Depression, Emotional Health and Technologies in Adolescents

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Abstract

Depression is a mental health disorder that was thought to occur only in adults; however, in recent years it has been occurring in the adolescent population, so much so that it has had a considerable impact on this age group. In addition to this, the use and dependence on inappropriate technological devices have complicated the situation in young people. Therefore, it is understood that the compulsive use of smart devices results in physical, psychological and social damage. In view of this circumstance, the present work gathers compilations of research relevant to the study with the aim of analyzing, describing and contextualizing depression as a risk factor in adolescents. The methodology used is descriptive-bibliographic, showing the current context of depression in adolescents, with relevance in the technological context and its implications in this manifestation.

Key-words: Depression, Adolescents, Technology, Technological Devices, Nomophobia.

1. Introduction

In recent years, a radical change has been observed in the lifestyles of adolescents in relation to the use of technological devices, with manifestations of depressive behaviors. Given this situation, it is necessary to analyze the conceptualization of depression, which is defined as a mental disorder characterized by profound sadness, diminished self-esteem, feelings of guilt, loss of interest, as prevalent aspects in the individual (Comassetto, Kael, Brum, Lourenço, Bicca & Silveira, 2018; World Health Organization, 2016). In current scenarios, as is the health emergency experienced in various countries around the world, the prevalence of depression increases dramatically around 2% in early adolescence and 18% in early adulthood (Masselink, Van Roeke & Oldehinkel, 2018).

Likewise, a study presented by WHO (2016) that collects the reports presented on depression, typified as a cause of mental disability in the world whose prognosis will be for the year 2030; in addition, it is found that depression reached the second position in the ranking of major diseases in 2020, affecting about 121 million people in the world, regardless of race or sex (Costa, Souza, Sant'Anna, Fagundes, Terra & Veloso, 2018). According to Dickerson, Feeny, Clarke, MacMillan & Lynch (2018); Larios, Laborde, Sanchez, Gaviria & Lastre (2017) mentioned that depression is a debilitating disorder that affects almost one in five young people during the adolescent stage and negatively influences many areas of people's lives. Therefore, depression is conceived as one of the problems of a mental nature that has a greater impact on the population and tends to be considered as one of the primary reasons for disability in youth.

Faced with this, the theoretical myth of depression estimated as an illness proper to adults in traditional theories, presents a new paradigm where the age group of adolescents and infants suffer from depressive states, as conceived by theorists Bennik, Nederhof, Ormel & Oldehinkel (2014), indicating that adolescence is a vulnerable period for the installation of depressive symptoms in the individual, due to the drastic changes and transitions that affect the physical, sexual, cognitive and emotional aspects, this stage should be conceived as a process of emotional reorganization. Likewise, mental health problems and mortality have increased among adolescents, especially girls, and these trends have implications for etiology and prevention. It should be specified, new emerging risk factors that need attention to decrease socio-emotional dependencies, depressions and suicide rates (Keyes, Gary, O'Malley, Hamilton & Schulenberg, 2019).

2. Depression and Adolescence

Adolescence is the transition period between childhood and adulthood characterized by the need for social integration, the search for self-affirmation and individual independence, in addition, to the consolidation of sexual identity and conflicting emotions (Costa et al., 2018). Adolescence is a stage of instabilities and physical, socio-affective and behavioral changes, highlighted by an emotional responsiveness to stress and an increase in the so-called exploratory behaviors, which enhances the development of the individual, but can cause psychological problems if exceeded (Bermúdez, 2017). The transition to adolescence has been identified as a period of susceptibility to mental health problems, such as depression, which can have profound short- and long-term impacts on overall health and well-being (Conklin, Yao, & Richardson, 2018). On the other hand, the particular mention by Keyes et al. (2019) refers that depression is a multidimensional construct that

includes a variety of symptoms characterized by mood-related changes in affect, behavior, cognition, as well as physiological changes, and is part of a broader constellation of experiences that constitute well-being.

