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National Intelligence, Basic Human Needs, and Their Effect on Economic Growth

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Abstract

Self-actualization theory suggests that all individuals hold potential, and they can focus their motivations on actualizing this potential only if all basic and psychological needs are satisfied. Contemporary economic literature has reported that national average intelligence (IQ) is the most robust measure of human capital in raising economic productivity across countries. Treating national IQ as an intrinsic potential of society, our study examined the role of basic and psychological needs (i.e., life expectancy, life satisfaction, and political stability) in moderating the impact of national IQ on economic growth among 118 countries from 1970 to 2010. Hierarchical multiple regression indicates that the independent effects of national IQ, life expectancy, political stability, and life satisfaction on economic growth rate were significantly positive. Furthermore, life satisfaction was significantly negative in moderating the effect of national IQ on growth, while the other two factors were non-significant moderators. Therefore, we suggest that increased life satisfaction reduces desire for better performance, thereby diminishing the effect of IQ on economic growth. This finding is in accordance with the predictions of Maslow's hierarchy of needs.

1. Introduction

Intelligence (IQ) is a potentially powerful mechanism that drives humans towards economic well-being. Previous studies have found positive effects of national average IQ on various economic outcomes. National IQ predicts the level of GDP per capita (Lynn & Vanhanen, 2002, 2006; Zajenkowski, Stolarski, & Meisenberg, 2013), GDP per capita growth (Jones & Schneider, 2006; Meisenberg, 2012; Weede & Kämpf, 2002) and technological progress (Gelade, 2008; Lynn, 2012) across countries, where scientific technological achievements represent the path through which the impact of IQ on economic growth is channeled (Rindermann, 2012; Rindermann & Thompson, 2011). Moreover, national IQ is significantly more robust than other existing education and health indicators, (e.g., school enrolment ratios, life expectancy, literacy rates, and number of years of schooling) in determining productivity growth at a cross-country level (e.g., Jones & Schneider, 2006; Ram, 2007; Weede & Kämpf, 2002). Schools should ideally be institutions that cultivate critical thinking and social reformation; however, they often diffuse traditional values of a society, which inadvertently discourage critical thinking. Alternatively, IQ is strongly associated with critical thinking, which is an essential determinant of national wealth and a modern, non-traditional worldview (Meisenberg, 2004).

An editorial declaration by 52 psychologists defines intelligence as a very general mental capability that involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, learn from experience, etc. Intelligence is not defined by narrow academic skills such as book learning or test-taking ability. Rather, it reflects a broader and deeper capability for comprehending our surroundings—"catching on," "making sense" of things, or "figuring out" what to do (Gottfredson, 1997). Wechsler (1944, p. 3) defined intelligence as "the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment." Representing the capability of a nation, national IQ is essential for people to self-actualize and be successful within their competitive economies. Goldstein (1947) described self-actualization as the affinity to actualize, as fully as possible, one's individual capacities within his living world. The affinity for self-actualization is the solitary drive by which the future outcome of an individual is shaped. The drive that regulates an individual organism's function is nothing but the motivation that arises from its affinity to actualize itself as much as possible in accordance with its potential (Goldstein, 1947). Thus, self-actualization with regard to growth

and optimal functioning is an active progression of a human being towards becoming increasingly inwardly directed and well balanced in thought, emotion, and bodily reaction. This cannot be perceived as a goal, but as a progression towards growth, development, and the unfolding of human potential (Shostrom, 1976).

In relation to productivity, the economic actor has two basic goals: to maximize material wealth and minimize effort (Beaudreau, 2012). Human motivation, which is oriented by achievement, plays a major role within national economic performance, which is in turn a more significant factor than the collective effects of institutional quality and education quantity (Maridal, 2013). Therefore, the efficiency of skilled laborers will be limited if they are not motivated to perform their jobs (Delaney & Huselid, 1996). Consequently, economic growth rates will not improve when needs are met, as individuals become less motivated than when their most important needs remained unfulfilled (Marini, 2004).

Based on self-actualization theory, our study investigated motivational factors that regulate individuals' optimal function on their life performance. Next, applying this theory at the cross-national level, we examined how these motivational factors regulate self-actualization of human capital potential (i.e., moderation of the effect of national IQ on economic growth). Thus, we investigated empirically whether self-actualization theory could partly explain the inequality of economic achievement across countries.

