Depression and Personality

Vania Martínez
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Prevention and Early Treatment of Depression Through the Life Course

Depression and Personality

The Depression and Personality book series presents cutting edge knowledge regarding the causes, treatment, and prevention of depression from a perspective that takes into account the interaction between depression and personality and the influences of multiple dimensions that contribute to the development, maintenance, and exacerbation of depression in different populations. The series is published in collaboration with the Millennium Institute for Research in Depression and Personality (MIDAP), a scientific center of excellence in Chile made up of psychologists, psychiatrists and professionals from various areas of social sciences and health, who seek to generate knowledge based on a multidimensional understanding of depression.

MIDAP's characteristic multidimensional and multidisciplinary approach implies the development of an empirically-based model that takes into account the etiology, prevention, intervention, and rehabilitation of depression. This multidimensional and multidisciplinary model is evidenced in the titles of the series, which cover, individually or in combination, the following topics:

1. Basic bio-psycho-social structures and processes involved in depression and its interaction with the personality.
2. Health promotion and psychosocial intervention strategies that would prevent early conditions associated with the development of depression and personality dysfunction.
3. Psychotherapeutic interventions and mechanisms involved in symptomatic relief and change processes in diverse types of depressive patients.
4. Rehabilitation and reintegration interventions oriented to reduce the chronicity of depression and to maintain gains after treatment, as well as, topics regarding early-life maltreatment and co-morbid personality dysfunction as risk factors of chronic or recurrent courses of depression.

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ISSN 2662-3587 ISSN 2662-3595 (electronic)
Depression and Personality
ISBN 978-3-031-13028-1 ISBN 978-3-031-13029-8 (eBook)
https://doi.org/10.1007/978-3-031-13029-8

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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Chapter 1
Introduction

Thamara Tapia-Muñoz, Claudia Miranda-Castillo, and Vania Martínez

Depression is considered a preventable health disease and an important public health problem (The Lancet, 2022). Different public health services are offered in order to tackle depression globally with increasing effectiveness (Herrman et al., 2022; The Lancet, 2022). So far, countries have made advances in building public health capacity, including national plans and policies to provide care for all ages. Yet, especially after the COVID-19 emergency, it is known that depression is far from being a resolved problem (Santomauro et al., 2021). The Mental Health Gap Action Programme (mhGAP) was settled to address the gap between the need and provision of health services, especially among low- and middle-income countries (World Health Organization, 2015). The program included depression as one of the priorities because of its high prevalence and burden. Actions needed to reduce the mental health gap included improving mental health literacy among the community

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_1

and health professionals, strengthening primary care, providing universal care, providing nonspecialized and specialized health workers, setting up community-based approaches to address mental health issues, and establishing promotion, prevention actions, and also evidence-based treatments (World Health Organization, 2015). In consequence, decreasing the mental health gap includes preventing depression, diagnosing it on time, and providing proper treatment for all ages, genders, races, and contexts around the world, with the involvement of all sectors (Herrman et al., 2022; Votruba & Thornicroft, 2016).

Additionally, mental health was included as part of the United Nations' 17 Sustainable Development Goals. The third goal stated a 30% reduction of the "premature mortality from non-communicable diseases through prevention, treatment and promotion of mental health and well-being by 2030" (General Assembly, 2015). Depression, as one of the leading noncommunicable diseases, is related to Sustainable Development Goals by both directly affecting mental health and indirectly restricting people's access to education, work, nutrition, and housing, among other negative consequences (Herrman et al., 2022).

Depression is a broader term used to designate a group of depressive disorders characterized by a syndrome of depressive mood accompanied by emotional, behavioral, and cognitive manifestations (World Health Organization, 2019). The current diagnostic manuals, DSM-5 (American Psychiatric Association, 2013) and ICD-11 (World Health Organization, 2019) share common symptoms and signs to identify depressive disorders, that is, if at least two conditions are met, the presence of depressive mood (low mood) or the presence of anhedonia (lack of interest or lack of pleasure in regular activities), plus at least 2 weeks of these manifestations (World Health Organization, 2019). The symptoms have to affect functionality significantly and should not be secondary to a disease or a response to substance use (World Health Organization, 2019). Both manuals recognize single episodes with mild, moderate, and severe manifestations, as well as chronic disorders, recurrent episodes, and suicide risk. Also, the criteria apply to diagnosing depression with melancholia or psychotic symptoms (Herrman et al., 2022) and exclude depression associated with bipolar disorders (World Health Organization, 2019).

The average prevalence of major depressive disorder (MDD) is 4.5% (Bromet et al., 2018). MDD is associated with an increased risk of death due to suicide, disability, and harm to the new generations (Herrman et al., 2022; World Health Organization, 2021). It is also associated with difficulties in a full integration into society due to loss of functionality or stigma (Ferrari et al., 2022; The Lancet, 2016). The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 (Ferrari et al., 2022) showed that depressive disorders were among the 25 principal causes of burden for women and men across the lifespan (Vos et al., 2020). They accounted for 37.3 million (32.3–43.0) disability-adjusted life-years (DALYs). Depressive disorder's level of impact did not notoriously change in two decades, remaining the second leading cause of years lived with disability (YLDs) (Ferrari et al., 2022; Vos et al., 2020).

Despite the efforts to tackle depression, the COVID-19 pandemic directly or indirectly affected the mental health of the population, including an increase in the

incidence of depressive disorders. In 2020, there were additional 53.2 million cases of MDD attributable to COVID-19 (Santomauro et al., 2021). Thus, the estimated prevalence of MDD was 3152.9 cases per 100,000 population, equivalent to 246 million people. Moreover, 10.7 million DALYs for MDD were estimated globally, with a higher burden for women than men (Santomauro et al., 2021).

Depressive disorders affect people of different ages. Depression across the lifespan has similarities but also has its features. Among children and adolescents, the disease manuals recognize symptoms like lack of interest in school, grades problems, and risk for self-harm and suicide attempt as substitutions for depressive mood (Rao & Chen, 2009). Suicide is one of the most important causes of death in adolescents (Vos et al., 2020). Depressive disorders were also the first cause of years lived with disability (YLDs) for people 14 years and older (Ferrari et al., 2022). In the case of older adults, depression might manifest with somatic symptoms and pain, lack of interest in social involvement activities, cognitive decline, and a low energy level without feeling sad. In male older adults, anger is a common feature (Blazer, 2003). Among older adults with late-onset depression (first episode after 60 years old), the prevalence of depression is 28%, while the prevalence of MDD is 13%. This last one increases in people 80 years and older (Abdoli et al., 2022; Hu et al., 2022).

Depressive disorders are underdiagnosed and undertreated in young and older people (Blazer, 2003; Bromet et al., 2018; Stein & Fazel, 2015). Because of the characteristics of adolescence and older adulthood, people can consider depression signs and symptoms as natural, neglecting a proper diagnosis (Herrman et al., 2022). The barriers identified for the existing gap in mental health services for children and adolescents are associated with both individual factors, such as mental health literacy, not verbalizing their need for help, and low adherence to treatment, and social factors like stigma toward mental illness and lack of trust in professionals, especially related to confidentiality. Additionally, structural barriers might be the cost of mental health services and the difficulties of making an appointment with a mental health professional (Werlen et al., 2020). Regarding older adults, the barriers related to mental health services gaps are, for example, the lack of belief in the effectiveness of treatments, the idea that symptoms are normal, fear of medication, the cost of treatments, and transportation difficulties (Wuthrich & Frei, 2015).

Across countries, there are individual differences and social-economic factors that make some groups more at risk of developing depression. Black women, without a partner, with lower educational levels, lower incomes, and living in low-income countries are at higher risk of negative mental health outcomes, including depression (Allen et al., 2014). In addition, women who have just given birth (within the first 4 weeks) are at increased risk of depression even without a previous history of mental health issues. The postpartum depression prevalence was 17% among women (Shorey et al., 2018). Even though men also experience postpartum depression (PPD), they have a lower risk than women (Wang et al., 2021). The physical and mental health of the mother and her children is impacted by postpartum depression (Dadi et al., 2020).

In adulthood, particular circumstances might increase the risk of depression. This is the case of someone who cares for a person with a chronic disease or disability (del-Pino-Casado et al., 2019; Mårtensson et al., 2020; Scherer et al., 2019). Caregivers of people with dementia have been largely described as a risk group for depression and other mental health issues due to their exposure to a high level of emotional, physical, and economic demand (Collins & Kishita, 2020). Addressing caregivers' mental health is considered part of an integral approach to tackling dementia since people living with dementia's mental health and their prognosis are closely related to caregivers' mental health (Livingston et al., 2020).

A life-course perspective on the analysis of depression might enhance the understanding of the mechanisms associated with the onset of depression and identify/develop proper evidence-based treatments for different ages and in different circumstances (Allen et al., 2014; Colman & Ataullahjan, 2010). Collaborative care programs within public health seem to be the most effective strategy for all ages, particularly for older adults (Herrman et al., 2022). Nevertheless, in some groups, like caregivers with people living with dementia, those collaborative care programs should integrate specific adapted non-pharmacological treatments (Livingston et al., 2020). Cognitive behavioral therapies (Gautam et al., 2020) and mindfulness-based therapies have shown good results for people of all ages and across contexts (Hofmann & Gómez, 2017). Moreover, new technologies have been developed in the past decades. Technology-based interventions apply to children, adolescents, and adults. They reduce the cost and distance difficulties of other non-pharmacological interventions (Cukrowicz & Joiner Jr., 2007; Grist et al., 2019; Köhnen et al., 2021).

This book is part of the "Depression and Personality" book series. Through these pages, we present current evidence of new perspectives for the prevention and appropriate management of depression in people across the life cycle. A special focus has been given to facilitating factors for the development of health system capacity and the effectiveness of the different types of interventions. The first part of the book reviews the innovations in global prevention and non-pharmacological treatments for children, adolescents, and youths. Chapter 2, "Innovations in Closing the Global Prevention and Treatment Gap for Depression in Children, Adolescents, and Youths," presents evidence related to building clinical capacity and expanding mental health coverage, testing the interventions' attainability, agreeableness, utility, and adequacy in different settings, including low- and middle-income countries. Chapter 3, "Preventing Depression in Children and Adolescents Through Mindfulness-Based Interventions in Schools," assesses current evidence on mindfulness-based interventions (MBIs) implemented in the school context. Chapter 4, "Digital Technology Interventions for Preventing and Treating Youth Depression," discusses the use of digital technologies as an alternative or complement treatment to conventional mental health services. Chapter 5, "Contemplation of Nature to Promote Mental Health and Prevent Depression in Youth," describes the effectiveness of nature-based interventions and their applicability for young people in different contexts. Finally, Chap. 6, "Internet-Based Interventions for Prevention and Early Treatment of Depression in Higher Education Students,"

reviews the benefit of Internet-based interventions for young adults focusing on people living in negative environments within schools.

The second part of this book reviews interventions for adults across the lifespan. Chapter 7, "Interventions for Adult Depression in Primary Health-Care Clinics," discusses the feasibility, effectiveness, and cost-effectiveness of psychosocial, psychological, and pharmacological interventions for depression in primary health-care settings. Chapter 8, "The Potential of Internet-Based Psychological Interventions for Perinatal Depression Prevention and Treatment," covers postpartum depression and how Internet-based treatments could help to overcome barriers for health-care providers and patients, holding promising results for cost-effective interventions. Chapter 9, "Preventive and Early Treatment of Depression in Older Adults," reviews the interventions that have shown positive results in preventing or treating timely and effectively this disorder in older adults. Finally, Chap. 10, "Depressive Disorders Among Family Caregivers of People Living with Dementia," analyzes the context of caregiving for a person living with dementia and evidence-based psychosocial approaches to address depressive symptoms in that group.

Acknowledgments This manuscript was supported by ANID – Millennium Science Initiative Program – ICS13_005, ICS2019_024, and NCS2021_081. In addition, TT-M received funding from ANID – Doctorado Internacional/2020-72210393, CM-C from ANID – FONDECYT – 1191726, and VM from ANID – FONDECYT – 1221230.

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Part I
Children, Adolescents, and Youths

Chapter 2
Innovations in Closing the Global Prevention and Treatment Gap for Depression in Children, Adolescents, and Youths

Matías Irarrázaval

2.1 Improving Mental Health and Well-Being by Transforming Lives and Communities

Depression is a highly prevalent common mental disorder and a major public health problem worldwide. Worldwide, depression affects 13.6 million adolescents aged 10–14 and 3.5 million of those aged 15–19 (WHO, 2017). During the last three decades, the incidence of depression increased 49.86%, from 172 million in 1990 to 258 million in 2017 (Liu et al., 2020). Most recent estimates from the Global Burden of Disease study show that unipolar depressive conditions represent 4.4% of the global disease burden (65 million impairment changed life years [DALYs] lost in total), ranking third among the leading causes of disability in the world, the same range as the total burden attributable to diabetes, diarrheal diseases, or the combined impact of asthma and chronic obstructive pulmonary disease (GBD, 2019).

The COVID-19 pandemic has exacerbated the burden of depression, and the number of people predicted to experience depression rose by much more than 25% in 2020 (Santomauro et al., 2021).

Too often, depression goes undetected or untreated – even when it is at its most distressing and disabling – because services are not available, cannot be accessed, or are unaffordable, or because widespread stigma stops people from seeking help. Different belief systems, language, and idiomatic expressions around mental health across cultures also influence whether people seek help from traditional health providers, formal health services, or both (Mekonen et al., 2021). Access to effective

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_2

mental health treatment is disturbingly limited around the world, especially in low- and middle-income countries (LMICs) (Degenhardt et al., 2017). In some countries, the treatment gap for depression is a staggering 90% (Liu et al., 2020). The World Mental Health surveys showed that in high-income countries, only 22% of all individuals with 12-month MDD received minimally adequate treatment (Thornicroft et al., 2017). Furthermore, there is a significant shortage of human resources for mental health, particularly in LMICs (Sarikhani et al., 2021). As a result, universal mental health coverage for depression remains far out of reach.

Innovative strategies involving healthcare systems, mental health professionals, and consumers can be important to close the depression treatment gap and make the best use of available resources. Evidence-based innovative strategies that have the potential to substantially reduce the disease treatment gap of depression are discussed further below.

2.2 Scaling Up Care for Depression

The high prevalence and extensive treatment gap for depression imply that countries need to diversify and scale up options for care. Innovative evidence-based psychological care is available to expand existing health and mental health services that can be implemented in countries that are willing to reduce the depression treatment gap.

2.2.1 Nonspecialist Counseling

Counseling programs that recruit, train, and deploy nonspecialist counselors to deliver group or individual psychological interventions in the country's territories have proven to be highly effective in the treatment of depression.

Nonspecialist counseling can also add substantial value to specialized psychological care. As an example, in a specialized psychological healthcare center in Islamabad, Pakistan, a quick mental intervention, Problem Management Plus (PM+), was incorporated into regular, mostly medicinal treatment. The intervention was delivered by nonspecialist counselors that had finished a bachelor's degree in psychology. The program was found to substantially improve results for people with depression (Hamdani et al., 2021).

Additionally, counseling may be directed and also supported to be implemented in primary healthcare and community setups, scaling up the intervention in the different levels of care. In Uganda and Zambia, the social enterprise StrongMinds have trained lay employees as well as volunteers in a culturally adapted and locally validated interpersonal treatment to treat depression in adolescents. Groups of usually 12 adolescents meet in their neighborhoods and are trained in eight or more

sessions, developing skills that can be used for depression treatment and prevention of future relapses (Bolton et al., 2003). Through this form of therapy, the lay therapists assist team individuals to identify their depression causes (extended bereavement, disagreements, isolation or social seclusion, and adjustments in one's life) and also layout strategies to overcome them. As clinical depression can reoccur, the skills acquired with treatment have both a prompt and long-term preventive effect on the persons treated. Over the past eight years, the program has treated more than 100,000 persons with depression, with a recovery rate of 80%, a 30% increase in school attendance, a 28% increase in social connectedness, and a 13% increase in families sharing meal time together (StrongMinds, 2021).

Nonspecialist counseling programs can be implemented at the primary care level of services and also in community-based settings. Research studies show that these programs can increase the ability of frontline psychological health services as well as considerably improve treatment. As an example, one program in the North-West Province of South Africa identified individuals with depression among patients with the persistent condition in a collective care program and refer those with moderate depressive symptoms to lay counselors for structured counseling based on cognitive behavioral therapy. The research study discovered substantial reductions in symptoms at year follow-up. Users reported feeling more equipped and far better outfitted to deal with social issues (Petersen et al., 2016).

Indeed, nonspecialist counseling programs can be and increasingly are implemented within primary care facilities and other community-based settings, including through stand-alone services run by NGOs. Studies show that these programs can boost the capacity of frontline mental health services and greatly improve care. For example, one program in Peru identified people with depression among patients with HIV in a collaborative care program and refered those with mild to moderate depressive symptoms to lay counselors for Psychological First Aid (PFA) intervention (Galea et al., 2021). The study found that the use of a simple care pathway operationalizing depression screening and nonspecialist delivered psychological support allows for the reduction of symptoms and the integrations of depression and HIV care for adolescents (Andrews et al., 2018).

In Zimbabwe, the Friendship Bench (FB) project has been incorporating psychological wellness into other wellness programs for more than 20 years. The project uses analytical treatments delivered by neighborhood volunteers, known as "grannies," to resolve "kufungisisa" (depression). The model has also been adapted to be more relevant for adolescents and the Youth Friendship Bench intervention (YouFB) task-shifts youth lay health workers to offer a culturally contextualized, manual-based, six-session problem-solving therapy to adolescents, 16–19 years of age. Unlike the "grannies" in FB, YouFB has younger lay health workers, mostly psychology and sociology students who perform a 1-year internship at the YouFB before their last year of college. YouFB is delivered not only in clinics but also in public parks and other community settings, with a focus on topics such as drug use, sex, and relationships in vulnerable populations (Broström et al., 2021).

2.2.2 Self-Help

Self-help can be guided (when a worker helps the person in the use of the materials) or unguided (when the person receives no support or even encouragement in using the materials). Both specialists and nonspecialists can have a role in supporting guided self-help interventions for depression. For example, they can facilitate discussions, demonstrate techniques, and support people to work through self-help materials; and they can do this face-to-face or remotely. Self-help interventions can be delivered rapidly to large numbers of people, making them particularly useful for scale-up. A recent meta-analysis indicates that low-intensity psychological interventions show promising results for children and adolescents in efficacy trials (Bennett et al., 2019).

Improving Access to Psychological Therapies (IAPT) is a national program for evidence-based mental treatments for depression in the United Kingdom. IAPT has a stepped care approach in which gradually intensive therapies are provided according to the needs. People are initially provided low-intensity, guided self-help based on principles of cognitive behavioral therapy (CBT). The self-help is psychoeducational and is delivered over the phone, through digital CBT, in big teams, or separately.

Released in 2008 as a solution for adults, the program has expanded to children and young people (CYP). The CYP IAPT program's goal has shifted from workforce development to workforce growth since 2017, with the program training 1700 additional psychologists. Based on the initial CYP IAPT curriculum, the CYP IAPT program currently has three training streams: (a) a low-intensity workforce, (b) a school-based workforce, and (c) a high-intensity workforce (Ludlow et al., 2020). People who do not improve after guided self-help are stepped up to receive high-intensity psychological therapies by qualified therapists. A meta-analysis of 60 studies on IAPT found that the program has generated large pre- to posttreatment effect sizes for depression (Wakefield et al., 2021).

The program has been a model for establishing comparable services in Australia, Canada, Japan, and also Norway. Step-by-Step is a new guided, technology-supported, intervention for depression developed by the World Health Organization (WHO). It provides psychoeducation through a narrated story and uses interactive exercises to support additional therapeutic techniques focusing on behavior activation combined with stress management (slow breathing), strengths identification, positive self-talk, increasing social support, and relapse prevention. Step-by-Step was created for usage in a variety of cultural contexts and resource availability, as well as to be relevant in adversity-affected communities. Step-by-Step has been culturally adapted to address depression among Chinese young adults (Sit et al., 2020).

In Lebanon, the Ministry of Public Health with partners tested an adapted version of Step-by-Step called "Khoutweh-Khoutweh" with Lebanese citizens and displaced Syrians. A guided self-help format was used in which supervised nonspecialist

counselors provided no more than 15 minutes of remote guidance (by phone or online) per week to people with symptoms of depression. It was found to be relevant, acceptable, and beneficial by those who completed it. Two randomized controlled trials with more than 1000 participants suggest that the intervention was effective in reducing symptoms of depression and improving functioning and well-being. After completing the research, the intervention is now offered by the government as a routine service (Harper Shehadeh et al., 2020).

Even unguided, self-help books and materials can be useful in scaling up psychological support for common mental health conditions. Research shows that bibliotherapy (the use of books as therapy) effectively reduces depressive symptoms, including in the long term (Yuan et al., 2018). "Computer therapy" that delivers CBT for depression and anxiety through the Internet has similarly been shown to be effective, acceptable, and practical, providing equal benefits to traditional face-to-face CBT (Andrews et al., 2018; Martínez et al., 2021).

2.3 Supporting Child and Adolescent Mental Health Services

Standard mental healthcare is usually provided via two discrete systems, child and adolescent mental health services (CAMHS) and adult mental health services. In most LMICs, child and adolescent mental health services are much less available than the adult ones (Zhou et al., 2020).

In response, there has been a growing movement to develop integrated community-based hubs providing uninterrupted services for adolescents and young adults. In addition to mental health services, these hubs often deliver other health and social services in a single community-based setting. They are sometimes referred to as 'one-stop services'. Headspace started in 2006 in Australia, to address the gap in traditional services in supporting young people aged 12–25 years experiencing mental health problems. While each center is deliberately located near public transport for easy access, local youth help design each center and the services it provides. Mental health professionals at the centers provide evidence-based psychological care, and young people can also access physical and sexual health services, work and study support.

A key feature of Headspace is the 'no wrong door' policy. This means that young people can refer themselves or be referred from any service. All centers routinely report data to a national database that is used to monitor and evaluate service activity and outcomes, and inform continuous improvement (Jensen et al., 2016; Rickwood et al., 2019). There is now more than 100 Headspace in Australia and 28 in Denmark.

2.4 Mental Health Services Beyond the Health Sector

Healthcare alone is often not enough to meet all the needs of people living with mental health conditions, especially those living in poverty or without housing, education, or the means to generate an income. This means that other sectors have a key role in complementing any mental health services provided by the health sector.

Depression treatment alone is frequently insufficient to address all the requirements of children and adolescents living with mental health conditions, particularly those who are poor or lack housing, education, or the means to earn a living. As a result, other sectors play a critical role in enhancing any mental health treatments given by the health sector (WHO, 2019). Taking a multisectoral approach to depression prevention, treatment and recovery include services for persons with mental health conditions into the policies and activities of all relevant sectors, such as livelihood support, housing, education, vocational training, employment, social welfare, and legal assistance. It is necessary to take a whole-of-government strategy.

2.4.1 Mental Healthcare and Depression Prevention in School Settings

Mental health activities in non-health settings are largely focused on mental health promotion and prevention activities.

Early Detection and Intervention in Schools Schools operate where most school-age children are, have access to families, are free at the point of use, and overcome traditional access barriers such as inconvenient location, costly transportation, and stigma. Therefore, schools provide a strong platform for early detection and treatment of depression in children and adolescents.

Social and emotional learning programs in schools have been related to mental health benefits at all socioeconomic levels (Fazel, Hoagwood et al., 2014; Fazel, Patel et al., 2014). They may be offered to students of all ages, but are especially beneficial in supporting teenage mental health, as they have been shown to increase emotional well-being, social functioning, and academic success. They have also been linked to a lower risk of depression, as well as the prevention of suicide, substance use, antisocial conduct, and risky sexual practices (Greenberg et al., 2017).

The potential role of schools in securing student mental health and well-being is well recognized in WHO's Global School Wellness Initiative. The Initiative proposes that mental health should be included in comprehensive school healthcare, according to the latest WHO recommendations for school health services (WHO & UNESCO, 2021). According to the standards, school health services should be able to conduct screening and clinical assessments (using the HEADSSS instrument) for referral and assistance for a variety of mental health disorders, including depression (Smith & McGuinness, 2017). The guidelines also propose that school health

services include crisis and substance use counseling, as well as support policies on bullying and health promotion.

School-based counseling can be used as a preventative intervention for children who are showing early indications of depression, as an evaluation tool, as early intervention, or as a support to specialized mental health services. All counseling seeks to give young people a safe place to talk about their problems in a supportive setting and to help them find their solutions. Counseling may include working with a family or a group. Counselors in schools can help connect students and their families with social and specialized services (WHO, 2021). School professionals, social service organizations, and others can be trained on specific mental health conditions intervention techniques (including depression, suicide, and pathological gaming) and on how to support youths with caregivers experiencing mental health issues. Since 2007, the Response, Early Intervention, and Assessment in Community Mental Health (REACH) project in Singapore has established regional multidisciplinary and intersectoral networks of care to give frontline help to students with mental health problems. School counselors are taught to recognize emotional, social, and behavioral problems in children and refer them to a REACH clinicians' mobile case management team for assessment and intervention. REACH teams are made up of a mix of doctors, psychologists, medical social workers, occupational therapists, and psychiatric nurses who are at a regional hospital to provide continuity of care if further expert services are needed. Counselors have referred over 4000 adolescents to REACH teams between 2007 and 2015 (Lim et al., 2017).