Experiencing stages of depression in adolescence can disrupt important developmental processes which can have long-lasting sequelae on the individual's future socioeconomic status and relationships (Clayborne, Varin & Colman, 2019). According to Alzuri, Hernández & Calzada (2017), the particularities of depression in adolescence can be related, among other things, to mood inconstancies; sometimes it is usually disguised as irritability - aggressiveness, disobedience, confrontational states, drug dependence; facts that place the individual in a group at high risk of deriving in suicide, the latter being much more marked than in adults. According to Aburto, Díaz and López (2017), the problems of suicidal behavior in adolescents are related in greater proportion to poor communication among family members, a fact that has repercussions on non-identification and therefore depression in the youngest members. It is reaffirmed that depression is prevalent in adolescence, with conservative estimates indicating 13% of young people between the ages of 12 and 17 years, experiencing symptoms of a depressive episode in a period of one year (Conklin et al., 2018). Research estimates that a large proportion of those who experience depressive episodes in adolescence will go on to experience at least one recurrent episode in adulthood (Mullarkey, Marchetti & Beevers, 2019).

Globally, depressive disorders contribute a substantial degree of disease burden, and prioritizing the prevention and treatment of depression represents an important public health priority (Granrud, Steffenak & Theander, 2019). According to Ware et al. (2020), depression is a serious mental illness whose symptoms associated with depression are both behavioral (appetite, energy, and sleep) and cognitive (interests, mood, and concentration). Depression among adolescents has been a growing problem in recent decades and is a problem in various societies in the health sector (Mullarkey et al., 2019; Abebe, Frøyland, Bakken & von Soest, 2016; Espina, & Calvete, 2017). The number of adolescents who have experienced major depressive disorder in recent years is approximately 23%, from 2005 to 2014 (Mojtabai, Olfson, & Han, 2016). In adolescence, the main symptoms of depression appear, involving irritability, instability, mood swings and disinterest, as can be seen in Figure 1.

On the other hand, it should be noted that recently there was very little discussion about depression in children and adolescents, due to the false belief that these age groups, had nothing to worry about, or being sad and unmotivated or similar situations (Comassetto et al, 2018). If the individual has suffered from depression during his or her adolescent period, this predicament will be

carried over into adulthood, which will inexorably lead to a marked deterioration in quality of life and performance level; therefore, early detection of the condition and treatment is essential (Bermúdez, 2017). Adolescents experiencing depression have more costly and frequent physical health problems (Mullarkey et al., 2019). Depression in youth is common, more prevalent among young women, and is increasing in some countries; approximately 13% of young men and 17% of young women report depressed mood or a major depressive episode in recent years (Granrud et al., 2019; Conklin et al., 2018).

Adolescence is considered a key stage that will determine the maturity of the individual, on which the foundations of those habits aimed at maintaining a healthy state of balance that will prevent the onset of depression will be built (Gonzáles & Ato, 2019). It should be noted that 26% of cases of depression in adults began before the age of 18 years". (Gonzalez, Pineda & Gaxiola, 2018, n/p.), and according to researchers confirm the early onset of depressive situations. These early onset cases imply a greater possibility of generating a growing sequel of such problem. Trends over time in various aspects of depressive symptoms have received considerable attention in the literature over the years; however, they are not adequately understood (Keyes et al., 2019).

Figure 1 - Identification of Day-to-day Sensations in Adolescents. (Taken and adapted from Comasetto et al., 2018).
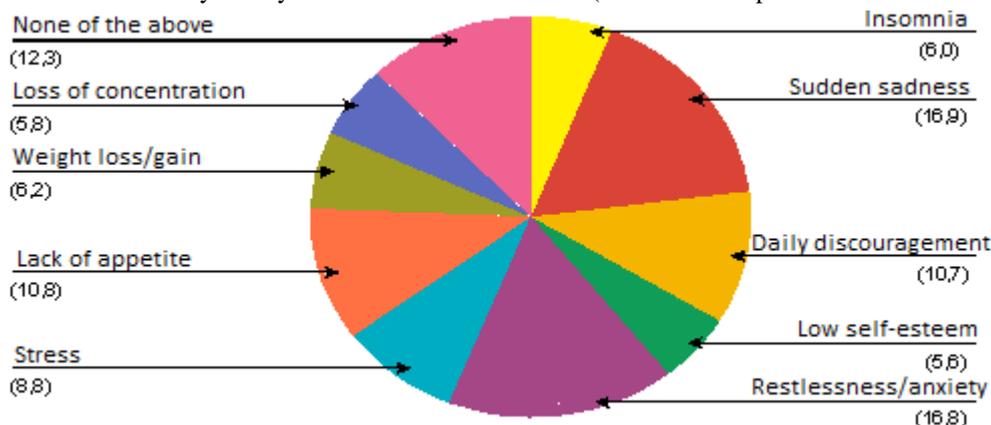
As stated by Vázquez & De Haro (2018), adolescents considered as a sensitive and vulnerable population on a global scale, often suffer from economic constraints, discrimination, depression, among other aspects that to some extent are triggers for suicide risk, which is considered a public health problem, with a third leading cause of death among adolescents and, on the other hand, is a determinant factor for mental disorders. Depressive symptomatology typically begins to emerge during the middle or late pubertal stages, particularly in young women (Clayborne et al., 2019;

