

## Developmental Changes and Their Relationship to Emotional Sensitivity in Adolescents – A Cross sectional Study

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10.37653/juah.2024.149767.1284

Submitted: 12/05/2024

Accepted: 02/06/2024

Published: 15/06/2024

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### Abstract:

**Objectives:** This study examined the developmental changes (Logical Reasoning LOGT, Digital Spatial Search DSS, Selective Attention SA, and Physical Growth PG), the level of emotional sensitivity (ES), and the relationship between developmental changes in various dimensions (physical, psychological, and cognitive) and emotional sensitivity among adolescents.

**Methods:** Using RihaCom, two hundred and sixty-four males and females ranging in age (14-17) years completed questionnaires measuring the aforementioned psychological and cognitive constructs.

**Results:** The results showed that the level of developmental changes and emotional sensitivity was significantly high. The results also indicated that there was a significant correlation between emotional sensitivity and psychological changes, while there was a negative correlation

between emotional sensitivity and cognitive changes. The results also revealed that there are significant differences in developmental changes and emotional sensitivity between the two age groups (14-17) in favor of age (17) for the developmental changes (physical, psychological, and cognitive) and in favor of age (14) for the emotional sensitivity. Based on the research results, a set of recommendations were formulated.

**Keywords:** Developmental Changes, Cognitive Aspect, Psychological Aspect, Physical Aspect, Emotional Sensitivity

## التغيرات النمائية وعلاقتها بالحساسية الانفعالية لدى المراهقين

– دراسة مستعرضة –

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### الملخص:

**الأهداف:** استهدفت هذه الدراسة التعرف على مستوى التغيرات النمائية (النفسية، المعرفية، والنمو الجسمي)، الحساسية الانفعالية، وكذلك التعرف على طبيعة العلاقة بين التغيرات النمائية بأبعادها المختلفة (الجسدي، المعرفي، والنفسي) والحساسية الانفعالية لدى المراهقين. **المنهجية:** تم استخدام بطارية اختبارات ضمن منظومة الريهاكوم للتشخيص والتدريب المعرفي المحوسب (الاستدلال المنطقي "LOGT" Logical Reasoning ، البحث المكاني الرقمي Digital spatial research، الانتباه الانتقائي Selective Attention ، اختبار النمو الجسمي) لقياس القدرات المعرفية والنفسية والجسمية على عينة مكونة من (٢٦٤) مراهق بعمر يتراوح بين (١٤-١٧) سنة.

**النتائج:** بعد تحليل البيانات اشارت النتائج الى أن مستوى التغيرات النمائية والحساسية الانفعالية كان مرتفعا بشكل ملحوظ. كما أشارت النتائج إلى وجود علاقة ارتباطية موجبة ذات دلالة احصائية بين الحساسية الانفعالية والتغيرات النفسية، بينما كانت هناك علاقة ارتباط سلبية بين الحساسية الانفعالية والتغيرات المعرفية. كما كشفت النتائج عن وجود فروق ذات دلالة إحصائية في التغيرات النمائية والحساسية الانفعالية بين الفئتين العمريتين (١٤-١٧) لصالح الفئة العمرية (١٧) لجميع التغيرات (النفسية، المعرفية، الجسمية) ولصالح العمر (١٤) للحساسية الانفعالية. بناءً على نتائج البحث تمت صياغة مجموعة من التوصيات والمقترحات.

**الكلمات المفتاحية:** التغيرات النمائية، النمو العقلي، النمو النفسي، النمو الجسمي، الحساسية الانفعالية.

### **Introduction**

The pursuer of the process of human development in its different age stages clearly sees that it is accompanied by complexity and problems on different levels (physical, psychological, and cognitive). The stage of adolescence has got a great deal of attention from psychologists for different reasons. As it is one of the critical stages, so many problems and difficulties could occur and could clearly affect the



psychological and cognitive structure in the later stages. It is worth mentioning that one of the important reasons and factors that prompted the researchers to conduct the current study is the rapid and volatile nature of the biological and psychological changes in adolescence. Among the most important of the psychological changes is how the self-image of adolescent is formed; how he/she could present himself/herself in front of others, which directly affects his/her body image and behavior, and thus has a great impact on the adolescent's psychological and cognitive development. Psychological literature showed that how others could describe the adolescent, for example tall, short, slender, or bulky could greatly affect his/her self-image. Furthermore, the adolescent stage is characterized by emotional sensitivity (ES) towards sudden physical changes and the opinions of others about these changes (Yurgelun-Todd, 2007).