2. Self-actualization and Maslow's hierarchy of needs

Self-actualization as a concept was first reported in Abraham Maslow's hierarchy of needs. It represents the final stage of psychological development that can be realized when all basic and psychological needs are satisfied. Only then can the actualization of one's full potential occur (Maslow, 1943). According to Maslow, as humans meet their basic needs, they seek to fulfill, in sequence, higher needs that reside within a set hierarchy. Maslow's hierarchy of needs is often illustrated in the shape of a pyramid, with the principle and most essential needs at the bottom, and self-actualization at the top (Figure 1).
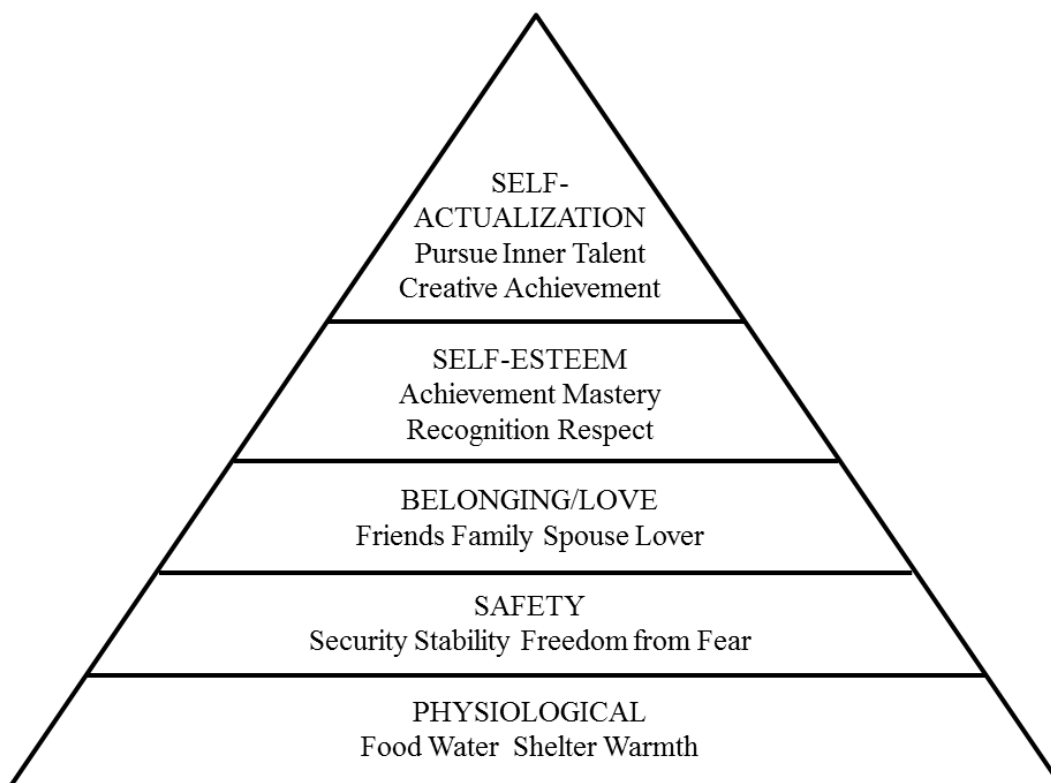
Figure 1. Maslow's hierarchy of human basic and psychological needs (Maslow, 1970).

The most essential and fundamental four layers of the hierarchy consist of what Maslow called deficiency needs: esteem, friendship and love, security, and physical needs. If these deficiency needs are not achieved, individuals experience anxiety and stress. Maslow's theory proposes that the most fundamental level of needs must be attained before individuals can focus their motivations on the secondary, high-level needs. Individuals can ultimately achieve self-actualization at the summit of the hierarchy (Gleitman, Fridlund, & Reisberg, 2004).

Maslow defined self-actualization as the need for self-fulfillment, that is, for the individual to actualize his/her potential. It is the desire to become to greater than what one currently is, to develop into the whole entity that one is capable of becoming. Maslow applied this phrase to describe it as a desire, rather than a driving force, which could culminate in realizing one's potentials. Unlike Goldstein, Maslow did not believe that self-actualization determines one's life. Instead, he believed that self-actualization bestows upon a specific individual the motivation to realize his/her growing ambitions, and therefore, Maslow

portrayed self-actualization as the full realization of individual potential (Gleitman et al., 2004).