Granrud et al., 2019; Comassetto et al., 2018; Conklin et al., 2018;). In addition, the experience of depressive symptomatology and disorders during adolescence may increase the risk of more severe outcomes in adulthood, including mental disorders and major depressive episodes and suicide attempt (Scott, Lewi & Marti, 2019).

A relevant aspect is to understand adolescent depression as a complex syndrome with different etiologies and treatment responses (Alzuri et al., 2017). Other authors stated that depression is one of the most prominent mental health disorders affecting adolescents, with an annual prevalence of four to five percentage points globally. (Scott et al., 2019). In agreement with Alzuri et al. (2017) indicated two groups of factors, mutually exclusive, that catalyze depression pictures namely: exogenous, proper to the environment and endogenous, manifested through the behaviors developed by the individual. Also, the cross-sectional analytical study conducted by Bustillos & Laguna (2018) with 160 adolescents in the city of Huanuco - Peru, showed that a high percentage suffered from depression due to associated factors such as the perception of a distorted body image and situations of family dysfunctionality.

3. Mood Aspects

Depression in adolescents is often associated with some event that occurred in childhood, such as traumas, fears and anxieties (Comassetto et al., 2018). Depression is considered as one of the highly disabling disorders as its impact can have repercussions in various areas of individuals' lives and, in addition, it is twice more common in women than in men (García, Valencia, Hernández & Rocha, 2017). As expressed by Bermúdez (2017) the subjective feeling of emotional discomfort could be related to a marked increase in anxiety levels, as well as depression and with it a low self-esteem, annexing that such situations are linked to each other. According to the compilation made by García, Lacalle, Valbuena & Polain (2018) it has that currently anxiety and depression are the two psychic disorders of greater recurrence among children and adolescents. The relationship between depression and anxiety present depressive and anxiety symptomatology, which have experienced episodes of depression and anxiety at different times of their existence (Álvarez, Castillo & Moreno, 2019). According to Gonzáles & Ato (2019) proposed that there are differences between young people who present and do not present depressive states, whose differences are demonstrated in the adaptive and functional conditions of the psychological response to the context. In this regard, their proposal can be seen in Figure 2.

Figure 2 - Model of Psychological Response to Depression. (Taken from Gonzáles & Ato, 2019, p.30).
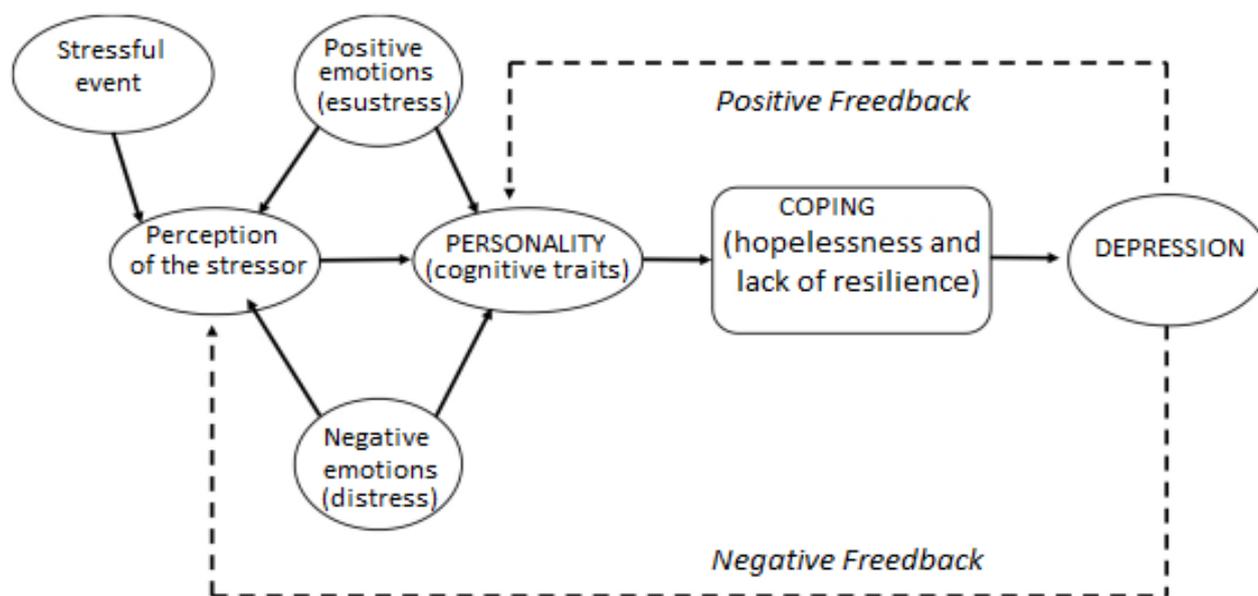

