



## FACTORS ASSOCIATED WITH THE PROPOSITION OF NURSING DIAGNOSIS: DELAY IN GROWTH IN ADOLESCENTS


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### ABSTRACT

**Objective:** to analyze the socioeconomic and clinical factors associated with the proposition of the nursing diagnosis delay in growth in adolescents.

**Method:** cross-sectional study in public schools of a city in the Northeast of Brazil. Sample with 385 adolescents between 10 and 19 years old. The collection took place from June to September 2017. The data obtained were analyzed with the aid of IBM SPSS statistic.

**Results:** the factors that presented association with the defining characteristics "Final height below the target", "Delayed sexual maturation", "Decrease in bone mass", "Growth velocity below expected" and "Decrease in bone mass" were: sex, years of study, marital status and muscular mass. The factors related to "Undesirable effects of therapies" and "Emotional deprivation" were associated with age and sex, respectively.

**Conclusion:** These factors may directly or indirectly influence the diagnostic proposition, contributing to the accurate detection of the problem and providing accurate actions and positive results in health.

**DESCRIPTORS:** Growth; Adolescent Development; Adolescent; Nursing Diagnosis; Nursing Process.

### FACTORES ASOCIADOS CON LA PROPOSICIÓN DEL DIAGNÓSTICO DE ENFERMERÍA: RETRASO EN EL CRECIMIENTO DE LOS ADOLESCENTES

#### RESUMEN

**Objetivo:** analizar los factores socioeconómicos y clínicos asociados con la proposición del diagnóstico de enfermería retraso del crecimiento en adolescentes. **Método:** estudio transversal en escuelas públicas de una ciudad del Nordeste de Brasil. **Muestra** con 385 adolescentes de entre 10 y 19 años. La recolección tuvo lugar de junio a septiembre de 2017. Los datos obtenidos fueron analizados con la ayuda de IBM SPSS statistic. **Resultados:** Los factores que se asociaron a las características definitorias "Estatura final por debajo del objetivo", "Retraso en la maduración sexual", "Disminución de la masa ósea", "Velocidad de crecimiento por debajo del esperado" y "Disminución de la masa ósea" fueron: sexo, años de estudio, estado civil y masa muscular. Los factores relacionados con los "Efectos indeseables de las terapias" y la "Privación emocional" se asociaron con la edad y al sexo, respectivamente. **Conclusión:** Estos factores pueden influir directa o indirectamente en la propuesta diagnóstica, contribuyendo a la detección precisa del problema y proporcionando acciones precisas y resultados positivos para la salud.

**DESCRIPTORES:** Crecimiento; Desarrollo del Adolescente; Adolescente; Diagnóstico de Enfermería; Proceso de Enfermería.

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## INTRODUCTION

Stature growth is a biological process, the result of a series of genetic and environmental interactions, expressed by increasing body size. It is a dynamic process of evolution, as a function of time. Growth occurs in a non-linear manner and may be susceptible to external influences, such as the nutritional state, environmental aspects and cartilage capacity to respond to growth stimuli<sup>(1-2)</sup>.

The adolescence phase is marked by a complex process of biopsychosocial growth and development. According to the Ministry of Health, adolescence comprises the second decade of life (10 to 20 incomplete years), being characterized by intense physical growth and development, strongly influenced by the social, economic and cultural environment<sup>(2)</sup>.

It is considered a phase of great vulnerability to external factors that may influence and cause damage to the individual's stature, which demonstrates the importance of growth monitoring to evaluate the adolescent's health conditions<sup>(3)</sup>. The clinical suspicion of delayed growth serves as an alert for the professional, who must, in turn, seek a thorough review of the adolescent's family, health and social history<sup>(4)</sup>.

It is known that during adolescence a greater growth of the skeleton, called pubertal growth, occurs<sup>(3)</sup>. However, there may be problems in this process that result in the delay of this growth. In this context, the role of the nurse as a legally instructed and supported professional to accompany and evaluate the adolescent in the several transformations that this age group provides<sup>(5)</sup> is highlighted.

In this sense, nursing care requires decisions and interventions fundamental to the evaluation of the individual's health status. It is also necessary that the nurse, based on the survey of the health status of the individual under his care, identifies the nursing diagnoses manifested in this clientele<sup>(6)</sup>.

Nursing diagnoses (ND) represent a clinical judgment on human responses to health conditions/life processes, or vulnerability, of individuals, families, groups or communities<sup>(7)</sup>. However, NANDA-I does not present a nursing diagnosis related to delayed growth in its current classification system.