In contrast, Goldstein's definition of self-actualization can be understood as a basic drive, rather than a goal to be accomplished at some point in the future. The organism has the essential tendency to actualize all its capacities cumulatively toward its full potential. Self-actualization theories suggest that, in any given circumstances, we seek to maximize the use of all of our capacities in all of our actions to stimulate the best performance at that particular condition and time. To simplify, two men with the same actual capacities will present two different degrees of performance in two different conditions. For instance, if we consider two groups of men with the same cognitive ability and the same job, the first group will be more motivated to perform well in their job, and thereby contribute more to their firm because their stomachs are full and they are consistently healthy and happy. On the other hand, the second group might be demotivated to perform effectively, thereby contributing less to their firm, as they are hungry, sick, and unhappy. Our freedom from emotional sickness is the first factor toward expansion and fulfillment of health (Schultz, 1977). Thus, higher capacities will not necessarily result in higher productivity if needs are left unmet.

Human potential supporters propose that considerable human progress has occurred and that it is essential for society to continue to strive toward this desired, exceptional level of progress, and in turn actualize society's innate potential (Schultz, 1977). Rogers (1959, 1975) also elaborated on self-actualization as an innate drive towards achieving one's potential, parallel to Maslow (1971, 1998). Nevertheless, as opposed to Maslow's "self-actualization," Rogers favors the process as continuous, and thus prefers, like Goldstein, the term "self-actualizing." These scholars, however, consistently perceive self-actualization as a growth process incorporating the same class of qualities (Reber, 1995).

3. Aims

In accordance with self-actualization theory, it cannot be assumed that, at a macro level, all societies live in adequately motivated environments for performing to their actual

potential because much of the world is deficient in the satisfaction of basic needs.[1] Following our literature review, we conceptualized national IQ as a human capacity for problem solving, reasoning, and success within competitive economies. Thus, our study adopted this idea with the assumption that national IQ can produce diverse effects on cross-country economic growth when moderated by adequate satisfaction of basic and psychological needs. This study did not seek to determine which basic needs are most important, as this has been continually discussed by Maslow within the context of his hierarchy. Instead, we endeavored to employ self-actualization theory to examine whether any deficit (or surplus) of basic and psychological needs will impede (or facilitate) the effect of national IQ on economic growth across countries, as illustrated in Figure 2.
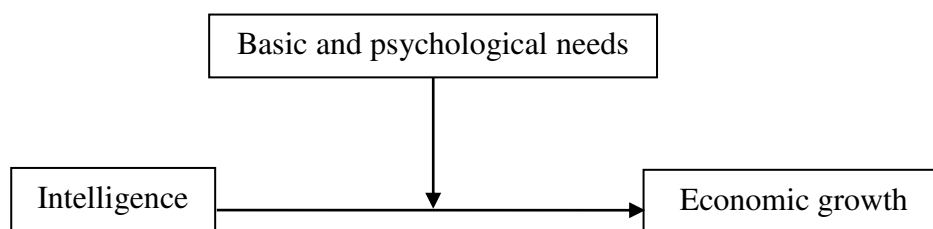
Figure 2. The possible role of basic and psychological needs in moderating the impact of national intelligence potential on economic growth rates.

4. Methodology

To examine the role of basic needs in moderating the impact of IQ on economic growth, we used a standard economic model as follows:

$$\text{GROWTH}_i = \beta_0 + \beta_1 (\text{Y}_{1970})_i + \beta_2 \text{IGDP}_i + \beta_3 \text{IQ}_i + \beta_4 \text{X}_i + \beta_5 (\text{IQ} * \text{X})_i + e_i$$

where the dependent variable is GROWTH, which denotes the average growth rate of real GDP per capita over the 1970–2010 period. Y_{1970} and IGDP are two control variables, initial

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[1] The disparity in degrees of human development has categorized our world into two major groups: developed and developing countries. A developed nation is one in which all of its civilians experience a free and healthy life in a safe environment. A developing nation is one in which citizens are incapable of maintaining material well-being and experiencing standards of civil liberties and environmental protection (UNCTAD, 2000).