The rapid and irregular growth of the adolescence stage could be also due to the nature of biological changes and the imbalance of the body's hormones, which in turn may lead to an increase in weight a change in shape of the body. These changes are not something the teenager is accustomed with, which may lead to negative thoughts about his / her body. Many researchers, therefore conducted studies to investigate the adolescent stage since it is one of the most complex stages of human development, and during it the adolescent may experience many negative feelings and emotional changes that can often be severe (Alzoubi, 2001).

Psychological studies indicate that the adolescent's feeling of this crisis and other difficulties that he/she may face during that stage constitutes a conflict between the need for self-discipline and the need for liberation and independence. As a result, the adolescent would be in dire need for someone to direct his/her behavior to know what is acceptable and what is not. This conflict leads to psychological instability and emotional imbalance and could negatively impede the later stages of proper growth (Kosaibat, 2007).

Regarding the cognitive development, scientific studies have indicated that adolescence is characterized by the maturity of mental abilities, and that these abilities continue to grow and reach their peak around the age of sixteen. After that, the process of gradual stabilization begins. Among the important variables that are related to cognitive development at this stage is intelligence, mental activity, and perceptual speed, which is represented in the ability of the adolescent

to quickly perceive simple things. These abilities start to wiggle during adolescence, which may directly or indirectly affect academic achievement and provoke anger of parents because of academic failure (Abu Mansour, 2011).

Hence, the importance of the current research lies in the fact that it investigates the nature of the growth of one of the most important human development stages, which is considered one of the most sensitive stages that the individual goes through. The importance of this study also comes from the reality that the adolescent suffers enormous physical, psychological, and cognitive changes that can enormously impact on the human behavior. Furthermore, the current study examines the profundity of this stage and its relationship to emotional sensitivity, which is considered one of the most important psychological factors that characterize the adolescence stage and plays an important role in the understanding of human behavior.

Literature showed that the changes during adolescence do not include only the physiological, psychological, and cognitive aspect but extend to include the emotional aspects. The emotional life in all its forms during adolescence is a substantial aspect of the normal formation of the adolescent's personality and it has a significant impact on his/her mental health. Bhatia's (2009) study indicated that normal levels of emotional sensitivity of adolescents had a positive impact on personal poise and psychosocial adjustment. On the other hand, the same study indicated that adolescents with exaggerated emotional sensitivity, which is represented by excessive emotion as a response to simple situations that may not affect adolescents with moderate or simple emotional sensitivity, tended to exaggerate the normal life situations more than what the situation requires. It also suggested that adolescents with high levels of emotional sensitivity showed weak ability to demonstrate emotional persistence, being moody, difficulties adjusting to psychosocial situations, emotional conflicts, high tension, exaggeration in emotions such as screaming and beating, uncontrolled violent reactions, in addition to feelings of despair, frustration and sadness (Al-Shamasi, 2021).

The adolescent years are characterized by the maturation of psychological, emotional and cognitive abilities that provide the developing individual with capacities needed for independent functioning during adulthood. During adolescence, maturing individuals show increasing capacity to attend selectively to informati



on and to control their behavior. This period of growth is marked by an increased ability to read social and emotional cues and an increased appreciation and dependence on interpersonal relationships. Until recently, relatively limited research existed on the psychological, cognitive and emotional changes that accompany the emotional sensitivity that occur during the transition between childhood and early adulthood (Yurgelun-Todd, 2007). Aims Hence, the current study's main research question is: what is the level of developmental changes that occur during adolescence, and what is the relationship of those changes to emotional sensitivity?

