an illness. What is even more important, however, is that, in line with predictions formed on the basis of LHT, the subjective sense of happiness is enhanced by growing up in a family with positive emotional relationships, financial support from grandparents, and frequent tactile contact between family members and the child. It can therefore be assumed that such a family environment supports the somatic effort of the child's body, thereby contributing to better physical and psychological development. This is of great consequence to adaptation, as a general sense of satisfaction with life is also linked to overall somatic and psychic condition, which, in turn, determines the presence or absence of health indicators which are commonly perceived as physical attractiveness. Such health indicators form an important criterion for the choice of partner (Wincenciak et al., 2015).

The negative correlation between autistic characteristics (AQ) and quality of life has already been documented (Pisula, Danielewicz, Kawa, & Pisula, 2015). However, the incorporation of concepts originating from evolutionary psychology, such as "life history", measured by the Mini-K Short Form, serves to position this relationship within a new theoretical context. Although there is an ongoing debate on the heritability of autistic characteristics (Holmboe et al., 2014; Picardi et al., 2015), there is no doubt that some profound developmental processes play a crucial role in how these characteristics develop. The evolutionary theoretical framework has already been successfully applied to illuminate this question (Del Giudice, 2014; Del Giudice, Angeleri, Brizio, & Elena, 2010).

Our data, however, are not consistent with del Giudice's et al. (2010) expectations. Study participants who scored higher on the AQ scale obtained lower scores in the Mini-K Short Form and came from families of poorer economic backgrounds with lower emotional and social parameters; study participants who scored lower on the AQ scale, in turn, obtained high scores in the Mini-K and came from families of better economic backgrounds with higher emotional and social parameters. It appears, therefore, that autistic traits in the general population may be somehow linked to the fast reproductive strategy, and not to the slow strategy, contrary to the del Giudice's et al. (2010) predictions. In other words: individuals scoring high on AQ increase their reproductive success probably through mating effort, which translates into a higher probability to enter into short-term relationships (possibly due to their difficulty in maintaining a long-lasting emotional relationship).

Our data does not facilitate a precise causal hypothesis formulation. There may be numerous possible developmental paths. In one of the possible scenarios leading to an expression of a specific pattern of social functioning, the starting point would be the moment of prenatal exposure to androgens. The multilevel

interaction of the fetus with the environment may initiate the development of specific social characteristics, which then shape subsequent stages of development. This direction of theoretical speculation is supported by a vast body of data obtained from the analyses of the 2D:4D ratio (Hines, 2010), as well as the theoretical proposal formulated in studies on autism (Hönekopp, 2012; Teatero & Netley, 2013). This way of thinking assumes a very early point at which developmental processes are triggered, and therefore a certain degree of early determination of those processes.

One may, however, adopt another perspective, devoting more attention to the long-lasting developmental impacts of various environmental factors. This perspective is supported by many decades of research on so-called environmental enrichment. This line of research has helped accumulate a considerable amount of evidence that physical stimulation as well as a rich social environment may have a profoundly positive impact on development, and therefore on quality of life (Fares et al., 2013; Hertzog, Kramer, Wilson, & Lindenberger, 2009; Sackett, Novak, & Kroeker, 1999). Rich environment (e.g. grandparents showing great interest in their grandchildren's development, varied and frequent physical contact with parents) may produce conditions in which an individual develops as a person who is likely to experience a high level of QoL, develop good social skills (low AQ), and be ready to invest effort and engagement in long-lasting relationships with their children and partners. In addition to what has already been said, the fact that the study appears to suggest the important role of physical contact (tactile stimulation) seems to be an interesting conclusion in its own right.

6. Limitations of the Study

This study is of a preliminary nature. At this stage, the data collected may only suggest possible paths for further investigation. Moreover, a better distribution of the two sexes would be desirable. It does not seem out of line to recommend a precise focus for future research. However, it seems reasonable to incorporate evolutionary psychology theory into research on quality of life. Secondly, this field will benefit from the application of developmental theories, as proposed by Bjorklund and Pellegrini (2000). The combination of these various perspectives may provide a useful approach to the study of AQ, QoL, and reproductive strategies in human beings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix 1. Life History Survey

I. General Information

0. Age: _____
1. Gender: _____
2. Education: _____
3. Occupation: _____
4. Marital status: _____

married	separated	divorced	widowed	single	decline to answer

5. Children

	boys	girls
Number of children		

6. Your own health

(circle as appropriate)	Very poor	Poor	Average	Good	Excellent

II. My Family of Origin

Section II a—General

7. Number of siblings:_____
8. Economic situation of my family of origin:

Very poor	Poor	Average	Good	Excellent

Section II b—Support

9. When I was a child, my grandparents (maternal or paternal) provided financial support to me or my family:

Very rarely	Rarely	Averagely	Often	Very often

10. When I was a child, my grandparents (maternal or paternal) helped me with schoolwork:

Very rarely	Rarely	Averagely	Often	Very often

11. When I was a child, my grandparents (maternal or paternal) took care of me (played with me, told me stories, went hiking with me, etc.):