Social and Emotional Learning Programs Helping Adolescents Thrive (HAT) is a joint WHO-UNICEF initiative to strengthen programming and policy responses for adolescents, to promote positive mental health, prevent mental health conditions, and prevent self-harm and other risk behaviors. The HAT initiative aims to protect and promote adolescent mental health by routinely implementing and monitoring evidence-informed and human rights-based strategies for improving mental health and preventing and reducing mental health and substance use conditions in adolescents (Berger et al., 2016). The HAT initiative advocates a broad approach to school-based social and emotional learning that uses a mix of interventions to build mental health awareness; strengthen emotional, cognitive, and social skills; and engage in physical activity (WHO & UNICEF, 2021).

Table 2.1 shows psychosocial interventions for social and emotional learning strategies to promote and protect adolescent mental health and reduce self-harm and other risk behaviors.

Universal school-based social and emotional learning programs can be embedded into the usual school curriculum and delivered by teachers. For example, a universal randomized controlled effectiveness trial to increase depression literacy shows that ADAP, a short school-based intervention (3 hours throughout 2- or 3-course periods), significantly increased depression literacy in both boys and girls (Swartz et al., 2017).

According to research, a whole-school approach to social learning programs might be beneficial. A cluster randomized trial of a whole-school health promotion

Table 2.1 Psychosocial interventions for social and emotional learning

Learning goal		Intervention
Emotional	Emotion regulation	Techniques to improve one's ability to manage and respond to emotions effectively
	Stress management	Techniques to control levels of stress, especially chronic stress that interferes with everyday functioning
	Mindfulness	Activities to enhance abilities to pay attention purposefully, in the present, and without judgment
Cognitive	Problem-solving	Techniques to identify and act on a solution to a challenge or difficult problem
	Drug and alcohol knowledge	Education about the use of drugs and alcohol and their effects
Social	Interpersonal skills	Improving skills to develop or improve close, strong, positive relationships with others
	Assertiveness	Improving skills to communicate one's viewpoint, needs, or wishes clearly and respectfully
Physical	Physical activity	Opportunities to engage in sports or physical activity, either individually or in teams

Source: Helping Adolescents Thrive toolkit: strategies to promote and protect adolescent mental health and reduce self-harm and other risk behaviors. Geneva: World Health Organization and United Children's Fund; 2021. License: CC BY-NC-SA 3.0 IGO (https://apps.who.int/iris/handle/10665/341327, accessed 10 March 2022)

intervention in Bihar, India, found that it was more effective than classroom-based treatments at improving school environment at a 1-year follow-up, with substantial positive benefits on depressive symptoms, bullying, and violence (although only when delivered by lay counselors, not teachers) (Shinde et al., 2018). These effects were shown to last over time, with similar effect sizes during the 2-year follow-up. (Shinde et al., 2020). Overall, there is evidence to support psychological preventive interventions, delivered across the school in preventing depression at the universal level. This is combined with existing review evidence to support physical activity interventions for the prevention of depression (Hoare et al., 2021).

Such programs are not only effective but can bring good economic returns (WHO, 2021) (Table 2.2). One investment case for the Philippines calculated that the return on investment (including productivity gains and social value of health) of universal school-based social and emotional learning programs was 14.8 to 1 over 20 years (WHO, 2021).

Anti-bullying Interventions Within any universal school-based promotion and prevention program, anti-bullying interventions are especially important to improve school safety and protect the mental health of both victims and perpetrators, in the short term and throughout the life span.

Bullying can take many forms: physical, verbal, social, and, since the rise of the Internet and social media, cyberbullying. Nearly one in three adolescents is a victim of bullying (Biswas et al., 2020). People who are bullied as a child are more likely to experience emotional distress and mental health conditions and to have problems

Table 2.2 Costs, health impact, and cost-effectiveness of mental health interventions

	Low- and lower middle-income countries (n = 10)			Upper middle- and high-income countries (n = 10)		
	Cost of implementation per year (I$ million per one million population)	Health impact per year (healthy life years gained per one million population)	Average cost-effectiveness ratio (I$/healthy life year gained)	Cost of implementation per year (I$ million per one million population)	Health impact per year (healthy life years gained per one million population)	Average cost-effectiveness ratio (I$/healthy life year gained)
Universal, school-based socio-emotional learning programs to improve mental health and prevent suicide in adolescents	<0.10	50–100	1000–5000	0.10–0.50	50–100	1000–5000
Indicated, school-based socio-emotional learning programs to improve mental health and prevent suicide in adolescents	<0.10	<10	10,000–50,000	0.10–0.50	<10	10,000–50,000

Adapted from WHO menu of cost-effective interventions for mental health. Geneva: World Health Organization, 2021. License: CC BY-NC-SA 3.0 IGO

adjusting to school (Smokowski & Kopasz, 2005). When relevant confounders were taken into account, there is a correlation between being bullied at the age of 15 or 18 and reporting depression symptoms at the age of 28 (Winding et al., 2020). Bullying can also result in isolation, low self-esteem, and self-harm.

Childhood bullies themselves are more likely to have academic problems in the short term and are more likely to engage in harmful substance use, antisocial behavior, and interpersonal violence later in life (Smokowski & Kopasz, 2005). Anyone involved in bullying – those who bully and/or are bullied– is more likely to have depression and anxiety (Stephens et al., 2018).

School-based anti-bullying programs focus on addressing factors in the school that fosters bullying behavior. They can decrease subsequent aggression and depression in youths, in addition to lowering bullying rates (Williford et al., 2012). Anti-bullying programs may be carried out in a variety of ways, ranging from parental and peer support interventions to staff and student awareness-raising and social and emotional skill development. Overall, school-based anti-bullying initiatives have been proven to be effective in reducing intimidation by around 20% (Good Thinking, n.d.). According to the findings, one of the most effective interventions is a multi-level, whole-school approach that includes enforcing an anti-bullying policy as well as class rules (including use of electronic devices), providing information to parents and students, including peers, and facilitating cooperative teamwork (Gaffney et al., 2019).

2.4.2 Mental Healthcare in the Child Protection and Juvenile Justice System

Child Protection Childhood adversity is a key risk factor for depression, as well as a variety of other health and social problems. To prevent and respond to all types of violence against children, including exploitation, abuse, and neglect, an efficient child protection system is essential.

Effective child protection requires a comprehensive, multistakeholder approach that can tackle the root causes of violence and abuse. The WHO and its partners advocate a seven-pronged strategy (INSPIRE) to simultaneously (WHO, 2016):

- Enact and implement laws prohibiting the use of violence against children, criminalizing sexual abuse and exploitation, limiting juvenile access to guns, and reducing dangerous alcohol consumption
- Strengthen nonviolent, respectful, caring, positive, and gender-equitable connections for all children and challenge restrictive and harmful norms through bystander interventions and community mobilization activities
- Combat the spread of violence in the community and create safe spaces where children and teens may meet and spend time

- Strengthen parent and caregiver support to prevent harsh parenting and foster strong parent-child connections
- Improve family economic security and stability through strengthening incomes, notably through social protection, group saving and loans, and microfinance
- Provide reaction and support services, such as health and social assistance, as well as psychiatric counseling and psychological therapy programs for both victims and offenders
- Increase school enrollment, create a safe school environment, and enhance children's awareness of sexual abuse and how to protect against it, life and social skills training, and teenage intimate partner violence prevention programs

Many of the youth people in the court system who have depression or other mental health conditions require treatment. According to a meta-analysis, as many as 70% of youths had a diagnosable mental health condition at any justice interaction point. This is in line with other research that shows that children with mental/behavioral health issues are overrepresented in the juvenile justice system (Abram et al., 2015). However, the frequency of mental problems varies depending on where teenagers are in the legal system, with the prevalence of mental disorders increasing as juveniles proceed through the system (Wasserman et al., 2010). Despite the significant prevalence of mental disorders –including depression– among justice-involved youths, many do not have adequate treatment (Abram et al., 2013).

There are several evidence-based programs in the juvenile justice system that specifically target youths with mental health needs –including depression– and focus on reducing delinquency and other related behavioral problems by properly addressing risk factors and mental health needs (Matthews et al., 2013).

Liaison and diversion programs, often known as 'street triage', have been created in certain high-income countries to identify persons with suspected mental health problems when they first come into contact with the juvenile justice system. These services are then used to help persons navigate the juvenile justice system in the early stages, send them to appropriate health or social services, or redirect them away from the juvenile justice system to more appropriate settings.

Crisis Intervention Team (CIT) is a model initially developed in 1988 in Memphis, Tennessee, after a police officer fatally shot a man with a history of mental illness and substance abuse. The model is designed to increase the safety of encounters with the police. Police call center dispatchers are trained to identify mental disturbance calls and assign them to CIT-trained officers; these have access to a designated psychiatric emergency drop-off site that operates a no-refusal policy, reducing officer time with an individual. CIT requires police officer training and changes in police procedures as well as collaboration with mental health providers. CIT is the co-responder model of police mental health 'street', triage with the most robust evidence, but is not widely used in the countries (Puntis et al., 2018).

Integration of mental health into general health services provided to all juvenile offenders, such as the mhGAP with supportive monitoring by mental health specialists, is another recommended strategy for enhancing mental health treatment in the juvenile justice system. Mental health training for staff and juvenile offenders at all

levels of the juvenile justice system can help raise awareness, challenge stigmatizing attitudes, and support mental health promotion (Gureje & Abdulmalik, 2019).

In practice, child protection and juvenile justice services are spread across many sectors and may be provided by local governments, nonprofit organizations, and community organizations. Key players in child protection include members of community protection networks, police officers, healthcare professionals, and social workers. These stakeholders have a responsibility to protect and promote the mental health and well-being of the children and adolescents in their care, in addition to protecting them from violence.

2.5 Technological Solutions to Increase Depression Treatment Coverage

The way we prevent and treat depression in children and adolescents is changing because of digital technologies. The recent increase in the accessibility and acceptance of digital interventions may promote a fundamental shift in how depression and other common mental disorders are addressed. Technology has the benefit of being easy –yet not free– accessible to young people and nonspecialist health workers. Digital technology breaks barriers and access to stigma-free mental healthcare, and is also made possible by connecting to fitness, health, and wellness applications. Traditional healthcare might be disrupted, and user interactions with the system could shift because of new types of interventions (Meskó et al., 2017). Self-care and assistance for people to look after their mental health are areas where digital technology excels. However, the impact of its usage, particularly on young people, is a significant concern.

Some research has been done on digital programs that support established healthcare systems, such as providing talking therapy via digital platforms (Fairburn & Patel, 2017). For example, MoodGYM is a free online depression intervention that has been utilized by over three-quarters of a million people since 2001 (Christensen et al., 2002). If there is no supporting assistance, one of the major drawbacks of direct-to-user treatments is the low completion rates. The E-COMPARED (European Comparative Effectiveness Research on Internet-Based Depression Treatment) project is investigating the efficacy and cost-effectiveness of blended Internet-based treatments, which are a combination of in-person and Internet-based therapies. According to the findings, patients have a high level of acceptance of blended therapies, indicating that a progressive integration of technology into normal care may be appropriate for their attitudes and requirements. It also takes into consideration the fact that cost-effectiveness is a major incentive for the implementation of digital solutions (Topooco et al., 2017).

Table 2.3 shows examples of digital solutions for depression prevention in children and adolescents.

Table 2.3 Examples of digital solutions for depression prevention in children and adolescents

Helplines for: • People in crisis, looking for information, or who just want someone to talk to. For example, Crisis Text Line for young people in Chile (Fundación Todo Mejora, 2017)
Information about: • Services, anxiety, depression, and other topics related to general well-being. For example, ReachOut in Australia (ReachOut, 2022)
Connecting with: • Services. For example, the ReachOut NextStep online self-assessment tool asks young people a series of questions to help them identify relevant services in their area (ReachOut NextStep, 2022)
Training and supervision for: • Healthcare settings. In Chile, an online e-platform enhanced collaborative care by providing primary care clinicians with virtual access to specialists who backed adolescent depression treatment. At the 12-week follow-up, satisfaction with psychological care was linked to a substantial reduction in depressed symptomatology in both groups. However, at follow-up, the intervention did appear to have equivalent effectiveness to reduce depressive symptoms compared with enhanced usual care (Martínez et al., 2018) • Schools. In Brazil, a web-based educational program was created to educate primary school teachers on the detection and classroom management of children with mental health problems. Through interactive tutorials, instructional films, and an online discussion forum with mental health professionals, teachers gained more understanding of depression, as well as less stigmatized perspectives on mental disorders, than those who received a text- and video-based program or no training (Pereira et al., 2015)
Prevention and intervention using: • E-delivery of talking therapies. For example, This Way Up in Australia (ReachOut, 2022) • Self-assessment tools and self-care platforms to improve well-being. For example, MoodGYM in Australia and Good Thinking in England (Good Thinking, n.d.) • Conversational agents or chatbots. For example, Woebot in the United States (Good Thinking, n.d.). supporting delivery by: • Screening. For example, the mhGAP depression-screening tool used by nonspecialist health workers in primary care in rural Kenya (Musyimi et al., 2018) • Treatment support. For example, monitoring strategies to help ensure medication or therapy compliance (Mohr et al., 2013) • Telepsychiatry. For example, in Chile, a telepsychiatry consultation program for rural PHC clinics was found to be feasible and useful to support clinicians in the management of institutionalized children and adolescents with complex psychosocial care needs living in a poorly resourced setting (Mundt et al., 2021)

2.6 Conclusions

In many countries of the world, there is a significant and widespread mental health-care gap for depression, which is worsened in limited resource settings. However, innovative strategies to close this gap have been studied and proven to be effective. At least four areas have been discussed that countries can develop to close the depression treatment gap: (1) scaling up care for depression, (2) supporting child and adolescent mental health services, (3) mental health services beyond the health sector, and (4) technological solutions to increase depression treatment coverage. The examples in this chapter demonstrate the effectiveness of these strategies. More

research is needed on its feasibility, value, acceptability, and efficacy, particularly in LMICs and other resource-constrained situations.

Finally, here is an action plan for policymakers and other stakeholders based on the innovations described above:

- Take the lead and commit to improving depression prevention and treatment.
- Increase investments in low-cost interventions for depression that might significantly enhance depression therapy.
- Keep track and assess depression services outcomes and indicators, ensuring that they are focused on the needs of service users, their families, and caregivers.
- Provide comprehensive, integrated, and responsive mental health and social care services for depression in community-based settings.
- Integrate and coordinate holistic prevention, promotion, rehabilitation, care, and support that aims at meeting both mental and physical healthcare needs and facilitates the recovery of children and adolescents with depression within and across general health and social services.
- Build the knowledge and skills of general and specialized health workers to deliver evidence-based, culturally appropriate, and human rights-oriented mental health and social care services, for children and adolescents.
- Include mental health into undergraduate and graduate curricula.
- Through training and mentoring health workers in the field, particularly in non-specialized settings, identify and offer treatment and support to people with mental disorders as well as to refer people, as appropriate, to other levels of care.

Conflict of Interest The author has no relevant financial or nonfinancial interests to disclose.

Acknowledgments This manuscript was supported by ANID – Millennium Science Initiative Program – ICS13_005.

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Chapter 3
Preventing Depression in Children and Adolescents Through Mindfulness-Based Interventions in Schools

Carlos García-Rubio and Catherine I. Andreu

3.1 Prevention of Children's and Adolescents' Depression in Schools

The prevalence of child and adolescent mental health problems continues to grow worldwide. Between 12% and 16% of children and adolescents experience a mental health problem of some type (Polanczyk et al., 2015), while the number of young people who consider suicide has increased in the last decade (Kann et al., 2018). The World Health Organization (WHO, 2018) recognizes that child-adolescent mental health problems are the leading cause of disability in Europe, with one-half of emotional problems starting before the age of 14 (Kessler et al., 2007). Furthermore, these conditions tend to be recurrent and chronic if not prevented or treated early (Pine et al., 1998) and are associated with poor functioning and low quality of life in the short and long term (Fombonne et al., 2001; Zisook et al., 2007). Of particular concern is the increase in mental disorders in children and adolescents since the beginning of the COVID-19 crisis, which has tripled (Save the Children, 2021), with health care services being overwhelmed (Golberstein et al., 2020; Novins et al., 2021). Besides, along with the individual suffering of experiencing a mental health problem in childhood, the economic and social costs are enormous (Fatori et al., 2018). For example, a study carried out in the Netherlands

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_3

on the cost of depression among children and adolescents showed that the investment amounted to 38 million euros (Bodden et al., 2018). Also, the report *The State of the World's Children 2021 – On My Mind: Promoting, Protecting and Caring for Children's Mental Health* (UNICEF, 2021) has shown that the economic impact of not preventing and treating mental health problems in childhood and adolescence is $387.2 billion per year. Despite these alarming data, several reports from government institutions and experts conclude that mental health problems at an early age are under-recognized and that providing urgent solutions is a priority (European Commission, 2016a; Saunders et al., 2020).

Depression is one of the most prevalent mental disorders in childhood and adolescence, with devastating repercussions for positive development (Garber, 2006). The probability of developing a depressive disorder increases over the life cycle (Kostev et al., 2019). Depressive disorders have an estimated annual prevalence of about 2% in children and 4–8% in adolescents (Lynch & Clarke, 2006), with around 20% of American young people experiencing an episode of depression before the age of 18 (Costello et al., 2003). Depression in childhood and adolescence is characterized by feelings of sadness and hopelessness, irritable mood, and loss of interest in activities. Feelings of underestimation and excessive guilt may be present, together with difficulty concentrating and thinking, recurrent thoughts of death and suicide, sleep and eating disorders, frustration and hostility, agitation or inhibition of movement, fatigue or loss of energy, isolation, and high vulnerability to criticism (Fernández-Hermida & Villamarín-Fernández, 2021). Additionally, depressive disorders tend to run a chronic and recurring course, with comorbidity levels with anxiety disorder nearing 50% (Flannery-Schroeder, 2006). The earlier onset of depression in youth is associated with substance abuse, risky sexual behavior, suicide risk, poor social functioning, decreased school performance, and physical health problems (Lynch & Clarke, 2006).

Several risk factors have been reported to contribute to the development of depression in children and adolescents: exposure to negative life events from childhood (e.g., death of a loved one or being exposed to stress or trauma), maladaptive cognitive style (e.g., excessive rumination and worry, involvement in global and stable attributions, inferring negative characteristics of the self and anticipating negative consequences), deficits in emotional self-regulation skills (e.g., cognitive and emotional reactivity), low self-esteem, self-criticism, feelings of helplessness, being a woman, family risk of depression (e.g., having a father with depression), violence and family instability, poor social support, and subclinical levels of depressive or anxiety symptoms, among others (Carballo et al., 2020; Fernández-Hermida & Villamarín-Fernández, 2021; Garber, 2006; Mendelson & Tandon, 2016; Mezulis et al., 2006; Van der Gucht et al., 2018). Protective factors include positive life events, self-regulation skills (emotion regulation skills and psychological flexibility, mindfulness, and self-compassion), personal resources (resilience, self-efficacy, self-concept, self-esteem, optimism), and supportive relationships (family cohesion, parental support, social support, peer competence and acceptance, sense of belonging, positive teacher-student relationship), among others (Klasen et al., 2015; Muris et al., 2017; Otto et al., 2017; Wang et al., 2012). Therefore, interventions to

reduce the risk factors and promote the protective factors for depression are necessary to prevent the early appearance of depressive symptoms and depressive disorders throughout child-adolescent development. In this regard, psychological interventions, which typically target one or more of these risk and protective factors, are cost-effective in the prevention and treatment of depression in young people (Cuijpers et al., 2021; Lynch & Clarke, 2006; Mendelson & Tandon, 2016; Merry et al., 2011).

Psychological prevention depression programs for children and adolescents are divided into universal or targeted approaches. Universal prevention is delivered to a whole population regardless of depression risk (e.g., school-based universal interventions). Targeted prevention approaches are directed either toward those who have an increased risk of depression, such as children with family risk (selective prevention), or adolescents with subclinical depressive symptoms (indicated prevention) (Mendelson & Tandon, 2016). The report *Child and Adolescent Mental Health Policies and Plans* (WHO, 2005) points out the importance of involving all sectors of society in the prevention of mental health problems, highlighting the role of the school. Along the same lines, the European Commission (2016b) points out the need to develop an intersectoral cooperation framework to prevent mental health problems and promote child and youth well-being, highlighting the importance of collaboration between school and health centers in this regard. The school context can be particularly advantageous for depression prevention, since it offers an accessible way to reach youth and provide them with strategies that protect against early depression. In addition, interventions in schools can reduce some of the barriers associated with treating child and adolescent depression, such as stigma or the high cost of individual treatment. A recent meta-analysis of the effectiveness of school-based depression and anxiety prevention programs for young people showed that universal and targeted programs effectively improved mental health (Werner-Seidler et al., 2017). The authors conclude that the school environment provides an ideal context for prevention programs, with the potential to offset the trajectory toward disorder. Furthermore, the effectiveness of these interventions can be amplified by involving other school agents, such as teachers and parents, given that improving the mental health of teachers and parents can indirectly improve that of children and adolescents (Carr, 2000; Durlak, 1998; Restifo & Bögels, 2009; Schonert-Reichl, 2017; Schonert-Reichl & Hymel, 2007).

In recent years, mindfulness-based interventions (MBIs) have been added to the set of preventive psychological interventions implemented in schools to improve young people's mental health. MBIs have been shown to be effective in reducing depression in children and adolescents, teachers, and parents. This chapter proposes that the systematic implementation of MBIs at school can be effective to prevent depression throughout child and adolescent development. As our proposal is based on a systemic approach, in the following sections, we will develop the evidence on MBIs for the reduction of depression in children and adolescents, teachers, and parents.

3.2 Mindfulness-Based Interventions

Mindfulness is defined as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding experience moment by moment" (Kabat-Zinn, 2003, p. 145). Along the same lines, Bishop et al. (2006) conceptualized mindfulness as "the self-regulation of attention that is maintained in the immediate experience… (2) with a particular orientation towards the experience in the present moment, characterized by curiosity, openness and acceptance" (p. 232). MBIs have been designed to teach individuals how to cultivate mindfulness skills and incorporate them into their daily lives. The primary aims of MBIs are to teach participants (1) to regulate their attention to monitor their experience of the present moment and (2) to bring an attitude of openness, acceptance, and non-reactivity to the monitored experience (Lindsay & Creswell, 2017).

Recently, Crane et al. (2017) proposed a framework that defines the fundamental characteristics of an MBI. These authors assert that all MBIs must include a set of essential factors and a set of specific adaptations for the population and context to which it is aimed. Regarding the essential factors, they point out that MBIs are programs:

1. That are informed by theories and practices that draw from a confluence of contemplative traditions, science, and the disciplines of medicine, psychology, and education.
2. That help participants to understand how stress and discomfort are created and maintained and how mindfulness practice can help to prevent and treat discomfort generators and maintainers by cultivating a new way of relating to experience.
3. That cultivate the ability to approach and be in contact with the experience of the present moment (e.g., thoughts, emotions, sensations) and promote awareness of the consequences and implications of the different ways of approaching experience (rejection vs. acceptance). Specifically, MBIs facilitate insight into how a rejection-based relationship with the unpleasant experience may generate greater reactivity and suffering, while one based on experiential acceptance can decrease reactivity and suffering. Participants learn the ability of decentering – a metacognitive process that promotes a greater psychological distance from internal experiences, such as thoughts and feelings, and allows the person to disidentify with them (Bernstein et al., 2015) – to recognize how the reactions of rejection, avoidance, or suppression of their thoughts, emotions, and sensations tend to generate greater reactivity and suffering, as well as a more inflexible response pattern, while experiential acceptance allows greater stability, flexibility, mindful decision making, and freedom.
4. That support the development of greater attentional, emotional, and behavioral self-regulation, as well as positive qualities such as kindness, compassion, and equanimity.
5. That involve participants in a systematic training in mindfulness meditation practices (e.g., mindful breathing meditation, body scan, thoughts and emotions meditation, informal practices).

6. That apply a methodology and pedagogy that is experiential, interactive, participatory, student centered, and relationship centered, and a learning process based on an inquiry process.
7. And finally, that are led by facilitators who are experienced mindfulness practitioners with the ability to embody the state of mindfulness in the first person when leading and holding the group.