GDP per capita in 1970 and the investment as a percentage of annual GDP averaged over the years 1970–2010, respectively. These two control variables are universally employed in most standard growth models worldwide (e.g., Mankiw, Romer, & Weil, 1992; Minier, 2007; Ram, 2007). Data on GROWTH and Y_{1970} were obtained from Penn World Table 7.1 (Heston, Summers, & Aten, 2012), while the data on IGDP were obtained from the World Development Indicators (WDI) from the World Bank (2013a) database. IQ is the national average IQ for specific country i and was obtained from Meisenberg and Lynn (2011). Additionally, we include X, which is a set of basic and psychological needs hypothesized to moderate growth through the impact of IQ on GROWTH. Finally, e_i is an error term. The new idea in this study is the interaction, where we hypothesized that the association between IQ and GROWTH would be affected by each value of X. To model for this interaction, we follow Dawson (2014) and Zajenkowski et al. (2013) to construct an interaction term (IQ $*$ X) that is the cross product of the two predictor variables, and place this interaction term into the multiple regression along with the original predictors to determine the significance of the interaction slope.

Drawing inspiration from Maslow's hierarchy of needs, we suggest a set of three X's representing the stages of basic and psychological needs, where each is included separately in our estimation model.

Life expectancy (HEALTH)

The first stage of Maslow's hierarchy of needs demonstrates the need to satisfy physiological needs and health for ideal human functioning. In the current study, we employ life expectancy (at birth, total years) to represent the level of health in the populations that would affect the full functioning of IQ on economic growth. Data were obtained from the World Bank (2013a) database. Health is a core component that allows us to fully actualize our capacities. Health decline causes physical and emotional deterioration and is a hindrance to normal human activity. Healthy individuals are more competent at assimilating knowledge and skills, and therefore, they are more productive (Knowles & Owen, 1995). Grossman (1972) perceives health as a long-lasting capital stock that creates an output of healthy time. The allocation of healthy time is divided between leisure and work. Adding poor health to this equation will limit the amount of healthy time allocated to generating income. Because laborers are not working to their potential, the loss of productivity occurs when they come to work but cannot function optimally owing to poor health. Healthy societies are more

productive since they maintain greater physical and mental readiness and engage in a sufficient amount of work, which leads to higher per capita income (Bloom & Canning, 2000). Furthermore, to our knowledge, most studies found a significant role of health in raising productivity at a micro level and, therefore, economic growth at a macro level (e.g., Bloom, Canning, & Sevilla, 2004; Cole & Neumayer, 2006; Knowles & Owen, 1995, 1997).

Political stability and absence of violence or terrorism (PEACE)

Based on the second stage of Maslow's hierarchy of needs, we hypothesized that safety and security of individuals, peace of surroundings, and freedom from fear would also play an important role in moderating the effect of human potential on economic growth. To investigate the safety and peace of nations, we utilized data on political stability and the absence of violence and terrorism. The data were obtained from the Worldwide Governance Indicators 2013 (World Bank, 2013b) database, in which higher values indicate greater political stability and absence of violence and terrorism. Haggard and Tiede (2010) reported that political violence is an essential barrier to the growth process. Violent conflict and political war within societies will have a negative impact on human motivation and, consequently, on economic growth. Economic studies have corroborated this suggestion. Political violence is associated with lower national productivity (e.g., Collier, Hoeffler, & Rohner, 2009; Kang & Meernik, 2005). The economic, political, and social consequences of this instability are substantial. Instability compromises social structure, destroys capital and infrastructure, interrupts schooling, jeopardizes civil liberties, and impairs the quality and functioning of institutions (Acemoglu, Johnson, & Robinson, 2005; Blattman & Annan, 2010; Collette & Cullen, 2000). Thus, when civil wars end, there is a considerable revitalization in economic performance, education, health, and political development (Brakman, Garretson, & Schramm, 2004; Chen, Loayza, & Reynal-Querol, 2008; Davis & Weinstein, 2002; Justino & Verwimp, 2006; Miguel & Roland, 2011).

Satisfaction with Life Index (SWL)

We investigated the impact of human capacity on growth when a national population has achieved distinct levels of life satisfaction or happiness. The SWL is a subjective value-based survey and data were obtained from White (2007). Data were collected from large-scale standardized national surveys asking people about how happy they are, the extent to which they are satisfied with life, and the extent to which they have achieved their target

goals. Data, which were analyzed by White (2007), were published by the Afrobarometer, CIA, Latinbarometer, New Economics Foundation (NEF), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Human Development Report (UNHDR), Veenhoven Database, and the World Health Organization (WHO) to establish "a global projection of subjective well-being: the first world map of happiness." Participants in several studies were asked questions concerning their happiness and life satisfaction. White's (2007) meta-analysis was centered on discoveries from more than 100 different studies worldwide with a total sample of about 80,000 individuals (University of Leicester, 2006).[2]