NANDA-I, in its 2012-2014 version, presented the nursing diagnosis 'Delay in Growth and Development in Adolescent'<sup>(8)</sup>. However, in the 2015-2017 edition, this ND was excluded, as it was believed that additional investigations should be carried out in order to distinguish the concepts of growth and development<sup>(9)</sup>.

Faced with this problem, the authors<sup>(10-11)</sup> have developed studies aimed at validating the diagnostic proposition 'Delay in Growth in School Adolescents' through stages of concept analysis, content and clinical validation. This new diagnosis can help in the direction of nursing assistance to adolescents.

In this way, aiming to contribute for the nursing advance, the study had as objective to analyze the socioeconomic and clinical factors associated to the proposition of the nursing diagnosis Delay in the growth in adolescents.

## METHOD

This is a cross-sectional study, carried out in state schools in a city in the Northeast of Brazil. The city has 131 state schools, distributed in four zones: East with 41 units; South with

33; West with 31; and North with 26. These schools were grouped by zones in numerical order in Microsoft Excel, and the selection was made by drawing lots in each group, using the random function between. This tool has the ability to randomly select numbers in a predefined range, thus the numbers selected were equivalent to the schools that would enter the sample. Two schools were selected in each zone, totaling eight educational institutions.

The study population was composed of students between 10 and 19 years old. For the determination of the sample calculation, a pre-defined constant<sup>(12)</sup>, 55, was used, which was multiplied by the number of characteristics of the diagnostic proposition Delay in growth in adolescents, seven. Thus, the sample size was 385 adolescents.

Inclusion criteria are age between 10 and 19 years, being regularly enrolled in one of the selected schools and residing or having communication with the biological parents. This last criterion was launched because the research needs data concerning biological parents. The exclusion criteria were being in a committed physical and/or mental state incapable of answering questions, being on medical leave, or being absent from school at the time of data collection.

A physical examination and interview form were used as a data collection tool, based on the results of the concept analysis performed in a previous study<sup>(10)</sup>. This form contains sociodemographic and clinical data, defining characteristics and related diagnostic proposition factors, as well as the empirical reference for the measurement of the presence or absence of defining characteristics.

The variables identified as defining characteristics were: low height per age; low weight per age; final height below the genetic target; delayed sexual maturation; slower than expected growth rate; and, decrease in bone mass. Delay in pubertal growth spurt, although also a characteristic of the diagnostic proposition, was not evaluated given the need to submit adolescents to hand and wrist radiography, which, in addition to costly resources, would expose individuals to radiation. Regarding the variables identified as related factors, there are: genetic disorders; chronic diseases; undesirable effects of therapies; prolonged physical stress; and emotional deprivation.

The data collection took place from July and September 2017, and it was carried out by two post-graduates and three nursing undergraduates, duly trained.

For the physical examination, Beurer® branded portable bioimpedance digital scale (with 100-gram accuracy) was used. In the body evaluation, the adolescent climbed on the scale barefoot, unadorned and positioned in the center of the platform. This information was important to measure the defining characteristics of low weight per age and decrease in bone mass. For height, an inelastic measuring tape was used with the adolescents barefoot, in orthostatic position, arms along the body, feet joined, head oriented in the Frankfurt horizontal plane, after inspiration and stretched knees<sup>(13)</sup>. These data are used as parameters for evaluating the presence of the characteristics: low height per age; final stature below the genetic target; and growth speed below the expected. The data found were compared with World Health Organization (WHO)<sup>(13)</sup> graphs, besides information acquired in the adolescent interview itself, as the average height of the parents.

Tanner's proposal was used as a method for evaluating the characteristic delayed sexual maturation. It was used as basis the observation of secondary characteristics, considering the self-reported breast development and pubic hair in females; and the aspect of genital organs and male pubic hair<sup>(3,14)</sup>. For self-evaluation, self-explanatory figures were utilized, and the adolescent was instructed on the stages and modifications concerning them, by means of the self-tanner. Subsequently, the adolescents marked on the drawing which stage they were in. This was the means adopted to avoid discomfort or embarrassment on the part of the interviewee, since the survey was conducted in the school environment.

For the related factors: genetic disorders, chronic diseases and undesirable effects

of therapies, the student was asked if he had any of these characteristics through a list of genetic disorders, permanent diseases and therapies that could cause growth retardation, according to the literature<sup>(10-11)</sup>. For prolonged physical stress, the student was asked about activities involving intense physical effort, and those who perform this type of exposure were checked for body fat level by means of a bioimpedance scale. The related factor was considered present when the fat patterns were below the normal pattern according to age and gender<sup>(10-11)</sup>.