Likewise, Masselink et al. (2018) presented various research related to low self-esteem having as a consequence an increased likelihood of risk for developing depressive symptoms during adolescence; however, the mechanism underlying this association remains largely unknown. Several factors contribute to the increase in depressive symptoms during adolescence (Gonzales & Ato, 2019). Low self-esteem is held to be an important factor that increases vulnerability to depression (Orth, Robins, Meier & Conger, 2016; Bermudez, 2016). An impressive considerable amount of research has shown that low self-esteem and depressive symptoms often coexist among adolescents (Masselink et al., 2018; Sowislo & Orth 2013). Low self-esteem, therefore, appears to be a key factor that makes adolescents vulnerable to developing depressive symptoms. The association between self-esteem and depressive symptoms is particularly interesting to examine during adolescence, as self-esteem affects many of the developmental challenges adolescents face, such as identity formation and reshaping social relationships (Masselink et al., 2018). According to Clayborne et al. (2019) a growing body of research indicated that depressive symptoms are associated with family and economic conflicts, life habits, and difficulties in school. According to the aforementioned, those adolescents who lived in very troubled families were almost five times more likely to suffer from depressive symptoms. In addition, as a particular data, being female and being in a late stage of puberty, cohabiting in an environment with a high level of family conflict, is sensitive to be associated with depressive symptoms (Clayborne et al., 2019).

For Ortega, Muros, Palomares, Martín & Cepero (2015), to predict a possible symptomatology associated with depression, the aspect of self-esteem should be assumed as a

transcendent factor. In addition, adolescents give priority to physical self-concept, which is highly significant since it has the ability to decisively influence their overall self-concept; therefore, pictures associated with overweight and/or increased body mass-volume usually generate dissatisfaction particularly in the female gender (Fernández, González, Contreras & Cuevas, 2015). On the other hand, it is worth mentioning the work done by Ocampo, Guerrero, Espín, Guerrero & Aguirre (2017), with 180 adolescent women whose ages ranged from 14 to 19 years, from the city of Quito; in order to associate a crucial aspect that is physical appearance in terms of obesity and body mass with depressive symptoms, concluding that there was a significant relationship between symptoms associated with depression and overweight in adolescents.

