

Adolescent Fatigue: A crossroad symptom

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When discussing teenagers, two clichés usually come to mind: The thankless image of the continually tired adolescent and the appealing one of the adolescent bursting with energy like all those sport idols commercials. Both those clichés are obviously just snapshots in a kaleidoscope of very different situations, ranging from one period to another for the same adolescent, from one teen's lifestyle to another.

Having said this, certain figures speak for themselves: more than 40% of teenage students often feel tired (1).

Fatigue is the result of integrated perceptions of which interpretation varies depending on the individual and the circumstances. It's an impression that is relative and subject to multiple influences. A bout of fatigue can suddenly disappear after a motivation, a new interest or a strong emotion. Boredom, dullness or annoyances can either trigger or enhance fatigue.

Whatever the origin, fatigue is the result of a more or less vague perception of a shift of balance and the need for rest to reestablish normal equilibrium. Fatigue ends up limiting physical, intellectual and psychic activity. But first, we must distinguish two very different situations:

a) "Normal" fatigue, that appears after and proportionally to an effort. It is a healthy and necessary signal. This handicap is momentary and it disappears with rest. This fatigue is reversible and, therefore, almost enjoyable.

b) Morbid or "pathological" fatigue, an iterative suffering that is not related or is disproportional to any effort. This fatigue only slightly disappears and can even be accentuated with rest. It is a fatigue that takes its toll on moral, makes us complain, a fatigue that we try to fight in vain. Symptoms include diurnal sleepiness, insomnia and irritability, aches, headaches, decreased appetite, etc. Attention span and perception capacities are diminished. Physical and intellectual performances are altered and errors, even accidents can more easily occur. This state is best described by the terms "general fatigue" or asthenia, especially if it is chronic. This type of fatigue, when observed in teenagers, deserves our full attention. Whether it is detected objectively or only expressed subjectively, it always has a significance.

Fatigue or tiredness is commonly used to describe very different states. On the other hand, any perception of fatigue can be expressed by other terms. Both these uses are particularly frequent with adolescents. This can be more easily understood when we know that most adolescents' concept of health is both vague and global, and that,

generally, teenagers have difficulties targeting their complaints (2,3). Therefore, “I’m tired” can be a substitute for “I’ve had enough”, “I’m bored”, “I don’t feel good enough”, “I’m stressed out” or “I’m sad”, etc. On the other hand, an actual fatigue is sometimes expressed by statements like “I’m fed up”, “It’s not going very well”, “I have a headache”, “I can’t fall asleep”, etc.

The frequency of adolescent fatigue

Literature on adolescent fatigue has grown considerably over the past 10 years. But the ideal longitudinal study that would allow us to evaluate the fatigue parameters for a same individual according to different biological, psychosocial and environmental circumstances does not yet exist. This would be a precious study given a teen’s dynamic and changing character and the varied profile of external circumstances that he or she goes through along his or her development.

The first few surveys with teenaged students show that a large proportion of them, especially girls, feel tired. This phenomenon seems often related to sleeping problems (4.5).

Fatigue is not the primary motive for consulting our adolescent medicine service in Bicêtre, Paris; however, more than 45% of adolescents consulting us state on a self administered questionnaire that “they are often tired during the day” and almost one third of them admitted having trouble falling asleep and frequent nocturnal awakenings.

Does social context play a role?

Lifestyle and socio-cultural contexts are often mentioned when discussing fatigue. Thus, making some preliminary remarks around this question seems worthy.

Is it still relevant to evoke the idea of an “abused generation” (6)? It is difficult to deny the impact that socio-cultural contexts have on adolescents (7,8): adolescence has stretched in time, whereas, the right to adolescence as a privileged, creative and independent period, is hardly being recognized. Teenagers must handle difficult external demands, this on top of numerous developmental internal conflicts that he or she must confront alone (2). Most demands come from family, school (often elitist), peers relationships, certain contemporary threats (aids, violence, etc) and, finally, socio-economical worries about the future (9).

Many adults, themselves unstable, question their commitments and values without giving any credible alternatives for teens. Adolescents may have to make the difficult choice of approving, mimicking or deserting “mandatory” social steps. In an increasing movement of cultural independence, the new generation may want to enter the “adult world” without limiting themselves to it or by developing their own identity taking a different road. But the adolescent tends to rely on his or her peer group and to conform to it; thus, he or she may only find a short-lived or debatable solidarity.