For the emotional deprivation factor, several situations of affective and emotional deprivation that the adolescent might have experienced were exposed. These situations may reduce the transient release of growth hormone and have a negative impact on its peak growth<sup>(11)</sup>.

IBM SPSS Statistic version 20.0 for Windows was used for the descriptive statistical analysis of socio-demographic and clinical data, and for the frequencies of defining characteristics and related factors. The relative and absolute frequencies of the categorical variables, the measures of central tendency and dispersion of the numerical data were calculated, as well as the normality of the data using the Kolmogorov-Smirnov test ( $p < 0.05$ ).

The project was approved by the Research Ethics Committee of the responsible institution, with a favorable opinion number 1713820.

## RESULTS

The sample presented a predominance of the female sex, 218 (56.6%), brown 201 (52.2%), living without a partner 319 (82.9%). Median of 12 years of study, 14 years old, family income of two minimum wages and four members in the family. According to clinical data, the muscle mass presented a normal index of 299 (77.6%), as shown in Table 1.

Table 1 - Sociodemographic and clinical characterization of adolescents in state schools. Natal, RN, Brazil, 2017 (continues)

Variables	n	%	
Gender	Female	218	56.6
	Male	167	43.3
Marital status	No partner	319	82.9
	With partner	66	17.1
Race	Brown	201	52.2
	White	82	21.3
	Black	75	19.5
	Yellow	27	7
Muscle mass	Standard	299	77.6
	Low	79	20.5
	High	7	1.8

Variables	Average	Median	DP	Minimum	Maximum	Value p <sup>1</sup>
Age*	14.45	14.00	2.07	10	19	0.00
Years of Schooling	12.28	12.00	2.04	9	16	0.00
Members <sup>§</sup>	4.40	4.00	1.68	2	18	0.00
Family Income <sup>¶</sup>	1.86	2.00	1.09	0	8	0.00

Source: Author (2020).

Legend: Kolmogorov Smirnov Test<sup>1</sup>; DP Standard Deviation; \* Age in years; § Family members; ¶ Family income in minimum wages (one minimum wage in Brazilian Real equivalent to R\$937.00).

Table 2 shows the socio-demographic and clinical variables and their association with defining characteristics and factors related to the diagnostic proposition, Delay in growth school adolescents.

Table 2 - Sociodemographic and clinical variables and their association to the defining characteristics and related factors of the diagnostic proposition Delay in growth in school adolescents. Natal, RN, Brazil, 2017

	Gender	Marital Status	Race	Years of Schooling	Age	Members	Family Income	Muscle mass
CD1	0,474*	0,274*	0,825**	0,931 <sup>¶</sup>	0,167 <sup>¶</sup>	0,889 <sup>¶</sup>	0,969 <sup>¶</sup>	0,023**§
CD2	0,556**	0,441*	0,593**	0,149 <sup>¶</sup>	0,048 <sup>¶§</sup>	0,935 <sup>¶</sup>	0,505 <sup>¶</sup>	0,058**
CD3	0,000**§	0,036**§	0,689**	0,000 <sup>¶§</sup>	0,000 <sup>¶§</sup>	0,117 <sup>¶</sup>	0,874 <sup>¶</sup>	0,249**
CD4	0,005**§	0,025**§	0,661**	0,000 <sup>¶§</sup>	0,000 <sup>¶§</sup>	0,750 <sup>¶</sup>	0,873 <sup>¶</sup>	0,686**
CD5	0,260**	0,460**	0,643**	0,083 <sup>¶</sup>	0,141 <sup>¶</sup>	0,972 <sup>¶</sup>	0,769 <sup>¶</sup>	0,026**§
CD6	0,050**§	0,097**	0,192**	0,000 <sup>¶§</sup>	0,000 <sup>¶§</sup>	0,857 <sup>¶</sup>	0,307 <sup>¶</sup>	0,000**§
FR1	0,566*	0,829*	0,821**	0,636 <sup>¶</sup>	0,782 <sup>¶</sup>	0,882 <sup>¶</sup>	0,317 <sup>¶</sup>	0,866**
FR2	0,153**	0,825**	0,565**	0,345 <sup>¶</sup>	0,563 <sup>¶</sup>	0,195 <sup>¶</sup>	0,086 <sup>¶</sup>	0,477**
FR3	0,116*	0,534*	0,460**	0,220 <sup>¶</sup>	0,020 <sup>¶§</sup>	0,209 <sup>¶</sup>	0,237 <sup>¶</sup>	0,228**
FR4	0,102*	0,530*	0,657**	0,558 <sup>¶</sup>	0,440 <sup>¶</sup>	0,920 <sup>¶</sup>	0,599 <sup>¶</sup>	0,943**
FR5	0,001**§	0,329**	0,494**	0,233 <sup>¶</sup>	0,702	0,724 <sup>¶</sup>	0,136 <sup>¶</sup>	0,371**

Source: Author (2020).