The validity of the SWL has been intensely discussed and verified by Kahneman and Krueger (2006) as well as by Wallace and Wheeler (2002). Life satisfaction implies contentment with or acceptance of life circumstances, or the fulfillment of wants and needs for life as a whole (Kashdan, 2004; Sousa & Lyubomirsky, 2001). Wilson (1967) and Chekola (1975) suggested that unfulfilled needs facilitate unhappiness, but fulfillment of needs will facilitate happiness. The life satisfaction index not only asks how people feel, but also their level of social and economic development. This measure of subjective well-being is therefore a kind of motivation variable as it is measured by the existence of positive experiences and impressions (e.g., enjoyment and self-esteem in achievement) and the nonexistence of negative experiences and impressions (e.g., suffering, worry, and sorrow). We suggest that these achievements are essential factors for self-esteem with regard to Maslow's hierarchy of needs, and thus, they are essential for economic growth. However, at the same time, higher life satisfaction would ambiguously decrease individuals' effort towards further life achievement. According to Maslow (1970, p. 393) "[a] satisfied need is not a motivator," a statement corroborated by Heylighen (1992, p. 40), who reframed a

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[2] The relationship between SWL and individual income levels has also been a controversial issue among empirical studies. A number of studies found a positive relationship between income and subjective well-being, with no satiation point (e.g., Deaton, 2008; Sacks, Stevenson, & Wolfers, 2012; Stevenson & Wolfers, 2008, 2013). Conversely, other studies did not find a permanent relationship between SWL and income (e.g., Di Tella & MacCulloch, 2008; Kahneman & Deaton, 2010). Several empirical studies have found that life satisfaction and happiness tend to fluctuate only in the short term, as a result of prominent positive or negative events and life adjustments (e.g., Easterlin, 2011; Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010; Eysenck, 1994; Kahneman, Diener, & Schwarz, 1999) and focusing illusion, which is a cognitive bias that arises when individuals put too much importance on one aspect of an event, leading to an inaccuracy in predicting the utility of a future outcome (e.g., Diener, Kahneman, Tov, & Arora, 2010; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2006; Schkade & Kahneman, 1998). However, it stabilizes across decades (e.g., Clark, Frijters, & Shields, 2008; Diener & Seligman, 2004; Easterlin, 1995, 2005; Eysenck, 1994; Frey & Stutzer, 2002; Fujita & Diener, 2005; Kahneman et al., 1999; Kubiszewski et al., 2013; Veenhoven, 1993). The main reason for this stabilization is genetic attributes (e.g., Bartels & Boomsma, 2009; Frijters, Johnston, & Shields, 2011; Hamer, 1996; Kendler, Myers, Maes, & Keyes, 2011; Lykken & Tellegen, 1996; Nes, Røysamb, Tambs, Harris, & Reichborn-Kjennerub, 2006; Røysamb, Tambs, Reichborn-Kjennerud, Neale, & Harris, 2003).

cognitive-systemic construct of Maslow's self-actualization theory. Heylighen emphasizes the finding that human needs that have been satisfied are no longer active. Therefore, the higher human satisfaction becomes, the less active needs become. Di Tella and MacCulloch (2008) further emphasized that full adaptation to subsequent economic growth takes place once satisfaction of basic needs has been achieved. Life satisfaction is negatively associated with human desire. Michalos (1985), in an empirical study, found that discrepancy between desires and possessions accounted for more than 50% of the variability in life satisfaction, where people with higher life satisfaction had fewer desires. Another empirical study by Crawford Solberg et al. (2002) found that people's satisfaction is associated with desires, where people with less (more) desire have less (more) satisfaction as income increases. Thus, in this case, it could be that populations with higher life satisfaction index would possess a decreased motivation.