Some, disappointed by the perspectives and roles assigned to them by society, will only see inertia and closure. Already in 1980 in France, close to half of 16-21 year olds not in school were unemployed or occupied precarious jobs. In 1987, 50% of 23 year-old men and 50% of 22 year-old women were still living with their parents (9).

The adolescent feels often the intense desire of wanting it all and wanting it now. Once confronted by reality, he or she may find himself or herself unable to accomplish his or her projects. Oscillating between promises and fears, between repeated states of excitement and disappointment, the adolescent could become the victim of feelings of incompleteness and incomprehension. This may render the teen vulnerable to moroseness, anguish and solitude, while the right to sadness, or simply the right to “be tired” is paradoxically denied by adults.

Adolescent fatigue

Causes of fatigue are either isolated or simultaneous and able to produce the same effect. In clinical cases, this symptom brings us at a crossroad where it is important to distinguish:

- 1) The physiology of fatigue: its connection with sleep, growth and energetic balance.
- 2) The pathology of fatigue: its value as a sign in certain somatic pathologies and mostly its links with the psyche of a teen in crisis.

We will address each item separately.

Sleep and its troubles during adolescence

Sleep, for its repairing qualities, is the first physiological parameter to consider as regards to fatigue. All studies with adolescents whether they are American (5), French (11, 12, 13) or Swiss (14), show that more than half of the teens surveyed were unsatisfied with sleep, feeling tired when they wake up. As for sleep troubles, they clearly affect girls more often than boys, as they will later on affect women more often than men. As is, one out of two girls have trouble falling asleep and one out of three clearly wake up before its time (11). The most recent French epidemiological data on sleep and its troubles during adolescence can be found in Table 1 (1). It would be tempting to interpret all those manifestations as a direct consequence of a new lifestyle at that age. However, during adolescence, we know that sleeping problems (trouble falling asleep, nocturnal awakenings, nightmares) are less often linked to lifestyle (staying up late, noisy environment, etc.) than they are to anxiety and relationship problems. Adolescents themselves agree on the influence of the latter in the quality of their sleep (13).

Sleep rhythm and organization: the influence of puberty

Even if teenagers’ “nights” last on average 8,7 hours (1), time spent sleeping is very different depending on circumstances, with a “catching up” rest period on the weekends and vacations as opposed to school days (14, 15) (see Figure 1).

It is true that a “phase delay preference” (going to sleep at a later hour in relation to waking up), unknown to children, starts during adolescence (16). This shift in sleep-non-sleep rhythm is more important on weekends and vacations when one third to half of teens go to bed after midnight (17). Remarkably, this phenomenon, which seems to be independent of psychosocial factors, corresponds to puberty’s developmental stages.

In fact, studies done in laboratories on sleep during adolescence have shown that sleep organization evolves more with pubertal maturation as opposed to chronological age (18). During puberty, physiological nocturnal sleep time regularly declines. Moreover, certain important qualitative changes occur during that same period: from puberty stage I (child) to puberty stage V (adult). There is a progressive shortening of the “falling asleep” phase before the first paradoxical sleep. But mostly, a progressive drop in stages III and IV of sleep pattern is observed. At the same time the proportion of paradoxical sleep stays constant. This data is interesting since we know that *deep sleep* stages III and IV are the recuperation and restoration stages of sleep, indispensable after sleep deprivation.

These studies also show that diurnal sleepiness that rarely exists among pre-adolescents, progressively increases with pubertal maturation stages (nocturnal sleep time being constant). This tendency, observed in girls as well as boys, is at a peak in the afternoon. Finally, teenagers have a more difficult time spontaneously waking up than pre-teens.

Shift in sleep-non-sleep rhythm and the influence of new habits

Thus, adolescence is a special period where diurnal sleepiness tendencies occur and increase with physical and neuroendocrine maturation processes and this, regardless of the number of hours slept. Of course, the voluntary or involuntary reduction of sleep during adolescence increases this phenomenon. Obligatory morning awakenings are often set, although social demands and a normal longing for later evenings are more insistent. If they could do what they wanted, many teens would go to sleep late and get up quite late. For some older adolescents, the chronic incapacity of falling asleep at night with difficulties getting up in the morning can lead to a chronic source of fatigue not to be overlooked. This is a real and well-documented syndrome (18).