Legend: CD1: Low height per age; CD2: Low weight per age; CD3: Final height below genetic target; CD4: Delayed sexual maturation; CD5: Speed of growth below expected; CD6: Decrease in bone mass. FR1: Genetic disorders; FR2: Chronic diseases; FR3: Undesirable effects of therapies; FR4: Prolonged physical stress; FR5: Emotional deprivation. \*Fisher's exact test, \*\* Chi-square test, ¶ Mann-Whitney's U test, § value p: ≤ 0.05

Regarding the association between the components of the diagnostic proposition Delayed growth in school adolescents and the socio-demographic and clinical variables, it should be noted that the variable sex was associated with the characteristics "Final stature below the genetic target", "Delayed sexual maturation" and "Decrease in bone mass".



It should be noted that for the characteristic Final height below the genetic target, of the 55 (14.2%) individuals who presented this characteristic, 38 (9.8%) were male. Delayed sexual maturation was already identified in 124 (32.2%) individuals, 83 (21.5%) of these were female. And the decrease in bone mass presented a quantitative of 62 (16.1%) female adolescents.

The variable marital status was related to "final stature below the genetic target" and "delayed sexual maturation", with predominance of adolescents without companions in both situations.

Regarding the years of study, it was observed that this data was associated with "Final stature below the genetic target", "Delayed sexual maturation" and "Decrease in bone mass", as well as the variable age. However, this was also associated with the characteristic "Low weight by age".

The variable muscle mass was associated with the characteristic "Low stature by age", "Below-expected growth speed" and "Decrease in bone mass". Regarding the analysis of the related factors, it is noted that the variable sex was associated with the related factor "Emotional deprivation". Age has been associated with "undesirable effects of therapies".

## DISCUSSION

The monitoring of adolescent growth is consensually accepted as essential for evaluating and controlling the nutritional aspect<sup>(15)</sup>. In the study, short stature was significantly associated with the adolescent muscle mass index. Corroborating, the article states that the peak speed of growth in stature is directly proportional to the lean muscle mass index, stature, bone mineral content and sexual maturity<sup>(16)</sup>.

It was found that low weight in adolescents was associated with age. This occurs due to the characteristics of age itself, such as: higher demand for nutrients for growth, organ maturation, energy reserves and family dependency, considering that children and adolescents are vulnerable to malnutrition<sup>(17)</sup>.

Authors demonstrate that, in both genders, the averages of weight and height had gradual increases with advancing age and maturation stages<sup>(18)</sup>. This data corroborates the findings of the present research, whose related chronic malnutrition factor was not present in the studied population, however, recognizes the influence that this cause has on delayed growth. There was a low prevalence of low weight in adolescents, with a mean age of 14 years.

The characteristic Stature below the genetic target was present in the sample and associated with the social characteristics' years of study and age. Thus, when the calculation for the genetic target was made, many adolescents had not yet reached their final height, applying mainly to the male gender. It is important to emphasize that this characteristic can be easily observed by the nurse in primary health care, for not depending on expensive resources.

Delayed sexual maturation was the defining characteristic that presented the highest prevalence and was associated with sex. The literature addresses its occurrence in approximately 3% of the population, being more frequent in males. In women, this characteristic is usually secondary to an underlying disease<sup>(19)</sup>. However, in the present study, sexual maturation was more prevalent in women. Of the adolescents presenting this characteristic, 67% were female. However, it should be noted that the participants performed a self-assessment, and errors may have occurred in the judgment of their stages.

Regarding the variable marital status in association with this characteristic, it has been observed that adolescents who start their sexual life earlier also undergo bodily modifications earlier<sup>(20)</sup>. This characteristic was also associated with age and years of study. Authors demonstrate that age is important both in anthropometry and pubertal analysis of adolescents<sup>(19)</sup>.