### **Theoretical framework**

**Psychosocial Development Theory (Eric Erikson):** The concept of crisis plays an important role in Erikson's theory. In each of the eight stages of growth there is a crisis, constituting a turning point. During this point of crisis, if dealt with successfully and positively, the parents will take the child/teenager to a safety point. These stages are: The stage of the cradle (or breast feeding): A sense of confidence versus a loss of confidence: The first year of a child's life corresponds to the first stage of psychosocial development. The child relies completely on the parents, especially mother, to fulfill his/her basic needs (Knight, 2017). Early Childhood: A Sense of Autonomy versus Shame and Doubt: At this stage, the child begins his/her second year to face a new demand for growth, which is represented by a crisis of a sense of autonomy versus doubt and shyness. The emergence of this crisis depends on three variables: the fulfillment of biological needs, which is closely related to maturity, finding a solution to the crisis of confidence from the previous stage, and the surrounding social factors. Pre-school age: the stage of initiation versus guilt: this stage begins when the child enters the third year and remains within the early childhood stage for about six years of age (Sekowski, 2022). School age: perseverance versus a sense of inferiority: this stage extends from the age of six years to the beginning of adolescence at the age of (11-12 years), where the ego grows. This stage and its growth is linked to three factors: the child's arrival to maturity, socialization, and a positive solution to the crisis stage. Adolescence: Identity vs. Identity Disorder: It begins with the maturity from the age of (12-20 years). This age is adolescence or youth, where the adolescents progress towards independence from the family and achieve physical maturity. Early adulthood: the feeling of intimacy and affection versus the feeling of

alienation and isolation: This stage extends from the end of adolescence and the clarity of identity until the end of adulthood. In this period, the adolescent begins to develop his identity to become a unique and independent person. Middle age: the stage of productivity versus stagnation: This stage extends to middle age from the age of (35-65) years. This stage is called the generation stage or the stage of procreation and the desire to become father/mother and taking responsibility for family and surrounding them with care and love. Old age: integration versus despair: this is called the last stage of growth and extends after the age of fifty. At this stage, the person looks back to his/her previous achievements in life and asks himself whether his/her goals have been accomplished or not. Feeling his goals have been accomplished would lead to self-integration. But if he/she sees his life was disorganized, scattered, and has not achieved goals this could lead to despair and heartbreak (Knight, 2017). This conceptual framework within the theory of psychosocial development will help the researchers in the current study gain a better understanding and explanation of growth especially during adolescence. The concept of growth was mentioned to better conceptualize human development as a part of the psychosocial theory.

**Cognitive Development Theory (Jean Piaget):** Piaget is considered one of the most important contributors to the emergence of the cognitive perspective. His theory is considered one of the most common cognitive development theories in the field of psychology. The four stages of development according to Piaget are as follows. The first stage (the sensory-motor stage) starts from birth until the second year of the child's life, when the child is able to think and do some sensory-motor activities. The second stage (the pre-operational stage) starts from 2 to 7 years old, and Piaget divides it into two types: A- The pre-operational stage from 2 to 4 years old. In this stage the child engages in symbolic play (imaginative) instead of physical play, which is the beginning for the child to use language as a means for communication with the outside world. B- The stage of sensory development and it extends from 4 to 7 years, where the child is able to use the language for some numerical concepts (such as larger, smaller, more, less) in addition to his/her ability to classify things according to just one dimension such as color or shape, as he/she is unable to make classifications on two bases such as shape and color. The third stage (the stage of physical operations) extends from 7 to 11 years. When the child

reaches the age of six or seven, they reach the stage of cognitive development, which Piaget calls the tangible operations. The fourth stage is of abstract operations. It starts from 11 years and over and it is within the stages of logical thinking. Piaget believes that abstract processes control an individual's thinking and beliefs when he/she reached this stage (Babakr, Mohamedamin, & Kakamad, 2015). This theory will help the researchers in the current study to better explain the nature of cognitive changes that occur during adolescence.

Theories that explain ES in the current study are highlighted. It was found that the most suitable theory to explain the ES is James Lange Theory (visceral physiological theory). It suggests that emotions occur as a result of a person's feeling of change in blood vessels. The psychologist William James had independently reached a similar conclusion, taking into account contributions of Lange and therefore the theory was later known as the James-Lange theory of emotion. The theory proposes that emotion ultimately leads to visceral physiological changes, and one of the results of these changes is the feeling of severe emotion, that is, the visceral bodily sensation precedes the emotional sensation. Lange believes that our normal way of dealing with all abnormal emotions will dictate our mental awareness of a situation or a specific incident, and therefore the actual feeling is called emotion (Al-Kinani, 2022).