Sleep length, sleep problems and morning fatigue syndrome

The average sleeping time continually decreases from the beginning of adolescence. It goes from 8,6 to 7,6 hours from 9 to 14 year-olds, i.e. minus 12% for girls as well as for boys (11). But generally, 86% of teens think their sleep is good (1) and their dissatisfaction with sleep is independent of the amount of time they sleep (11). Furthermore, adolescents’ tolerance to sleeping difficulties is quite remarkable: half of those who complain about a chronic sleep problem (mostly difficulties falling asleep) are, however, satisfied with the general quality of their sleep (12). This tolerance will decrease with age.

No matter the sex, sleep dissatisfaction is first and essentially linked to the presence of frequent fatigue when waking up. It appears less dependent upon general sleeping

problems (nocturnal awakenings, nightmares) for girls or fatigue felt throughout the day for boys.

One of the rare longitudinal studies available can enlighten us on this phenomenon (14). In a sample of one hundred teens evaluated every 2 years and 5 times between the ages of 10 and 14, 54% to 75% (depending on the evaluation year) expressed a “desire for more sleep” (A higher percentage than adults, generally at 40%). This desire is always paired with what the authors have described as morning fatigue syndrome combining: fatigue when waking up, wanting to stay in bed longer, a need for more than 15 minutes to completely wake-up. This phenomenon does not seem to be the result of general sleep disorders but rather of multiple factors. Only 3.3% of teens said they had enough sleep throughout the whole study. For the rest, the most striking finding is the extreme individual variability in time, with almost 15% of teens constantly wishing for more sleep.

Sleeping pills

According to a recent national adolescent survey in France, one out of every six teenager has used, during the year, medication for nervousness, anguish or insomnia. For girls, this tendency increases with age (1). Another study with students in Lyon indicates that among the students with chronic problems falling asleep, one out of ten (5% of boys, 12% of girls) have used sleeping pills more than once a week (12). This use is clearly influenced by family habits. Among these teenagers, 7% of boys and 16% of girls have diurnal sleeping urges on a regular basis.

Hypnotics, if they induce or maintain sleep bring a poorer quality of sleep (with differences depending on the molecule) (19). They alter the deep sleep which can eliminate stages III and IV and decrease the first stages. Thus, they oppose the organism’s restoration and recuperation process. Some *hypnotics* decrease the paradoxical sleep (with dreams), and could affect long-term harmonization of lived experience and psychological history. Teens who regularly use sleeping pills may encounter the following: other than an artificial sleep resulting in a qualitative aggravation of the deficit, a rebound insomnia after medication is stopped, and maybe a *hypnotics* dependency, a vicious circle of chronic fatigue covering up anxiety. Finally, these medications can lead to accidents, especially road accidents that lead to high mortality in this age group.

Growth, Diet and Energetic Balance

Puberty and growth

Is the explosive biological and physical maturation process during adolescence itself tiring?

This question, often evoked by teens’ parents and surroundings, seems to have created some false ideas. It is true that growth is the most obvious characteristic at the beginning of adolescence. Nutritional and energy needs are superior to any other life stage. Starting at 10 years old for girls and 12 for boys (individual variations are great), growth

acceleration reaches its maximum about 2 years later, and can reach more than 10 centimeters per year. Close to 15% of height and as much as 50% of adults “musculo-skeletal” mass is acquired during and following this acceleration phase (20).

A widely discussed and debated notion is that the teen is “growing faster than his or her strength”, thus becoming weaker or more easily tired. This hypothesis has never been seriously proved. In fact, muscular mass increases proportionally until the ages of 12-13 for both sexes. After this age, for boys, muscular mass increases very rapidly. Muscular strength, already greater than girls, also increases. So it seems that puberty is a period of rapid gain of strength, physical ability and endurance without any “weakening” stage. However, growth acceleration and muscle development’s peak comes one year before the development of muscular strength. During this period, we cannot expect from a teen, especially boys, the same strength as an adult of the same built.

