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Internet-based CBT interventions with adolescents: a systematic review

Intervenções em TCC baseada na internet com adolescentes: uma revisão sistemática

ABSTRACT

With the recent technological advance, internet-based CBT emerges as an alternative to the traditional psychotherapy, while being a promising and effective mental health care. Adolescents may engage and benefit from these internet-based programs, but there are still few interventions led with this specific population. In order to investigate the evidences of efficacy of internet-based CBT among adolescents, a systematic review was conducted, while using the Prisma method, on studies published in the last five years on Academic Google, PubMed and Scielo academic data basis. The descriptors used were ("cognitive behavioral therapy" OR "CBT") AND ("internet" OR "online"). After analysis and application of inclusion and exclusion criteria, 14 studies were selected. No research was found in the Brazilian context. Participants from the selected studies presented significant reductions on symptoms after the interventions; furthermore, half of the publications pointed out that significant percentages of adolescents were recovered or in remission of a psychological disorder. From these preliminary analyses, it may be concluded that internet-based CBT programs seem to be effective models to the promotion of adolescents mental health.

HEADINGS: Cognitive Behavioral Therapy. Internet-Based Intervention. Adolescent.

RESUMO

Com o avanço tecnológico crescente, a TCC baseada na internet surge como uma alternativa à psicoterapia tradicional, mostrando-se promissora e eficaz no cuidado com a saúde mental. Os adolescentes podem engajar-se e beneficiar-se de programas baseados na internet, mas ainda há poucas intervenções realizadas com este tipo de população. Visando investigar evidências de eficácia da TCC baseada na internet para adolescentes, foi realizada uma revisão sistemática com o método Prisma advinda da busca de estudos publicados nos últimos cinco anos nas bases de dados do Google Acadêmico, PubMed e Scielo. Os descritores utilizados foram: ("cognitive behavioral therapy" OR "CBT") AND ("internet" OR "online"). Após análise e submissão aos critérios de inclusão e exclusão, foram selecionados 14 artigos. Nenhuma publicação foi realizada no Brasil. Foram verificadas reduções significativas nos sintomas dos participantes dos estudos selecionados após a intervenção, ademais de metade das publicações terem apontado porcentagens significativas de adolescentes recuperados ou em remissão de um transtorno psicológico. Pode-se concluir, a partir das análises preliminares, que os programas de TCC oferecidos por intermédio da internet parecem constituir modalidade eficaz no cuidado da saúde mental em adolescentes.

DESCRITORES: Terapia Cognitivo-Comportamental. Intervenção Baseada em Internet. Adolescente.

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INTRODUCTION

Recent technological advances have integrated and modified several areas related to contemporary life, including the therapeutic process (McKay, 2018). The largest changes to occur in psychotherapy in the next few years are associated to technological innovation (Norcross et al., 2013). Moreover, the advance of COVID-19's global pandemic has evidenced the need for the inclusion of technological resources in mental health care (Ojha & Syeb, 2020). Therefore, cognitive behavioral therapy's (CBT) online approach, known as internet-based CBT, has emerged as a promising manner for the advance of interventions related to mental health (Webb et al., 2017).

Internet-based CBT is based on self-guided interventions that are delivered through online apps or platforms with the aid of educational texts and tasks, complemented, or not, by the support of a therapist via messages (Berg, Malmquist et al., 2020). Internet-based approaches that involve therapist contact may include synchronous communication, that is, simultaneous interactions between therapist and patient through messages or videoconferences, or asynchronous communication, when the therapist and the patient interact according to their availability of time, such as in e-mail sessions (Sigmund et al., 2015). Internet-based CBT usually involves self-guided interventions and asynchronous therapist contacts, especially through e-mail exchanges (Lopes & Berger, 2016).

Interventions that are characterized by the use of internet-based CBT are generally formed by weekly modules that incorporate activities, concepts, and techniques originally related to traditional CBT (Richards et al., 2018). Likewise, internet-based CBT can be used to complement traditional face-to-face psychotherapy, instead of simply substituting it (Woods et al., 2017). Online therapeutic programs have many advantages, such as in the possibility to approach individuals that live in distant locations (Vigerland et al., 2016) and because of its lower economic cost (De Bruin et al., 2016).