As reported by Twenge (2020) during the period 2011 to 2018, rates of adolescent depression in the U.S., increased by at least 60%, being much higher for girls as shown in Figures 3 and 4.
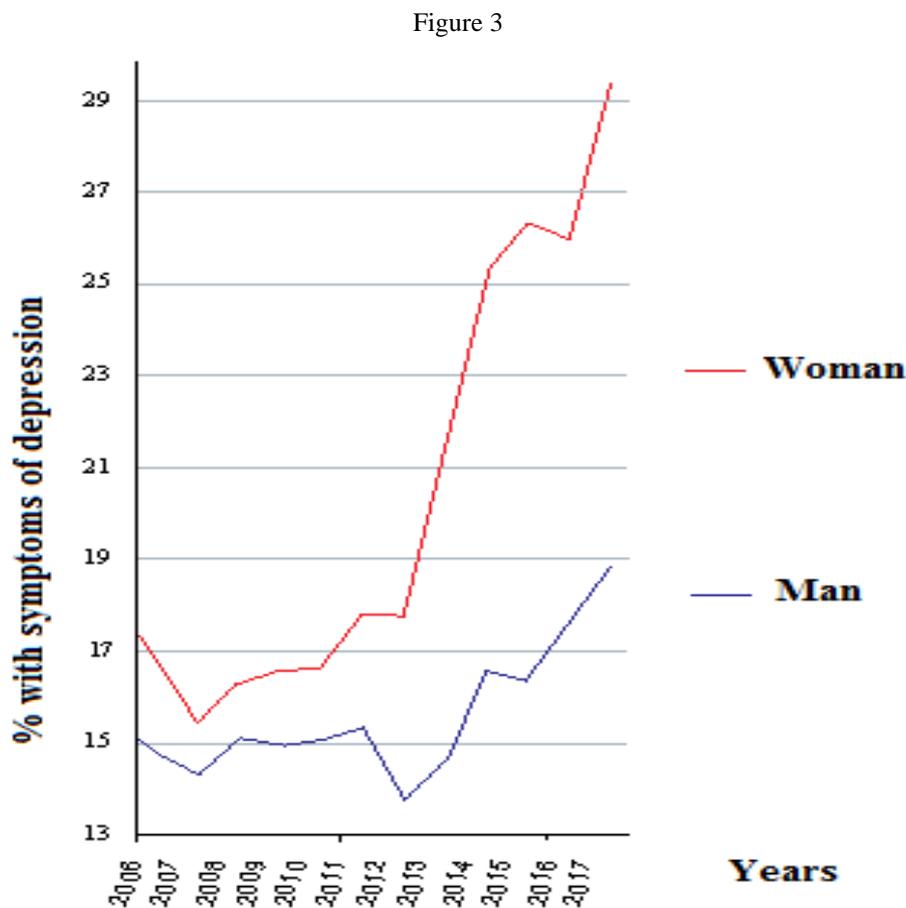
Figure 3

Percentage of U.S. 8th, 10th, and 12th graders with high depressive symptoms, by gender. (Adapted from Twenge, 2020).

Figure 4
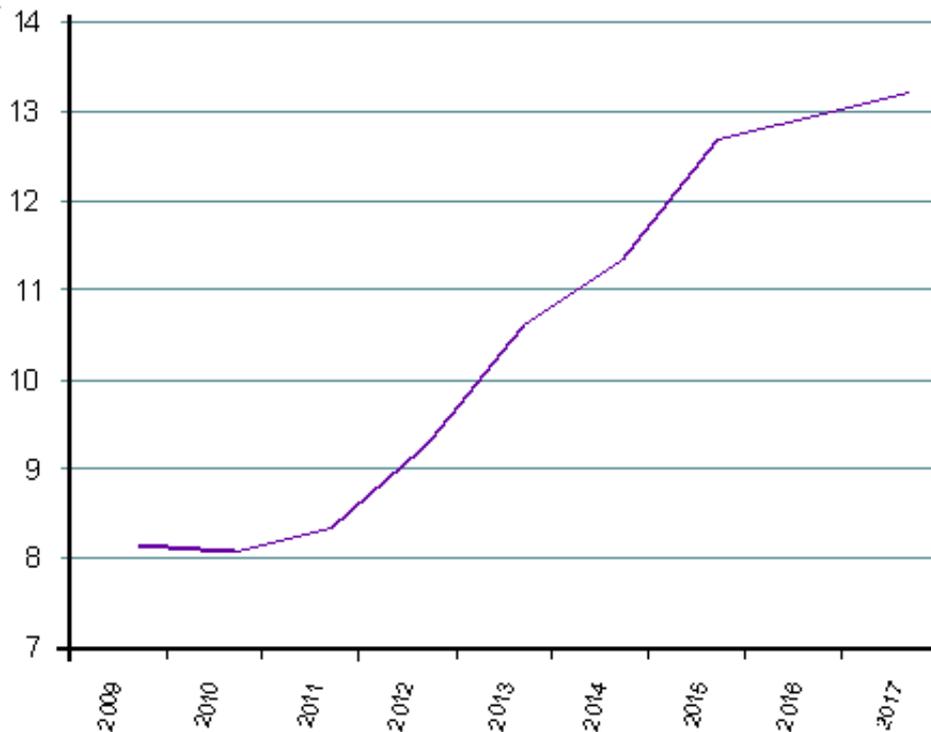
Major depressive episode in the past 12 months, by age group and sex, U.S. National Survey on Drug Use and Health, 2009-2017 (Adapted from Twenge, 2020).