Another frequent error comes from comparing teens by their age. That is how they are grouped in classes and sporting activities. This last point can be criticized when looked at by a strictly maturational point of view. It is illogical to expect the same performance of a 14 years old just starting puberty than you would from his cousin or classmate of the same age finishing his. The prejudice for the first boy is easy to imagine.

Diet, nutrition and energetic balance

A malnourished body is quickly tired: this is true for everybody no matter the age. For teenagers, in developed countries and when looking at global statistics, problems with energetic balance seems to be mistaken.

American nutritional guidelines are usually attained with an average diet (22). For boys, at onset and end of adolescence, they recommend respectively 2700 to 2800 calories and 45 to 56 grams of protein per day; for girls, 2,200 to 2,100 calories per day and 46 grams of protein. These numbers are an average. A teen that does a lot of sports will need more. We may ask ourselves what about fast foods since it is quite popular with teens compared to home-cooked meals. At a dietary standpoint, it is far from being a catastrophe (23). Relatively inexpensive, their protein ration seems quite balanced and they provide enough calories (sometimes too much). Thus, sometimes a hamburger is better than a cake or a skipped meal.

We must admit teens generally go for foods that are simple and fun. They look at eating in its symbolic dimension, and like a way of experimenting and straying from family traditions. At a dietary standpoint, their choice of products only slightly differs from that of the general population (24).

Practically speaking, it is mostly nutritional errors that, during adolescence, can create real gaps in nutrition or fatigue. The most recent French epidemiological data, for teens, on eating habits and perceptions related to weight, speak for themselves (1). A typical example is breakfast. They sleep in, notice they are late so they leave without eating. But 20% of calories used by the body are consumed during the morning. This explains several discomforts that appear at the end of the morning. The importance of breakfast

should be publicized, especially among teens. This meal should not only consist of sugar and butter but also protein and must contain at least 400 to 500 calories. Two studies have shown that skipping breakfast at that age has a negative effect on vigilance and concentration whereas it has a positive effect on memory skills (25, 26). Skipping lunch is not rare among certain teens and can contribute to the same consequences. For some, this may be the result of rejecting home-cooked meals, source of parental control (27). Another phenomenon is that of girls trying desperately to lose weight in an unbalanced and unsupervised way. This desired weight loss is sometimes achieved but it is always associated with a nutritional unbalance. Not including the beginning stages of anorexia nervosa (28), rapid weight loss always gives a sensation of general fatigue. Finally, a survey with 200 older teenagers shows that the more a girl's eating habits are unhealthy, the more she is likely to have other bad habits (tobacco, alcohol, absence of sports, etc...). This combination of risks concerns 1 out of 5 girls in this study which is quite alarming (29).

The role of iron

Out of all nutritional elements that are a direct source of fatigue, iron deserves a closer look.

We will not be looking at extreme lacks of iron. But the teen's muscular anabolism, to which we must add girls' menses, requires an additional amount of iron. These increased needs, about 1.6 mg /day for girls and 1.4 mg/day for boys, are rarely covered by the adolescents normal diet so 70% to 95% of teens do not have the required amount of iron. That is why 12% of boys and 25% of girls show different degrees of deficiency (30, 31). Iron plays an important role in "musculo-skeletal" growth. Iron deficiency results in a decreased physical strength, endurance and an increase in fatigue, which is well documented among athletes.

Fatigue in somatic pathologies

Fatigue can be associated with several somatic pathological conditions. Having said this, if infectious illnesses, severe organ illnesses or malignant afflictions are logically linked to fatigue, not all illnesses are.

During adolescence, a recent and general state of fatigue, especially if it's unusual or all the more so if accompanied by fever or other signs, first evokes a flu-like illness, an infectious mononucleosis or a viral hepatitis. We must also remember that a diabetic can be revealed by a general fatigue without the polyuria-polydipsy being apparent as well as pulmonary tuberculosis without the classic symptoms being apparent. More rarely, asthenia can reveal an anemia, hypothyroidism, etc. Post-hepatitis or post-mononucleosis asthenia are not myths. This is also true for authentic chronic fatigue syndromes, which, even if they are multifactorial, are often associated with post-viral infections (32, 33).