Internet-based CBT seems to be a promising approach for the treatment of mental disorders for many populations, including for adolescents (Weineland et al., 2020). Adolescence is a unique developmental stage, as it comprises the ages between 10 and 19 years old (WHO, 2014), and whose specificities should be incorporated within psychological treatments. Therefore, internet-based CBT may reduce youngsters' perceived stigmas related to the search of psychological treatments and, thus, promote this population's mental health (Van Voorhees et al., 2005). Furthermore, adolescents tend to be more engaged in therapeutic processes when these adopt innovative and intriguing technologies (Hill et al., 2018).

Although this therapeutic field is still being developed, there are efficacy indications about the internet-based CBT interventions that suggest its efficacy of improvement in

symptoms and psychological disorders of many adolescents' samples (Fisher et al., 2019; Vigerland et al., 2016). The systematic review and meta-analysis conducted by Vigerland et al., (2016) analyzed seventeen studies that involve adolescents that went through internet-based CBT treatments, and its results show the positive effects that have been evidenced in the researches. However, this publication was conducted more than five years ago, and it is estimated that this period of time is long enough to justify a new review, which's objective is also to identify studies in the Brazilian context. Besides that, the world has been through a pandemic that has significantly increased the amount of online psychotherapeutic sessions. Therefore, recent researches about the theme may reveal potentially relevant aspects and positive effects that may lead to knowledge advances in the subject of internet-based CBT for adolescents.

METHOD

In order to organize the studies that have presented internet-based CBT efficacy evidences in adolescents' samples, a systematic review of publications was conducted on the following data basis: SciELO (Scientific Electronic Library Online), Academic Google, and PubMed. The searches were carried on July and August of 2021 by two independent judges. The key-word descriptors and Boolean operators used in the title searches were ("cognitive behavioral therapy" OR "CBT") AND ("internet" OR "online"). Moreover, a publication filter was also used to distinguish the studies published in the last five years (2016-2021). Since adolescence is a wide developmental stage and that many researches include it in the category of "children" or "youngsters," it was decided not to include adolescence as a descriptor from the beginning of the searches. Therefore, 445 studies were selected in this preliminary phase.

After having eliminated 119 duplicates, 326 studies were selected for the complete text reading phase. The initial eligibility criteria were: (a) have been written in English, Spanish, Portuguese, or French; and (b) present an accessible abstract. In this step, 20 studies were excluded (amidst which 18 did not present an abstract, and two were not written in any of the mentioned languages), while the 306 researches left were fully analyzed.

The second step consisted in establishing the inclusion criteria: (a) the studies needed to be empirical and original; (b) they had to include an adolescent sample (participants had to be between 10 and 19 years old); (c) they needed to be intervention studies; and (d) they had to evaluate internet-based CBT interventions' impacts on participants' symptoms and/or cognitive processes. Consequently, the exclusion criteria used for the selection of studies were: (a) researches that only involved theory, protocol assessment

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or psychometry; (b) studies that were composed of participants' samples with ages different from the ones previously mentioned; (c) researches that, after the interventions, only evaluated factors related to the therapeutic process, such as cost, client satisfaction, and others. The final database was achieved after the enforcement of such factors and, therefore, it was formed by 14 articles.

Table 2 presents a summary of the 14 analyzed studies within their main information regarding the authors, type of sample, interventions that were conducted and their main results. The ages from the adolescents that participated in such interventions were among those that were established by WHO (2014).