The Interactions

A problem with the inclusion of interaction terms is that lower order terms will frequently be highly correlated with their interactions. This causes misleading interpretations of the true effect of variables due to computational problems and inflated variances of estimated coefficients, that is, the collinearity problem. To overcome this problem within moderating effects, we follow procedures recommended by Frazier, Tix, and Barron (2004) and Dawson (2014). First, the dependent (GROWTH) and independent (Y_{1970}, IGDP, IQ, X) variables are standardized to a standard deviation of one, that is, by subtracting the mean from each observation and dividing by the original standard deviation. Then, the value of interaction term (IQ*X) that is constructed from these standardized predictor values is standardized. Therefore, the slope (β_5) of IQ*X is estimated by analyzing standardized variables and standardized regression coefficients from the output, so that regression coefficients (β_1, β_2, β_3, β_4, β_5) are comparable between predictors, all with a standard deviation of one. This standardization method will reduce collinearity between predictors on the dependent variable and ensure normal distribution of data. Table 1 shows the list of countries ranked by selected variables.

Table 1

List of Countries with Top- and Bottom-10 Rankings for All Variables

	GDP Growth, GROWTH (N = 118)		National Intelligence, IQ (N = 118)		Life Expectancy, HEALTH (N = 118)		Political Stability, PEACE (N = 118)		Satisfaction with Life, SWL (N = 115)	
10 Countries at Highest Ranking	1. China	7.847	1. Singapore	106.9	1. Japan	78.55	1. Finland	1.510	1. Switzerland	2.7333
	2. South Korea	5.885	2. China	105.9	2. Iceland	78.20	2. Luxembourg	1.423	2. Denmark	2.7333
	3. Macau	5.684	3. Hong Kong	105.7	3. Sweden	77.77	3. Iceland	1.360	3. Iceland	2.6
	4. Singapore	5.359	4. South Korea	104.8	4. Switzerland	77.70	4. Malta	1.338	4. Austria	2.6
	5. Botswana	5.271	5. Japan	104.1	5. Hong Kong	77.47	5. Switzerland	1.296	5. Sweden	2.5667
	6. Malaysia	4.647	6. Finland	100.8	6. Norway	77.16	6. Norway	1.289	6. Finland	2.5667
	7. Malta	4.605	7. Canada	100.4	7. Canada	77.09	7. Sweden	1.261	7. Canada	2.5333
	8. Hong Kong	4.488	8. Netherlands	100.4	8. Spain	77.00	8. Ireland	1.238	8. Luxembourg	2.5333
	9. Thailand	4.276	9. Mongolia	100	9. Netherlands	76.93	9. New Zealand	1.218	9. Ireland	2.5333
	10. Mauritius	4.242	10. Macau	99.9	10. Italy	76.75	10. Denmark	1.170	10. Netherlands	2.5
10 Countries at Lowest Ranking	109. Jamaica	.078	109. Ethiopia	68.5	109. Zambia	47.56	109. Indonesia	-1.448	106. Niger	1.5
	110. Zambia	.010	110. Cameroon	68.2	110. Centr. Afr. R.	46.48	110. Cote d'Ivoire	-1.527	107. Rwanda	1.4667
	111. Cote d'Ivoire	-.128	111. Congo DR	68	111. Burundi	46.39	111. Chad	-1.550	108. Bulgaria	1.4333
	112. Burundi	-.161	112. Benin	67.7	112. Malawi	46.09	112. Nepal	-1.589	109. Pakistan	1.4333
	113. Nicaragua	-.564	113. Chad	67.1	113. Congo DR	46.08	113. Centr. Afr. R.	-1.638	110. Lesotho	1.4333
	114. Comoros	-.799	114. Sierra Leone	64	114. Mozambique	44.42	114. Colombia	-1.869	111. Swaziland	1.4
	115. Madagascar	-1.168	115. Centr. Afr. R.	64	115. Rwanda	44.38	115. Pakistan	-1.872	112. Sudan	1.2
	116. Centr. Afr. R.	-1.208	116. Gambia	62	116. Niger	43.86	116. Burundi	-1.896	113. Zimbabwe	1.1
	117. Niger	-1.265	117. Malawi	61.9	117. Mali	43.44	117. Sudan	-2.232	114. Congo DR	1.1
	118. Congo	-2.426	118. Niger	61.2	118. Sierra Leone	40.75	118. Congo DR	-2.324	115. Burundi	1.0

5. Results

Table 2 presents univariate statistics and correlation matrix for selected variables. Table 3 provides a summary of regression analysis, where we used 11 models based on the inclusion and exclusion of the present variables. All models included Y_{1970} and IGDP, but differed on the inclusion of other factors and interaction terms. IQ was significant ($p < .01$) in all regressions. Across 118 countries, we find a substantial increase in adjusted R^2 between Model 1 ($R^2 = .302$) and Model 2 ($R^2 = .544$) before and after the inclusion of IQ into the regression. Accordingly, Model 2 can explain approximately 55.5% of the variance in GROWTH, where a one standard deviation increase in IQ will raise economic growth rate by 0.709 standard deviations.