This said, certain *rest prescriptions* could perpetuate or create a fatigue. A prolonged immobilization due to a broken leg is also susceptible to induce this type of situation.

This is also relevant for medical exemption from physical education classes, especially when they aren't justified.

Among chronic illnesses that occur during adolescence, which affects less than 10% of teens (34), fatigue poses a particular problem. Other than various physical handicaps that they can bring, varying from one illness and one stage to another, these illnesses can have noticeable subjective impact: anxiety, self-esteem, social competence, autonomy. However, we know that some adolescents tend to develop very efficient defenses (such as denial) against their real state. A complaint of fatigue in this type of context must make us systematically look at, other than a symptom linked to the illness' own evolution, the chronic illnesses psychological impact, or an asthenia of another origin.

Fatigue and psyche during adolescence

Psychic fatigue

An adolescent *psychically tired* can present with evident fatigue. But with some adolescents, this fatigue can only be a vague complaint without any congruence between their statement and their non-asthenic appearance. This complaint should not be brushed off with general advice only. It may be hiding a more profound trouble of the psyche, which is even not accessible to the teen's conscience (35). This must especially be looked at when the complaint of fatigue comes from a third party (usually the mother) that initiated the consult.

No matter the situation, we must distinguish two different contexts:

Inhibition or over-excitement

A repeated complaint of fatigue, in its different forms, appears sometimes as inhibitions or "a functional limitations of the Ego" (36). A perfect example would be that of an intense and transient fatigue that appears at a precise moment of the day, reminding the teen of an unpleasant activity imposed by a parent, or a fatigue at school corresponding to a particular activity or class.

In other cases, this fatigue can appear in certain situations as a "super symptom" that replaces a multitude of symptoms, which their psychic conflict "absorption functions" are missing. Fatigue is therefore a type of shyness which the adolescent expresses easily during moments or activities that does not protect him or her against psychic conflicts.

With hysterical manifestations, a "fatigue" associated with a particular atmosphere or circumstance, can be expressed as the cause of the following symptoms: passing out, aches, hyperventilation, etc. It is then possible to imagine that this sensation, named fatigue afterwards, could have been caused by a controlled excitement, unmastered by the mind and expressed by the body.

Moroseness, fragility and "acting-out"

Here, the "fatigue" complaint is expressed in a less insistent though paradoxical way and is related to difficult emotional situations. When questioning the adolescent, a decrease or loss of emotional investment and an attitude of moroseness are noticed. This attitude isn't

necessarily a depressive state but shows the adolescent's vulnerability confronted by circumstances, including familial, which cause depressive feelings, and shows the teen's struggle to overcome his or her fragility by acting-out. Separation anxiety can also exist and can be the cause of sleeping phobias. In reality, instead of secreting asthenia, the adolescent is searching for "tiring" behavior. In most severe cases, this vulnerability could result in a dangerous act such as a suicide attempt. For this adolescent, talking about his or her suffering is an intensely sensitive subject that he or she fears, being afraid by the feeling of not being able to resist depression. This is why this type of "fatigue" complaint – even discreet- deserves our full attention and a thorough analysis. The useless appearance of our intervention, as frustrating as it may seem, does not eliminate the opportunity for a preventive attitude. In certain cases, a professional placed in the path of this type of adolescent can be an unexpected lifesaver.

Adolescent's depressive state is often hidden, which only means that the classic symptoms are not apparent. A depressed teen can complain about sleeping problems: falling asleep, insomnia, nocturnal awakenings or premature awakenings. A self-depreciation could be hidden by irony. The loss of self-esteem can only surface through external signals or by a poor body image.

Mental Fatigue" among adolescents should always be taken seriously and be considered as a rupture of balance and, sometimes, as a signal of a possible dangerous impulse.

Contextual elements

In a clinical context, sleep problems rarely appear isolated and are usually a consequence of other problems, either personality disorders or environmental problems or both.