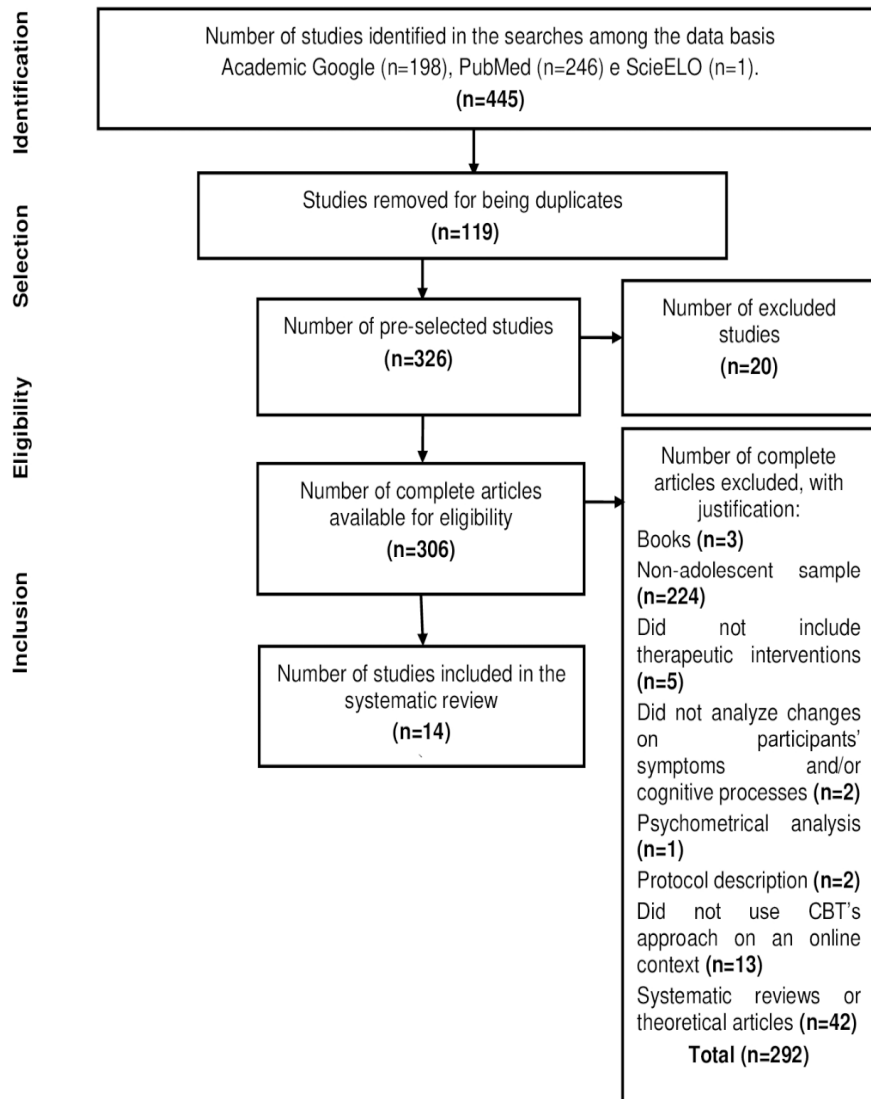


Figure 1. Systematic review of literature's flowchart.

Table 1. PICOS criteria for the inclusion of studies in the systematic review

Acronym	Definition	Application of criteria in the study
P	Population	Adolescents.
I	Intervention	Usage of CBT techniques in the online context.
C	Control	Control groups that did not go through therapeutic interventions.
O	Outcomes	Online therapeutic practices' efficacy.
S	Study design	Studies about therapeutic interventions.

Nota: PICOS = Participants, Intervention, Control, Outcomes, and Study designs.