Table 2

Univariate Statistics and Correlation Matrix for Selected Variables.

		Mean	Standard Deviation	1	2	3	4	5	6
1	GROWTH	1.94	1.55	-					
2	log (Y_{1970})	3.51	.52	.032	-				
3	IGDP	22.31	5.25	.551**	.201*	-			
4	IQ	84.79	11.45	.547**	.673*	.477*	-		
5	HEALTH	64.65	10.54	.419**	.821**	.403**	.854**	-	
6	PEACE	-.08	.92	.313**	.622**	.318**	.570**	.589**	-
7	SWL	2.04	.38	.227*	.756**	.261**	.623**	.632**	.753**

Note: Y_{1970} was log-transformed to improve normality.
*$p \le .05$
**$p \le .01$

In other models, we find that HEALTH (Model 3), PEACE (Model 6), and SWL (Model 9) are significant ($p < .01$). When IQ is added to these models, HEALTH (Model 4) becomes non-significant, while the significances of PEACE (Model 7) and SWL (Model 10) were reduced to the $p < .05$ level. These outcomes demonstrate the stronger impact of IQ relative to other predictors in explaining economic growth rate from 1970 to 2010.

Table 3

*Summary of Regression Analysis Predicting Growth with Interaction Terms*

Dependent Variable: GROWTH (GDP Growth Rates, % (1970–2010))											
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Y_{1970}	-.103	-.490**	-.490**	-.536**	-.594**	-.296**	-.584**	-.560**	-.378**	-.725**	-.713**
IGDP	.564**	.273**	.368**	.264**	.282**	.480**	.241**	.211**	.534**	.300**	.265**
IQ		.709**		.600**	.555**		.660**	.692**		.730**	.739**
HEALTH			.604**	.165	.282*						
PEACE						.338**	.211*	.195*			
SWL									.373**	.242*	.208*
IQ*HEALTH					.114						
IQ*PEACE								-.108			
IQ*SWL											-.135*
N	118	118	118	118	118	118	118	118	115	115	115
R^2	.314	.555	.472	.561	.569	.380	.580	.590	.376	.598	.615
Adjusted R^2	.302	.544	.459	.546	.550	.364	.565	.571	.359	.584	.597

Note: Regression coefficients are standardized betas. All variables have a mean of zero and a standard deviation of one.
*$p \leq .05$
**$p \leq .01$