But studies on this type of correlation are rare. A recent French study with 713 students ranging from 15 to 23 years of age clearly confirms the frequency of this type of association (Vignau Jet coll, 1997). The adolescents were separated in 2 groups, depending on how they answered 5 questions pertaining to difficulties falling asleep, precarious awakenings, the feeling of needing more sleep, the poor quality of sleep and the use of medication for sleeping. Compared to good sleepers (see Table 2) poor sleepers reported suicidal thoughts more often, prior suicide attempts, disrupted family relationship and mothers experiencing problems. Certain deviant behaviors were also more frequent.

This study also shows that sleep problems among teenagers living alone or in a foster home are constant; whereas, they are absent in 60% of those living at home with their parents. All of these contextual elements are important, even through they don't draw a formal conclusion on their causal links. However, they offer interesting leads for detection and prevention.

Conclusion

When teenagers are consulting, fatigue is a frequent complaint if we systematically ask them about it. Looking into the possibility of this symptom often represents for the

adolescent an interesting way to send a message during the consultation, no matter the initial motive. Sometimes a witness to a physiological unbalance, this fatigue can be inflicted on or produced by the adolescent.

This overview on fatigue does not claim to bring pertinent answers to this crossroad symptom (37). Rather, its goal is to synthesize principal factors that are linked to fatigue and can help explain it. A fatigue complaint, whether vague, discreet or only subjective should not be quickly dismissed. Also, it shouldn't be dreaded nor treated like an isolated manifestation. The teen's environment can bring important elements to the analysis of this symptom. Its significance and relationships can only be correctly evaluated with a complete health assessment over a sufficient period of time during the consultation.

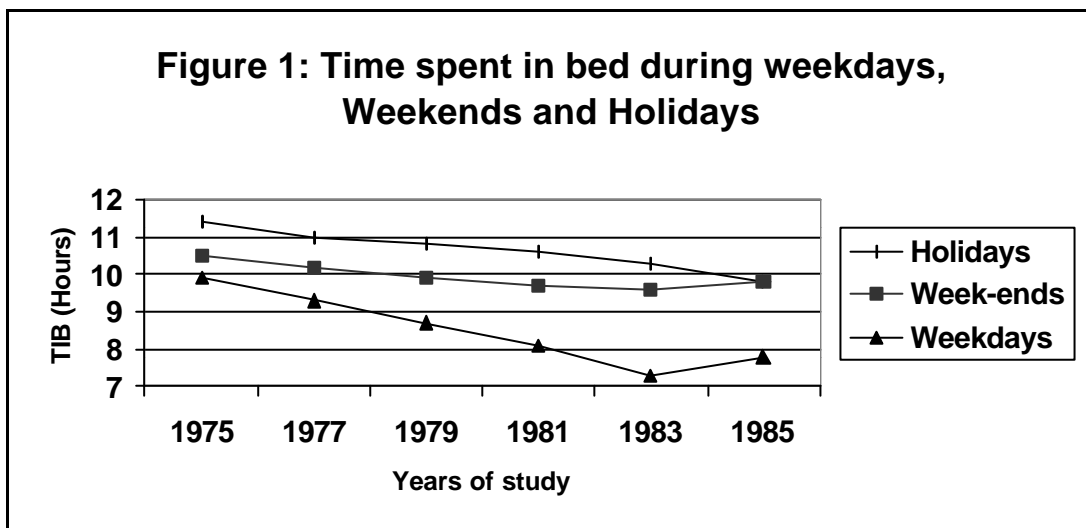
Table 1: Sleep and tiredness among adolescents

Frequent or very frequent troubles	% adolescents	>	With age
Trouble to get asleep	41	+	
Awaken during night	19	+	+
Nightmares	9	+	
Waking up tired	50		+
Sleepy during the day	7		
Sensation of tiredness	43		+

Table 2: Frequency of significant contextual variables correlated with the quality of sleep among adolescents (both sexes).

Associated Variables	Good Sleepers (N = 439)	Poor Sleepers (N = 302)
Suicidal thoughts	15%	38%
Suicide attempts	1%	9%
Been drunk	31%	39%
Theft	21%	29%
School absenteeism	31%	40%
Disrupted family relationships	4%	17%
Problems among mothers: Depression	18%	30%
- Psychotropic treatment	22%	31%
- Somatic illness	8%	20%

Figure 1: Time spent in bed during weekdays, Weekends and Holidays



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