Table 2 . Main characteristics of the selected studies

Authors	Sample	Type of intervention	Main results
Berg, Rozental, et al. (2020)	Adolescents that met anxiety criteria and that reported depressive symptoms (n=120).	Therapists-guided models containing learning and memorizing therapeutic support strategies associated, or not, to chat sessions.	Adolescents that were a part of the support group combined with learning reported lower levels of anxiety and depression post-treatment.
Donovan et al. (2016)	Adolescents suffering from clinically relevant anxiety (n=44).	Interactive online programs mediated by therapists, and incorporating games, questions and graphics.	There were no differences in symptoms' reduction between adolescents that were engaged in the treatment and the control group.
Flink et al. (2016)	Individuals that presented recurrent problems with pain in combination with recurring low mood, worry or distress (n=6).	Intervention modules in combination with therapist contact through a platform, and two face-to-face sessions with the professional.	All participants reported improvements on the levels of perceived stress. Half of the adolescents improved on the measures of mood and/or worry.
Karbasi & Haratian (2018)	Adolescent females with anxiety disorders (n=30).	Seven stages of tasks and content about cognitions, emotions, behaviors, and relaxation techniques, mediated by e-mail contact with a therapist.	The intervention was able to significantly reduce anxiety symptoms
Lenhard et al. (2017)	Adolescents with a primary diagnosis of obsessive-compulsive disorder (n=67).	12-module program composed by texts, movies and animations related to exposition and relapse prevention. Participants had asynchronous contacts with a therapist.	The intervention group had lower OCD scores after the treatment, compared with the waitlist group. After being a part of the intervention, the control group also presented symptoms reduction.
March et al. (2018)	Adolescents (n=2952) with anxiety disorders.	Adolescents' version was formed by 10 online modules, without any contact with therapists.	Reductions on anxiety levels were observed as sessions were completed.
Murray et al. (2020)	Adolescents with chronic pain (n=269)	Online modules in an interactive format regarding cognitive and behavioral coping strategies' learning, education about chronic pain, and strategies to communicate with their parents.	Intervention participants showed significant pain expression reduction effects six months after the treatment, in comparison with the control group. After 12 months, levels of pain-related disability continued to improve, but between-group effects were attenuated.
Nordh et al. (2021)	Individuals with a primary diagnosis of social anxiety (n=103)	Interventions mediated by video call sessions contact with therapists.	Adolescents that participated in the intervention related less social anxiety and depression symptoms.
Palermo et al. (2018)	Adolescents with sickle cell disease diagnosis (n=25).	Modules regarding cognitive abilities learning and behavioral tasks mediated by therapists.	Participants perceived the intervention as beneficial and would recommend it to others.
Radomski et al. (2020)	Individuals that report clinical levels of anxiety (n=536).	Program for anxiety symptoms that presents the possibility of contact with a therapist by telephone call.	75% of the adolescents who completed the intervention have described lower levels of anxiety symptoms.
Shahnavaz et al. (2018)	Children and adolescents with dental anxiety (n=18).	12-module online program composed by texts and tasks, while also involving contacts with therapists through messages.	Participants reported improvements on the symptoms and there was a lower rate of individuals with the diagnosis one year after treatment.
Stjerneklar, Hougaard, McLellan, & Thastum (2019)	Adolescents with a primary anxiety disorder diagnosis (n=70).	Online module intervention. Participants received a weekly phone call from their therapist.	Adolescents that participated in the treatment related improvements on anxiety symptoms.
Stjerneklar, Hougaard, & Thastum (2019)	Individuals with an anxiety disorder (n=65).	Online modules focused on anxiety, and sporadic phone calls from the therapist.	Higher levels of self-reported anxiety predicted larger improvements on anxiety levels after the intervention.
Topooco et al. (2019)	Adolescents with a primary depression diagnosis (n=162).	Online modules combined with individual therapeutic sessions through messages.	The group that participated in the intervention reported lower levels of depression, in comparison to the control group.

All selected publications were written in English, and no study about the subject was conducted in the Latin-American context. Interventions were administered in Europe (Berg, Rozental, et al., 2020; Flink et al., 2016; Lenhard et al., 2017; Nordh et al., 2021; Shahnavaaz et al., 2017; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Stjerneklar, Hougaard, & Thastum, 2019; Topooco et al., 2019), United States (Murray et al., 2020; Palermo et al., 2018), Canada (Radomski et al., 2020), Australia (Donovan et al., 2017; March et al., 2018), and Iran (Karbasi & Haratian, 2018).

The samples of adolescents chosen to participate in the selected studies had, in most cases, some type of anxiety diagnosis. However, some researches involved teenagers who had a depression (Topooco et al., 2019) or phobia diagnosis (Shahnavaaz et al., 2018), whereas others selected adolescents that have experienced different kinds of chronic pain (Flink et al., 2016; Murray et al., 2020; Palermo et al., 2018).

While the publications have used different types of intervention programs, all of them had modules regarding the practice of CBT principals. The amount of weekly sessions that the adolescents were exposed to varied between five (Flink et al., 2016) and twelve (Lenhard et al., 2017; Shahnavaaz et al., 2018). Amidst CBT's principals emphasized by the selected studies, the ones that stand out are: psychoeducation (Berg, Rozental, et al., 2020; Lenhard et al., 2017), gradual exposure (Nordh et al., 2021; Shahnavaaz et al., 2018), behavioral activation (Flink et al., 2016; Topooco et al., 2019), relaxation techniques (Donovan et al., 2017; Karbasi & Haratian, 2018; March et al., 2018; Palermo et al., 2018), acquiring and implementing coping skills (Flink et al., 2016; Murray et al., 2020), cognitive restructuring (Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Stjerneklar, Hougaard, & Thastum, 2019), relapse prevention (Lenhard et al., 2017; Murray et al., 2020), and assignment of homework tasks (Radomski et al., 2020; Shahnavaaz et al., 2018).