Regarding the set of specific adaptations that MBIs require, several authors have proposed relevant factors to adjust MBIs to educational settings. The design of an MBI in educational contexts must include all essential factors, adapting them to the school structure and objectives. In educational contexts, MBIs are integrated into (a) the framework of socio-emotional learning (SEL) interventions, whose main objective is to promote socio-emotional competence, and (b) the framework of contemplative education, aimed at promoting mental habits and healthy emotional factors for positive development (Lawlor, 2016). Contemplative education engages the educational community in a set of contemplative practices that help the development of self-awareness to recognize mental and behavioral habits and learn new ways to transcend habitual patterns, thus fostering a more conscious lifestyle, learning, and relationships (Jennings, 2008; Roeser & Peck, 2009). The aims of MBIs for children and adolescents in schools include improving mindfulness skills as well as cognitive (attention and executive function), emotional (emotional regulation), and social (prosocial dispositions) functioning. Improvements in these domains lead to improved mental health, peer relationships, classroom behavior, and student academic performance (Andreu & García-Rubio, 2019). Besides, MBIs for teachers seek to improve their mindfulness and self-compassion skills, reduce burnout, and improve their mental health, which in turn indirectly helps to improve classroom outcomes and student outcomes (Roeser et al., 2012). Furthermore, MBIs in school contexts must be adapted to the specific needs of the multiple agents of the educational community; for example, interventions should be tailored to students' stage of development (Roeser & Pinela, 2014), adapted considering teachers' needs (e.g., practices to reduce burnout or increase emotional support in class) (Jennings, 2015), or adjusted depending on school type (e.g., the secularization of the program in public schools; Jennings, 2016).

3.3 School-Based Mindfulness Interventions for Reducing Children's and Adolescents' Depression

Overall, the evidence suggests that MBIs in schools can reduce some risk factors (e.g., subclinical levels of depression or anxiety, emotional and cognitive reactivity, cognitive vulnerability, self-criticism, victimization) and promote some protective factors (e.g., mindfulness skills, emotional and behavioral self-regulation, self-compassion, peer acceptance) that are involved in the onset or maintenance of depression during child and adolescent development.

About protective factors, MBIs in schools have been shown to be effective in increasing mindfulness skills in children and adolescents (Dunning et al., 2019; Klingbeil et al., 2017). Throughout child-adolescent development, mindfulness skills prevent the early appearance of depressive symptoms and depressive disorders. Cross-sectional studies have shown that children's and adolescents' mindfulness skills correlate with reduced behavioral problems and improved mental health, psychological inflexibility, quality of life, social skills, and academic competence (García-Rubio et al., 2020; Greco et al., 2011). Specifically, mindfulness skills in children are related to less depression, anxiety, negative affect, rumination, and behavioral impulsiveness, as well as greater optimism, academic self-concept, self-efficacy, and school competence (García-Rubio et al., 2019; Lawlor et al., 2014). In adolescents, mindfulness skills have been associated with lower levels of depression, anxiety, stress, and negative affect, as well as greater acceptance, life satisfaction, academic self-concept, and self-efficacy (Pallozzi et al., 2017; Yu et al., 2021).

Furthermore, several studies have shown that mindfulness skills predict a decrease in depressive symptoms during adolescence through a reduction in several psychological mechanisms that facilitate the onset and maintenance of depression. Recently, Royuela-Colomer et al. (2021) found that mindfulness skills in adolescents predicted a reduction in depressive symptoms 1 year later. Similarly, Royuela-Colomer and Calvete (2016) showed that the ability to not react to internal experience and act with awareness predicted a reduction in depressive symptoms at 4 months. Along the same lines, Galla et al. (2020) found that positive changes in not reacting to internal experience during the ages of 13 and 14 are associated with reductions in negative affect and perceived stress 2 years later. Moreover, Tumminia et al. (2020) have shown that adolescents' ability not to judge internal experience reduces rumination at 3 months, which in turn reduces negative affect 6 months later. Likewise, the ability to act with awareness protects against the development of self-injurious behavior during adolescence (Calvete et al., 2017), while mindful attention reduces the association between depressogenic schemas and depressive symptoms (Calvete et al., 2019). Therefore, mindfulness skills can decrease cognitive vulnerability to depression in adolescents. However, more longitudinal studies with children are needed to elucidate the effect of mindfulness skills on the development of depression at an earlier age. Given the protective role of mindfulness skills in child and adolescent depression, it may be useful to promote these skills through school-based preventive interventions. As mentioned above, school-based MBIs have been shown to be effective in increasing mindfulness skills in children and adolescents. Besides, a recent meta-analysis showed that MBIs effectively improve mental health (Kallapiran et al., 2015) and reduce depressive symptoms (Dunning et al., 2019).

Regarding risk factors, MBIs have been shown to be helpful for reducing depressive symptoms in school contexts in the community population (universal prevention) (Raes et al., 2014), in the population at risk (selective prevention) (Fung et al., 2019), and in the population with clinical symptoms (indicated prevention) (Wright et al., 2019). Among the MBIs aimed at reducing depression, there stands out the adaptation for children and adolescents of mindfulness-based cognitive therapy

(MBCT) (Ames et al., 2014; Knowles et al., 2015; Semple & Lee, 2011; Semple & Lee, 2014). In adults, MBCT has been recommended by the National Institute for Health and Clinical Excellence (NICE) to prevent relapse in depression (Segal et al., 2002). MBCT seems to reduce the risk of relapse in patients with recurrent depressions even at a 15-month follow-up (Kuyken et al., 2016). MBCT improves self-regulation, decreasing cognitive reactivity, worry, and rumination, and increasing decentering and self-compassion skills (Gu et al., 2015). In children and adolescents, results are promising, although few studies have evaluated the effectiveness of MBCT for children (MBCT-C). MBCT-C programs at school have been shown to be as effective as cognitive behavioral therapy in reducing symptoms of anxiety and depression in children with high levels of internalizing symptoms (Wright et al., 2019). Also, a study that used MBCT-C for adolescents suggests that it may reduce depressive symptoms in those who are at risk of relapse (Ames et al., 2014). Other trials have shown promising results for improving depression and anxiety in children and adolescents (Cotton et al., 2016; Esmaeilian et al., 2018; Lam, 2016; Lee et al., 2008; Semple et al., 2010).

Recent results with children also suggest that the improvement of emotional regulation skills underlies the effectiveness of MBIs in reducing anxiety-depressive symptoms. In this regard, Bauer et al. (2019) found that school mindfulness training with middle school children can alter the neurocognitive mechanisms of stress. Specifically, the authors showed that children who participated in an MBI integrated into the school curriculum, compared to an active control group, reported lower stress associated with reduced right amygdala activation in response to fearful faces and relatively stronger functional connectivity between the right amygdala and the ventromedial prefrontal cortex while viewing fearful facial expressions. Thus, these results indicate that a school MBI may potentially alter brain correlates of emotional regulation during middle childhood positively, expressly, by altering the neural mechanisms associated with emotional reactivity to unpleasant situations. This finding is consistent with the results of a study with children aged 7–12 years that showed that the increase in dispositional mindfulness after an MBI in school led to reductions in children's anxiety and psychological inflexibility and that positive changes in teacher-rated children's emotional regulation led to improvements in emotional symptoms and decreased peer relationship problems (García-Rubio, 2021). Also, a qualitative study found that children with high social vulnerability (i.e., low family socioeconomic status) can benefit from a school-based MBI by learning to reduce reactivity to unpleasant sensations, thoughts, and emotions (e.g., sadness) and adopting an attitude of openness and non-reactivity to internal experience, being able to shift from reactive to self-regulated behavior (Andreu et al., 2021).

Therefore, although further research is needed, preliminary evidence suggests that children and adolescents learn new strategies of emotional regulation based on mindfulness (e.g., mindful emotion regulation) after participating in an MBI at school. Students are able to get in touch with the present moment and bring an attitude of non-judgment, acceptance, and non-reactivity to internal experience (e.g., not reacting quickly to unpleasant bodily sensations and being able to decenter and

disidentify from the ruminative pattern to let go of unpleasant thoughts) instead of engaging in avoidance-based strategies to regulate the unpleasant internal experience, which are involved in the onset and maintenance of depression disorders (e.g., thought suppression, rumination and worry, self-criticism; Ehrenreich-May & Chu, 2013; Greco & Hayes, 2008; Kashdan & Rottenberg, 2010; Muris et al., 2017; Oppo et al., 2019; Tan & Martin, 2015). Furthermore, engaging in mindful emotion regulation from an early age seems to help children and adolescents to develop less inflexible behaviors (i.e., less guided by their psychological reactions to unpleasant internal events and more guided by personal values and goals), which can help to prevent the onset of depressive disorders and relapse (García-Rubio, 2021). Chambers et al. (2015) found that mindful emotion regulation is associated with less depression, anxiety, rumination and dysfunctional attitudes, and a higher quality of life compared to well-studied emotional regulation strategies such as cognitive reappraisal and expressive suppression. Moreover, greater mindful emotion regulation predicted greater recovery from depression in young people with major depression (Chambers et al., 2015). It is also important to mention that students with a higher risk of depression (i.e., women and students with higher baseline depressive symptoms) benefit more from school MBIs in the short and long term (Kang et al., 2018; Van der Gucht et al., 2017; Volanen et al., 2020).

Although there is extensive evidence of the effectiveness of school-based MBIs in reducing depression, very little research has been conducted on their mechanisms of action. Cognitive reactivity and self-compassion are two mechanisms that seem to influence the effectiveness of school MBIs for adolescents. Cognitive reactivity refers to the ease with which negative (often ruminative) thinking patterns are (re) activated when in a mild dysphoric state (Scher et al., 2005). Self-compassion refers to the tendency (or vice versa, the lack thereof) to be caring, warm, and understanding toward oneself when faced with personal shortcomings, problems, or failures (Neff, 2003). Van der Gucht et al. (2018) showed that reduced cognitive reactivity and increased self-compassion after an MBI led to a decrease in students' depressive and anxious symptoms. Similarly, a study conducted with 145 adolescents with high depressive symptoms showed that, after an MBI, reductions in rumination and expressive suppression led to a reduction in internalizing symptoms and perceived stress (Fung et al., 2019). These results suggest that improvements in adolescents' emotional regulation skills are involved in the reduction of depressive symptoms.

Future randomized controlled trials with larger sample sizes and follow-up measures are necessary to generalize the results obtained. Likewise, it is essential for future research to deeply examine the mechanisms of action that underlie the reduction of depressive symptoms in children and adolescents after an MBI, taking into account multiple domains (cerebral, cognitive, emotional) and using diverse methodologies (self-reports, behavioral tasks, neurocognitive measures, teachers' and parents' reports, qualitative methods).

3.4 School-Based Mindfulness Interventions for Reducing Teachers' Depression

Lee Shulman, one of the most relevant American educational psychologists of the XX century, noted: "After 30 years of doing such work, I have concluded that classroom teaching… is perhaps the most complex, most challenging, and most demanding, subtle, nuanced, and frightening activity that our species has ever invented… The only time a physician could possibly encounter a situation of comparable complexity would be in the emergency room of a hospital during or after a natural disaster" (Shulman, 2004, p. 504). Currently, the worldwide prevalence of teacher burnout is very high (Aloe et al., 2014). The MetLife Survey of the American Teacher found that nearly 60% of teachers reported feeling under too much stress (Markow et al., 2013). The increase is dramatic, since in 1985 only 35% reported this. Additionally, the survey found that teacher job satisfaction had dropped dramatically, from 62% in 2008 to 39% in 2012. These data are not exclusive to US teachers, as similar data have been reported for the educational systems of other countries. For example, in the Netherlands, more than half of the teachers report feeling high levels of work stress (Lensen et al., 2021). Almost one in five is quitting their work as teachers and choosing a new profession within 5 years of starting as teachers. These data are alarming since it is well known that repeated exposure to stress over time leads to burnout (Bellingrath et al., 2010). Burnout is considered a syndrome that combines three dimensions: emotional exhaustion, depersonalization, and a lack of personal accomplishment (Maslach et al., 2001). Recent studies have shown a substantial overlap between burnout and depression, with some authors even considering burnout a subtype of depression (Bianchi et al., 2015).

Teacher burnout is associated with greater depressive symptoms, low enthusiasm and motivation, and impaired cognitive ability (García-Carmona et al., 2019; Jennings & Greenberg, 2009). Furthermore, teachers who experience burnout are more likely to fail to meet the instructional and emotional demands that classroom dynamics require (Sandilos et al., 2015). Teachers with high depressive symptoms may be emotionally exhausted and may not be able to provide high-quality care, which can directly affect classroom climate and healthy child development (Jeon et al., 2014). Evidence shows that teachers' depressive symptoms impact children's outcomes directly and indirectly via classroom quality (Roberts et al., 2016). Also, in classrooms where teachers suffer elevated depressive symptoms, children show more internalizing problems (Jeon et al., 2014) and worse socio-emotional competency skills (Roberts et al., 2016). Likewise, teachers' depression and emotional exhaustion are associated with adverse reactions of the children in the classroom. However, teachers' positive coping skills (e.g., emotion regulation skills) are associated with positive responses to children's negative emotions (Buettner et al., 2016).

Therefore, since teaching is a very stressful profession that may directly affect teachers' mental health and indirectly impact on children's mental health, preventive interventions to improve teachers' mental health, teacher-student relationships, and classroom learning environments are necessary. MBIs for teachers are an

emerging area of practice and research. Mindfulness training with teachers aims to cultivate their mindfulness, self-regulation, and self-care skills to create a healthy teacher mindset, promoting greater occupational health, well-being, and mental health (Roeser et al., 2012). Also, MBIs seek to provide teachers with tools to foster effective classroom management, a positive interpersonal climate, and positive teacher-student relationships in the classroom. Finally, all of these positive outcomes are aimed at generating a beneficial impact on student outcomes, for example, improving students' mental health. A recent meta-analysis of the effects of MBIs for teachers showed positive effects, increasing mindfulness skills and well-being and reducing psychological distress (Klingbeil et al., 2017). This result is relevant since mindfulness skills in teachers are associated with lower depression and anxiety symptoms, job stress, occupational and emotional burnout, and missed workdays, as well as with greater self-efficacy, job satisfaction, job performance, and emotionally supportive classroom interactions with students, even with the more challenging ones (Abenavoli et al., 2013; Braun et al., 2019; Dane & Brummel, 2014; Hülsheger et al., 2013; Jennings, 2015; Taylor & Millear, 2016). Besides, the association between the teacher's greater dispositional mindfulness and higher-quality relationships with students (e.g., fewer conflicts and positive interactions) is mediated by the teacher's lower burnout and depressive symptoms (Becker et al., 2017; Braun et al., 2019). Therefore, these findings suggest that teachers who have higher levels of dispositional mindfulness may suffer fewer depression symptoms and burnout, leading to higher-quality relationships with students in their classrooms.

Along with improving mindfulness skills, MBIs for teachers have been shown to be effective in improving a set of outcomes relevant to mental health. In a cluster-randomized controlled trial design (RCT) involving 36 American urban elementary schools and 224 teachers, the CARE for Teachers program, a mindfulness-based program specifically designed for teachers, showed positive effects on teachers' emotion regulation, mindfulness, psychological distress, time urgency, and emotional support toward students (Jennings et al., 2017). Almost a year later, the teachers' mental health, mindfulness, and emotional regulation skills continued improving (Jennings et al., 2019). Recently, an RCT in the UK with 206 teachers from 43 different schools showed improvements in mindfulness, self-compassion, well-being, depression, anxiety, perceived stress, and burnout (Montero-Marin et al., 2021). Furthermore, the authors examined the mechanisms of action of the intervention, concluding that the improvement in mindfulness and self-compassion skills led to a reduction in depressive-anxiety symptoms and burnout while also increasing well-being. Likewise, other studies with teachers have shown that the improvement in mindfulness and the reduction in rumination mediate the following benefits of MBIs: decreasing depression, low mood, negative affect, and sleep difficulties (Crain et al., 2017; Roeser et al., 2013). At a biological level, Rodrigues de Oliveira et al. (2021) have examined the impact of an MBI for Brazilian professors on pro-inflammatory and antioxidant biomarkers related to depression. The mindfulness group showed significant decreases in pro-inflammatory markers (IL-6 and IL-8) and increased antioxidant activity (glutathione and cystine) compared to controls at immediate post-intervention. Overall, current evidence suggests that MBIs are

effective preventative programs that provide teachers with a set of mindfulness-based socio-emotional competencies, thereby reducing the burnout cascade and preventing depression.

Students also indirectly benefit from teachers' mindfulness skills. Specifically, stronger mindfulness skills in teachers have been indirectly associated with better student outcomes through better interpersonal mindfulness skills or mindful teaching in teachers (Jennings & Greenberg, 2009). In the educational field, interpersonal mindfulness has been defined as the ability of teachers to (1) listen with full attention to students, (2) maintain present-centered awareness of emotions experienced by the self and students during interactions, (3) be open, with acceptance and receptivity to students' thoughts and feelings, (4) be able to self-regulate emotion and behavior in challenging situations (i.e., low emotional and behavioral reactivity and low automaticity in response to the everyday behavior of students), and (5) be compassionate toward the self and students (Frank et al., 2016). Also, Hulburt et al. (2020) have proposed that a mindful teacher is one who is calm in body in challenging situations, clear in mind when making decisions in complex classroom environments, and kind in approach to interactions with students. In this regard, it has been shown that students' perceptions of mindful teaching are associated with changes in mindfulness, self-compassion, and compassion for others. A study with 599 high school students found that those who perceived that their teachers' teaching was more mindful at the beginning of the course developed greater satisfaction with themselves in the middle of the course (i.e., the satisfaction of autonomy, relationship, and competence needs) and improved their skills of mindfulness, self-compassion, and compassion for others at the end of the course (Colaianne et al., 2020). The students seemed to internalize the mindful and compassionate attitude throughout the school year due to their teachers' mindful teaching. There is also evidence that this phenomenon can occur in reverse: the effect of "stress contagion" in the classroom. A higher level of teacher burnout has been found to correlate with higher student cortisol, showing that teacher mental health is linked to the regulation of student stress (Oberle & Schonert-Reichl, 2016). However, teachers' interpersonal mindfulness has been found to moderate the relationship between high levels of teacher stress and the quality of the teacher-student relationship. For instance, teachers' interpersonal mindfulness buffers the effects of elevated pressure on emotional supportiveness in the classroom (Molloy Elreda et al., 2019). Therefore, teacher interpersonal mindfulness and mindful teaching are factors that protect both teachers and students from developing the "burnout cascade" and mental health problems. Furthermore, evidence has shown that MBIs for teachers effectively promote interpersonal mindfulness skills. Concretely, a group of teachers, interviewed after participating in an MBI, reported that they felt greater presence in the classroom, greater body awareness and less emotional reactivity, greater capacity to regulate emotionally and reevaluate stressful situations in the classroom, and less feelings of defensiveness in the relationship with students (i.e., greater understanding and compassion) after the program (Sharp & Jennings, 2016).

In summary, current evidence suggests that MBIs for teachers can prevent burnout and depression by increasing their mindfulness and mindful teaching skills. In

addition, this learning helps teachers to be more present to address the needs of students in the classroom and engage in emotionally supportive interactions with them, which undoubtedly prevents the development of mental health problems throughout childhood and adolescence.

3.5 Mindfulness-Based Interventions for Reducing Parents' Depression

Parental psychopathology affects children's mental health. There is strong evidence that family factors play a relevant role in the development, maintenance, and course of youth depression (Restifo & Bögels, 2009). Parents' mental health problems predict depressive symptoms in children and adolescents, as well as their development over time. Concretely, children and adolescents of depressed parents are three to four times more likely to develop a depressive disorder and have a greater risk of experiencing a more severe and continuous course of depression (Garber, 2006). Furthermore, the offspring of depressed parents are more likely to develop greater cognitive vulnerability, internalize more maladaptive emotional regulation strategies, and experience fewer positive life events and positive parenting practices (Loechner et al., 2020). However, children with a high family risk of depression tend to show better mental health if the parent-child relationship is characterized by warmth, acceptance, a lack of hostility, and parental control (Thapar et al., 2012). Positive parenting skills and positive family relationships are protective factors for developing child depression (Klasen et al., 2015). Therefore, to reduce child and adolescent depression, preventive interventions must use a family-based approach to reduce risk factors (e.g., reduce parents' depression and negative parental practices) and increase protective factors (positive parenting skills) (Joshi et al., 2019). Preventive interventions to improve parents' mental health have been shown to reduce children's depression (Gladstone & Beardslee, 2009). As mentioned above, the European Commission (2016b) has indicated that preventing child-adolescent mental health problems requires a cooperation framework that includes several sectors, with particular attention to the preventive role that the school can play. In this regard, home-school or family-school collaboration refers to the relationship between families and schools where parents and teachers work together to promote children's and adolescents' socio-emotional, mental, and academic development (Cox, 2005). Family-school interventions have been shown to improve the development of parents and their children while also strengthening their mental and physical health (Zeleke et al., 2020). In addition, parents will agree to participate in these interventions if they are aimed at improving their well-being and that of their children (Parent & DiMarzio, 2021).

Mindfulness-based parenting interventions are a new approach that is yielding positive results (Burgdorf et al., 2019). These interventions aim to promote parent dispositional mindfulness and mindful parenting skills to improve parents' and

children's mental health, parent-child relationships, and family climate (Cohen & Semple, 2010). Parent dispositional mindfulness has been linked to mindful parenting, which consists in intentionally bringing present-centered, nonjudgmental awareness to everyday parent-child interactions (Duncan et al., 2009; Kabat-Zinn & Kabat-Zinn, 1997). The model advanced by Duncan et al. (2009) encompasses five dimensions of mindful parenting relevant to the parent-child relationship: (a) listening with full attention to the child, (b) nonjudgmental acceptance of self and child, (c) emotional awareness of self and child, (d) self-regulation in the parenting relationship, and (e) compassion for self and child. Recent evidence shows that mindful parenting can be a protective factor for the early onset of child and adolescent depression.

First, cross-sectional research has found an indirect association between mindful parenting and adolescents' mindfulness and self-compassion through a more secure perception of the relationship with the parents. Adolescents seem to develop higher levels of mindfulness and self-compassion when the parent-child relationship is characterized by affection, self-regulation, and mindful awareness (Moreira et al., 2018). Also, Parent et al. (Parent et al., 2016) found that higher levels of parent dispositional mindfulness are indirectly related to lower levels of youth internalizing and externalizing problems through higher levels of mindful parenting and lower levels of negative parenting practices (e.g., hostility, reactive and intrusive parenting, coercive disciplinary tactics, and ineffective discipline). Second, longitudinal research has found that mindful parenting predicts reduced levels of depressive symptoms, aggression, and victimization in adolescents after 1 year (Calvete et al., 2021) as well as fewer recurrent conflicts after 3 months, leading to fewer internalizing problems in children after 1 year (Park et al., 2020). Similarly, Parent et al. (2021) carried out a relevant study with children and adolescents where they showed that (a) higher levels of parent dispositional mindfulness are related to higher levels of mindful parenting after 4 months, (b) higher levels of mindful parenting are associated with higher levels of positive parenting (parental proactivity, positive reinforcement, warmth, supportiveness) and lower levels of negative parenting practices (hostility, lax control, and physical discipline) after 8 months, and (c) lower levels of negative parenting practices are related to lower levels of youth internalizing (e.g., depression) and externalizing symptoms after 12 months. Some mechanisms that have been proposed to explain the impacts of mindful parenting on parent-child interactions in the context of child and parent mental health problems are (Bögels et al., 2010) (1) the reduction in parental stress and parental reactivity, (2) the reduction in parental concern regarding parental and/or child psychopathology, (3) the improvement of parental executive functioning in impulsive parents, (4) the break of the cycle of intergenerational transmission of dysfunctional parenting schemas and habits, (5) the increase in self-nourishing attention, and (6) the improvement of marital functioning and co-parenting. Therefore, this body of evidence indicating that dispositional parent mindfulness and mindful parenting help to prevent depression in parents and children justifies the importance of implementing interventions that promote mindfulness skills in parents as well as mindful

parenting. Mindful parenting interventions seem adequate for this purpose (Bögels & Restifo, 2013).

Mindful parenting interventions targeting only parents, but not children, have shown promising results. A 10-week mindful parenting intervention found improvements in parents' internalizing symptoms and parental stress and children's internalizing and externalizing symptoms (Bögels et al., 2014). Similarly, an 8-week mindful parenting intervention found that increases in parent dispositional mindfulness after the intervention predicted a decrease in parental psychopathology, while increases in mindful parenting skills predicted a reduction in children's psychopathology (Meppelink et al., 2016). For their part, mindful parenting interventions targeting parents and children in parallel are still scarce, but their results are encouraging. A study examining the feasibility of MBCT in parallel for adolescents recovering from a depressive episode and for their parents showed improvements in depression, rumination, decentering, mindfulness, and self-compassion for the adolescents. Moreover, their parents reported that MBCT helped them to better understand their child's depression and improved the family climate. Similarly, the MYMind protocol, which consists of eight weekly 1.5-hour mindfulness-based group sessions for children and parallel ones for parents, has shown positive effects on the mental health of parents of children with autism spectrum disorders, who usually show elevated depressive symptoms, as well as on mindful parenting and parenting style (de Bruin et al., 2015; Haydicky et al., 2017; Ho et al., 2021; Ridderinkhof et al., 2018; Salem-Guirgis et al., 2019). Also, the MYMind program has shown positive effects, such as reducing childhood ADHD (i.e., reducing internalizing and externalizing symptoms while also increasing attention and executive functioning) and improving parental functioning (i.e., reducing parental psychopathology, over-reactivity, and stress while also increasing mindful parenting) (Bögels et al., 2021).