According to work by Keyes et al. (2019), depressive symptoms are perceived to be increasing among adolescents, especially among girls, consistent with the increase in depression and suicide for the North American case. The population variation in psychiatric disorder symptoms highlights the importance of current environmental determinants of psychiatric disorder risk and provides evidence of emerging risk factors that may be shaping a new and concerning trend in adolescent mental health. According to the cited authors depressive symptoms are increasing among U.S. students aged 13 to 18 years as of 2018 (as can be seen in Figure 5), with the largest increases occurring among girls since 2012. That conclusion is based on national trends among adolescents from the years 1991 to 2018, using annual cross-sectional self-assessment, of nearly half a million adolescents with consistent sampling frames and measurement of depressive symptoms. Such findings are consistent with two other national adolescent data sources, both of which have documented substantial and significant increases in depression and suicidal behavior, beginning around 2012, and affecting girls more than boys.

Figure 5 - Effects of Age, Period, and Cohort on Symptoms of Depressive affect among 13- to 18-year-olds in the U.S., 1991-2018 [taken and adapted from Keyes et al., 2019].
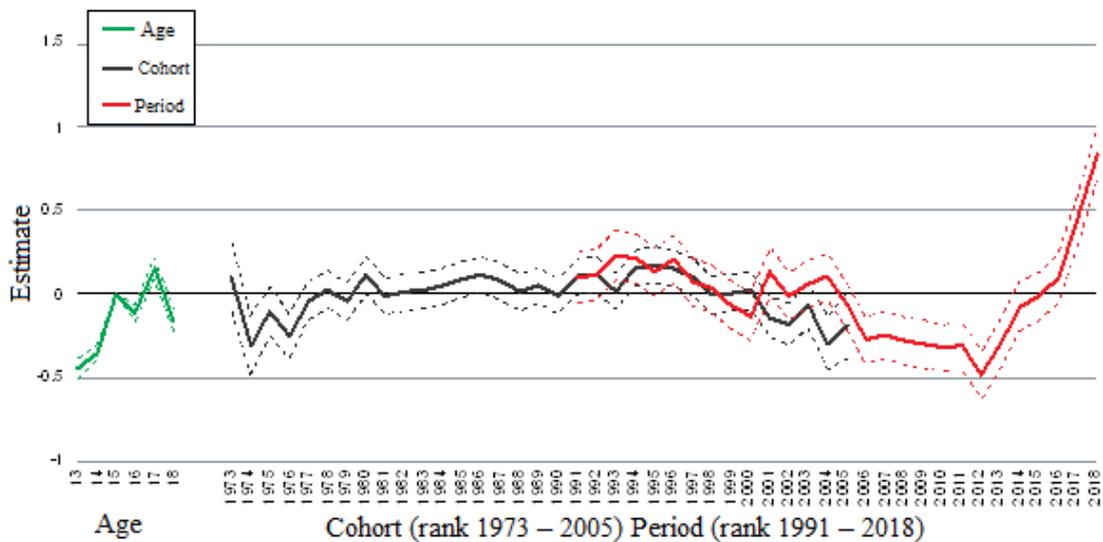
Within the broad and diverse spectrum associated with depression, the work of Conklin et al. (2019) on the comorbidity of depression and insufficient sleep is worth mentioning; as, according to the researchers, much of the evidence on the sleep-depression nexus is composed of cross-sectional studies, and there is scant research on the direction of this relationship. Thus the prospective study demonstrated a strong, gender-specific link between cumulative sleep deprivation and increased depression, where chronic sleep deprivation was associated with a greater increase in depressive symptoms among young women only, in an adolescent population comprised of 3170 Canadian British Columbia students whose ages ranged from 13 to 18 years, confirming the importance of young people getting at least 8 hours of sleep per night as recommended by the American Academy of Sleep Medicine for children aged 13 to 18 years; the study corroborates that sleep is a modifiable behavior and important in future health promotion efforts aimed at preventing depressive symptomatology since adolescent depression predicts the frequency and severity of depression in adulthood.