Therapists were available for asynchronous contact with participants throughout the intervention through e-mail (Donovan et al., 2017; Flink et al., 2016; Karbasi & Haratian, 2018; Lenhard et al., 2017) and messages (Berg, Rozental, et al., 2020; Donovan et al., 2017; Flink et al., 2016; Palermo et al., 2018; Shahnavaaz et al., 2017; Topooco et al., 2019). Synchronous communication was primarily achieved by telephone calls (Lenhard et al., 2017; Nordh et al., 2021; Radomski et al., 2020; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Stjerneklar, Hougaard, & Thastum, 2019), as only one intervention suggested the alternative of video conferences between participants and researches, and, therefore, aimed to promote greater closeness between them (Nordh et al., 2021). Although one study did not mention any contacts between therapists and participants throughout the intervention (Murray et al., 2020), the goal of the study conducted by March et al. (2018) was to analyze the effects of the therapeutic program without having any communication with the psychologists responsible for the project.

Most intervention programs randomly allocated approximately half of its participants in a control condition. In some studies, this condition consisted on a waitlist and its individuals later on participated in the intervention (Donovan et al., 2017; Karbasu & Haratian, 2018; Lenhard et al., 2017; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Topooco et al., 2019), whereas other researches created education modules about the adolescents' diagnosis condition, without having CBT's therapeutic techniques and principals attached to them (Berg, Rozental, et al., 2020; Murray et al., 2020; Nordh et al., 2021; Palermo et al., 2018; Radomski et al., 2020). Nonetheless, four interventions did not have any control groups (Flink et al., 2016; March et al., 2018; Shahnavaaz et al., 2018; Stjerneklar, Hougaard, & Thastum, 2019).

The therapeutic programs' adherence rate was classified as high (Lenhard et al., 2017; Palermo et al., 2018; Shahnavaaz et al., 2017; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Topooco et al., 2019) or moderated (Berg, Rozental, et al., 2020; March et al., 2018) in seven studies, even though the intervention conducted by Radomski et al. (2020) was completed by only a small portion of adolescents. The remaining selected studies did not report participants' adherence rates. Adolescents' satisfaction rate was also classified as moderated in two of the selected interventions (Lenhard et al., 2017; Stjerneklar, Hougaard, McLellan, & Thastum, 2019), although some of the participants have reported that they would like to have had more contact with therapists, in addition to the online program (50% of the sample; Lenhard et al., 2017).

The selected studies reported that the participants that went through the interventions showed significant symptoms' reduction associated to their diagnoses or conditions (Berg, Rozental, et al., 2020; Karbasu & Haratian, 2018; Lenhard et al., 2017; March et al., 2018; Murray et al., 2020; Nordh et al., 2020; Radomski et al., 2018; Shahnavaaz et al., 2018; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Stjerneklar, Hougaard, & Thastum, 2019; Topooco et al., 2019). One study did not find any significant reduction differences regarding anxiety and sleep related problems between the treatment group and the control group (Donovan et al., 2017). In the research conducted by Palermo et al. (2018), although participants have reported that the intervention was beneficial to them, researches did not present any quantitative data that supported these statements.

Whereas the intervention conducted by Flink et al. (2016) evidenced significant improvements on all adolescents' perceived levels of stress, only half of them showed improvements related to their humor or worry. In the study carried on by Berg, Rozental, et al. (2020), the group of adolescents who participated in the intervention, which combined both education and therapeutic support, showed the greatest anxiety and depression reduction levels after the treatment, in comparison to the other groups. Furthermore, a research reported that pain expression reduction had a significant effect on adolescents from the intervention group, in comparison to the control group, six months after the treatment; however, the same was not verified 12 months after the intervention (Murray et al., 2020).

Moreover, seven studies presented a significant percentage (which varied between 15% and 57,2%; Lenhard et al., 2017 and March et al., 2018, respectively) of participants that enhanced outcomes of recovery or remission after the intervention (Berg, Rozental, et al., 2020; Lenhard et al., 2017; March et al., 2018; Murray et al., 2020; Radomski et al., 2020; Stjerneklar, Hougaard, McLellan, & Thastum, 2019; Topooco et al., 2018).

DISCUSSION

Although the analyzed studies have presented different therapeutic goals, the interventions conducted showed promising results that point out to the amplification of internet-based CBT usage. The use of technological advances to promote therapeutic processes may be the starting point of children and adolescents' health care revolution, although that process has just begun (Bruha et al., 2018).

Within internet-based CBT's field, there is an ongoing debate about the relevance of therapist contact on this kind of intervention (Farrer et al., 2011). In one study about adolescents' perspective on online interventions, feedback and contact with professionals were considered to be essential for treatment (Geirhos et al., 2021). Therapeutic guidance seems to be a relevant moderator factor about internet-based psychotherapies efficacy (Wozney et al., 2017). Therefore, most of the selected studies analyzed by the present review have included synchronous and/or asynchronous therapeutic support to adolescents. Nevertheless, March et al. (2018) have observed a significant symptom reduction in individuals who participated in the intervention without any contact with therapists. Additionally, the quality of the therapeutic bond has been suggested to be an important aspect regarding treatment's efficacy and adherence (Lancee et al., 2013), as both aspects tend to be maintained even when the interactions are exclusively established from online means (Berg, Malmquist, et al., 2020).