To our knowledge, there are no studies involving parents in mindfulness-based interventions at school aimed at preventing parent and child depression. However, results obtained in clinical settings suggest that including mindful parenting interventions in school contexts may benefit this purpose. Future research on the feasibility and effectiveness of mindful parenting interventions implemented in school contexts is necessary to determine whether the benefits of preventing depression in clinical settings may be generalized to schools.

3.6 Conclusion

The prevalence of depression in children and adolescents is increasing worldwide. The early emergence of a depressive disorder during childhood and adolescence negatively influences socio-emotional and cognitive development and school and family functioning and has a significant associated socioeconomic cost in the short and long term. Therefore, it is necessary to implement interventions that prevent depression in childhood and adolescence across multiple social sectors. In this

regard, the school context meets the necessary conditions for implementing interventions that can help to prevent infant-adolescent depression, adopting either a universal approach (for all students) or a selective approach (for children and adolescents at risk of depression). MBIs are among the emerging interventions that can be cost-effective to address this purpose. This chapter has shown that MBIs implemented in school contexts effectively reduce risk factors and increase protective factors involved in child and adolescent depression. MBIs in schools have been shown to have a positive impact on the functioning of multiple agents involved in the early onset of depression, such as children and adolescents themselves, teachers, and parents. In summary, the evidence presented in this chapter (a) shows that MBIs implemented in schools for children and adolescents, teachers, and parents individually and separately effectively reduce child and adolescent depression, and (b) suggests that implementing MBIs in schools from a community and systemic perspective, involving students, teachers, and parents simultaneously in the intervention, may have greater success in preventing child and adolescent depression. Despite all of the above, it is important to mention that there are studies where there have been no results regarding the prevention of depression (Johnson et al., 2016, 2017), so this is a very recent field of research that still requires optimizing key ingredients, dosage, and format of the MBIs applied in schools. Further research must be conducted on the effectiveness of implementing an MBI in parallel for students, teachers, and parents in school contexts to reduce child and adolescent depression.

Conflict of Interest The authors declare that they have no conflict of interest.

Acknowledgments This chapter was supported by a María Zambrano grant from the Ministry of Universities of the Spanish Government to CIA (Reference number: ZA21-056) and by ANID – Millennium Science Initiative Program – ICS13_005.

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Chapter 4
Digital Technology Interventions for Preventing and Treating Youth Depression

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4.1 Current Evidence Regarding Mental Health in Young People

Good mental health is essential for positive development in children and adolescents, including optimal psychological development, establishing and maintaining good interpersonal relationships, effective learning, and good physical health (Clarke et al., 2015). Thus, the presence of mental health problems in childhood and adolescence is of great relevance given their prevalence, early onset, and impact on multiple areas of young people's lives (Liverpool et al., 2020).

In recent years, a significant increase in mental health problems has been reported in youth (Scholten & Granic, 2019). Estimated prevalence ranges between 10% and 20% worldwide (Liverpool et al., 2020), with depression being one of the most frequent problems in adolescents (Christ et al., 2020).

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_4

Unipolar depressive disorders are one of the leading causes of disability among adolescents (Topooco et al., 2018). Studies estimate that around one in nine adolescents will meet the criteria for major depressive disorder (MDD), with similar percentages of adolescents experiencing subthreshold symptoms (Wozney et al., 2017). Thus, studies indicate that by the age of 18, 20% of young people will have experienced at least one clinically significant depressive episode, with 75% of these experiencing a subsequent episode within 5 years (Grist et al., 2019).

Depression affects youth development, reduces commitment to education, and can lead to lifelong disabilities (Garrido et al., 2019). Furthermore, depression can have persistent impacts on daily functioning and a negative impact on social, family, and peer relationships (Wozney et al., 2017). Early depressive symptoms have been linked to various mental health problems in adulthood, including anxiety, depressive, and substance use disorders (Christ et al., 2020). Increased risk of suicide is among the most alarming consequences of depression in youth, as those who suffer from MDD are seven times more likely to commit suicide than people without MDD. This is one of the main causes of death in this population (Das et al., 2016).

In turn, pandemic-related measures and consequences (e.g., lockdowns and social distancing) may have had negative impacts, including increased depressive symptoms and feelings of loneliness (Rauschenberg et al., 2021). Although young people are less susceptible to severe COVID-19 infections, they are more at risk regarding the negative psychosocial effects of the pandemic (Power et al., 2020). Moreover, according to the research that has emerged in this context, more negative mental health consequences are expected in the future (Rauschenberg et al., 2021).

However, studies indicate that 64–87% of mental health problems are not detected or treated (Scholten & Granic, 2019). Thus, only a small percentage of youth with depressive symptoms receive treatment, and those who are treated generally receive only a few sessions (Stiles-Shields et al., 2016). Therefore, several deficits and disparities currently exist in health systems, which are often affected by problems of coverage, accessibility, efficiency, and cost (Stiles-Shields et al., 2016).

In addition, several studies have reported ethnic, racial, and economic disparities, with lack of access to effective services and the financial burden of treatment being established as some of the barriers to accessing treatment (Stiles-Shields et al., 2016). Nevertheless, the low percentage of treatment is associated not only with a lack of availability but also with low rates of help-seeking behavior resulting from the perceived stigma of mental health problems (Ebert et al., 2015; Grist et al., 2019).

4.2 Digital Technologies as an Opportunity for Mental Health in Young People

Digital mental health interventions are those that are delivered or supported through mobile technology (Clough & Casey, 2015). Given the existing barriers and disparities, the mental healthcare needs of youth cannot be addressed using traditional

interventions alone (Stiles-Shields et al., 2016). Thus, coupled with the high presence of digital devices, interest in digital mental health interventions for this population has increased notably (Schleider et al., 2020). The accelerated development of technological innovations has been identified as an opportunity to address the gap in mental health services in various settings (Scholten & Granic, 2019).

Although access to these technologies varies between countries with different levels of economic development, studies show that one in three Internet users in the world is under 18 years of age (Odgers & Jensen, 2020). Thus, digital interventions are a highly viable choice for delivering youth depression treatment, given young people's access to this type of technology and their familiarity with it (O'Dea et al., 2015).

In recent years, the use of digital technologies to deliver interventions tailored to the needs and preferences of the youth population has been promoted (Liverpool et al., 2020). These interventions present several advantages such as greater availability and privacy (O'Dea et al., 2015).

The COVID-19 pandemic has become a catalyst to rethink service delivery in order to make it more accessible, equitable, and efficient (Power et al., 2020). Thus, digital interventions provide unique opportunities for the delivery of mental health services, even under the restrictive conditions associated with the COVID-19 pandemic (Rauschenberg et al., 2021; Taylor et al., 2020).

There is currently a great diversity of types of digital interventions, which have different levels of development and diffusion (Andersson, 2018). These interventions, which have different objectives, can be therapeutic and preventive (Buntrock et al., 2014) or be based on a stepped care approach (Ebert et al., 2017). Thus, it has been proposed that these interventions can be implemented in a way that is tailored to the individual needs of people (Mohr et al., 2019).

4.2.1 General Definitions of Digital Technologies in Mental Health

TeleMental Health One of the best-known terms for digital intervention in mental health is TeleMental Health. The American Telemedicine Association (ATA) (2009) has stated that TeleMental Health is the practice of mental health specialties at distance, a broad definition that points to the delivery of health information and services by electronic means. Thus, the prefix "tele" primarily refers to the communication tools used for these remote services (Craig & Petterson, 2005). However, the terminology used to refer to this type of intervention has not been consistent in the literature, with authors employing other terms such as e-health, cybertherapy, or teletherapy (Andersson, 2018).

This type of intervention consists in the exchange of mental health information between people who are not in the same physical space, utilizing devices (e.g., computers, smartphones) connected to the Internet (Orsolini et al., 2021). This exchange,

aimed at improving the patient's health status, can be established between mental health professionals (e.g., psychiatrist, psychologist) or between a professional and a patient (ATA, 2009). Thus, this type of intervention can be regarded as equivalent to one conducted in a clinician's office, but with remote contact over the Internet (Bernardy et al., 2019).

Web- and Computer-Based Interventions After nearly two decades of development, web- and computer-based interventions are one of the most developed types of digital interventions today (Andersson et al., 2019). Interventions of this type are backed by controlled trials of self-help interventions and the first computer-based interventions conducted via CD-ROM or email in the late 1990s (Andersson, 2018).

Throughout their history, web- and computer-based interventions have used – among others – psychodynamic and interpersonal therapeutic approaches (Moshe et al., 2020), with most interventions being based on the principles of cognitive behavioral therapy (CBT) (Andersson et al., 2019). Thus, web- and computer-based CBT laid the groundwork for this type of interventions, which were initially developed as programs designed to replicate traditional face-to-face treatments in terms of content and duration (Carlbring et al., 2018). Currently, regarding features and components, they typically include screening or diagnostic stages, psychoeducational information, and exercise modules (Andersson, 2018; Carlbring et al., 2018).

Mental Health Apps Mental health apps consist of discrete, stand-alone software that works on mobile devices such as smartphones, tablets, and personal digital assistants (Lui et al., 2017). Their features include visual appeal, extensive multimedia capabilities, self-paced use, content sharing, customizability, and the ability to track user progress anytime, anywhere (Bricker et al., 2014).

Currently, as the acquisition of mobile devices continues to increase worldwide, it has been proposed that apps, due to their connectivity, mobility, and availability, can become an important vector for mental health interventions (Lecomte et al., 2020). Thus, apps with mental health-related objectives have rapidly proliferated in recent years, with more than 10,000 apps currently available (Torous et al., 2019). These apps encompass various intervention types and generally feature elements such as symptom monitoring, delivery of various therapeutic tools (e.g., relaxation exercises), psychoeducation, recruitment of social support, and positive reinforcement (Lui et al., 2017). Thus, these applications seek to provide mental health benefits in a variety of ways, making it possible to measure, monitor, and actively manage problems, among other functions (Yardley et al., 2016).

Virtual Reality and Augmented Reality Accelerated advances in the creation of artificial or altered environments in recent years have also impacted on mental health interventions through technologies such as virtual reality (VR) and augmented reality (AR) (Vinci et al., 2020). VR is a digital technology that artificially creates sensory experiences while allowing the user to manipulate objects within the virtual environment (Zeng et al., 2018). Thus, VR combines 3D graphics, motion trackers, vibration platforms, and audio to create immersive and interactive environ-

ments (Vinci et al., 2020). This technology makes it possible to produce therapeutic situations that are difficult to recreate in real life, providing repeated and immediately available treatment (Freeman et al., 2017). In general, VR interventions incorporate exposure and social skills training, strategies that are well suited to naturalistic virtual environments, allowing greater control of the stimuli presented in therapeutic strategies and lower risk compared to strategies such as in vivo exposure (Vinci et al., 2020). In addition, simulations can be designed to be presented repeatedly and graded in terms of difficulty until the desired change occurs (Freeman et al., 2017). For its part, AR "affects the perception of the real-world environment by 'augmenting' it with computer-generated digital objects" (Vinci et al., 2020). Therefore, AR can be considered an extension of VR: while VR integrates the person into the virtual environment, AR integrates virtual data or objects into the real environment (Bin et al., 2020). Thus, AR combines real and virtual objects in the real world, aligning them with each other and operating in response to the user in real time (Vinci et al., 2020).

Video Games Among mediated virtual experiences, video games have recently attracted attention given the potentialities of their use to promote positive functioning (Villani et al., 2018). Thus, in recent years, game-based digital interventions have been developed to address mental health problems (Fleming et al., 2017). The literature in this field has mainly focused on two approaches: the so-called "serious games," which are designed to educate, alleviate symptoms, train, or change behaviors while entertaining players (Lau et al., 2017), and "gamification," which consists in the inclusion of game elements (e.g., scoring and rewards) in nongame contexts (Fleming et al., 2017). Importantly, research has shown the potential of video games in the development of various cognitive, emotional, and social skills (Villani et al., 2018). In addition, video games have been observed to be useful both as a psychoeducational tool (Shah et al., 2018) and for assessment and rapport building in psychotherapy (Colder Carras et al., 2018). Depending on the developmental capacity of their target audience, video games can vary greatly in their level of complexity, interactivity, social interaction, immersion, and story development (Shah et al., 2018).

Chatbots Chatbots (conversational agents, conversational bots, or chatterbots) are computer programs that can interact with human users through spoken, written, and visual language (Abd-Alrazaq et al., 2019). Recently, the use of this technology has increased significantly in the field of mental health (Abd-Alrazaq et al., 2020). For example, chatbots have been used to assess self-esteem and anxiety, promote user engagement, and increase symptom awareness in those who are reluctant to seek treatment (Cameron et al., 2017), as well as to complement evidence-based therapies by targeting symptoms of depression (Abd-Alrazaq et al., 2019).

Websites Finally, the increased use of web technologies and resources has influenced the way people seek help, as their accessibility has created opportunities to make available more sources of care and information (Pretorius, Chambers, & Coyle, 2019). Thus, individuals can access various websites and web-based materi-

als to support the self-management of mental health problems (Stawarz et al., 2019). In this domain, formal and informal resources such as social media and discussion forums exist to promote help-seeking (Pretorius, Chambers, Cowan, & Coyle, 2019). Therefore, the growing role of alternative sources of help such as YouTube, blogs, self-help websites, and discussion forums needs to be studied to determine how they are used and how they can be positively enhanced (Pretorius, Chambers, & Coyle, 2019). In addition, these tools are used as a source of peer support, with evidence suggesting that they promote a sense of community, help raise awareness and combat stigma, and provide spaces for expression and coping (Stawarz et al., 2019).

4.2.2 Uses of Digital Technologies in Mental Health

Just as there is diversity in the types of digital mental health interventions, these interventions can also be administered in diverse ways. For instance, interventions can be delivered synchronously, that is, in real time (Bernardy et al., 2019). Most of the literature on synchronous digital interventions focuses on services delivered via video calls, as they are the most similar to face-to-face treatments (Berryhill et al., 2019). Interventions can also be asynchronous, with communication occurring at different times and being delivered through means such as email, voicemail, or text messages (Orsolini et al., 2021). Asynchronous interventions include protocolized self-help programs, which may involve contact with healthcare professionals or staff (i.e., guided interventions) or be used without therapeutic support (i.e., unguided interventions) (Bernardy et al., 2019).

Another mode of administration consists in using digital interventions as a tool attached to traditional face-to-face formats (i.e., blended treatment). This approach is aimed at strengthening the effectiveness and efficacy of said interventions (Neary & Schueller, 2018; Schuster et al., 2020).

Lastly, collaborative programs (Martínez et al. 2018b) and distance consultancies or teleconsultations (Mundt et al., 2021) represent another way of implementing digital technologies. In this case, technologies are used to allow teams of mental health specialists to collaborate with primary healthcare teams in centers where there are no specialists (Orsolini et al., 2021). Thus, the objective is to enhance the resolution capacity of primary care, improve the referral of patients across all levels of care, and safeguard the continuity of care for the population with mental health problems (Martínez et al. 2018b).

4.3 Digital Interventions for Youth Depression

4.3.1 Digital Interventions for Preventing Youth Depression

Evidence indicates that mental health problems can be prevented and that interventions during childhood and adolescence enhance the benefits of prevention efforts (Baños et al., 2017). Prevention focuses on reducing the incidence, prevalence, or severity of mental health problems (Clarke et al., 2015), involving various actions that seek to reduce risk factors, interrupt the progress of problems, and reduce their negative consequences (Baños et al., 2017).

Prevention includes interventions termed universal (i.e., for the entire population), selective (i.e., for people with risk factors), and indicated (i.e., for people who show early signs of mental health problems) (Ebert et al., 2017). Also, since reaching as many people as possible is another fundamental element of prevention, the accessibility of digital interventions makes them especially suitable for young people (Baños et al., 2017).

Preventive digital interventions for young people have attracted less scholarly attention than those aimed at the adult population (Ebert et al., 2017). However, several authors have sought to synthesize the current evidence for preventive digital interventions for young people in reviews and meta-analyses. For example, in their systematic review of preventive interventions for young people, Clarke, Kuosmanen, and Barry (Clarke et al., 2015) identified a total of 20 studies of digital interventions, most of which are computer-based CBT programs designed to prevent depression and/or anxiety. The authors found that the studies varied in quality, classing them as weak, moderate, or strong in this regard. Those deemed to be "strong" showed significant positive effects in reducing depressive symptoms, with these improvements being maintained in those studies that included follow-up assessments at 6–12 months. However, the authors note that these results should be viewed with caution because of the generally small sample sizes used (Clarke et al., 2015). In addition to the above, the studies indicated high acceptability, especially in those interventions that included support from therapists over the Internet. Regarding support, the authors point out that, given the diversity of the studies in terms of design and quality, it is difficult to establish what type of support is necessary – and how intense it must be – to promote the participation of young people in interventions of this type. Finally, dropout was a significant issue for digital preventive interventions, as participants completed an average of 50% of the modules included in the programs (Clarke et al., 2015). This problem is consistent with the evidence for digital interventions in other populations (Batterham & Calear, 2017).

Another study, which consisted in a systematic review and meta-review by Hollis et al. (2017), analyzed the results of 30 randomized controlled trials (RCTs), of which 7 were preventive interventions for young people. These preventive interventions included a total of 1345 participants aged 12–25 years. The interventions were both universal and indicated, featuring components such as behavioral activation, CBT, psychoeducation, interpersonal psychotherapy, and modification of attention

bias. Overall, the analyses revealed that the most effective digital interventions used the CBT approach, attaining small to moderate effects, whereas the rest of the interventions yielded poorer results. However, it is worth noting that the strongest effects were found in interventions with non-active comparators (e.g., waiting list control). Furthermore, the interventions varied in terms of the level of human and technical support offered, leading to particularly deficient acceptance and adherence results for unguided interventions. Finally, the authors note that none of the studies presented cost-effectiveness data.

Garrido et al. (2019) examined, quantitatively and qualitatively, the effectiveness and engagement results of research on digital interventions published between 2007 and 2017. The interventions were diverse (e.g., web- and computer-based, applications, games, text messages) and were implemented in various contexts (schools, hospitals, and community settings). Most of the interventions were based on CBT strategies or a combination of CBT with other models. Analyses indicated that digital interventions had small effects compared to non-active control groups, and no differences were found compared to active controls. Regarding support, most of the interventions were guided, and these were found to be more effective than the unguided ones. Regarding adherence and commitment, qualitative data from the studies were categorized as characteristics that participants liked or disliked and as characteristics that predicted adherence. One of the characteristics that the participants liked was the social support associated with the interventions, as they perceived that contact with professionals and/or the possibility of connecting with peers with similar difficulties was useful to them. Another of the main attractions of the interventions was their digital nature, with the participants highlighting aspects such as privacy, anonymity, and the possibility of adapting the interventions to their routines and interests, added to the possibility of accessing them in various locations. Another aspect evaluated positively was the content of the interventions, as the participants indicated that the topics covered helped them to learn more about mental health and become familiar with specific techniques for their difficulties (e.g., questioning negative thoughts). With respect to the negatively evaluated characteristics, one of the aspects pointed out by the participants was the so-called educational content, which they criticized when the modules were seen as too long, exhausting and/or tedious, and not adjusted to their needs (e.g., possibility of skipping modules). The participants also evaluated interventions negatively when they found them too youth-oriented or condescending. They also mentioned the negative impact of technical failures or navigation difficulties, which were among the reasons cited for low adherence and commitment. Finally, few studies reported factors predictive of adherence, which included the context of the intervention (greater adherence in school settings), gender (greater adherence of female participants), and mental health (higher initial symptomatology scores and previous history of mood disorders predicting greater adherence) (Garrido et al., 2019).

Recently, Bergin et al. (2020) published the results of a scoping review of digital interventions aimed at examining factors related to implementation. This review included 30 studies of preventive interventions (universal, selective, and indicated) for depressive and/or anxiety symptoms. Most were web- and computer-based

interventions targeting adolescents between 15 and 16 years of age (Bergin et al., 2020). The results showed diversity in terms of the reporting and measurement methods used to collect information about the usability, participation, and implementation features of the interventions, as well as with respect to how the sociodemographic characteristics of the samples were reported. Regarding the barriers and facilitators related to implementation, the results showed that these varied according to the contexts in which the programs were implemented. For example, in school-based programs, completeness was affected by absenteeism (Bergin et al., 2020). However, aspects such as technical difficulties affected all implementation settings and were overcome with the support of the research teams. In general, the authors state that, since few studies consistently report the factors related to the implementation of digital interventions, they still cannot reach their full potential, given that there is a lack of understanding of the optimal implementation choices (Bergin et al., 2020).

4.3.2 Digital Interventions for Treating Youth Depression

Although digital interventions for the treatment of youth depression are a rapidly developing field, it remains limited compared to research in the adult population. However, various efforts are being made to examine the current evidence for this type of intervention. For example, in a systematic review and meta-analysis, Grist et al. (2019) examined the results of 34 RCTs of digital interventions for the treatment of depression and/or anxiety in children and adolescents. The studies analyzed included a total of 3113 participants aged 6–22 years, with an average of less than 18 years. Most of the interventions consisted in web- and computer-based CBT (50%), while the rest included attention bias modification training, cognitive bias modification training, problem solving therapy, acceptance and commitment therapy, biofeedback, and emotion regulation training. Regarding effectiveness, analyses revealed that CBT-based digital intervention produced moderate effect sizes ($g = 0.66$) compared to non-active control groups (e.g., waiting list). However, the quality of the studies was varied, with most studies showing low risk of bias in aspects such as participant randomization, but showing high risk of bias in the reports and in the blinding of participants and personnel involved in the trials. Regarding program completion, the studies varied widely regarding whether and how it was reported, with an average of 64%. The authors also presented subgroup analyses, for example, of therapeutic support. These analyses pointed to a significant effect of the guided interventions, which produced larger effect sizes compared to the unguided ones. However, both the guided and unguided interventions were significantly better than the control groups. Therapeutic support was also identified as a moderating factor of commitment and therapeutic outcomes. Other analyses showed that interventions with parental support significantly differed from and had larger effect sizes than those without support. Furthermore, it was also observed that interventions that featured participants with a confirmed diagnosis of depression produced significantly larger effect sizes than those that targeted participants with

severe symptoms. Finally, there were no significant differences between studies with children, adolescents, and mixed ages, with all the age subgroups of the intervention groups exhibiting a significant benefit over the control groups.

Another recent systematic review and meta-analysis by Christ et al. (2020) evaluated the results of 24 RCTs of computer- and web-based CBT for adolescents, emerging adults, and mixed samples with depression and/or anxiety. In more than half of the studies, interventions were guided by a therapist or researcher who monitored progress and provided personalized support, encouragement, clarification, or feedback. Regarding adherence, the results indicated an average of 57.12% in the 19 studies in which it was reported. Regarding control groups, most studies compared interventions with a non-active control group (e.g., waiting list), while the remaining studies used placebo controls (e.g., information control) or treatment as usual (TAU). The pooled effect sizes of the interventions with respect to depressive symptoms were moderate compared to the control groups (active and non-active), with moderate to high heterogeneity. Regarding effectiveness at short-term follow-up (i.e., up to 5 months), only three studies reported these results, with no significant differences being found between the interventions and their control groups. However, in the three studies in which the results of long-term follow-up effects (i.e., 6–12 months) were reported, the interventions were noted to be effective in reducing depressive symptoms compared to non-active control groups. Regarding the quality of the studies, most of their results were found to be poor overall. Thus, the high risk of bias observed was mainly due to bias in outcome measurement and missing outcome data. Christ et al. (2020) also performed subgroup analysis, which revealed no evidence that aspects such as diagnosis, age, level of support offered, adherence, recruitment type, or number of modules completed were associated with differential effect sizes.

Liverpool et al. (2020) recently published the results of a systematic review focused on modes of delivery, facilitators, and barriers in digital interventions for children and young people (up to 25 years). The review indicated that six types of digital intervention exist: websites, computer-based games and programs, apps, robots and digital devices, VR, and text messaging. The factors presented as barriers and facilitators of digital interventions were categorized into two broad themes, which included intervention and person-specific influences. Regarding intervention-related factors, the authors identified suitability (accessibility and convenience), usability (ease of use and/or understanding), and acceptability of the characteristics of the intervention. In this area, one of the main factors was acceptability, where elements such as images, language, and interfaces could constitute a barrier to engagement if they were unappealing to the participants. In contrast, the participants highlighted features such as the inclusion of videos, personalization or creation of profiles, and the possibility of connecting with others as features that promoted the use of the interventions. Regarding usability, those interventions that were described as self-paced, user-friendly, age-appropriate, simple, and straightforward were favored by the participants (Liverpool et al., 2020). On the contrary, those interventions in which participants encountered problems understanding the task or did not receive enough instructions decreased the probability of continuing to use them. The

possibility of including interventions according to their lifestyle was another facilitating factor, as it enabled participants to access them anytime and anywhere. With respect to person-specific factors, motivation (usefulness) and opportunity (trust and anonymity) were deemed fundamental. Regarding motivation, curiosity and perceived need stood out, as less interest was shown in interventions considered not very useful or too general. Regarding opportunity, the participants indicated that social connection (peer interaction or therapist support) promoted the use of the interventions. Furthermore, participants also identified trust as a critical issue, with interventions that raised concerns regarding privacy, anonymity, or uncertainty of their validity being less accepted and used (Liverpool et al., 2020).