The emotional sensitivity that occurs during adolescence may lead to the consideration that the adolescent is somehow abnormal. Lange however indicated that emotional sensitivity is one of the traits of adolescence. Lange also believed that the ES serves as an entrance through which we can identify the personality of the teenager. In other words, emotional sensitivity could indicate an emotionally sensitive personality. Literature suggested that the emotionally sensitive personality that dominates the personality of the adolescent is related to independency of the adolescent (Silvers, 2022). In other words, the adolescent does not need support from others. He/she seeks to deeply understand people before engaging in any activity. In addition, the adolescent who shows high levels of emotional sensitivity is sensitive to criticism. Directed criticism by others, whatever its degree, is considered hostile in one way or another. So, the reactions shown by the adolescent towards that criticism are severe and not taking into account the consequences of that behavior.

Lange suggests that the emotionally sensitive personality

consists of three dimensions: First - the negative individual sensitivity, which is the individual's tendency after exposure to a specific situation to negative reactions such as unjustified sharp criticism, aggression and anger. Secondly - positive sensitivity to peers, which is the emotional tendency to build relationships with others, the ability to recognize, understand and sympathize in various forms with the feelings of others. Lange indicated that emotional acceptance is the basis for an adolescent's sense of happiness and personal success. Third - emotional distancing, which is the adolescent's tendency to avoid interacting with others in order to minimize negative emotional sensitivity (Al-Shamasi, 2021).

## Methods

### Research design and sampling

The researchers adopted the cross-sectional approach. Data were collected from Iraqi students in several grades (third, fourth, fifth, and sixth) in morning studies in secondary schools from Al-Karkh Al-Awla District/Baghdad for the academic year 2020-2021. Before participating in the study, all participants were informed about the purpose and procedures of this study by the researchers; after this, every participant provided written informed consent. The number of schools included in the research, according to the Directorate of Social and Educational Statistics of the Ministry of Planning, was (63) with (30187) students distributed as (15254) males and (15370) females. After checking all the information of the study population, 4 schools were randomly selected, two representing male schools (Al-Ghazalia Preparatory School for Boys - Al-Mustafa Preparatory for Boys) and two representing female schools (Dijla School for Girls - Umm Salama School for Girls). Two hundred and sixty-four students were randomly selected from these four schools, distributed according to gender, with (106) males and (158) females. The four grades were included: the third intermediate grade (75: 45 females - 30 male), the fourth grade (50: 20 males - 30 female), fifth grade (50: 16 males - 34 female), sixth grade (89: 40 males - 49 female). The participants' ages ranged from 14 to 17 years.

**Inclusion and Exclusion criteria:** participants were included in this study based on the following criteria; They were students. They were aged 17 years or younger. Participants were not eligible to participate in the study if: They were more than 18 years old. Had been exposed to mental illnesses. The incident was less than one month prior to the



interview. Had been diagnosed with learning difficulties.

### **Research Tools:**

To measure the developmental changes (logical reasoning, digital spatial research, selective attention, physical growth, emotional sensitivity) among adolescents, the researchers relied on the RehaCom Cognitive System. It is one of the modern systems of high quality, coinciding with modern scientific and technological development. The Rehacom system is also considered one of the unique specialized psychological and therapeutic systems because of its multiple functions in diagnosis, rehabilitation, training and cognitive therapy, and its ability to deal with a lot of data. The Rehacom system is movable, so the researchers were able to collect the data from the participants outside the psychological laboratory easily. It is also accurate, with no errors could be found in the answers. Finally, it is objective; it has the ability to analyse data free of researcher bias.