4. Depression and New Technologies

According to the review conducted by Yildiz (2019) there are several theoretical positions that try to explain about technological disorders and the use of Smartphone (smartphones); such as behaviorism, which assumes that behavioral disorders generated by the use of technology consider it as a learned behavior, focused on the stimulus-response-reinforcement principle; so they explain that addictive behavior, like any other learned behavior, tends to be changeable. On the other hand, the

psychodynamic position explains that Smartphone use disorder is a form of escape that the individual possesses from negative emotions; due to the sociocultural tendency that considers Smartphone use disorder as a product of social culture. On the other hand, cognitive theory explains that Smartphone use disorder is a product of distorted ideas and schemes assumed by the individual. Finally, it is currently assumed that Smartphone use disorder is produced by a combination of personal, cultural, social, environmental and emotional factors.

On the other hand, it is worth mentioning what is reported by the work of Ting & Chen (2020) who have stated that despite knowing about the excessive use of Smartphones, it is not currently recognized as a formal clinical disorder within the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) or in the International Classification of Diseases (ICD-10), since various behavioral aspects often share certain similarities with other recognized behavioral addictions. Due to the problems generated as a result of smartphone dependence, the term nomophobia has been generated, which according to Louragli, Ahami, Mammad & Lamrani (2018) can be understood as the level of fear of not having the mobile device; whereby it can also be endorsed as the degree of anxiety generated by the lack of connectivity through the smartphone (Lachmann, et al. 2018).

Smartphone devices have the potential to influence individual's behavior due to its specific features and functions as it is small enough to accompany the user in almost all situations, offers a wide range of diverse functions and its environment allows easy employment (Ting & & & Chen, 2020; Wang et al, 2019; Lachmann, et al. 2018). Adolescents with low academic achievement are assumed to use their smartphone at levels such that they are considered disorders to get rid of negative situations (Yildiz, 2019). There is no doubt that the features exhibited by smartphones, enable multitasking and maintaining a connectivity status, so the mobile device has the potential to conveniently integrate with the individual's daily life. On the other hand, the proximity and convenience with such devices tends to increase the risk of overuse, which over time could lead to addictive behavior (Lachmann et al., 2018). For example, Want et al. (2018) stated that problematic smartphone use leads to psychosocial disturbances in which some individuals in which they answer text messages, watch some video or social networks, while walking, driving or chatting.

The compulsive use of mobile devices tends to be considered as a form of human-machine addiction which is characterized by a behavioral pattern equivalent to internet addiction or substance addictions; however, it is possible that the symptomatology of the problematic use of smartphones may not be perceived immediately or may be different according to the context and the technological level of the devices (Ting & Chen, 2020).

As studied by Twenge (2020), in the North American case a sudden increase in depression occurred between 2011 and 2018, which according to his appreciation the cause must be something that appeared or strengthened in the early 2010 and continued to grow. Such events were related to technology, Smarphone employment, social networks, cyberbullying, and similar situations that round the field of connectivity and internet. As estimated by Scott et al. (2019), symptoms of depression that emerge during adolescence are likely to reappear throughout life if not adequately addressed, and consequently may result in increased suicidal tendencies, as well as academic and interpersonal concerns. In this regard, such correlation can be seen in the graph detailing that between the years 2011 and 2017-18, rates of adolescent depression in the U.S. Increased by at least 60%, with a strong trend among girls.

As reported by Twenge, Spitzburg & Campbell (2019) has it that the shifts of adolescents' free time towards technology and away from direct social interaction, affects the daily lives of most adolescents, suggesting that such aspect should have a greater influence on personal mental health. According to Twenge (2020) the use of social networks affects adolescents of these times at the group level, as they will suffer exclusion in their interaction and with it generate frustration and unhappiness, so the mental health of many adolescents, not only regular users of social networks, may be affected over time as the cultural patterns of adolescents' social life change. On the other hand, it is worth mentioning the position of Lachmann, Sindermann, Sariyska, Luo, and Melchers, Becker & Montag (2018), who assume that it is the internet and social networks that have a transcendent role on the development in the excessive employment/dependence of Smartphones, as the internet and social networks were involved with each other through connectivity.