The characteristic below expected growth speed was present in 5.7% of adolescents. The growth speed can be analyzed in distinct phases, this is the main normality criterion, since this is a dynamic process<sup>(21)</sup>. Therefore, this is an important characteristic to be evaluated by professionals, since it analyzes a time series and not an isolated measure of time. The growth speed in boys occurs around 14 years of age, while in girls it tends to occur earlier, usually around 12 years of age<sup>(22)</sup>.

The speed of growth was associated with the muscle mass index. The study demonstrates that the maximum growth occurs during Tanner's stage 4 and in that period, there is also an extensive muscular mass formation<sup>(23)</sup>.

The variables age and years of study presented association with Decreased bone mass. The age variable is important both in the anthropometry analysis and in the pubertal analysis of adolescents<sup>(24)</sup>. In this age range, both the female and male sexes could already be analyzed in terms of delay, because for both groups the secondary sexual characteristics should already be present<sup>(19)</sup>.

The characteristic Decrease in bone mass was present in 24.7% of the sample. It was noticed that younger adolescents presented lower bone mass index, when compared to the older ones, the same proportion happened with the years of study. A study of female adolescents found lower bone mass values in participants aged 10 years and higher values in girls aged 17 years and older. In general, these girls have a higher risk of bone involvement, such as osteoporosis<sup>(25)</sup>.

This fact corroborates with the findings of the present study, in which the decrease in bone mass was associated with the variable sex and muscle mass. Thus, bone evaluation reflects skeletal maturity and can be useful in the analysis of growth disorders. Significant delays in bone age may be found at late puberty or an underlying chronic disease, while rapid growth conditions, such as early puberty, may result in an advancement of bone age<sup>(22,25)</sup>.

It is noted that the gender variable has also been associated with the Emotional Deprivation factor. There are no studies that make specific association of the factor related to the gender variable. Emotional deprivation is the management of negative emotions that cause sentimental deprivation and consequently can cause transient deficiency of growth hormone release. Depending on the moment and intensity in the life of this adolescent, different responses may develop<sup>(26)</sup>.

Emotional deprivation can be caused by some factor that makes the adolescent want to return to a period prior to deprivation, where there was a loss of something that was good at a certain time and was then withdrawn for a certain period. Delay in growth is found in most families that are within the context of separation, inadequate health care, or some discord. As a tool to help in the reconciliation of relationships, there is dialogue, establishing feelings of trust and affection in care, to minimize the situation of emotional deprivation<sup>(27)</sup>.

Age was associated with the related factor Undesirable effects of therapies. Studies indicate that treatments such as radiotherapies, chemotherapy, or those using corticoids and antiretrovirals cause considerable delay in the growth of the stature, organs or pubertal, and consequently may alter the bone metabolism and body composition<sup>(28)</sup>.

In all the treatments mentioned above, when they occurred in early adolescence years, there is likelihood of causing undesirable effects on growth. It is noticeable that

these therapies echo negatively on the adolescent's growth, especially when they occur in conjunction with important body modifications, in which the organism would need energy for the growth process<sup>(28)</sup>.

Thus, it is observed that the knowledge of socio-economic and clinical factors, when associated with the recognition of etiological factors and characteristics expressed in this clientele, can help in early tracking of growth retardation in adolescents. The study in question associates these variables, seeking to increase and facilitate the understanding of the growth phenomenon, as well as to demonstrate which factors may have repercussions on their natural process.

For the nursing, the study makes available a useful tool for the evaluation of variables in the adolescent consultations, mainly for not having expensive resources for the evaluation, besides contributing for the state of the art in the profession for presenting a new diagnostic proposal attached to the clinical analysis and sociodemographic factors. For the society, besides presenting a way of monitoring the growth of adolescents, it makes possible instruments and procedures in health that can promote progress in the quality of assistance to this clientele, in addition to provide better prognosis for the adult age.

As a limitation of the study, it emphasizes temporality, since to analyze the growth phenomenon, longitudinal approaches longer than six months are oriented. Thus, it is suggested the application of the product in longitudinal studies and with different adolescent populations.

## CONCLUSION

It is concluded that socio-economic and clinical factors can directly or indirectly influence the components of the nursing diagnosis proposition "Delay in growth in school adolescents".

The variables sex and years of study were associated with the defining characteristics "Final height below the target", "Delayed sexual maturation" and "Decrease in bone mass". The marital status variable was associated with the defining characteristics "Final lower than target height" and "Delayed sexual maturation". The muscle mass variable was associated with the defining characteristics "Speed of growth below expectations" and "Decrease in bone mass". Regarding the related factors, it is highlighted that "Undesirable effects of therapies" was associated with the variable age and "Emotional deprivation" was associated with the variable gender.

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