### **Questionnaires from the Rehacom system**

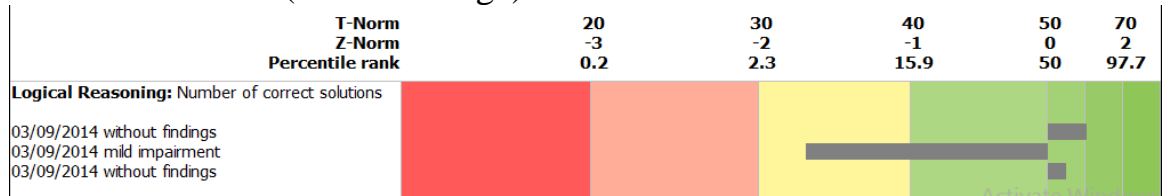
**First Test- Logical Reasoning (LOGT):** The LOGT is a battery that includes a set of sub-tests that measure psychological and cognitive development. Two tests were chosen from this battery, one of which measures the decision-making process and represents the psychological aspect, and the other measures cognitive growth through a problem-solving test. The average time to answer this test is (13) minutes, and whenever it exceeds that, it is considered a neglected answer. If the participant did chose or the answer was wrong after three consecutive sequences, the examination is stopped and the test ends. Data for the test is analyzed with three options (true, false and omission).

In order to find the results, the standard scores are calculated in the screen display, which are (t-norms, Percentile ranks, z-norms) and the results are compared with the standard sample that was displayed in the screen display results (Table 1). Average degree between 30 - 40 is considered, according to the test, below average in performance, while less than 30 indicates a significant deficit in decision-making and problem-solving.

Table 1 screen display results in logical reasoning showing a



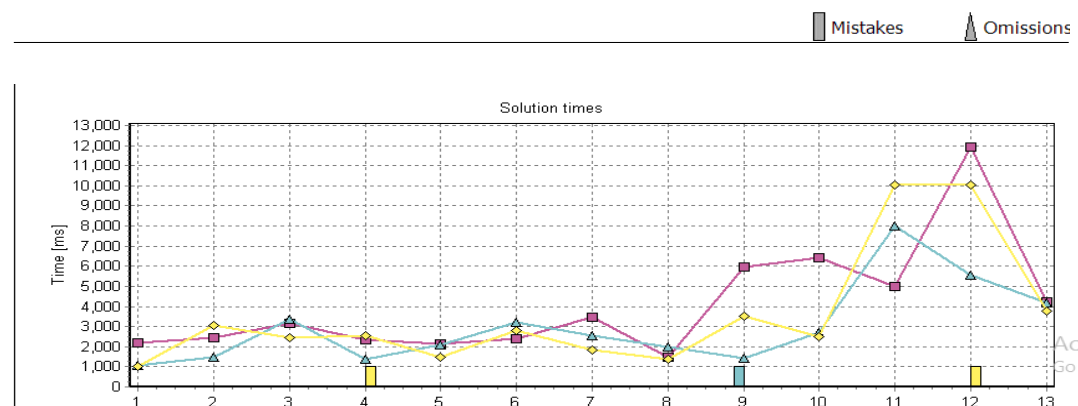
score less than 40 (below average)



Details of the results on a single test are extracted through the details and display the results button, so that the results appear for each participant attached to a form and a chart that match the answers of the participant (see table 2 and chart 1). The table and the chart include all the data needed by the researcher when analyzing the results, and so on for the rest of the tests in this study.

Marc Testpatient B-Day.: 01/01/2000						
HASOMED						
RehaCom <sup>®</sup> Logical Reasoning						
Date	Items	Correct	Mistakes	Omissions	Median Sol. Time [s]	Z Value Number of correct solutions
05/02/2016	13	13 (100%)	0 (0%)	0 (0%)	3.2	1.18 (88.1%)
09/02/2016	13	12 (92%)	1 (8%)	0 (0%)	2.6	0.66 (74.5%)
09/02/2016	13	11 (85%)	2 (15%)	0 (0%)	2.6	0.14 (55.5%)

Norm Number of correct solutions (Average value: 10.7; Standard deviation: 1.9)



**Second Test- Digital Spatial Research (DSR):** DSR is used to measure visual perception capabilities, speed of performance, and attention distraction. The cognitive development in this test is measured through the memory working speed or level of performance and visual perception, and is related to cognitive perceptual performance speed and working skills.

**Third Test- Selective Attention (SA):** SA is the ability to react in an appropriate way under time pressure while simultaneously controlling behavioral impulses when other stimuli appear. In this test, attention

must be focused on the visible stimulus that needs an emotional balanced response. In other words, it is a test of whether or not to react to a stimulus (Marinke J. Hokken, Elise Krabbendam, 2023).