As stated by Ellis (2019), understanding how people use technology remains important, especially when measuring the impact this could have on individuals and society. Such an aspect has resulted in the emergence of nomophobia. As a novel technology that combines the Internet and communication, smartphones have become an essential part of everyday life. The number of Smartphone users has increased rapidly worldwide, with Asia and Europe showing the highest number of users (Kim, Park, Kim, Kim, Pan, Lee & McIntyre, 2019). According to Jin, Suh & Gweon (2019) it is known that with the increasing popularity of Smartphone among adolescents, there is a concern that their excessive and habitual use may lead to smartphone addiction that causes psychological and physical difficulties. According to Wang, Liu, Zhao, Yang, Zhang, Chu, Wange, Zeng & Lei (2019), recent research evidences that problematic smartphone use is a risk factor for individual depression; however, little is known about the mediating and moderating mechanisms underlying this relationship.

If we consider promising and reliable strategies, we can turn to the study by Ware et al. (2020) who explored the feasibility of predicting by machine learning all major categories of depressive symptoms using smartphone data; for which they opted for two types of Smartphone data, one collected passively from Smartphones (via an application running on the mobile devices) that allowed data collection (e.g., location, activity, phone usage) and the other collected from the University of Connecticut Wifi network support (which does not require direct data capture on the phones), on the basis of which they built a family of machine learning-based models for prediction. Both scenarios require no effort on the part of users and can provide an objective assessment of depressive symptoms. Using smartphone data collected from 182 college students in a two-phase study, our results demonstrate that smartphone data can be used to predict behavioral and cognitive symptoms effectively, with an F1 score as high as 0.86. Our study takes a significant step forward over existing studies that only focus on predicting general depression status (i.e., whether one is depressed or not).

5. Conclusions

The transition from child to adolescent brings many challenges and pressures, including physical and emotional changes associated with maturation, increasing academic expectations, and social transformation. Adolescence is a period of increased autonomy that can influence adolescent health (McLeod, Horwood & Fergusson, 2016. This is a normal but challenging development, and can make adolescents more vulnerable to symptoms of depression, especially girls (Granrud et al., 2019).

Since the home is the zone of influence where we receive our first contacts with society, such a place should provide support and care, so that relationships of trust and security can be strengthened in adolescents. Difficulties usually arise in the course of the individual's life and it is when the role of the family is the breaking point for the development or attenuation of depression.

As it is a disease that is not detected through clinical tests, it is necessary for parents to observe the child's daily behavior. Treatment with a psychologist at an early age is a measure that helps to combat this disorder. Thus, the diagnosis is made early and the likelihood of effective treatment increases considerably.

Social problems seem to function as a direct mediating agent between self-esteem and depressive symptoms (Masselink et al., 2018). Due to the boom in the use of smartphones and their annexation to the way of life, as well as their association with various pathologies; Yildiz (2019) recommended developing viable mechanisms that tend to concretize prevention actions against the

intense and uncontrolled use of Smartphones. Currently, a huge number of individuals spend a considerable amount of time employing Smartphones, a fact that according to Yildiz (2019) assumes it as a cause that derives in some symptomatologies of physical type, generation of good and bad feelings; as well as situations of pathological addiction, depression, symptoms such as fear-anxiety, productivity and low academic performance.

The results obtained by Masselink et al. (2018) showed that low self-esteem may make early adolescents more vulnerable to develop depressive symptoms in late adolescence and early adulthood, whereas young adolescents who experience low self-esteem are certainly not predisposed to experience depressive symptoms during development into adulthood. Research on depressive symptoms in adolescents is relevant to the extent that they can propose effective prevention, early detection, assessment, and intervention alternatives for the management of such a clinical condition in an age group that has been shown to be vulnerable to it (Costa et al. 2018).

A novel proposal is the one proposed by Mullarkey et al. (2019) about being able to analyze the symptoms of depression from the perspective of network analysis, a proposal by which it is possible to go beyond the current average level of symptoms and understand which symptoms may be particularly central to experiencing depression. The basis of such a proposal lies in the fact that symptoms are not outcome factors of an underlying disease, because the symptoms and the associations between them are the disease itself, being in this case the cases of depression. Their results shown were robust to tests of stability and precision and provide a novel framework for understanding adolescent depression.

We agree with Clayborne et al.'s (2019) proposal in the momentous aspect that future research should continue to expand the available literature on outcomes, but over the long term, on adolescent depression. This should, to the extent possible, include consideration of possible confounders or effect modifiers, including gender, socioeconomic status, comorbid conditions, and recurrence of depression; examining the level of impact of childhood learning or social difficulties on psychosocial outcomes and how depression has the potential to influence these relationships; and being able to follow up to weight estimates of the impacts of depression on psychosocial outcomes into adulthood.

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