Very rarely	Rarely	Averagely	Often	Very often

12. During adolescence my grandparents (maternal or paternal) provided financial support to me or my family:

Very rarely	Rarely	Averagely	Often	Very often

13. During adolescence my grandparents (maternal or paternal) supported me in other ways:

Very rarely	Rarely	Averagely	Often	Very often

Section II c—Physical Contact

14. In my childhood the forms of physical contact listed below occurred between me and my parents with the following frequency:

		Very rarely	Rarely	Sometimes	Often	Very often
14.1.	Stroking					
14.2	Patting					
14.3	Kissing					
14.4	Hugging					

15. In my childhood the forms of physical contact listed below occurred between me and my grandparents with the following frequency:

		Very rarely	Rarely	Sometimes	Often	Very often
15.1	Stroking					
15.2	Patting					
15.3	Kissing					
15.4	Hugging					

16. In my childhood the forms of physical contact listed below occurred between me and my siblings with the following frequency:

		Very rarely	Rarely	Sometimes	Often	Very often
16.1	Hugging					
16.2	Stroking					
16.3	Patting					
16.4	Playful shoving					
16.5	Wrestling					
16.6	Arm wrestling					
16.7	Tripping one another during play					
16.8	Tickling					
16.9	Friendly embrace					

III. Social Relations

Section III a—Peers

17. As a child, among my peers I was:

Very unpopular	Unpopular	Averagely popular	Popular	Very popular

18. As a child, I participated in games and activities with my peers:

Very rarely	Rarely	Averagely	Often	Very often

19. During childhood my peers visited me at home:

Very rarely	Rarely	Averagely	Often	Very often

20. During my childhood, the forms of physical contact listed below occurred between me and my same-sex peers with the following frequency:

		Very rarely	Rarely	Sometimes	Often	Very often
20.1	Stroking					
20.2	Patting					
20.3	Playful shoving					
20.4	Wrestling					
20.5	Arm wrestling					
20.6	Tripping one another during play					
20.7	Tickling					
20.8	Friendly embrace					

21. During my childhood, the forms of physical contact listed below occurred between me and my other-sex peers with the following frequency:

		Very rarely	Rarely	Sometimes	Often	Very often
21.1	Kissing					
21.2	Stroking					
21.3	Patting					
21.4	Playful shoving					
21.5	Wrestling					
21.6	Arm wrestling					
21.7	Tripping one another during play					
21.8	Tickling					
21.9	Friendly embrace					

Section III b—Parents

22. When I needed help as a child, my mother offered it to me:

Very rarely	Rarely	Averagely	Often	Very often

23. When I was a child, my mother gave me her full attention:

Very rarely	Rarely	Averagely	Often	Very often

24. As a child, I felt safe with my mother:

Very rarely	Rarely	Averagely	Often	Very often

25. When I was a child, my mother treated me with love:

Very rarely	Rarely	Averagely	Often	Very often

26. When I needed help as a child, my father offered it to me:

Very rarely	Rarely	Averagely	Often	Very often

27. When I was a child, my father gave me his full attention:

Very rarely	Rarely	Averagely	Often	Very often

28. As a child, I felt safe with my father:

Very rarely	Rarely	Averagely	Often	Very often

29. When I was a child, my father treated me with love:

Very rarely	Rarely	Averagely	Often	Very often

end

Appendix 2. Detailed Characteristics of Extracted Clusters, in Terms of the Values of LHS Items, E.G. Variables Input into the Clustering Procedure. See Appendix 1 for the Content of Given Items