4.4 Advantages and Challenges of Digital Interventions

The advantages of digital mental health interventions have been widely covered in the literature, with authors proposing several benefits that include better uptake and accessibility, efficiency, clinical effectiveness, and customization (Hollis et al., 2017). Digital interventions offer greater availability and accessibility, with participants being able to use them at a time and place of their choice (O'Dea et al., 2015). This has been pointed out as an important benefit for disadvantaged populations and/or people living in isolated geographic areas (Clarke et al., 2015). In addition, digital interventions offer greater privacy and anonymity, which increases access among people who are not willing to seek face-to-face help due to the stigma associated with mental health problems (Grist et al., 2019). Other widely discussed advantages of digital interventions include their potential to reduce health system costs, rapid scalability, and dissemination (O'Dea et al., 2015) as well as low-cost delivery (Grist et al., 2019). Thus, digital interventions promise cost-effective evidence-based interventions at scale, reducing disparities and removing barriers in access to mental healthcare (Odgers & Jensen, 2020). In addition, these types of interventions also offer flexibility in self-direction and self-pacing, high fidelity due to automated delivery, ease of use, quick feedback, and the appeal of interactivity and visual features (Ebert et al., 2015; Liverpool et al., 2020; O'Dea et al., 2015).

It has been proposed that the advantages of digital interventions could be especially relevant for young people (Ebert et al., 2015), given their greater digital literacy, access to and use of technology (Liverpool et al., 2020), and ownership of digital devices (Garrido et al., 2019). Thus, young people, considered to be digital natives, exhibit high acceptance of technology and digital formats, which are suited to their activities, habits, culture, communications, relationships, and social connection (Baños et al., 2017). In addition, several studies show that young people use the Internet as an important source of information on mental health, preferring it and feeling more comfortable when addressing personal problems in the relative anonymity of an online context (Garrido et al., 2019).

Despite the numerous advantages that digital interventions can offer, their potential benefits are hindered by various difficulties and limitations (Bergin et al., 2020).

Therefore, although current evidence from youth depression prevention and treatment programs is promising, challenges are observed in several areas (Topooco et al., 2018). The most commonly mentioned issues include limitations in program acceptance, commitment, and adherence (Bergin et al., 2020). Thus, the evidence indicates that, despite the great accessibility offered by digital interventions, these limitations make it difficult to use, disseminate, and research them (O'Dea et al., 2015). It has been proposed that these difficulties are linked to methodological and design aspects (e.g., how human support is incorporated) and that they can be overcome by attaining a deep understanding of the intended behavior of users and their environments (Orlowski et al., 2015).

Other challenges stem from the clinical limitations of digital interventions, including restricted adaptation to the needs of the patient, difficulties in addressing comorbidity, and problems dealing with acute crises (Liverpool et al., 2020). In addition, several concerns have been raised regarding digital interventions: their impact on the therapeutic relationship, their efficacy in treating more serious problems, their high attrition rates, and concerns about technology failure during therapeutic processes and quality control (Grist et al., 2019). Other challenges arise from the cautious or negative attitudes of professionals towards digital interventions; among other issues, they mention the inability to address important aspects of the disease, data security, and accessibility (Liverpool et al., 2020).

Furthermore, several research gaps have been identified, for example, with respect to the wide diversity and methodological and reporting quality of RCTs, which results in difficulties for combining and comparing research in systematic reviews and meta-analyses (Hollis et al., 2017). In addition, current evidence points to the presence of highly heterogeneous studies and a clear scarcity of longitudinal results that might allow us to determine whether the benefits of the interventions hold in the long term (Baños et al., 2017). The scarcity of economic evaluations and implementation studies constitutes another relevant limitation, as there is very little evidence showing that digital interventions for young people can be successfully implemented (Bergin et al., 2020). Given these limitations, and since the field of digital interventions advances at such an accelerated rate, it has been suggested that the capacity of traditional research designs (such as RCTs) to generate evidence has been overwhelmed (Hollis et al., 2017). Finally, although research on the young population has increased in recent years, it is still limited compared to research in adults (Christ et al., 2020).

4.5 Ethical and Legal Considerations of the Use of Digital Interventions

There are important aspects that must be considered for an ethical use of digital interventions, the first of which is selecting evidence-based interventions to ensure their quality and rigorousness (Baños et al., 2017). This is relevant because the rapid

development of digital interventions (such as apps) has led to an explosive increase in their availability, causing many of them to remain unevaluated (Torous et al., 2019).

Security, privacy, and confidentiality are other fundamental aspects of digital interventions (Grist et al., 2019). To meet these requirements, the literature suggests using safe and proven platforms such as Skype for Business, Updox, VSee, Zoom for Healthcare, Doxy.me, and thera-LINK (Chiauzzi et al., 2020). In addition, it is relevant to consider that aspects such as the use of other people's devices or the recording of sessions (which require explicit consent) can increase the risk of breaches of confidentiality (McSwain et al., 2017; Myers et al., 2017). Thus, it is essential that professionals take reasonable measures to preserve confidentiality, considering aspects such as the context in which the person will be treated and their preferences to agree on how, where, and through what means the intervention will be carried out (Chiauzzi et al., 2020). Finally, with respect to safety, professionals must consider the possibility of emergencies and/or acute crises and prepare accordingly (McSwain et al., 2017; Myers et al., 2017).

Regarding the young population, it must be considered that the implementation of digital interventions for minors requires parental consent. However, since reliably obtaining consent online can be difficult, this can be a barrier to reaching these groups (Ebert et al., 2017). In consequence, it has been suggested that these procedures should include information on why the interventions are justified, their benefits, risks, limitations, duration, costs and conditions, and connections with their implementation settings, among other issues (Myers et al., 2017).

Finally, given the rapid adoption and development of digital interventions, equitable and inclusive research, policies, and interventions are required to prevent their use from amplifying inequalities in youth mental health and benefiting only those who are best positioned to take advantage of the possibilities that they provide (Odgers & Jensen, 2020). Thus, this field requires laws, regulatory frameworks and policies, political will, and financing conducive to the proper use, development, and implementation of digital interventions (Titov et al., 2019).

4.6 Implementation Recommendations for the Use of Digital Interventions

Despite the promising results, advantages, and benefits of digital interventions for the prevention and treatment of mental health problems in young people, current evidence indicates that more research and development are required (Bergin et al., 2020). For example, users' and health professionals' expectations and preferences regarding digital interventions are among the most frequently mentioned barriers to scalability (Vis et al., 2018). Thus, researchers have suggested that, for an effective implementation and sustained use, interventions must be adequately designed in terms of both their purpose and practical implementation (Liverpool et al., 2020).

Thus, the importance of involving young people, communities, and stakeholders in the multiple stages of development and implementation has been pointed out in order to strengthen the adoption, adherence, acceptability, and effectiveness of digital interventions (Orlowski et al., 2015). Thus, evidence suggests that participatory research strategies and the co-design of interventions can ensure that these are developed according to the needs, stage of development, lifestyle, and preferences of young people (Liverpool et al., 2020). The authors have also proposed moving away from traditional computer-based interventions and using the most up-to-date technology (such as apps, games, VR, and AR) in interventions aimed at this modern technology-oriented population to increase their attractiveness and usability (Ebert et al., 2017). In addition, researchers have suggested including elements such as rewards and reminders (which are part of persuasive design methods) to promote user engagement and adherence (Liverpool et al., 2020).

Additionally, to improve acceptance by mental health professionals, it is important that they also get involved in the strategy design and decision-making processes of digital mental health interventions (Vis et al., 2018). Likewise, researchers have suggested that interventions should be developed and implemented by interdisciplinary teams that combine knowledge and experiences from various areas (not only mental health), including professionals from fields such as communication and computer science (Odgers & Jensen, 2020). In addition, to ensure the proper implementation of digital interventions, it is necessary to design training programs for health professionals and offer them continuous guidance (Titov et al., 2019).

4.7 Future Directions for Digital Interventions

If digital interventions are the way to overcome current deficits and disparities in health systems, more research is required, especially in young people, since less evidence is available for this age group than for the adult population (O'Dea et al., 2015). This entails improving the quality of research to collect more solid evidence of the effectiveness of these interventions as well as considering other methodologies in addition to traditional RCTs (Hollis et al., 2017). Given the fast pace of technological advances, new methodological frameworks and research designs are required (e.g., micro-randomized trials) that are adapted to emerging needs in this area and allow a timely response to them (Liverpool et al., 2020).

In addition, it is necessary to accumulate a larger and deeper body of evidence in relation to elements such as long-term outcomes and cost-effectiveness data (Das et al., 2016). This can help to corroborate the expectation that digital interventions can reduce the health and economic burden of mental health problems in young people (O'Dea et al., 2015). Furthermore, it is necessary to deepen our understanding of the differences between guided and unguided interventions in order to determine what type of support can generate the greatest benefits (and under what conditions) (Ebert et al., 2017).

Likewise, differential reports are required with respect to characteristics such as gender, ethnicity, socioeconomic status, and geographic and social contexts, since the impact of digital interventions may vary depending on these factors (Das et al., 2016). The scarce evidence in this area makes it difficult to generalize current findings to populations with the greatest need for digital interventions and that might benefit the most from them (e.g., minorities; Bergin et al., 2020). Along the same lines, given that most studies have been conducted in high-income countries, it is necessary to obtain rigorous and high-quality evidence of effective interventions for the prevention and treatment of young people's mental health problems in low- and middle-income countries (Jiménez-Molina et al., 2019; Martínez et al., 2018a; Naslund et al., 2017; Rojas et al., 2019).

Furthermore, future research should incorporate other types of digital interventions in addition to traditional web- and computer-based interventions (Ebert et al., 2017). This can improve engagement and intervention outcomes through technologies that are better matched to the characteristics and lifestyles of the young population (Liverpool et al., 2020). In addition, current technological developments offer a wide variety of opportunities and new functionalities, such as greater interactivity and the possibility of connecting with other types of devices (e.g., sensors), which could enhance the benefits and use of digital interventions (Stiles-Shields et al., 2016).

Finally, future research should address those aspects of implementation that have yet to be fully addressed, such as workforce issues, training of professionals, and the transfer of evidence for real-world adoption (Bergin et al., 2020). It is also important to take into account the contexts in which the interventions will be delivered (Baños et al., 2017). Since digital interventions offer flexibility regarding when, how, and where they are used, specific application contexts (e.g., school and primary care) can offer unique challenges and opportunities (Bergin et al., 2020). Furthermore, current evidence highlights the importance of participatory research and co-design (Orlowski et al., 2015): it has been proposed that the inclusion of young people, their parents, various groups of specialists, and stakeholders in the design and development of these types of interventions is necessary to enhance their benefits and overcome obstacles such as low adherence (Bergin et al., 2020).

4.8 Conclusions

There is some promising evidence for the effectiveness of digital interventions in preventing and treating youth depression. This is relevant given its high prevalence, its negative consequences, and the current deficits of health systems when it comes to addressing this problem. In this context, digital interventions offer various advantages and opportunities, such as accessibility, flexibility, and interactivity. In addition, these types of interventions can be especially useful for the young population, since they match their preferences and lifestyles while also offering more privacy, thus reducing the stigma associated with mental health problems. However, for this type of intervention to achieve its full potential, it is necessary to address various

challenges and obstacles. For instance, research and implementation processes need to be improved, which requires new methodological frameworks that are capable of adjusting to a constantly changing and developing field while also making it possible to respond to the current knowledge gaps. Thus, participatory research and design involving all agents (young people, researchers, professionals, communities, and stakeholders) are key to developing effective interventions that are tailored to the needs and preferences of this population and that can be adopted and used sustainably. In addition, cost-effectiveness data are essential to fulfill the promise that digital interventions can be effective, low cost, and rapidly scalable. This is highly relevant considering that these interventions could be especially beneficial to vulnerable populations. However, current evidence does not allow clear conclusions to be drawn in this regard, which might cause gaps and disparities in youth mental health to remain unchanged. Finally, it is necessary to generate regulatory legal frameworks that allow digital interventions to be developed, researched, and ethically implemented.

Conflict of Interest The authors declare that they have no conflict of interest.

Acknowledgments This manuscript was supported by ANID – Millennium Science Initiative Program – ICS13_005 and NCS2021_081, and by ANID – FONDECYT N°1221230. DL received funding from ANID/BECA DOCTORADO NACIONAL/21200952.

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Chapter 5
Contemplation of Nature to Promote Mental Health and Prevent Depression in Youth

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5.1 Losing Contact with Nature in Current Times

For millions of years, *Homo sapiens* have evolved and developed in natural habitats dominated by plants, animals, rivers, mountains, lakes, hills, and grasslands. Now, an estimated 55% of the world's population lives in urban areas, as urbanization continues to increase worldwide, and is estimated to reach 68% by 2050 (United Nations, 2018). The highly urbanized and artificial environment is a contributing cause of the "state of stress" in modern people (Song et al., 2016). The triggers of urban life, such as intense noise, traffic, and frenetic pace, as well as overload at work, university, and school, in addition to the pressure of social expectations, tend

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_5

to prolong stress, generating chronic stress (Arvay, 2015). Living in urban environments has been documented to have a negative impact on emotional health, and it is especially related to an increased risk of depressive disorders (Kovess-Masféty et al., 2005; Wang, 2004). It appears that the loss of contact with the healing and restorative properties of nature contributes to the generation and perpetuation of stress.

Increasing urbanization and less access to green spaces are affecting the physical and mental health in children and adolescents. A strong relationship has been observed between living environments with less green space and anxiety disorder and depression, especially in children and people with lower socioeconomic status (Maas et al., 2009). Socioeconomically deprived children and adolescents, especially in urban areas, are also at an increased risk of behavioral disorders (Trivedi et al., 2008). Urbanization has been associated with increased rates of substance use and technology addiction among youth, as well as high rates of self-harm in adolescent females (Chandra et al., 2018).

In addition, the current pandemic times pose an exponential burden and threat to the mental health of children and young people (Ford et al., 2021). Physical restraints and social distancing measures are affecting the development of self and interpersonal regulatory systems at critical periods of personal development, contributing to vulnerability to stress. For example, Meherali et al. (2021) conducted a systematic review, selecting 18 articles, and reported that children and adolescents are more likely to experience anxiety, depression, sleep and appetite disorders, and impaired social interactions during and after a pandemic. They highlight the impact of mitigation measures and describe common affective symptoms such as stress, worry, helplessness, and social and risk behavior problems.

5.2 Contemplation of Nature as a Practice of Connection

Contemplative practices (e.g., sitting meditation, breath awareness, walking meditation, yoga) are activities or actions that allow us to slow down and deepen awareness and connection as ways to promote well-being and alleviate human suffering. Awareness refers to seeing clearly the phenomena of experience, including thoughts, emotions, and sensory information as they occur: “What am I noticing now?” Connection refers to an intimate attunement to the experience: “What is my relationship/attitude to the present moment like?” Over the past several decades, contemplative interventions have been incorporated at a secular level among diverse populations, age ranges, and within clinical and educational perspectives, with the goal of achieving well-being and resilience (MLERN, 2012). The most studied interventions include mindfulness-based interventions, compassion training programs, and other mind-body practices, showing benefits across a wide array of conditions in physical, mental, and emotional domains including changes at neurological and

immunological levels (Goldberg et al., 2018; Guendelman et al., 2017; Khoury et al., 2015; Rosenkranz et al., 2013). Specifically in youth, contemplative practices can foster the development of self-regulatory, mentalizing, and empathic capacities contributing to the building of internal resources for resilience (Medeiros & Guendelman, 2019).

Nature contemplation can be understood as a contemplative practice that can help us recover our embodied, embedded, and interconnected experience. Different nature-based interventions (NBIs) have emerged and are being incorporated in different contexts and age ranges. Some examples are horticulture therapy, community gardening, nature meditation, and forest therapy, among others (Chaudhury & Banerjee, 2020). Franco et al. (2017) recall how interest in nature as a therapeutic resource has ancient foundations, including Hippocrates, who extolled the benefits of air, water, and natural environments for physical and mental well-being. Shamans and healers from all traditions have always recognized the healing power of nature.

We have all experienced the peace of mind and tranquility that arise when we are in contact with nature: being in a forest, by the sea, on a lake or a mountain, listening to the sound of the wind, the waves, the current of a stream, the singing of birds, the smells of a forest or flowers, the light reflecting off a lake or coming through the leaves of a forest. Connecting with and exploring nature allows a sense of comfort, security, and belonging and offers promising benefits for promoting mental health.

5.2.1 Coming Back to Our Senses Through the Forest: "Shinrin-Yoku"

One of the most scientifically explored examples of NBIs is "shinrin-yoku," a term proposed in Japan in 1982. Its literal meaning corresponds to "forest bathing" (also referred to as forest therapy) and consists of immersing oneself in nature by mindfully using all the senses (Hansen et al., 2017). The duration of each session can vary, for example, a single session from 2 to 4 hours, short 15-min sessions twice a day for 3 consecutive days, 12-week forest-based programs, and others. Some activities are conducted with the guidance of a therapist, while others are realized individually (following instructions and behavioral recommendations) or in a group. According to Clifford (2018), "forest bathing is not the same as hiking." "The destination in forest bathing is here, not there. The pace is slow." "We walk slowly so we can focus our senses on the myriad ways the living forest surrounds and touches us. Feeling the breeze on our skin, hearing the gurgle of the stream and the calls of the birds, seeing the movement of the trees in the wind… When the forest is allowed to take its place within you, it supports your body's natural capacity for wellness and healing" (p. 2).

5.2.2 *Key Factors of Nature Contemplation to Enhance Mental Health Promotion and Depression Prevention*

We consider NBIs to be contemplative practices in themselves. However, when formal meditative practices or instructions to train attention (such as mindfulness practices) are incorporated, there appears to be an enhancing effect. In fact, a recent study demonstrated that mindfulness instructions improve mood during exposure to nature in an urban setting (Nisbet et al., 2019). Specifically, 100 participants were randomly assigned to 20-min guided walks under the following conditions: outdoors, outdoors with mindfulness, or indoors. The results indicated that walking outdoors presented more relationship with nature and better mood than those who walked indoors. However, the group with mindfulness practice, compared to the group walking outdoors, reported greater awareness of their environment, greater connection with nature, and lower negative affect. In a similar perspective, mindfulness practice in NBIs has been argued to be a key component to acquire the potential health benefits of exposure to nature (Djernis et al., 2019; Huynh & Torquati, 2019). Based on existing mindfulness research and theory, we highlight two attentional and attitudinal contemplative skills that may underlie benefits and should be further explored, particularly in youth at risk for depression. These are (1) sensory awareness of present moment experience in nature and (2) feeling gratitude and the perception of beauty.

Sensory Awareness of Present Moment Experience in Nature Our brains, including the limbic system, have evolved to inform us of whether we can relax and connect in a certain place or situation or, on the contrary, if we are in alarm mode and should activate fight or flight reactions. According to De De Wit (2008), from a contemplative perspective, suffering arises when we resist the changing and sometimes difficult nature of experience. This resistance can include hyperactivity and overthinking, as well as disconnection or avoidance of emotional and physical difficulties. The stressed mind constantly wanders or clings to things being different; the stressed body is in a state of hyperarousal and unease. Chronic stress can lead to a dysregulated neurocircuitry that underlies mental illnesses such as depression, schizophrenia, and anxiety disorders. Dysfunctional modes of thinking, in particular repetitive negative self-referential thinking (rumination), and experiential avoidance of emotions appear at the base of depression (Cribb et al., 2006; Mellick et al., 2019).

Contemplative practices cultivate focused attention as a means of stabilizing the mind in the present moment and counteracting dysfunctional thinking and disembodied patterns (Guendelman et al., 2017). Among these, nature-based practices that deliberately increase awareness and connection to the sensory experience of the present moment may offer profound healing properties, as greater inner calm and safety are experienced. A contemplative approach while in nature can facilitate a shift from self-referential narratives to direct, present-centered contact with the body and senses, i.e., touch, sight, hearing, smell, and taste. The senses help us to

situate ourselves in the present moment and thus absorb all that nature offers us, to welcome it and let it settle in us. As Clifford (2018) suggests, "By giving attention to your senses, you turn down the volume on the cacophony of inner thoughts. Your senses bring you into the present moment, where you can take in all the forest has to offer" (p. 2).

Franco et al. (2017) reveal the importance of multisensory pathways through which the benefits of nature are provided. Beyond visual components, for example, sounds such as wind, rushing water, birdsong, and chatter can counteract anthropogenic sounds such as traffic, recreational, and industrial sounds that contribute to stress. Similarly, many natural smells such as flowers, freshly cut grass, and damp earth evoke pleasant and calming sensations and mood. Furthermore, these authors differentiate a passive reception of the benefits with a more active engagement with the environment, in line with the idea of deliberately cultivating sensory awareness of present moment experience in nature.

Feeling Gratitude and the Perception of Beauty In the modern world, we tend to forget something very important: that we depend on the earth and that the sun, the climate, and the plants are fundamental for our existence. In his book, *A Song of Love to the Earth*, mindfulness teacher Nhất Hạnh suggests that we tend to think of ourselves as the center of the universe and our interest is focused almost exclusively on our survival. Much of our fear, hatred, anger, and our feelings of loneliness may stem from a sense of separation. We are so caught up in our work and our problems that we have forgotten that we are more than just our minds. A contemplative attitude toward nature that perceives beauty and cultivates a sense of gratitude can counteract that illusion of separateness, helping to recognize interdependence and foster care and belonging. According to Nhất Hạnh (2013), if one looks deeply and reflects on all the virtues of nature, one can experience the connection that binds one to the earth and realize that nature is not just the environment around us, arising in us great respect and admiration for the miracle of life.

To perceive beauty, we must train our attention capacity, something that mindfulness does (Langer et al., 2017). In other words, focusing on sensory awareness is training attention. Once the mind and the body are in a state of "attentive calm," we are more "available" to perceive what is around us. A central point of interest is that contact with nature could be a catalyst for perceiving beauty in a bidirectional way, i.e., that nature contemplation can reveal both a new point of view on what is perceived and, potentially, an insight of the self through what is observed (Langer et al., 2017).

A new view or appreciation of ourselves or the environment can trigger the feeling of gratitude. It has been often defined as "a generalized tendency to recognize and respond with gratefulness to the role of other people's benevolence in the positive experiences and outcomes that one obtains" (McCullough et al., 2002). According to Sansone and Sansone (2010), gratitude refers to "what is valuable and meaningful to oneself." It has been claimed that gratitude is a key element of psychological well-being (Wood et al., 2010) and that mindfulness meditation enhances gratitude (Sawyer et al., 2021). Thus, we propose that nature contemplation is a

specific way to cultivate gratitude and thus promote mental health. Specifically, contemplative practices include a caring and responsible relationship with nature, recognizing the interdependence between nature and our health. In fact, the relationship between these concepts has been noted: "Simply by experiencing nature and practicing gratitude, personal well-being and quality of life can be vastly improved. Experiencing the beauty of nature and giving gratitude towards its beauty is quite an experience" (Kachru & Taylor, 2017, p. 17).

5.3 Studies on Nature, Well-Being, and Mental Health

In recent decades, there has been a growing research interest in the impact of nature on health. Exposure to nature can improve physiological and biological markers of well-being including autonomic nervous system regulation and neuroimmunological dynamics, which are often impaired by chronic stress. White et al. (2019) examined associations between recreational contact with nature and self-reported health and well-being in 19,806 participants, estimating that spending at least 120 min per week in a natural environment may promote well-being when compared with spending less time in green spaces. Also in well-being research, a meta-analysis showed that people who were more connected to nature (i.e., not just contact) tended to experience more positive affect, vitality, and life satisfaction compared to those less connected to nature (Capaldi et al., 2014). Similarly, Pritchard et al. (2020) demonstrated that connection with nature was associated with dimensions of flourishing personal resources such as personal growth (i.e., the studies pointed out the increase of positive emotions).

On a more interventionist level, Kotera et al. (2020) conducted a systematic review and meta-analysis examining 20 studies on adults conducted in Asia and Europe indicating effectiveness of forest bathing in reducing mental health symptoms in the short term, particularly anxiety. Similarly, Stier-Jarmer et al. (2021) look at the effectiveness of forest-based interventions on the cardiovascular system, immune system, and mental health. According to Antonelli et al. (2021), there is a strong evidence to recommend the use of forest bathing as a complementary practice for the improvement of mental well-being in cases of stress, anxiety, emotional imbalance, and mild mood impairments. Regarding depression in adults, research shows that forest therapy is effective in preventing and improving symptoms. For example, using the Profile of Mood States (POMS) test, Li et al. (2007) demonstrated that forest bathing (three-day/two-night trip to forest fields) significantly increases vitality and decreases anxiety, depression, anger, and fatigue in healthy female subjects. Extensive research on disease and health problems (including cancer, chronic pain, and chronic stroke) has shown the effect of forest therapy in reducing associated symptoms of depression and anxiety (Chun et al., 2016; Han et al., 2016; Lee et al., 2017; Oh et al., 2017).