**Fourth Test- Physical Growth Test (PGT):** Contact was made with many physicians to obtain the internationally approved source for weight and height standards for all normal age groups used by Iraqi hospitals as a specific criterion for growth.

The researchers were informed that Iraqi physicians rely on the statistics listed below (Nelson Essentials of Pediatrics) in table 3.

Table (3) distribution of adolescents according to gender, height and weight

Sex	Age	Height	Weight
Male	13	145-175	35-66
Male	14	148-177	40-70
Male	15	153-180	45-75
Male	16	160-185	50-83
Male	17	163-188	56-88
Female	13	144-166	35-65
Female	14	148-170	40-72
Female	15	150-172	42-74
Female	16	152-173	45-76
Female	17	154-175	47-78

#### Statistical Analysis:

Since the Rhacom system consists of sub training tests and rehabilitative remedial programs, the statistical analysis for the results must be for every single test.

Statistical analysis for LOGT: in this test there are three elements the researchers relied on to analyze the data (correct answers, Mistakes, and Omission). In order to extract the results, the number of correct answers is taken into account, and the standard scores shown in the screen display are calculated: T-norms, percentile ranks, and Z-norms, and the results are compared to the standard sample that is displayed in the screen display results. The score that falls between 30 and 40 is considered below average in performance for the z-value standard score, and when it is <30, it indicates a severe inability to make decisions and solve problems.

Statistical analysis for DSR: in this test, three z-values are calculated for each variable from the sub-tests, as follows: The Z value of the working speed, calculated from the average total time of the orientation. The Z value for attention, by calculating the linear

regression of the total orientation search time. An increase in the regression line indicates distraction and mental stress during training. Finally, the Z value for visual neglect, calculated by comparing the average looking time in the right and left half of the screen, where a clear slowdown on one side indicates either neglect or blindness.

For the Selective Attention (SA), two z-value are calculated. The Z value for (Speed Reaction) is calculate all average reaction times for the relevant stimuli. Second, the Z value for the variable (reaction control) by calculating the reactions to a number of irrelevant stimuli. Psychological development is calculated through the technique of reaction speed, which is analyzed in every test by interpreting the mean, median, standard deviation, and reaction time.

### Results:

Two hundred and sixty-four participants completed the tests related to psychological, cognitive, and physical development and data were analyzed by calculating the t-tests, means, and standard deviation; table 4 shows the results.

Table (4) mean, SD, and t-tests of the tests

Test	Age	Mean	SD	t-test	Sig.
Speed Reaction and Decision Making	14	491.20	14.25	2.38	0.05
	17	523.55	14.16		
Problem Solving	14	1261.68	10.53	3.85	
	17	1763.45	10.51		
Visual Perception	14	4.21	1.72	2.55	
	17	7.44	1.86		

Regarding the first aim which asked about the developmental changes during adolescence, the results indicated (table 4) that there is a significant developmental growth in the both sides (cognitive and psychological) between the two age groups (14-17), which were measured by speed reaction and decision-making, problem-solving, and visual perception. This result is in line with literature. Dick et al., (2021) indicated that there are developmental changes in the psychological and cognitive aspects that occur in adolescents with increasing age.

The third developmental dimension (physical development), the height and weight of all the participants of the two groups, were also measured separately by the researchers. Results showed that the average height of females with age (14 years) was (156.11) with a standard deviation of (5.65), while the average height of the sample at

the age of (17 years) was (160.62) with a standard deviation of (7.03). The results also indicated that the average height of males at the age of (14 years) was (155.32) with a standard deviation of (3.04), while the average height of the sample at the age of (17 years) was (173.81) with a standard deviation of (6.68).

In the same vein, the statistical analysis indicated that the average weight of females aged (14 years) was (55.94) with a standard deviation of (7.96), while females of the age group (17 years) had an average weight of (63.35) with a standard deviation of (8.51). On the other side, the results of the statistical analysis of weight for the male group aged (14 years) indicated that the average was (60.01) with a standard deviation of (5.62). As for males of the age group (17 years), the results showed that the average weight was (73.77) with a standard deviation (9.96). In order to verify the significance of the differences in the two variables (weight and height), a t-test for two independent samples was carried out. The t-test ( $t=10.85$ ,  $df= 262$ ,  $P<0.05$ ) showed that the participants who aged 17 years old scored significantly higher in height and weight than participants who aged 14 years old.