	Centroids of given items across the extracted clusters			
	Item input to cluster analysis	Cluster 1	Cluster 2	Cluster 3
I7	Number of siblings	1.892	1.677	2.048
I8	Economic situation of my family of origin (Very poor, Poor, Average, Good, Excellent)	3.595	3.737	3.274
I9	When I was a child, my grandparents (maternal or paternal) provided financial support to me or my family (Very rarely, Rarely, Averagely, Often, Very often)	2.041	2.747	2.226
I10	When I was a child, my grandparents (maternal or paternal) helped me with schoolwork (Very rarely, Rarely, Averagely, Often, Very often)	1.622	2.434	1.532
I11	When I was a child, my grandparents (maternal or paternal) took care of me (played with me, told me stories, went hiking with me, etc.), (Very rarely, Rarely, Averagely, Often, Very often)	3.162	3.808	2.597
I12	During adolescence my grandparents (maternal or paternal) provided financial support to me or my family (Very rarely, Rarely, Averagely, Often, Very often)	1.973	2.576	2.145
I13	During adolescence my grandparents (maternal or paternal) supported me in other ways (Very rarely, Rarely, Averagely, Often, Very often)	2.432	3.051	2.113
I14	In my childhood the forms of physical contact listed below occurred between me and my parents with the following frequency (Very rarely, Rarely, Sometimes, Often, Very often):			
I14_1	Stroking	3.378	3.768	2.048
I14_2	Patting	3.230	2.899	1.823
I14_3	Kissing	3.176	3.343	1.758
I14_4	Hugging	3.743	4.051	2.242
I15	In my childhood the forms of physical contact listed below occurred between me and my grandparents with the following frequency (Very rarely, Rarely, Sometimes, Often, Very often):			
I15_1	Stroking	2.730	3.343	1.806
I15_2	Patting	2.622	2.616	1.645
I15_3	Kissing	2.446	2.778	1.790
I15_4	Hugging	2.838	3.434	2.032
	In my childhood the forms of physical contact listed below occurred between me and my siblings with the following frequency (Very rarely, Rarely, Sometimes, Often, Very often):			
I16_1	Hugging	2.784	3.030	1.887
I16_2	Stroking	2.446	2.556	1.613
I16_3	Patting	2.919	2.657	1.903
I16_4	Playful shoving	3.730	2.788	2.694
I16_5	Wrestling	3.527	2.364	2.419
I16_6	Arm wrestling	3.270	2.182	2.274
I16_7	Tripping one another during play	3.595	2.616	2.500
I16_8	Tickling	3.581	3.485	2.839
I16_9	Friendly embrace	3.176	3.273	2.242

Continued

I17	As a child, among my peers I was (Very unpopular, Unpopular, Averagely popular, Popular, Very popular)	4.122	4.051	3.661
I18	As a child, I participated in games and activities with my peers (Very rarely, Rarely, Averagely, Often, Very often)	4.419	4.253	3.839
I19	During childhood my peers visited me at home (Very rarely, Rarely, Averagely, Often, Very often)	4.054	3.768	3.177
I20	During my childhood, the forms of physical contact listed below occurred between me and my same-sex peers with the following frequency (Very rarely, Rarely, Sometimes, Often, Very often)			
I20_1	Stroking	2.284	1.687	1.468
I20_2	Patting	3.108	2.222	1.903
I20_3	Playful shoving	3.568	2.222	2.339
I20_4	Wrestling	3.216	1.727	1.935
I20_5	Arm wrestling	3.324	1.949	2.242
I20_6	Tripping one another during play	3.338	2.091	2.145
I20_7	Tickling	3.095	2.505	2.081
I20_8	Friendly embrace	3.284	3.010	2.258
I21	During my childhood, the forms of physical contact listed below occurred between me and my other-sex peers with the following frequency (Very rarely, Rarely, Sometimes, Often, Very often)			
I21_1	Kissing	2.392	1.626	1.726
I21_2	Stroking	2.486	1.778	1.581
I21_3	Patting	2.851	1.929	1.629
I21_4	Playful shoving	3.014	2.040	1.903
I21_5	Wrestling	2.392	1.354	1.548
I21_6	Arm wrestling	2.500	1.657	1.677
I21_7	Tripping one another during play	2.865	1.889	1.806
I21_8	Tickling	3.270	2.354	2.113
I21_9	Friendly embrace	3.027	2.283	2.032
I22	When I needed help as a child, my mother offered it to me (Very rarely, Rarely, Averagely, Often, Very often)	4.392	4.707	3.532
I23	When I was a child, my mother gave me her full attention (Very rarely, Rarely, Averagely, Often, Very often)	4.392	4.636	3.484
I24	As a child, I felt safe with my mother (Very rarely, Rarely, Averagely, Often, Very often)	4.554	4.808	3.597
I25	When I was a child, my mother treated me with love (Very rarely, Rarely, Averagely, Often, Very often)	4.459	4.677	3.452
I26	When I needed help as a child, my father offered it to me (Very rarely, Rarely, Averagely, Often, Very often)	3.986	4.212	2.984
I27	When I was a child, my father gave me his full attention (Very rarely, Rarely, Averagely, Often, Very often)	3.757	4.010	2.903
I28	As a child, I felt safe with my father (Very rarely, Rarely, Averagely, Often, Very often)	4.203	4.313	3.129
I29	When I was a child, my father treated me with love (Very rarely, Rarely, Averagely, Often, Very often)	3.757	4.071	2.823