In children and adolescents, exposure to nature shows mental, physical, and social health benefits. Recent systematic reviews and meta-analyses (including

randomized controlled trials and cross-sectional studies) have found reductions in emotional and behavioral problems including stress, depression, and attention-deficit/hyperactivity disorder and promotion of emotional well-being, cognitive development, self-esteem, resilience, and health-related quality of life (Mygind et al., 2019; Tillmann et al., 2018). In youth with affective and behavioral disorders and heterogeneous mental health disorders, a recent pretest-posttest non-randomized controlled study in 50 adolescent probationers explored the psychological and physiological effects of forest therapy programs. The forest therapy program, which consisted in 2 days and 1 night (vs. lecture room), offered beneficial effects on psychological and physiological measures of well-being (Jeon et al., 2021). Similarly, Macháčková et al. (2021) found a significant effect on psychopathology, irritability, restlessness, emotional instability, egocentrism, relativity, and negativism in 68 institutionalized adolescents with affective and behavioral disorders. Interestingly, this nature-based intervention included observation of patterns of prosocial behavior in forest animals. More research is needed to understand the role of nature in this population while recognizing their specific psychological needs and socio-emotional development.

To our knowledge, there are no studies designed to directly evaluate the effect of NBIs on young people presenting clinical depression. Most studies have assessed depressive symptoms among other psychological variables. For example, Chang (2015) observed a significant reduction in the Children's Depression Inventory (CDI) scores in 47 adolescents living in Seoul who participated in a forest experience program. Interestingly, they also found positive changes in Self-Confidence and Idealism Scales in the Offer Self-Image Questionnaire-Revised (OSIQ-R). Also, in Korea, the effects of a combined health promotion program using urban forests and mentoring on the perceived and psychological health of vulnerable elementary school students (from low-income families) were assessed. The results of this study showed that self-esteem and depression were significantly improved in the experimental group compared to the control group (Bang et al., 2018). Also, in university students who participated in forestry activities, a decrease in depressive symptoms was found compared to the control group (Mao et al., 2012). In addition, Furuyashiki et al. (2019) studied a sample of working-age people (including youth) with and without depressive symptoms that participated in day-long sessions of forest bathing. The results indicated that those with depressive symptoms demonstrated significantly greater improvement on many of the POMS items compared to those without depressive symptoms.

5.4 Connection with Nature and Arousal: A Regulated Mind and a Regulated Body

Going back to our physiology, when we perceive that a situation threatens our life, the body mobilizes a large amount of energy to prepare to fight or flee and to repair in case of injury. Our body knows how to cope with acute stress situations by

counteracting them through neurobiological and hormonal control systems that lead to allostasis. The autonomic nervous system (ANS) plays a fundamental role in orchestrating mind-body interactions, and its optimal functioning indicates adaptive self-regulation. Chronic stress involves dysregulation of the ANS and arousal, as excessive demands are felt as a threat and the whole organism is in survival mode. The neurobiological and systemic effects of chronic stress are well established (see McEwen, 2017). In the brain, chronic stress can cause alterations in regions such as the hippocampus, prefrontal cortex, and amygdala (McEwen, 2008) which are involved in memory, executive functions, and emotional regulation, among other functions.

At the physiological research level, heart rate variability (HRV) is a measure of autonomic nervous activity (primarily assessing parasympathetic-vagal tone) used as an index of health (Shaffer et al., 2014). An altered ANS regulation of the heart has been observed in various psychiatric disorders (Kemp et al., 2010; Quintana et al., 2016). Although the underlying mechanisms are still unclear, it seems that HRV-indexed arousal dysregulation is associated with depression (Hartmann et al., 2019). Studies in children and adolescents also point to a correlation between HRV and depressive symptoms (Blood et al., 2015). In adults, HRV has been introduced in the contemplative field to assess the effects of attentional and attitudinal practices on ANS modulation (Christodoulou et al., 2020; Medeiros et al., 2021). Regarding nature-embedded practice, the measurement of HRV has gained attention to understand its beneficial effects. For instance, Kobayashi et al. (2018) observed higher HRV in young male participants walking for ~15 min in forest environments compared to walking in urban environments. Forest bathing has been shown to reduce blood pressure (Ochiai et al., 2015; Park et al., 2009), probably accounting for reduced sympathetic activity and increased vagal-relaxed tone in blood vessels. Farrow and Washburn (2019) describe a positive relationship between parasympathetic nervous system activation and reduced anxiety. At younger ages, Jeon et al. (2021) have recently found improvement in HRV dynamics in the adolescents tested, along with beneficial effects on psychological well-being.

5.5 Nature, Inflammation, and Immune System in Mental Health

Acute stress is a potent trigger of inflammation as an adaptive response that prepares the body for eventual tissue repair and defense against pathogens. The hypothalamic-pituitary-adrenal (HPA) axis coordinates a hormonal response system to regulate stress. Through glucocorticoids, mainly cortisol, stress hormones increase to terminate the inflammatory response. Chronic stress induces endocrine and immune dysregulation and is associated with low-grade systemic inflammation that has serious

long-term health consequences (Gouin, 2011; Rohleder, 2019). Such is the case in depression, where chronic exposure to stress can lead to dysregulation of physiological and neurochemical processes including elevation of proinflammatory markers (leading to neuroinflammation) and alterations in the neurotransmitters' function (Davis et al., 2017; Howren et al., 2009). In addition, childhood adversity and early stress are associated with immune dysregulation at the epigenetic level, which results in the production of proinflammatory cytokines, leading to disease and susceptibility to infection (Chen et al., 2021). Indeed, Miller and Cole (2012) found that in adolescents at risk of depression, higher levels of childhood adversity were associated with greater increases in inflammation (measured by C-reactive protein and interleukin-6), suggesting that childhood adversity affects neuroimmune functioning, amplifying inflammatory signaling between the brain and the periphery.

Several studies in healthy adult and clinical populations exposed to nature have reported increased health and upregulation of cortisol levels and dynamics, as well as other markers of dysregulated immunology (Mao et al., 2012; Sung et al., 2012; for a review, see Antonelli et al., 2019). The case of natural killer (NK) cells is interesting as they are important contributors to cell-mediated immune response. NK cells release proteins and lymphokines such as perforin, GNR (granulysin), and GrA/B (granzyme A/B-expressing cells) that play a key role in the innate response to infections and tumors (Li et al., 2007, 2010). It is noted that NK cells may play a key role in the development of several diseases, including cancer risk, susceptibility to infections, and occurrence of autoimmune and allergic disorders (Antonelli et al., 2021). Similarly, findings of immune alterations in the pathogenesis of depression show decreased numbers and functions of NK cells (and other T cells) (Grosse et al., 2016). Chae et al. (2021) recommend the use of the number or activity of NK cells and cytotoxic molecules as effective outcome measures of the immunological effects of forest therapy. They conducted a systematic review in healthy and unhealthy participants and found that most studies reported improvement in these measures after the intervention. For college students, a recent study by Lyu et al. (2019) in 60 men observed that a "bamboo" forest therapy significantly increased well-being along with NK cells' number and activity and decreased cortisol level after a 3-day immersion. Further studies are needed to evaluate the impact of nature on inflammatory and immune functions in young people.

5.6 Psychological and Environmental Mechanisms

Experiences in nature, as we have named, provide multiple benefits for health and well-being; however, the mechanisms of how they work are not yet fully understood or are at an early stage. The underlying mechanisms are complex, as they appear to be multifactorial and intertwine internal-psychological and sensory aspects with

external-environmental non-sensory factors, including chemicals and therapeutic aromatic compounds. In terms of mental health and the impact of forest therapy, studies of psychological therapies in which nature itself is not integrated are excluded, even though they may be developed in nature-based settings.

5.6.1 Psychological Mechanisms

Attention restoration theory (ART) (Kaplan & Kaplan, 1989; Kaplan & Talbot, 1983) and stress reduction theory (SRT) (Ulrich, 1983) are some of the psychological avenues that have been argued to substantiate the above results and the primarily restorative effect that occurs in contact with nature. ART suggests that mental fatigue and concentration can be improved by spending time in or looking at nature. As summarized by Wolf et al. (2014), Rachel and Stephen Kaplan proposed ART to explain responses to the effects of natural environments noting that environments need the following conditions to be restorative: (a) being away, (b) extension, (c) compatibility, and (d) fascination. Specifically, fascination would be essential for cognitive recovery since when an environment has fascinating qualities, it attracts involuntary attention, which in turn would require less mental effort. Recent empirical findings have demonstrated the plausibility of ART for understanding the role of intentional attention in the benefits of being in nature. For example, being in nature with a portable electronic device would not be as beneficial in restoring attention in students who do not have these devices in the same natural environment (Jiang et al., 2018).

On the other hand, SRT states that natural settings would promote psychophysiological positive affective response (Ulrich et al., 1991). In short, nature environments are perceived as involving little threat, which allows generating a calm response, thus decreasing stress reactions. These effects would imply a reduction of several stress markers as mentioned above by translating the regulation of the ANS and the immune-endocrine systems. From a psychological and evolutionary perspective of emotion regulation (Gilbert, 2010), nature would promote the calm and appeasement system in counterpart to the threat detection (sympathetic activity, adrenaline) and goal-oriented systems (dopamine), typical autopilot and survival mode.

5.6.2 Environmental Mechanisms

Of particular interest is the study of therapeutic aromatic compounds known as phytoncides, which are volatile and essential oils produced by plants and trees. Most of these compounds are known as terpenes or terpenoids and represent one of

the major components of forest aerosols (Cho et al., 2017). Terpenes in the air originate from leaves and tree needles. They also emanate from tree trunks, their bark, weeds, herbs, shrubs, fungi, mosses, ferns, and decaying humus. These molecules fulfill a great number of functions; for example, they confer protection to plants by avoiding solar radiation, they have antimicrobial and antiparasitic properties, and they help to attract or avoid other species to collaborate or defend themselves.

When we walk through the forest, we come into contact with plant terpenes in gaseous form. Some of these are absorbed through the skin, but mostly through the lungs. Studies on terpenes show beneficial effects on inflammatory diseases, tumorigenesis, and neurodegeneration. For example, most of the anti-inflammatory functions of terpenes and terpenoids occur due to the decreased levels of proinflammatory mediators such as nitric oxide (NO), interleukins, tumor necrosis factor-alpha (TNF-α), and prostaglandin E2 (PGE2) (Kim et al., 2020). Terpenes produced by conifers have shown beneficial effects on human health (Cho et al., 2017). Terpenes also have several immunostimulatory properties. For example, breathing near trees for a single day in a wooded area causes a 40% increase in NK cells. Even more, spending two consecutive days in a forest can increase NK cells by more than 50% (Arvay, 2015).

5.7 Fostering an Embodied Relation with Nature and Current Times

Modern urbanization, current lifestyles, hyper-technologization, global health, and climate uncertainty, along with individual vulnerabilities and contexts, are outstripping our coping resources. A study by Killingsworth and Gilbert (2010), which ecologically assessed people's mental states as they engaged in various daily activities, found that regardless of the activity people engage in, they are happiest when their thoughts do not wander. Their research shows that a wandering mind has negative emotional consequences and feelings of unhappiness. Young people are especially vulnerable at this moment in history. Hyperactivity, digital addiction, overthinking, and other forms of autopilot functioning serve to disconnect from the present moment, especially when it is difficult, and appear as maladaptive strategies for coping with life today. Perhaps, urbanization and associated stress contribute to an autopilot mode of cognitive and emotional processing, in which disconnection leads to dysregulation. Under stress, we experience less awareness of what we are experiencing, of our emotions, thoughts, and sensations. In addition, survival mode limits resources for deepening connection and the possibility of healing. Chronic stress and loss of contact with nature translate into disorders that explain the difficulties in taking care of ourselves and self-regulating. When our physical body is sick, we need to stop, rest, and pay attention to it. Also, when we suffer, we need

love and understanding. It seems natural to turn to nature, as it possesses all the virtues we seek, such as strength, stability, patience, and compassion. Being in conscious contact with nature brings feelings of relief and helps to restore mood and vitality.

Along with other therapeutic interventions and lifestyle measures such as rest, exercise, nutrition, relationships, and avoidance of toxic substances (Kushner & Mechanick, 2015), getting back to nature appears as a natural necessity in promotion and prevention. Being in nature allows us to return to a safe sensory self-experience, as the five senses are easily stimulated, it does not speed us up as is usually the case with the frenetic pace of everyday life, and it usually takes us into relaxation mode. Its practice can be part of lifestyle changes to cultivate attentional and attitudinal qualities to be in relation with life. Despite observed benefits, a recent systematic review of observational studies found some limited evidence suggesting a beneficial association between exposure to urban green space (distance to nearest green space and average greenness) and mental well-being in children and depressive symptoms in adolescents and young adults (Vanaken & Danckaerts, 2018). Thus, the contemplative dimension of being in nature and how nature can teach contemplative abilities needs to be studied further to understand its benefits and its application in youth at risk for depression.

From a cognitive perspective, maladaptive patterns of information processing in adolescents with depression include difficulties in the voluntary deployment of attention to and from emotional stimuli, negative interpretation biases, and overgeneralized autobiographical memories (Oliver et al., 2019). At the brain level, depressed adolescents show increased functional connectivity in the default mode network (DMN) (Zhang et al., 2016). DMN includes the medial prefrontal, posterior cingulate, and precuneus, and its increased functional connectivity with the subgenual prefrontal cortex (sgPFC) is associated with depressive rumination (Hamilton et al., 2015). Multisensory stimuli present in nature can serve as available anchors to focus attention helping to decrease mental rumination in young. Interestingly, Bratman et al. (2015) reported decreased rumination, as well as decreased neural activity in the sgPFC, following a 90-min walk in a natural (vs. urban) environment in healthy adults.

From an emotional perspective, experiential avoidance refers to an "unwillingness to remain in contact with uncomfortable private events by escaping or avoiding these experiences" (Hayes et al., 1996). In adolescence, experiential avoidance has also been studied in depression and its symptom intensity and persistence (Kring, 2008; Mellick et al., 2019). Nature can foster stability and teaches us to relate it to ourselves in a more caring attitude. As difficult inner experience can be softened "naturally" by multisensory stimulation, repetitive exposure to nature can create safety, allowing for a more embodied sense of self. Contemplation of nature can temper experiential avoidance of bodily and emotional difficulties, as awareness of sensory stimuli helps to calm and regulate arousal. New ways of being present, along with recognition of the impermanent dimension of nature (i.e., cycles, weather, seasons, plant growth processes, death, and decay), can foster acceptance

of life's changes and losses. These qualities carry over to other times in life and act as valuable resources for coping with difficulties.

Considering that positive correlations have been described between nature, mindfulness traits, and measures of psychological well-being (Sadowski et al., 2020; Timko Olson et al., 2020), we suggest that intentionally developing contemplative skills while in nature may enhance their effects, especially in depression where mere exposure to nature may be insufficient. This is in line with research suggesting mindfulness practice as a key component of NBIs to maximize its benefits (Nisbet et al., 2019).

5.8 The Need to Implement Nature Therapy in Today's Youth

According to Antonelli et al. (2021), the positive impact of forest bathing on the quality of life of individuals, together with its favorable cost-effectiveness profile, may justify its possible adoption for public health strategies to promote well-being in different contexts. Nature therapy as promotion and prevention should begin at early childhood and continue throughout all ages, recognizing critical periods of development of self- and interpersonal regulatory systems. Promoting nature contemplation from an early age can teach young people to relate more healthily to life's difficulties and changes. Special interest has been placed on bringing NBIs into the educational settings, including schools and universities. Through simple interventions in nature, it is possible to pause, return to the senses, and cultivate appreciation and gratitude.

In university students, NBIs have started to be used as a preventive model for mental health problems (Bang et al., 2017). Thus, one of the interesting topics in universities is the possibility of using the campus itself as part of the recreational activities in which students may participate. These activities could reduce stress and anxiety and improve well-being in a relatively short period of time (Lee et al., 2014; Rajoo et al., 2019). For example, a recent study by Kim et al. (2021) with university students who participated in forest activities in a Korean university campus, using the Concise Measure of Subjective Well-Being (COMOSWB), found positive increases in subjective well-being compared with those participants who did not participate in any forest activities. A Chilean example of a university campus of forest therapy intervention was conducted in a Valdivian Forest hotspot (southern Chile) with 21 students who were randomly assigned to perform a walk and contemplation in a forest or city space in a single, 1-hour session. This pilot study evaluated its effect on mental health, well-being, and mindfulness. The results indicate that the overall protocol can be feasibly administered and that anxiety as a state was the only variable that decreased significantly in the forest therapy group compared to the city group (Langer et al., under review).

Future research is needed to explore the mechanisms of action of nature therapy in promoting effective responses to stress and preventing mental health disorders, especially depression. We suggest that studies should cover the NBIs at all stages of development, recognizing specific and critical needs. By understanding specific depressive psychopathology and the potential of contemplative resources in nature, more specific interventions can be designed for both universal and targeted prevention. This is in line with Owens and Bunce (2022) proposal of candidate mechanisms involved in both nature exposure and depression pathogenesis (i.e., stress, rumination, mindfulness, sleep, and exercise) that should be analyzed in more rigorous studies.

Neurologically, studies could further assess the change in activity of self-referential processing regions (e.g., DMN), characteristics of depressive cognitions, and enhancement of somatosensory areas and interoceptive pathways. Autonomic nervous system and immunological markers could provide further insight into the positive correlates of nature exposure in youth. Mixed methodological studies can articulate quantitative and subjective data to explore underlying mechanisms of action. Particularly in youth, qualitative methods should assess how specific contemplative skills (sensory awareness and appreciation/gratitude) may contribute to daily life coping and mental health. Future studies can deepen the understanding of the influence of the social and relational aspects of NBIs, thus recognizing the needs of youth as well as the environmental variables of local natural environment.

5.9 Conclusion

Given the deteriorating mental health of young people in recent years and the threat of rapid global urbanization, regaining contact with nature represents a great opportunity for well-being. There is capacity for healing and personal growth in the interaction with nature, as it provides us with a protective atmosphere in which, in a very concrete and tangible way, we feel sustained, and allows us to settle down. From a brief contemplation of a green space to a walk in the forest, whether from an individual motivation or as a public health measure or educational activity, contact with nature emerges as necessary to prevent and counteract the effects of stress and the underlying mechanisms of depression. More research is needed to understand the specific contribution of contemplative skills in nature in promoting mental health. Attentional and attitudinal qualities in nature and in everyday life appear to be especially relevant in the prevention of depression, as a less ruminative and more embodied sense of self serves as a prerequisite for perceiving beauty and, in turn, flourishing the sense of gratitude, key aspects of well-being.

Conflict of Interest The authors declare that they have no conflict of interest.

Acknowledgements This manuscript was supported by ANID – Millennium Science Initiative Program – ICS13_005 and NCS2021_081 and ANID – FONDECYT Program – 1221034.

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Chapter 6
Internet-Based Interventions for Prevention and Early Treatment of Depression in Higher Education Students

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6.1 Higher Education Students and Mental Health

Over the past two decades, the percentage of people accessing higher education has more than doubled worldwide (World Bank, 2018). Access to higher education institutions brings several changes and significant challenges. Many young people must adapt to the transition from a highly structured school model to a context characterized by greater flexibility, autonomy, new academic demands, and learning

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_6

methods, among other factors (Coertjens et al., 2017). Likewise, individual and family expectations about this period, accompanied by significant changes in interpersonal support networks and high levels of uncertainty about the future, can be sources of psychosocial tress.

Higher education also coincides with a crucial period in the life course called "emerging adulthood" (Arnett, 2000), which is a critical phase that concurs with the age of the onset of most mental disorders (Kessler et al., 2007; McGorry et al., 2011). In addition, some studies have found that higher education students have an increased risk of mental and substance abuse disorders compared to the general population of the same age range (Conley et al., 2015; Evans et al., 2018). Internationally, it is estimated that approximately one-third of higher education students meet the 12-month prevalence criteria for mental disorders, primarily major depressive episodes (18.5%) or generalized anxiety disorder (16.7%) (Auerbach et al., 2019; Bruffaerts et al., 2019). A meta-analysis showed a 12-month prevalence estimate of suicidal ideation, suicide plans, and suicide attempts in higher education students of 10.6%, 3.0%, and 1.2%, respectively (Mortier et al., 2018).

Mental health problems in higher education students have been associated with negative impacts on young people's development (Alonso et al., 2019; Auerbach et al., 2016), poorer academic performance and higher dropout rates (Reavley & Jorm, 2019), and a negative impact on later functioning in the labor market (Ashwood et al., 2016; Goldman-Mellor et al., 2014; Niederkrotenthaler et al., 2014).

There is an imbalance between the high prevalence of mental health problems among higher education students and their levels of access to treatment (Auerbach et al., 2018; Ebert et al. 2019b). Only 36% of students with a lifetime mental disorder and a similar proportion who had suicidal behaviors received some form of treatment during the last 12 months (Bruffaerts et al., 2019). This treatment gap involves structural (financial cost and availability of services) and cultural (stigma) barriers. Negative attitudes and beliefs regarding mental disorders and their treatment are also important barriers to seeking help (Eisenberg et al., 2012; Vidourek et al., 2014). Higher education students often perceive that institutional health services do not meet their needs (Goodman, 2017), and treatment is often not perceived as necessary, with many students preferring to manage the problem individually or within their closest support network (Ebert et al. 2019b). In addition, many students do not perceive themselves as ill because they have difficulty recognizing symptoms (Ebert et al. 2019b).

In this context, several interventions and strategies have been developed to address student mental health in higher education, including (1) contextual interventions for mental health promotion (e.g., enhancement of the built environment, social marketing strategies, curriculum-based strategies) (Fernandez et al., 2016), (2) universal and indicated prevention programs for subjects with subclinical levels of symptoms or at-risk populations (Conley et al., 2015, 2016), and (3) brief psychosocial interventions focused on treating specific diagnoses such as depression and anxiety disorder (Conley et al., 2015; Cuijpers et al., 2016; Winzer et al., 2018). An umbrella review of meta-analyses of randomized trials examining prevention

and treatment interventions for depression, anxiety, and stress in higher education students shows that effective interventions are now available at universal, indicated, and treatment levels (Cuijpers et al., 2021). The most promising results have been found for indicated prevention and treatment interventions compared to universal prevention. Although commonly used in prevention programs in educational settings, psychoeducation strategies alone did not seem to bring any significant improvement (Martineau et al., 2018).

Institutions of higher education are relevant sites for the prevention, early detection, and treatment of mental disorders, but the high prevalence of mental health problems among students reduces the likelihood that educational institutions will have sufficient resources to meet the need for mental health services. Therefore, there is a need to implement better methods to identify students at risk of developing a mental disorder and to improve prevention programs and early intervention strategies for timely management of mental health problems in higher education students (Duffy et al., 2019).

6.2 Internet-Based Interventions and Mental Health

Internet-based interventions for the prevention and early treatment of depression deserve special attention as an area of research and development at the intersection of mental health and education. These interventions are usually based on a web platform or a mobile application (app) and can be unguided/self-administered or guided. Unguided programs are generally automated interventions without any human interaction, although they may include some additional form of assistance (e.g., personal monitoring). Guided programs include human support ranging from low-intensity support (e.g., e-mail feedback and encouragement) to synchronous assessments (e.g., chat) or teletherapy, but with considerably less support than face-to-face therapy. Guidance may be related to the therapeutic content itself (e.g., homework) or focused on encouraging adherence to the program (e.g., reinforcement).

Table 6.1 proposes a theoretical classification of Internet-based interventions in mental health.

Given the rapid technological development and proliferation of Internet-based treatments in recent years, there have been several studies conducted to evaluate the effects of Internet-based approaches to depression. A recent meta-analysis shows that there is evidence for the efficacy of Internet-based interventions for the treatment of depression in a variety of populations and age groups and different settings (Moshe et al., 2021). The authors of that study found a greater effect size for participants with higher pretreatment depression severity (Moshe et al., 2021). They found no influence of participant age on outcomes, suggesting that Internet-based interventions may be equally effective for individuals of all age groups.