As for the second aim, which asked about the level of emotional sensitivity among adolescents, the results showed that mean was (1.86) with a standard deviation (1.90) and the t-test was (15.90). The result clearly suggests that the participants scored a significant level of emotional sensitivity. The third aim tried to identify the relationship between developmental changes in both aspects (psychological and cognitive) and emotional sensitivity. Pearson's correlation coefficient was calculated. The results indicated that emotional sensitivity was significantly correlated with psychological changes. This indicates clearly that the greater the psychological changes, the greater the emotional sensitivity. On the other hand, results showed there is a negative correlation between cognitive changes and emotional sensitivity. In other words, the greater the cognitive changes, the lower the emotional sensitivity.

Finally, to compare demographic variables (age and gender) with emotional sensitivity, t-test analyses were performed. Results in table (5) clearly indicate that there are significant differences in emotional sensitivity according to gender. Females were significantly more sensitive than males. The results also indicated that there are significant differences in emotional sensitivity according to the age. Younger adolescents were significantly more sensitive than older adolescents.

Table (5) mean, SD, and t-tests of the ES according to gender and age

Variable	Gender					-t-test	df
ES	Female			Male		2.21	262
	t-test	SD	Mean	SD	Mean		
	2.21	1.07	1.98	1.62	1.69		
	Age					3.49	
	17 year			14 year			
	t-test	SD	Mean	SD	Mean		
	3.49	1.47	1.82	1.91	2.26		

### Discussion

This longitudinal study was conducted with the following aims: first, examining the level of developmental changes among adolescents, second, identifying the level of emotional sensitivity among adolescents. An overall finding was that there is a significant developmental growth in both aspects (cognitive and psychological) between the two age groups (14-17). This result can be explained by the fact that despite the psychological stressors experienced by adolescents in Iraq, the developmental changes in both the psychological and cognitive aspects were logical and compatible with literature (Al-Mamouri & Al-Mamouri, 2012). This indicates that life difficulties and traumatic stressors that adolescents experience may lead in one way or another to early psychological and cognitive growth as a result of the awareness that is formed due to these difficult circumstances. Moreover, the psychological perspective also indicated that the nature of adjustment with the surrounding environment that the adolescent adopts could enhance growth. Likewise, the nature of the psychological aspect and what it includes of desires, motives, and the way of dealing with the various pressures experienced by the adolescent, in turn, forms the self-concept of the individual's search for his identity. Psychological growth is linked to many factors, including physical change and the accompanying tension, anxiety and psychological problems. In addition, cognitive growth and its impact on individual perception and community acceptance, is considered a key factor in psychological growth (Freh, 2016).

Regarding cognitive development, the current study showed that there is a significant difference according to age. Older adolescents scored higher levels of cognitive development than younger adolescents. A related explanation for this finding could be that the substantial level of abstraction that the adolescents acquired from the environ

ment they live in, which led in one way or another to early cognitive development. The cognitive perspective also indicated that on advancing in age and entering the middle adolescence stage (16 or 17 years), the adolescent develops considerable cognitive abilities that enable him/her to concentrate and focus. Concentrating, according to the cognitive perspective, enables the adolescent to employ old information in understanding new situations and this might lead to the adoption of new cognitive capabilities and strategies to face problems. It may also seem useful to refer to the role of technology. Accessing information easily might play a key role in expanding the adolescent's perception and contribute to cognitive growth.

The results also reported that individuals aged (17) have greater height and weight than the younger group. This finding may be interpreted as supporting the biological claim that physical growth during adolescence, which is controlled by the sex hormones testosterone and estrogen, is accelerated (Myruski, 2021). The sex hormones stimulate the pituitary gland to secrete more growth hormone, which in turn affects the growth of bones, cartilage, weight gain and the size of internal organs. All this, accordingly, stimulates growth in the extremities, muscle strength, and mineral density in bones. So, the bones become longer and the muscle is larger during this stage. It is worth mentioning that the majority of these changes reach peak during adolescence, which is called the evolutionary leap. So, the height increases rapidly, the shoulders and buttocks circumference widen, and the trunk length and the length of the legs increase, which leads to an increase in stature and strength, in addition to an increase in muscle growth and muscle strength in general. The changes in weight and height are accompanied by a development in the functional of the body's organs. So, every change in the adolescent's body spontaneously affects behavior and emotions.