Regarding the interaction terms, Models 5 and 8 show small increases in adjusted R^2 with the inclusion of interaction terms, which are non-significant. Nevertheless, HEALTH and PEACE have a direct impact on growth. Their effects on GROWTH are independent of IQ. Interestingly, we find that the interaction term IQ*SWL (Model 11) is negatively significant ($p < .05$), showing an inverse relationship between IQ and SWL on economic growth. However, the magnitude of IQ*SWL (-.135) is much smaller than that of IQ (.739) and SWL (.208) independently. Finally, based on the Models 5, 8, and 11, we construct path diagrams to illustrate the moderating effect of variables on the IQ-GROWTH relationship, as shown in Figure 3.
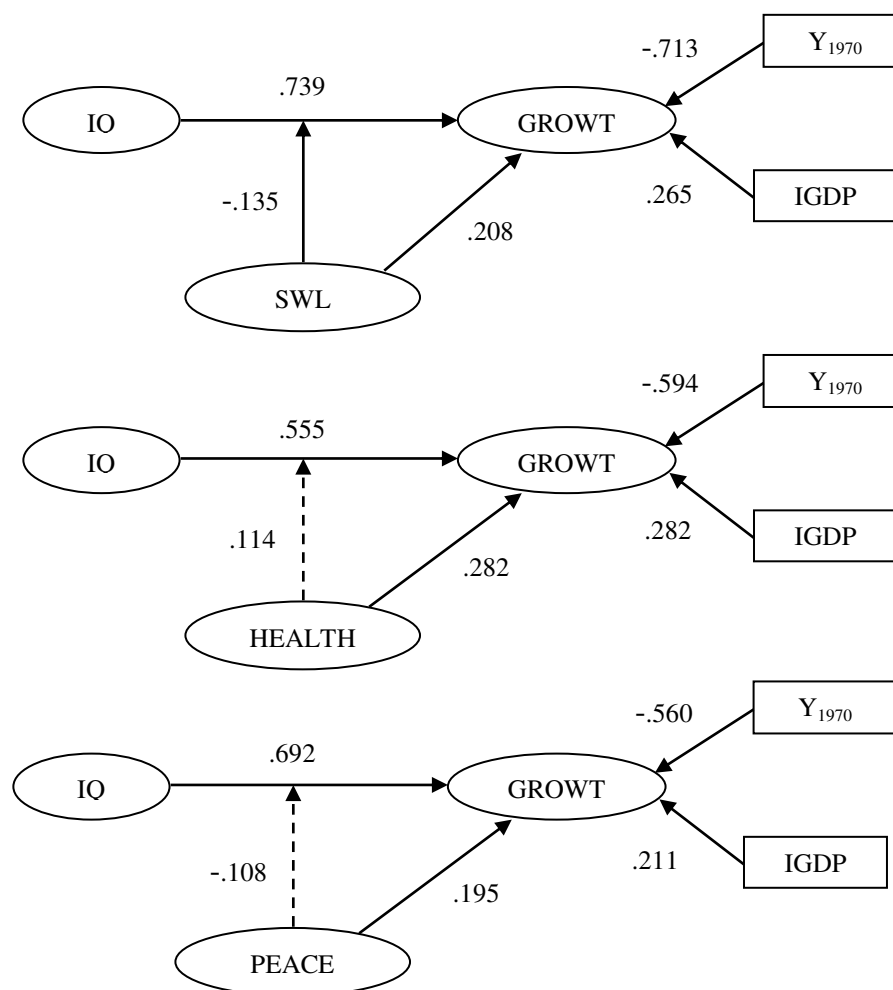
Figure 3. Standardized path coefficients between national IQ, GROWTH (GDP per capita growth rate), Y_{1970} (initial GDP per capita), IGDP (investment as a percentage of GDP), SWL (satisfaction with life index), HEALTH (life expectancy), and PEACE (political stability and absence of violence or terrorism). Ovals represent variables of theoretical interest and boxes represent control variables. Significant pathways ($p \leq .05$) are represented by solid lines, and non-significant paths are represented by dotted lines, which could be removed from the models.

6. Discussion

The main purpose of our study was to examine the role of basic needs and psychological needs in moderating the effect of human potential IQ on economic growth. Our study demonstrates that IQ is the strongest predictor of economic growth compared to other socioeconomic predictors. In previous studies (e.g., Knowles & Owen, 1995) life expectancy was considered a robust predictor of economic growth. However, in our study, the inclusion of IQ into the model made life expectancy non-significant. Consistent with the literature, political stability (absence of violence and terrorism) was directly related to economic growth. National peace is helpful in facilitating promoting productivity in society. However, these two growth predictors do not contribute to the effect of IQ on economic growth, leading to non-significant values for IQ*HEALTH and IQ*PEACE.

Furthermore, life satisfaction is positively related to economic growth. This suggests that the existence of positive feelings with the nonexistence of negative feelings will directly stimulate productivity over time. However, there is a significant negative interaction between intelligence and life satisfaction, which suggests that high life satisfaction decreases people's desire for and effort toward further life achievement, thus discouraging the optimal functioning of IQ potential on economic growth. This finding is in accordance with what has been proposed by Maslow (1970) and Heylighen (1992)—that satisfied needs cannot be motivators; hence, higher satisfaction leads to reduced motivation. On the other hand, the importance of this negative interaction effect is attenuated by the highly significant, positive effects of the independent predictors.

We conclude that basic and psychological needs do not amplify the effect of national IQ potential on economic growth. The impact of IQ alone is sufficiently strong to increase the economic growth rate, even without the contribution of other socioeconomic factors. For this reason, it is expected that the findings reported in this study will contribute as beneficial points especially in employing IQ as an important measurement of human capital in cross-national studies of economic growth. Policymakers and social scientists who wish to narrow the gap of cross-national disparities in living standards will have to put in effort particularly in understanding what can be improved to taper those persistent IQ gaps between employees across countries. Lastly, it would be insightful to extend the analysis in future studies to identify other potential moderating factors that may regulate the IQ-growth relationship, in order that the societies are able to fully utilize their productive IQ potential.

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