Table 6.1 Theoretical classification of Internet-based interventions for mental health

Target population	*Prevention*	
	Universal Selective Indicated	Targeted at the entire population Targeted to at-risk population subgroups Targeted at individuals with subthreshold symptoms
	Early intervention	
	Case identification	Identification of individuals with subthreshold or clinically significant symptoms through screening strategies, self-report questionnaires, or interviews with health or education professionals
	Early treatment	Intervention for individuals presenting subthreshold symptoms or clinical intervention for individuals meeting diagnostic criteria
Intervention specificity	Specific	Interventions targeting specific mental symptoms or disorders
	Transdiagnostic	Interventions targeting a set of hypothetical mechanisms shared by a group of mental disorders or syndromes
Intervention strategy	Psychoeducation	Primarily provides information to participants on topics such as stress, coping, and ways to relax
	Cognitive behavioral	Focused on how cognitions can be monitored and used effectively to change behaviors or emotions
	Meditation	Includes various meditation and relaxation techniques, such as mindfulness and yoga
	Social skills training	Focused on the development of interpersonal skills through assertiveness training, role-playing, or interpersonal skills development exercises
	Interpersonal psychotherapy	Assess how changes in social relationships impact psychological functioning
Supervision (human support)	Guided	The instructor or group leader directly monitors individuals' practice of new skills and provides feedback and helpful suggestions to encourage mastery of the skills
	Unguided	Fully automated interventions, without human intervention
Outcomes	Emotional distress	Measures of depression, anxiety, or stress, as well as measures of general psychological distress or well-being
	Social and emotional skills	Different types of cognitive, affective, and social skills such as coping techniques and mindfulness, among others
	Self-perceptions	Primarily measures of self-esteem and self-efficacy
	Interpersonal relationships	Measures of relationship quality and satisfaction, social support and adjustment, conflict and communication styles
	Health status	Measures of physical health status and symptoms, as well as reports of health-related behaviors (drinking, smoking, drug use, exercising, or nutrition)
Delivery format	Technology-delivered	Uses technology as a vehicle for mental healthcare service delivery
	Blended	Combines face-to-face and internet-based approaches

6.3 Internet-Based Interventions for Higher Education Students

Young adults are among the main users of the Internet and new technologies (Antoun, 2015) and are very active in online searching for health information (Hanauer et al., 2004; Rennis et al., 2015). In fact, "stress," "anxiety," and "depression" are among the most searched health topics by higher education students on the Internet (Montagni et al., 2018). Therefore, higher education students represent an ideal target for mental health interventions based on the Internet and digital technologies.

Internet-based interventions for higher education students may target universal or selective prevention, promotion of help-seeking and increased willingness to accept treatment when offered, indicated prevention for those at risk, early intervention for students with subthreshold symptoms, or clinical intervention for students who meet diagnostic criteria (Cuijpers et al., 2018; Harrer et al., 2019). A body of literature on technology-delivered interventions for higher education students suggests that these interventions may be effective in improving mental well-being outcomes (Davies et al., 2014; Farrer et al., 2013; Harrer et al., 2018). However, a meta-analysis by Harrer et al. (2019) on Internet interventions for mental health in college students found smaller effects on depression (g = 0.18, 95% CI (0.08, 0.27)) than those found for such interventions in other target groups (SMD = 0.90, 95% CI (0.73, 1.04); Königbauer et al., 2017). Since "effect size" is a statistical concept, it does not necessarily reflect the clinical relevance of interventions. Furthermore, these effects may be related to higher education settings, the age range of the students, or other characteristics of individuals that need to be studied.

6.3.1 Internet-Based Interventions for Depression in Higher Education Students

We selected a set of 18 Internet-based preventive and early treatment interventions for depression in higher education, whose studies have been published in 19 articles within the last decade (2011–2021) (Bantjes et al., 2021; Cavanagh et al., 2013; Day et al., 2013; Dear et al., 2019; El Morr et al., 2020; Ellis et al., 2011; Farrer et al., 2019; Fitzpatrick et al., 2017; Fulmer et al., 2018; Harrer et al., 2021; Kvillemo et al., 2016; Levin et al., 2017; Lintvedt et al., 2013; Melnyk et al., 2015; Mullin et al., 2015; Musiat et al., 2014; Palacios et al., 2018; Ritvo et al., 2021; Salamanca-Sanabria et al., 2020). Most studies have been conducted in North America (n = 7), Europe (n = 5), or Australia (n = 4), and very little research exists in Africa (n = 1) and Latin America (n = 1). Therefore, most of the interventions were developed in higher education institutions located in the Global North, reflecting the great variability in the degree of digital health penetration in different regions (Jiménez-Molina et al., 2019).

The interventions varied considerably in terms of duration, intensity, guidance, and rationale. The duration of the interventions ranged from 2 to 8 weeks. The vast majority had a modular structure, and half of the programs (9/18) distribute their components between five and seven modules or sessions. This indicates that they are generally short or ultrashort interventions.

Some studies suggest that the duration of digital technology-based programs has a significant influence on the effects of the interventions (Etzelmueller et al., 2020). For example, Richards & Richardson (2012) found that Internet-based interventions with eight sessions or less were more effective than interventions with more than eight sessions, and a meta-analysis concluded that the optimal effect and maximum acceptability were achieved in interventions with approximately seven modules (Moshe et al., 2021). Given that the risk of program dropout increases significantly for longer program lengths, there is a need to better understand the optimal combination between duration and number of modules for interventions targeting young people in higher education.

Most of the interventions were designed as part of universal prevention strategies. Most (13/18) were designed specifically to address depressive symptoms. However, some programs also included psychological distress, anxiety and stress symptoms, life satisfaction, self-efficacy, and academic performance as secondary outcomes.

Regarding the theoretical framework and techniques underpinning the intervention strategies, most of them (11/18) were based on cognitive behavioral theory. These interventions conceptually understand depression as a psychological disorder associated with cognitive, behavioral, and emotional maintenance processes, so they aim to intervene in these processes using techniques based on digital technologies. Internet-based cognitive behavioral therapy (iCBT) has shown moderate to large effects on depression (g = 1.18, 95% CI: 1.06–1.29) in usual adult care (Etzelmueller et al., 2020). However, the potential efficacy of this type of intervention for the prevention and early treatment of depression in higher education settings appears to be lower compared to other contexts (Harrer et al., 2019).

One strategy that has been developed in recent years consists of Internet-based programs supported by meditation techniques (e.g., audio files with instructions for mindfulness meditation exercises) (Cavanagh et al., 2013; El Morr et al., 2020; Kvillemo et al., 2016; Ritvo et al., 2021). Unlike traditional cognitive behavioral therapy (CBT), mindfulness-based interventions do not directly target the reduction of a specific set of symptoms, but rather account for a transdiagnostic understanding of mental health problems and address a general way of relating to experiences through the performance of repeated meditation exercises. Typically, mindfulness-based interventions advocate an open and nonreactive perception of events and train the individual to process experiences without attempting to control, suppress, or avoid sensations and situations. These skills trigger cognitive, emotional, and somatic effects linked to self-regulation strategies (Langer et al., 2020). Internet-based mindfulness interventions are effective in the treatment of depression and anxiety disorders (Boettcher et al., 2014), but more studies with higher education

students might be necessary to have a better assessment of their benefits in this population.

We also found interventions that combine different strategies: cognitive behavioral strategies with meditation, psychoeducation, interpersonal therapy, and specific skills training, such as stress management, problem-solving, concrete thinking, and coping skills for some aspects related to the difficulties of college life (e.g., procrastination) (Farrer et al., 2019; Fulmer et al., 2018; Harrer et al., 2021; Lintvedt et al., 2013). These types of interventions demonstrate that digitally supported programs can be flexible enough to incorporate strategies that go beyond specific techniques to address symptoms traditionally associated with mental disorders. Likewise, psychoeducation strategies about the underlying causes and mechanism of depression, as well as the provision of information about ways to cope with some of the difficulties of college life and how and where to access available support services, were a cross-cutting component of most interventions.

Most of the interventions reviewed were web-based resources (14/18), including discussion forums, online courses, wellness center/resource library, or a combination of these strategies. One intervention was an online workshop and e-book (Bantjes et al., 2021), two were mobile app-based (Fitzpatrick et al., 2017; Fulmer et al., 2018), and one intervention combined a web platform and a mobile app (Harrer et al., 2021).

Some interventions included a form of guidance, which could be through weekly contact or support with a trained therapist or assistant, either by phone or messaging system or through an online discussion group moderator or well-being coaches. However, more than half of the interventions were unguided or self-administered (13/18). These interventions included some form of automated reminders (e.g., prompts) or automated personalized feedback (e.g., based on questionnaire results). Interestingly, some forms of unguided interventions used chatbots, a system that can interact with human users (Fitzpatrick et al., 2017; Fulmer et al., 2018). For example, the *Woebot* program was associated with a high level of engagement by most individuals who used the bot almost every day, with some users describing the bot as a "fun" and "empathetic" system (Fitzpatrick et al., 2017). In this sense, the developers of this bot suggest that people are willing to disclose personal information to an artificial intelligence (AI) program (Fitzpatrick et al., 2017).

6.3.2 Main Findings of the Interventions

The studies reviewed showed mixed results. On the one hand, a significant number of interventions were effective in reducing depressive symptoms and increasing depression literacy (Bantjes et al., 2021; Cavanagh et al., 2013; Day et al., 2013; Dear et al., 2019; El Morr et al., 2020; Fitzpatrick et al., 2017; Fulmer et al., 2018; Harrer et al., 2021; Levin et al., 2017; Lintvedt et al., 2013; Musiat et al., 2014; Palacios et al., 2018; Ritvo et al., 2021; Salamanca-Sanabria et al., 2020). There was also a significant effect on the reduction of anxiety symptoms and perceived stress

in favor of intervention groups compared to control conditions (Bantjes et al., 2021; Ellis et al., 2011; Musiat et al., 2014; Palacios et al., 2018) and improvements related to other secondary outcomes (e.g., behavioral activation) after treatment (Harrer et al., 2021; Levin et al., 2017). Not only were significant improvements in depressive symptoms found from pre- to post-intervention, but some studies showed that these improvements were maintained at 3–6 months of follow-up (Day et al., 2013; Harrer et al., 2021; Salamanca-Sanabria et al., 2020). In some studies, more pronounced reductions in depressive symptoms were found among participants with clinically significant symptoms at baseline (Musiat et al., 2014).

On the other hand, some studies showed no significant effects on depressive symptom reduction in the post-intervention phase or compared to control conditions (Farrer et al., 2019; Kvillemo et al., 2016; Melnyk et al., 2015; Mullin et al., 2015). In this regard, some students may be more likely than others to respond to Internet-based interventions linked to several predictors of intervention response that have yet to be determined. For example, Harrer et al. (2019) show that the effects of Internet-based interventions in university students were greatest when participants were preselected across symptom cutoff points or risk factors. It seems that the effects of Internet-based interventions on depression in higher education students depend on the severity of symptoms at baseline. In this sense, interventions tailored to individuals based on their presenting symptoms may have better outcomes.

6.3.3 Program Adherence and Usability

Adherence to Internet-based programs might be a critical factor in determining their outcomes. As previously suggested, one of the main problems with Internet-based interventions for depression in young people is high levels of nonadherence (Martínez et al., 2021). A recent meta-analysis shows that the mean percentage of the intervention group that completed all modules in Internet-based interventions for depression was 55.3% (Moshe et al., 2021). A study by Karyotaki et al. (2018) suggests that younger adults have a higher risk of dropping out of Internet-based interventions than older adults, while Moshe et al. (2021) found that there was no significant influence of age, gender, or guidance on adherence.

One of the most striking results of the studies reviewed is related to the serious problems of adherence and usability of the interventions that translate into high levels of research attrition and high intervention dropout rates. Some studies operationalized adherence as the proportion of participants who completed all or a certain percentage of the intervention, while others defined it as the mean number of modules completed. Beyond these differences, there is a gap between intervention acceptability and participant satisfaction with program usability and adherence levels. Although some studies report that a large proportion of participants rated the interventions as “very useful” or “useful” and show high levels of participant satisfaction and acceptability, and even report that they would recommend the program to others (Dear et al., 2019; Ellis et al., 2011; Farrer et al., 2019; Mullin et al., 2015;

Musiat et al., 2014; Palacios et al., 2018), in several studies, less than 60% of participants completed all program modules (Cavanagh et al., 2013; Farrer et al., 2019; Kvillemo et al., 2016; Lintvedt et al., 2013; Mullin et al., 2015; Musiat et al., 2014; Palacios et al., 2018). For example, in the study by Kvillemo et al. (2016), less than two-fifths of participants completed the entire program. The authors suggest that program retention and compliance may have been affected because participants were not required to have a certain level of psychological symptoms to be included in the intervention (Kvillemo et al., 2016).

Some studies indicate that many of the potential participants who were approached to join the programs did not initiate the intervention (e.g., in the study by Melnyk et al., 2015, only 17% of the students invited to participate in the study initiated the intervention). In other cases, recruitment was based on offering additional credits to students, making it difficult to determine whether higher education students would be willing to participate in a program purely for mental health reasons, without additional incentives (Levin et al., 2017).

Given the important role that adherence plays in mediating outcomes, there would be benefit from further research on the design factors that influence adherence in higher education students, especially in unguided interventions, where adherence is often lower.

One way to address the problem of low adherence to programs is to improve their attractiveness and allow participants to customize some of their elements. For example, MoodGYM program participants complained about the monotony and redundancy of the resources and the length of the program itself (Ellis et al., 2011). Only one-third of the participants indicated that they enjoyed using the program. In the study by Farrer et al. (2019), some participants noted that the program was "too complex," contained "too much information," or was difficult to navigate. This underscores the need to focus more on providing programs that are relevant and meet the needs of higher education students.

Concerning improving the attractiveness of programs, the use of apps to support the prevention and early treatment of depression may be a particularly useful strategy for young people in higher education. However, several shortcomings of mental health apps have been repeatedly described, such as poor handling of users' personal information, poor adherence to evidence-based techniques, low app credibility, and lack of content personalization (Martinengo et al., 2021). Therefore, future studies with higher education students should examine how different platforms of interventions (web-based, app-based, or a combination of both) are associated with their acceptability, adherence, and effectiveness.

Other strategies to increase adherence, such as the inclusion of user-centered designs, should also be evaluated. Having a participatory design approach (i.e., including end users and other key stakeholders in all stages of the development process) when developing or adapting an Internet-based intervention for depression could help ensure that interventions meet the needs of higher education students and are better tailored to the actual user experience (Schilling et al., 2021). In addition, it is highly recommended to include features of persuasive systems, whereby

technology is designed to reinforce, change, and shape attitudes and behaviors (Parada et al., 2020).

6.3.4 Human Support or Guidance

Perhaps one of the most critical issues in the development of Internet-based interventions for mental health is the role of human support or guidance. Previous research suggests that guided Internet-based interventions for university students have higher effect sizes than unguided interventions (Conley et al., 2016; Cuijpers et al., 2018). However, the meta-analysis conducted by Harrer et al. (2019) did not find that the availability of guidance significantly moderated intervention efficacy. A recent meta-analysis of patient data network suggests that baseline depressive symptoms may be an important factor explaining differences in the effectiveness of guided versus unguided interventions (Karyotaki et al., 2021). This study shows that individuals with mild and subthreshold depression were associated with little or no benefit from therapeutic guidance, while guided interventions were associated with more effectiveness in individuals with moderate to severe depression (Karyotaki et al., 2021).

Several studies have also shown that guided interventions result in a higher number of completed modules and lower attrition compared to unguided interventions (Baumeister et al., 2014; Richards & Richardson, 2012). Some studies included in this review suggest that more frequent contact with study coordinators and more reminders as ways to help participants complete daily exercises could increase the likelihood of program success (Kvillemo et al., 2016; Salamanca-Sanabria et al., 2020).

Future studies should explore in detail the importance of human support in Internet-based interventions for depression in higher education students to increase engagement and adherence, as well as to improve outcomes. The most cost-effective options for providing guided interventions are not yet sufficiently understood, and there are many options for innovation in this regard. Given the resources of higher education institutions, there is a need to explore "blended approaches," i.e., combining the strengths of Internet-based and face-to-face interventions (Wentzel et al., 2016). Although interventions adopting this approach in higher education still appear to be scarce, this format represents a good alternative to address the growing need for access to psychological support and treatment of mental disorders in higher education students, without disproportionately increasing the costs of health and care services in these institutions. One way to organize the delivery of these interventions is through "stepped care" models, implementing higher-intensity interventions or face-to-face assistance depending on the severity of depressive symptoms. This is certainly an aspect that future Internet-based programs should address, in particular, the selection of the type of intervention according to the severity of symptoms.

6.3.5 Studies Design and Quality

There is a growing number of studies testing the feasibility and acceptability of Internet-based interventions for the prevention and early intervention of depression in higher education students. However, very few studies tested the effectiveness of these interventions through randomized controlled trial (RCT) designs. There is a need for methodological advances in large-scale effectiveness studies, as well as cost-effectiveness and implementation studies.

For the reviewed efficacy studies, a common weakness is that most of them used wait-list control groups as a comparison, which often leads to an overestimation of intervention effects. Also, in most of the studies, the outcomes were generally evaluated in the short term (less than 6-month follow-up), which does not allow for assessing whether the positive effects of the intervention were sustained over time.

Another problem identified is that several studies had relatively small numbers of participants and showed a significant gender imbalance of participants, including mainly women, who in some cases accounted for more than 75% of the sample (Cavanagh et al., 2013; Day et al., 2013; El Morr et al., 2020; Ellis et al., 2011; Farrer et al., 2019; Harrer et al., 2021; Kvillemo et al., 2016; Lintvedt et al., 2013; Melnyk et al., 2015; Ritvo et al., 2021).

Future studies should place more emphasis on comparing online interventions with traditional face-to-face interventions, either alone or in combination. This information is crucial for justifying the scalability of interventions.

Given that previous research has documented the enormous potential of Internet-based interventions for other target groups and application domains (Moshe et al., 2021), more research is needed on how Internet-based interventions should be designed and delivered to maximize these capabilities in higher education settings. For example, much remains to be done in implementing digitally supported programs to promote help-seeking in higher education students and to optimize referral systems for community health services (Ebert et al., 2019a). Specifically, more research is needed to determine which types of interventions are best suited to which students, and in what context, to optimize their effects to fully realize the potential of Internet-based interventions to improve the mental health of higher education students.

6.4 Description of Specific Internet-Based Programs

In this section, we will describe in detail some specific programs for the prevention and early treatment of depression that have been implemented in the context of higher education. This description is mainly intended to outline some trends in the development of interventions and their potential benefits for students. Specifically, we have chosen three programs to highlight interventions that have adopted a transdiagnostic approach, that have developed a process of cultural adaptation of interventions, and that may be particularly useful in distance education contexts. The rationale for this selection is based on three main reasons.

First, different prevalence studies show that there is high comorbidity among mental disorders, especially with regard to depression (Plana-Ripoll et al., 2019). Probably, these high comorbidity rates are not a simple co-occurrence of disorders, but the result of an underlying common basis (Dalgleish et al., 2020; Marshall, 2020). In response to this issue, a transdiagnostic approach to understanding and intervening in mental disorders has grown rapidly (Newby et al., 2015), which targets a set of hypothesized mechanisms shared by a group of mental disorders (Schaeuffele et al., 2021). Recently, these interventions are being adapted to Internet-based strategies for the higher education population.

Second, while enrollment growth in higher education over the past two decades has been greatest in low- and middle-income countries (UNESCO IEPP, 2017), most Internet-based interventions for depression have been developed in high-income Western countries. Given that the inclusion of diverse populations is often underrepresented in the evaluation of these interventions (Cuijpers et al., 2018) and that there are cultural differences in the expression and understanding of depression across cultures (Haroz et al., 2017), greater attention to their cultural sensitivity and ecological validity is needed to maximize their efficacy and contribute to their dissemination across countries. In this context, cultural adaptation of interventions developed in high-income countries that have proven to be effective is key to contributing to the reduction of global inequalities in mental health (Salamanca-Sanabria et al., 2019; Spanhel et al., 2021).

Third, the lockdown and physical distancing measures implemented in the context of the COVID-19 pandemic forced many higher education institutions to implement distance learning modalities. Evidence suggests that distance education students face a high level of stress compared to face-to-face students, most likely due to the need to cope with the demands of multiple social roles, the lower likelihood of social support from peers, and the lack of access to campus mental health services (Apolinário-Hagen et al., 2018). Changes in the higher education system in the context of the COVID-19 pandemic represent an opportunity to advance the implementation of interventions supported by digital technologies (Mac-Ginty et al., 2021). Depression prevention, screening, and early intervention could be enhanced by using the technological infrastructure that institutions have acquired to provide continuity of academic activities in the context of the pandemic. It is also possible that the intensive use of the Internet and digital technology in the context of the pandemic has increased the willingness of students and health professionals to use Internet-based programs.

6.4.1 Transdiagnostic Internet-Based Interventions

Most Internet-based interventions in mental health have been developed and evaluated on specific symptoms and disorders. However, we found five interventions that used a transdiagnostic approach to address depressive symptoms in higher

education students (Dear et al., 2019; Farrer et al., 2019; Levin et al., 2017; Mullin et al., 2015; Musiat et al., 2014). The development of this type of interventions seems to be still scarce, but growing in recent years.

Transdiagnostic approaches assume that individuals suffering from mental disorders share specific behavioral and cognitive processes (e.g., selective attention, interpretive bias, recurrent negative thinking, avoidance behaviors, etc.) that contribute to the development and maintenance of these disorders (Newby et al., 2015). This approach could provide very useful tools for higher education students who must deal with a range of problems simultaneously.

A good example of Internet-based transdiagnostic interventions is "PLUS" (Personality and Living of University Students), which focused on the prevention of common mental disorders in university students (Musiat et al., 2014). "PLUS" consists of five cognitive behavioral modules, which can be completed in any order. Each module focuses on the potentially negative impact of personality traits on certain aspects of life and how users can overcome them. The objective of the modules is to help users recognize and reduce unhelpful behaviors and thoughts resulting from certain personality-related factors. As an unguided intervention, it has the potential to be widely applied without the need for additional infrastructure.

The introductory module of "PLUS" presents the principles of the cognitive behavioral model and reports on the impact of personality on behavior. Then, the module "Perfectionism" addresses the positive and negative aspects of perfectionism and provides tools to identify and challenge perfectionist thoughts and behaviors. The module "Self-esteem" addresses strategies for overcoming low self-esteem, while the module "anxiety and worry" focuses on developing strategies to identify and reduce the impact of anxiety and worry. The fifth module, "Dealing with difficult emotions," addresses the consequences of emotional instability (neuroticism) and some strategies for emotional regulation.

In a first evaluation of the program, high attrition was observed (half of the participants dropped out after a 6-week follow-up) (Musiat et al., 2014). For analyses of the impact of the intervention, students were grouped into high and low risk of developing mental health problems according to their personality characteristics (and not their symptoms). The intervention was effective in increasing self-esteem and reducing depressive and anxious symptoms in the high-risk group compared to the control condition (three online modules addressing relevant student life issues). An RCT to evaluate the efficacy and cost-effectiveness of PLUS is currently underway in four countries (the United Kingdom, Republic of Ireland, Austria, and Germany), representing one of the largest trials of an Internet-based mental health intervention in higher education (Musiat et al., 2019).

Overall, the PLUS program supports the idea of preventing mental disorders by acting on underlying vulnerability factors in high-risk students. However, the current evidence from transdiagnostic programs is still too preliminary to indicate whether this approach is useful for the range of problems for which students in higher education generally seek treatment and whether it is more effective than disorder-specific approaches.

6.4.2 Cultural Adaptation of Internet-Based Interventions

Given that low- and middle-income countries have poor access to mental health services, Internet-based interventions could help close the treatment gap in these countries (Jiménez-Molina et al., 2019). Considering the paucity of studies in these countries, cultural adaptation of Internet-based interventions that have proven effective in other contexts can be very useful to accelerate the adoption process of these strategies. Cultural adaptation includes methodologies to achieve functional, conceptual, and linguistic equivalence of interventions in different cultural and socioeconomic communities (Spanhel et al., 2021). This method facilitated the adaptation of programs while maintaining the original treatment components (fidelity) and supports the inclusion of community members in the adaptation process as an essential component to increase its validity (Helms, 2015).

A study by Salamanca-Sanabria et al. (2019) attempted to integrate a cultural sensitivity and ecological validity framework to adapt "Space from Depression," a seven-module iCBT program for the treatment of depression (Richards et al., 2015), to the specific needs of Colombian college students. This program includes self-monitoring, behavioral activation, cognitive restructuring, and questioning core beliefs. All modules consist of questionnaires, videos, educational content, and activities with homework suggestions. In addition, users are provided with an assistant, who gives feedback and monitors the users' evolution every week (Richards et al., 2015). The original program has been evaluated by users as acceptable and was effective compared to a control group (waiting list) in an Irish community sample (Richards et al., 2015, 2016).

The culturally adapted version of the "Space from Depression" program ("*Yo Puedo Sentirme Bien*," Spanish version) contains an initial module that introduces the basic premises of CBT for depression and encourages users to identify their current difficulties. The second module aims to track mood and invites users to explore different aspects of emotions, physical reactions, action, and inaction. The third module motivates users to track their thoughts and explore the connection between their cognitions and mood. The fourth module promotes behavior change to improve mood, including behavioral activation ideas. Users can plan activities and plot their relationship to their mood. The fifth module is intended for the user to learn how to challenge distorted negative thought patterns. The sixth module describes the role that deeply held core beliefs may play in mood and depression. This module also contains a series of interactive activities to identify and challenge unhelpful core beliefs. In the last module, users are encouraged to bring together all the skills and ideas acquired through the program, note their personal warning signs, and develop a plan to maintain a state of well-being.