As for the second aim, results showed that the participants scored significant levels of emotional sensitivity. This finding can be explained by the theoretical framework adopted by the researchers. Individuals in adolescence may often lose control of emotions and show less flexibility in dealing with events. So, emotional responses are constantly inappropriate to situations. Also, literature clearly indicates that the absence of the role of the family at this age to develop emotional balance through what they offer of feelings of giving, love and containment may have a significant impact on the development of

feelings of emotional sensitivity. It may also seem useful to refer to the role of the school through educational and psychological guidance, motivation, and moral support which contribute to the weakness or strength of the ability to control impulses and sensitivity.

It was found in third aim of the current study that there is a significant positive correlation between the psychological changes and emotional sensitivity. This result can be explained with referring to the psychological perspective, which emphasizes that psychological stressors experienced by adolescents have been associated in one way or another with the emergence of emotional sensitivity. The reason for this may also be that psychological growth urges the adolescent to create self-identity which, in return, creates a crisis in achieving that identity. Failure to achieve that identity leads to a loss of confidence and an inability to control emotions and behaviors. Also, the theoretical background adopted by the researchers indicates that the adolescent at this age is more distracted from coping with stressful situations positively and effectively which, in turn, leads to greater association between psychological growth and increased emotional sensitivity (Chung & Freh, 2022; Freh & Chung, 2021).

The cognitive changes, however, correlated negatively with emotional sensitivity. The finding that cognitive growth is significantly correlated with emotional sensitivity could be discussed according to the cognitive conceptual model. Moreover, the aforementioned result is in line with literature, which indicated that rational thoughts could predict emotional sensitivity among adolescents. This may be due to the nature of emotional challenges and stimuli that adolescents face in their daily lives, which require them to use cognitive processes effectively to face these situations. Also, the theoretical perspective adopted in the current research indicates that the adolescent uses cognitive strategies to regulate and control his emotions by focusing on feelings and emotions.

Concerning demographic variables (gender, age), results showed that there are significant differences in both variables. Females experienced more sensitive emotions than males. This can be explained by the fact that the formative nature of females, especially in Arab and Islamic cultures, is represented by the instability of the emotional traits. Modesty and shyness are dominant traits among young ladies in such societies which in turn, lead to emotional sensitivity towards other people. It must also be noted that negative feelings, especially at the early

stages of adolescence, are common. Such feelings include being moody and psychological and cognitive fluctuations which could bring instability in feeling and excessive emotional sensitivity.

Furthermore, younger adolescents reported more emotional sensitivity than older. This result can be explained by the fact that despite the successive developmental changes that occur during adolescence, emotions, especially the negative ones, are often directed towards the self and others. It must also be noted that these negative feeling, especially at the early stages of adolescence, are common. Such feelings as being moody and psychological and cognitive fluctuations could bring instability in feeling and excessive emotional sensitivity. However, these changes start to stabilize just before adulthood.

### **Conclusion**

It can be concluded that developmental change in all its aspects is essential for normal psychological and cognitive growth. However, it should be noted that some of these changes, especially among younger girls could be greater and might affect the emotional growth of the adolescents negatively. It also can be concluded that all the developmental changes are essential for the cognitive and psychological growth. However, there are several factors, including the influence of the emotional sensitivity during this critical period, which might negatively affect the nature of that healthy growth and might lead to psychological unadjustment and deficits of mental health.

### **Limitation of the study**

This study is, of course, not without its limitations, so it is worth pointing out the limitations. Firstly, although the researcher tried to recruit participants from some area, the selection criteria be a potential criticism of the study. Secondly, the psychological studies almost rely on written questionnaire, however using electronica system to measure the psychological and cognitive abilities could be confusing for the participants.

The strengths of this study are, however, important to consider. Little is known about the development changes among adolescents in in Iraq. One of the main strong points of this study was employing the longitudinal prospective design. This design allowed the researchers to assess the stability and continuity of variables such as cognitive, physical, and psychological aspects. This provided more definitive results since data drawn longitudinally are much stronger than

correlational data.

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