The therapeutic techniques used by the selected studies are similar to those employed by traditional face-to-face CBT. In general, internet-based CBT interventions are composed by modules that maintain CBT's most common active ingredients, such as behavioral activation, problem solving, self-monitoring, and cognitive restructuring (Richards et al., 2018). CBT's main characteristics have shown to be adequate for the adaptation of therapeutic processes for the online context (Woods et al., 2017).

Even though online treatments offer many advantages and have the potential to reach a great number of individuals (Webb et al., 2017), it is necessary to carefully examine the studies' results. Many interventions did not report participants' adherence rates to treatment from different age populations, including adolescence (Vigerland et al., 2016), as it was observed in the present research. The meta-analysis conducted by Richards e Richardson (2012) reported that only 43% of individuals

that are exposed to an internet-based CBT intervention complete them, which suggests a low adherence rate from this population. However, the aid of the therapeutic team support to adolescents (Flink et al., 2016), and participants' satisfaction (Lalouni et al., 2019) may help to reduce such dropout rates. An alternative to that is to modify session protocols' formats in order for them to become more interesting and specific to the population being treated, so the adherence rate is elevated (Alfonsson, Olsson, & Hursti, 2016).

All interventions, with the exception of one (Donovan et al., 2017), have observed symptoms reduction in adolescents, and seven studies have pointed out significant disorders' response and remission rates among the participants of the therapeutic programs. Such result is in line with interventions' results regarding adult populations, which have verified that this therapeutic model contributed to the reduction of anxiety (Mathiasen et al., 2018), depression (Oehler et al., 2021), fear (Rondung et al., 2018), and chronic pain levels (Blaney et al., 2021).

The meta-analysis conducted by Vigerland et al. (2016) indicated significant positive effects on adolescents that had participated in internet-based CBT programs. While four of the studies analyzed by the authors reported significant proportions of previously diagnosed patients in remission, five interventions indicated significant clinical changes. Although eight studies have not reported their treatments' response rates, these psychotherapeutic programs presented a moderate effect on adolescents' symptoms, when compared to the control groups. Therefore, the present review has selected studies that showed similar result patterns to those analyzed by Vigerland et al. (2016).

Although the results found by the selected studies indicate a reduction or remission of symptoms, not all the interventions have compared these outcomes to the results of a control group. A post-treatment clinical response is not a synonym of an outcome that has been an actual result related to the therapeutic process, since it is necessary to have a control group to appropriately compare and measure such results (Guidi et al., 2018). Thus, it is needed to be careful how interventions' results are interpreted, especially if they have not allocated any participants in a control group.

Even though psychotherapy's technological revolution has already started, no internet-based CBT intervention publication regarding adolescents' samples were detected, according to the established parameters, in the Latin-American context, and, especially, in Brazil. Since rendering psychological services through information and communication technologies was only rectified in 2018 (CFP's resolution N.º 011/2018; Conselho Federal de Psicologia [CRP], 2018), the online interventions' prospect in the country is very recent. Consequently, it is possible that more studies about this subject might be conducted in the following years, especially after physical distancing measures that were a part of the necessary attempts of controlling COVID-19 pandemic's advances took place (Silva et al., 2021).

CONCLUSIONS

This review's goal was to identify internet-based CBT's efficacy evidences among adolescents that have been conducted in the last five years. Most of the selected studies' analyses have alluded to the efficacy of interventions regarding the reduction of symptoms and the remission of disorders. The use of online CBT's techniques seems to be a useful and beneficial alternative for disorders treatments, especially with adolescents, even though some results do not indicate a very high adherence rate from this specific population.

The limitations of this review involve the usage of only three data basis for the search and the inclusion of articles that could have been written in four languages. However, the idea behind this investigation was to create a recent overview on online treatments' efficacy that were specifically designed for adolescents and that employed the cognitive-behavioral approach. It is expected that this review contributes to the development of new protocols and online interventions that are designed and adapted for adolescents. So far, the evidences have shown empirical support to this type of psychotherapy related to the population mentioned.

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