"*Yo Puedo Sentirme Bien*" was evaluated in an RCT to examine its efficacy and feasibility in Colombian university students with depressive symptoms (Salamanca-Sanabria et al., 2020). Although research attrition and treatment dropouts were high, the results showed significant effects on the reduction of depressive symptoms for the treatment group, and these effects were maintained at a 3-month follow-up (Salamanca-Sanabria et al., 2020).

6.4.3 *Internet-Based Stress Intervention for Distance Learning Students*

The "StudiCare Fernstudierende" (Harrer et al., 2021) is an Internet- and app-based intervention to prevent depression in university students that adjusted the "StudiCare Stress" program (Harrer et al., 2018) to the needs of university distance learners. Specifically, it is a two-part intervention consisting of seven modules plus a booster module in which cognitive behavioral coping methods are used to manage personal difficulties and minimize stress factors. The first part of the intervention focuses on problem-oriented coping, while the second part focuses on emotion-oriented coping using emotion regulation strategies. Completing a module requires between 30 and 90 minutes, and participants are encouraged to work on no more than two modules per week. Therefore, the intervention is expected to last between 5 and 7 weeks.

The introductory module includes psychoeducational material and information on stress, as well as a description of the progress plan for the following sessions. The next two modules are devoted to stress management and systematic problem-solving strategies, and to providing information on the basic principles of muscle and breathing relaxation, including audio exercises for daily use. The fourth module is dedicated to self-criticism management and contains mindfulness exercises. The next two modules incorporate exercises on acceptance and tolerance of unpleasant emotions and strategies aimed at self-compassion and self-support, as well as strategies for overcoming dysfunctional perfectionistic thought-action patterns. Another module is devoted to recognizing physiological warning signs and creating a master plan for the future. The booster module allows repeating some previous exercises and includes information on self-help and psychotherapy, as well as a recapitulation of all the modules. Also, optional mini-modules are offered to participants, which address specific topics such as social support, rumination and worry, time management, concentration and procrastination, sleep, motivation, nutrition and exercise, and coping with writer's block (Harrer et al., 2019).

Evaluation of "StudiCare Fernstudierende" has shown substantial effects on reducing the severity of depressive symptoms, as well as positive effects on behavioral activation, perceived stress, anxiety, and other post-intervention outcomes. Compared to the active control group (psychoeducation), the intervention was found to be more helpful for depressive symptoms. These effects were maintained at a 3-month follow-up (Harrer et al., 2021). In addition, significant effects of the intervention on participants' academic outcomes were found.

Overall, this program shows that Internet-based interventions aimed at stress reduction can not only be effective in reducing perceived stress but can also provide significant effects on depressive symptoms. In addition, this program demonstrates that higher education students in distance learning modalities can benefit significantly from digitally supported interventions that allow for flexible use of available resources without time and location restrictions.

6.5 Conclusion

Internet-based interventions for the prevention and early treatment of depression in higher education students are growing rapidly, especially in high-income countries. Accumulating evidence shows promising results, but with important challenges. A wide range of factors could be influencing the effectiveness of these interventions, such as participant characteristics, intervention design, intervention duration or number of modules, the intensity of support or human guidance, and program adherence. To address some of these challenges, the development of interventions should be informed by the youth themselves.

Despite the limitations and challenges identified, we conclude that Internet-based interventions for the prevention and early treatment of depression in higher education students can have a beneficial impact on student functioning. Furthermore, integrating these programs into higher education settings offers several advantages. First, students would be able to access these programs at any time and from anywhere with an Internet connection, which helps to significantly reduce barriers to accessing mental health services. Second, Internet-based programs allow for a rapid scale-up effect of prevention and treatment interventions, in contrast to face-to-face care. Third, the relative anonymity and privacy of Internet-based interventions reduce the stigma of receiving professional treatment for depression. Thus, these interventions may help overcome cultural and attitudinal barriers to seeking treatment, such as fear of social judgment.

Overall, these advantages make these programs a highly scalable and potentially more cost-effective form of preventive and early intervention for depression than other forms of mental health treatment (Moshe et al., 2021). Internet-based interventions may be especially beneficial in overcoming logistical and financial barriers that burden both health services and users, holding promise for low-cost interventions with positive outcomes (Paganini et al., 2018). Indeed, students' concern about the high cost of health services strongly influences their decision to seek health information online (Rennis et al., 2015).

Given the rapid technological development and proliferation of Internet-based treatments in recent years, a more comprehensive understanding of the effects of Internet-based approaches to address depression in higher education students is needed.

Conflict of Interest The authors declare that they have no conflict of interest.

Acknowledgments This manuscript was supported by ANID – Millennium Science Initiative Program–ICS13_005 and NCS2021_081, and by ANID–FONDECYT N°1221230. Á.J.-M. received funding from ANID/FONDECYT POSTDOCTORADO/2020-3200944. PF received funding from ANID/PFCHA/BECA DOCTORADO NACIONAL/2019-21190745. SM-G received funding from ANID/PFCHA/BECA DOCTORADO EN EL EXTRANJERO BECAS CHILE/2019-72200092.

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Part II
Adults and Older Adults

Chapter 7
Interventions for Adult Depression in Primary Health-Care Clinics

Pablo Martínez and Graciela Rojas

7.1 The Global Burden of Adult Depression

Depression has been one of the most relevant public health problems in recent decades. According to the Global Burden of Disease (GBD) Study 2019, led by the Institute for Health Metrics and Evaluation (IHME), 279 million people worldwide suffer from depressive disorders – equivalent to 3.8% of the world's population (GBD 2019 Mental Disorders Collaborators, 2022). A closer inspection of the data provided by the IHME notes that the prevalence of depression increases during adulthood, reaching a peak of 6.0% immediately before older adulthood (Global Burden of Disease Collaborative Network, 2020). Depression mainly affects people during the most productive years of their lives, producing more significant declines in health than chronic physical illnesses such as arthritis or diabetes (Moussavi et al., 2007). Importantly, the health loss attributed to depression occurs earlier than those ascribed to these chronic physical diseases (Global Burden of Disease

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https://doi.org/10.1007/978-3-031-13029-8_7

Collaborative Network, 2020). The patterning of the decrements in health produced by depression makes it one of the leading causes of years lived with disability, particularly in the 20–59 age group (GBD 2019 Mental Disorders Collaborators, 2022).

Depression is also associated with one of the most significant causes of death globally – suicide. The World Health Organization's (WHO) Global Health Estimates (2017) report that more than 800,000 people die by suicide worldwide every year. Notably, depression is responsible for nearly half (46.1%) of the suicide burden attributed to mental and substance use disorders (Ferrari et al., 2014). Moreover, according to a recent systematic review and meta-regression, people with major depression are nearly eight times more likely than those not having this disorder to die by suicide (Moitra et al., 2021). Complementarily, there is very suggestive evidence of a possible association between depression and excess mortality in cancer, heart failure, and acute myocardial infarction, which would be mediated by pathological and physiological mechanisms and alterations in the behavior of the disease (Machado et al., 2018).

Depression does not affect the adult population equally. The IHME data suggests that, as older adulthood approaches, the prevalence of depression is twice as high in adults living in low-income vs. high-income countries (Global Burden of Disease Collaborative Network, 2020). The same source of information shows that for every depressed man, there are 1.5 depressed women in adulthood, regardless of the income level of the nation (Global Burden of Disease Collaborative Network, 2020). Furthermore, the GBD Study 2019 and WHO estimates found higher health losses attributable to depression in countries with increased rates of childhood sexual abuse, intimate partner violence, and conflict and war (Charlson et al., 2019; GBD 2019 Risk Factors Collaborators, 2020), highlighting population-level vulnerabilities to depression and its health consequences due to differential exposure to psychosocial risk factors. Notably, a recent systematic analysis of the prevalence of major depressive disorders during the ongoing COVID-19 pandemic noticed that the locations hardest hit by the pandemic had the most significant increases in the burden of depressive disorders (Santomauro et al., 2021).

7.2 Adult Depression in Primary Health Care

In the 1990s, the WHO led a relevant international study on psychological problems in general health care (Üstün & Sartorius, 1995). Primary health-care facilities in 14 culturally and economically diverse countries participated in the study. The diagnostic criteria of the International Classification of Diseases, Tenth Edition (ICD-10), were used to determine diagnoses for depression, anxiety disorders, and alcoholism, among others (Üstün & Sartorius, 1995). The WHO primary health-care study established that depression was the most prevalent mental disorder among the consulting population (10.4%), being more frequent in women (female/male ratio of 1.9) and patients with lesser education (Üstün & Sartorius, 1995). In four primary health-care centers (Santiago de Chile, Rio de Janeiro, Paris, and Bangalore), the

female rate of depression was significantly higher than the male rate (Üstün & Sartorius, 1995). In addition, the WHO primary health-care study showed that psychiatric comorbidity of depression was consistently associated with severe limitations in daily activities and poorer health perception (Üstün & Sartorius, 1995).

More recently, a meta-analysis of 41 studies totaling 50,371 patients in mainly urban primary health-care clinics from more than ten countries explored the accuracy of unassisted diagnoses of depression by general practitioners (Mitchell et al., 2009). The studies included in Mitchell et al.'s meta-analysis identified cases of depression through psychiatric expert diagnosis or validated structured or semi-structured interviews. When studies recruiting adult patients aged 18–65 years were considered, the prevalence of depression in primary health care was 18.4% (Mitchell et al., 2009). Mitchell et al. (2009) estimated a depression prevalence of 17.2% for ICD-based studies, differing from the WHO primary health-care study, which reported a depression prevalence of 10.4% through the same method (Üstün & Sartorius, 1995). Such discrepancies might be driven by variations in sampling procedures or differences across primary health-care centers – e.g., the meta-analysis by Mitchell et al. (2009) relied mainly on primary health-care clinics from Western developed countries.

Large primary health-care cohorts in Australia (n = 7620 patients) (Gunn et al., 2012), England (n = 403,985) (Cassell et al., 2018), and Scotland (n = 1,751,841) (Smith et al., 2014) have established that comorbid depression and chronic physical conditions are the rules and not the exception. Depressed individuals in primary health care were more likely than nondepressed individuals to have physical comorbidities (Smith et al., 2014). Moreover, nearly half of depressed patients suffer multimorbidity, which is the presence of multiple diseases or conditions (Gunn et al., 2012; Smith et al., 2014). The most typical comorbidities found in depressed patients were painful conditions, stroke, and irritable bowel syndrome (Cassell et al., 2018; Gunn et al., 2012; Smith et al., 2014). Notably, one of the studies reported a dose-response relationship between the number of chronic physical diseases and the severity of depressive symptoms (Gunn et al., 2012). Multimorbidity in depressed patients was associated with socioeconomic deprivation (Cassell et al., 2018; Smith et al., 2014), considerable health losses (Gunn et al., 2012; Smith et al., 2014), and health services utilization (Cassell et al., 2018).

Well-designed prospective cohort studies have identified the main risk factors for depression in primary health-care adult patients. The WHO primary health-care study found that psychological problems (e.g., recurrent suicidal thoughts and previous depressive episodes), as well as poor health status, predicted new depressive episodes at 12-month follow-up (Barkow et al., 2002). The same study noticed that sociodemographic factors (i.e., low formal education and unemployment) appeared to be more salient for sustained non-remission of a depressive episode (Barkow et al., 2003). The PredictD international study developed a predictive algorithm for depression in primary health care based on data from 10,045 attendees in Europe and Chile. Psychosocial and clinical variables (e.g., difficulties in paid and unpaid work, lifetime depression, family history of psychological problems, poor physical

and mental health status) were consistently selected in the PredictD algorithm (King et al., 2008).

Thus, depression appears to be particularly frequent in Western urban primary health-care facilities, and it is commonly associated with both physical and psychiatric comorbidities, generating significant degrees of disability. As in the general non-consultant population, depression mainly affects women, with psychosocial, psychological, and clinical variables leading to an increased propensity to depression in primary health-care attendees. Interestingly, secondary analyses of the PredictD data expand our understanding of the interplay between sex and risk factors for the onset of depression in primary health-care attendees (Stegenga et al., 2012). According to this study, women were not only more exposed than men to known risk factors, but they also faced enhanced susceptibility to depression resulting from exposure to these risk factors (Stegenga et al., 2012). Women were particularly affected by poor neighborhood conditions, whereas men were significantly impacted by living alone (Stegenga et al., 2012).

7.3 Integrating Mental Health into Primary Health Care

The WHO primary health-care study revealed that general practitioners acted as first contact care and gatekeepers for more than 75% of patients with mental health problems (Üstün & Sartorius, 1995). Complementarily, analyses of the WHO World Mental Health Surveys 2000–2005 described the use of mental health services for anxiety, mood, and substance disorders (Wang et al., 2007). The study found that among 84,850 participants in 17 low-, middle-, and high-income countries, the general practitioners were the largest source of mental health services (Wang et al., 2007). These findings confirm that primary health care plays a relevant role in the management of mental disorders, especially depression. Thus, it is necessary for general practitioners and allied health professionals in primary health care to timely and adequately detect, diagnose, and manage depression.

International organizations such as the WHO and its Regional Office for the Americas (PAHO), with support from the United Nations Children's Fund (UNICEF), have been instrumental in advancing the political and technical case for mental health integration into primary health care, with a particular emphasis on the Region of the Americas. As a point of reference, the Third Special Meeting of the Americas' Ministers of Health, held in Chile in 1972, summarized the health sector's challenges and achievements (Organización Panamericana de la Salud, 1972). Regarding mental health care, the 1972 meeting recognized the critical state of mental health services in the Region, with virtually no coverage for a then vast rural population and the severe insufficiency to meet the needs of a comprehensive mental health program (Organización Panamericana de la Salud, 1972). The 1972 meeting envisioned the necessary changes to address the mental health services crisis, such as integrating psychiatric care into primary health care and primary mental

health promotion and prevention activities into general health care (Organización Panamericana de la Salud, 1972).

The highly influential International Conference on Primary Health Care in Alma-Ata took place just 6 years after the 1972 meeting. The International Conference on Primary Health Care was jointly sponsored by the WHO and UNICEF, in which 134 countries and 67 international organizations participated (World Health Organization, 1978). The Conference recognized the urgent need to act on the grave inequalities in the global state of health and exhorted promotion and protection actions to realize the right to health (World Health Organization, 1978). According to the Conference, a primary health-care approach was deeply needed to achieve equity in health for all the people of the world (World Health Organization, 1978). Primary health care was considered essential health care that is universally accessible, acceptable, and affordable, "bringing health care close to where people live and work" (World Health Organization, 1978). The Conference emphasized that primary health care was the cornerstone of the health-care system and one of the foundations for social and economic development (World Health Organization, 1978).

The International Conference on Primary Health Care broadly recommended a set of priority contents for primary health care, such as the promotion of food supply and proper nutrition, the provision of maternal and child health care, and immunization against major infectious diseases (World Health Organization, 1978). The inclusion of mental health promotion was stressed among these subjects, an initial expression of the willingness and relevance of integrating mental health into primary health care (World Health Organization, 1978). This seminal disposition would find the definitive political and technical impetus with the Conference for the Restructuring of Psychiatric Care in Latin America, held in Caracas in 1990 (Levav et al., 1994). Although mainly regional in scope, with the participation of 11 Latin American countries (Levav et al., 1994), the Caracas Declaration has been recognized as a very influential milestone in global mental health (Patel et al., 2018).

The Caracas Declaration became a reference for mental health services reform processes, enshrining the commitment of Latin American governments to the development of community-based alternatives to psychiatric hospitals while respecting human rights (Levav et al., 1994). The Caracas Declaration explicitly states that restructuring psychiatric care should be based on primary health care, emphasizing decentralization, social participation and inclusion, and a preventive approach (Levav et al., 1994). Subsequent PAHO/WHO Executive Committee Resolutions have urged Latin American and Caribbean member states to adopt and deepen the principles set by the Caracas Declaration. Specifically, the Strategy and Plan of Action on Mental Health, among its recommendations, stresses the need to "review the organization of mental health services and carry out needed changes, emphasizing decentralization and strengthening the mental health component of primary health care" (Pan American Health Organization, 2009). This document also recognizes depression as a priority condition for which essential interventions should be available in primary health care (Pan American Health Organization, 2009).

Gathering much of the experience accumulated in Latin America, the WHO and the World Organization of Family Doctors (WONCA) provide a series of arguments

for integrating mental health into primary health care (World Health Organization & World Organization of Family Doctors, 2008). Most reasons for primary mental health care are directly linked to the principles highlighted by the International Conference on Primary Health Care: an accessible, acceptable, affordable, and holistic approach to mental health care, taking advantage of the embeddedness of primary health care in local communities (World Health Organization & World Organization of Family Doctors, 2008). Furthermore, the WHO and WONCA recognized that primary mental health care minimizes stigma and discrimination and prevents human rights violations as they typically occur in psychiatric hospitals (World Health Organization & World Organization of Family Doctors, 2008).

The WHO/WONCA document also states that the integration of mental health into primary health care should be made explicit in all the areas of action of mental health policies and plans, safeguarding continued financial and human resources (World Health Organization & World Organization of Family Doctors, 2008). As for human resources, the WHO/WONCA document underlines that primary health-care workers need undergraduate and in-service training and supervision to perform specific and well-defined mental health tasks adequately (World Health Organization & World Organization of Family Doctors, 2008). Essential psychotropic medications should be directly available to patients in primary health-care facilities, and specialized mental health resources should be available to primary health-care patients and workers. Advocacy is required to sensitize political leaders, health authorities, and primary health-care workers on the relevance of primary mental health care. Thus, to ensure clear and continued commitments and investments to the integration processes from government health and non-health and nongovernment sectors. Finally, health and intersectoral coordination are fundamental in helping primary health-care patients integrate fully into their communities (World Health Organization & World Organization of Family Doctors, 2008).

The following paragraphs are dedicated to detailing a successful example for developing and integrating a mental health component into primary health care, which particularly applies to the case of adult depression. The Chilean case aligns very well with the principles stated in the WHO/WONCA framework. Following the restoration of democracy in Chile, psychiatric reform found the political will to expand community mental health care (Minoletti et al., 2012). In 1993, the first national mental health plan was published, emphasizing the importance of developing a mental health component in primary health care as one of its priority areas. This plan was accompanied by attempts to provide ongoing mental health training to human resources and integrate psychosocial practitioners (e.g., psychologists) into traditionally biomedical health teams. The deinstitutionalization process was complemented and significantly aided by establishing community mental health facilities and day hospitals (Minoletti et al., 2012).

The National Mental Health and Psychiatry Plan was created in 2000 in response to the limitations identified following the first national mental health plan's experiences and to lessen the prevalence of impairment linked with mental diseases (Gobierno de Chile, 2020). This new mental health strategy established a model for mental health services networks and specified the roles of health teams. It also

incorporated sectoral and intersectoral efforts in mental health (e.g., in education, housing, and justice) and identified seven programmatic priorities: depression, alcohol and drug misuse and dependency, attention deficit hyperactivity disorder, victims of violence, schizophrenia, and dementia are among the topics covered in this section (Ministerio de Salud de Chile, 2000). The National Depression Program exemplifies how a mental health component can be integrated into primary health care among the programmatic aims.

Araya et al. (2003) conducted one of the first randomized clinical trials in a middle-income country in the early 2000s. In Chile, the authors evaluated the effectiveness of a stepwise improvement program for treating depression in primary health-care attendees. Given the substantial proportion of women affected by depression in primary health care, this study enrolled 240 adult women diagnosed with major depression using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria. Women were randomly assigned to receive usual care for depression or a stepped-care program, a highly structured, multicomponent intervention consisting of the following components: (1) a manualized, group-based psychoeducational intervention, (2) systematic monitoring of clinical evolution, and (3) a pre-established relapse prevention strategy (Araya et al., 2003).

The results of this clinical trial were highly positive: at 3 and 6 months, 49% and 70% of women who received the stepped-care program experienced recovery from depression, as measured by a Hamilton Depression Scale score of less than 8, respectively, compared to 15% and 32% of women who received usual treatment (Araya et al., 2003). This clinical trial was notable for the reorganization of primary health-care resources, with most actions carried out by nonmedical health professionals, and for the increased adherence of users in their treatment, which had a significant impact on the structure of the National Depression Program (Araya et al., 2003).

The National Depression Program began with a pilot phase in 2001, following the second National Mental Health and Psychiatry Plan adoption, and by 2003 had expanded to virtually every Chilean territory. The National Depression Program includes the following components (Alvarado et al., 2012):

1. On-site diagnostic evaluation of patients with a suspected depressive episode by a general practitioner or psychologist, based on the diagnostic criteria for depression in the ICD.
2. Indication of stepped-care treatment, according to severity level, incorporating (1) comprehensive evaluation by the primary health-care team, (2) treatment with antidepressant drugs, (3) individual psychotherapy and psychoeducational group intervention, and (4) visits to monitor the patient's clinical progress.
3. Patients with mild to moderate depression are managed in primary health-care clinics. The more severe cases are referred to specialized and outpatient mental health facilities for evaluation by a psychiatrist. If the clinical response to initial treatment is not favorable, the patient is reassessed by a psychiatrist at the primary health-care facility and, if necessary, referred to specialty care.

In September 2004, the Regime of Explicit Health Guarantees became law, mandating public and private health-care providers to guarantee access, quality, timeliness, and financial coverage for health care for prioritized health conditions (Araya et al., 2009). At the end of 2005, the second Regime of Explicit Health Guarantees came into force, which incorporated depression among the prioritized health conditions, and established that (1) all beneficiaries aged 15 years and over, with diagnostic confirmation, will have access to treatment; (2) for beneficiaries with mild or moderate depressions, treatment must be promptly initiated from the diagnostic confirmation, and, in more severe cases, consultation with a specialist must be made within 30 days from referral; (3) financial protection corresponds to a maximum co-payment of 20%; and (4) quality is defined by the provision of specific benefits for depression by an accredited or certified provider (Ministerio de Salud de Chile, 2006).

The Clinical Guidelines for Depression in People Aged 15 Years and Over currently direct the National Depression Program (Ministerio de Salud de Chile, 2013). The Clinical Guidelines stated objectives are to facilitate the active detection of depressive disorders, the reduction of their complications through comprehensive and continuous management, and to promote the rational use of available resources. Its successive editions and other regulatory documents, such as the Guidelines for Network Planning and Programming 2019 (Ministerio de Salud de Chile, 2019), have emphasized the management of major depression in primary health care, assisted referral to specialized mental health care in those cases with high suicidal risk, bipolar disorder, or treatment resistance (Ministerio de Salud de Chile, 2013), and the administration of individual psychotherapy in specialized mental health facilities (Ministerio de Salud de Chile, 2019).

7.4 Barriers to the Treatment of Depression in Primary Health Care

The Lancet Commission on Global Mental Health and Sustainable Development stresses that mental health is a public good necessary for sustainable development (Patel et al., 2018). However, the low priority given to mental health is one of the main macrostructural barriers that threaten access to this public good and sustainable development (Patel et al., 2018). An influential review on resources for mental health care found that scarcity, inequity, and inefficiency of such resources are the main obstacles to better mental health (Saxena et al., 2007). These severe limitations mean that the populations most vulnerable and in greatest need of mental health care have the least access to these services (Saxena et al., 2007). While mental health policies, plans, and laws exist in many countries, they are often outdated and poorly aligned with human rights standards to protect people with mental disorders (Saxena et al., 2007). As referred below, these structural barriers affect the quality of mental health services in primary health care.

The WHO Mental Health Atlas 2020 reported that the median global public expenditure on mental health was a meager 2.1% of total government health expenditure (World Health Organization, 2021). Moreover, most countries (81%) allocated less than a fifth of this expenditure to primary health care (World Health Organization, 2021). The WHO Mental Health Atlas 2020 assessed the functional integration of mental health into primary health care, considering the adoption of guidelines, the availability of pharmacological and psychosocial interventions, and training and supervision of primary health-care professionals (World Health Organization, 2021). Only 15% of countries met all criteria for functional integration of mental health into primary health care, whereas 31% met most criteria (World Health Organization, 2021). Notably, a low proportion of countries informed the provision of pharmacological (39%) and psychosocial (21%) interventions in primary health-care centers (World Health Organization, 2021).

Although 80% of countries noted that training was available for primary health-care professionals, the WHO Mental Health Atlas does not report details such as type, duration, or coverage (World Health Organization, 2021). An assessment of the mental health systems of 42 low- and middle-income countries made by the WHO offers a complementary view (World Health Organization, 2009). The evaluation showed that the proportion of total undergraduate training hours devoted to mental health is negligible for primary health-care professionals; the same occurs with refresher courses and in-service training (World Health Organization, 2009). In general, the higher the income level, the greater the training opportunities reported for primary health-care professionals (World Health Organization, 2009). The scarce training opportunities may affect primary health-care professionals' ability to manage depression. For instance, despite Chile's successful integration of mental health into primary health care, a recent study found that nurses, midwives, and general practitioners had difficulties in depression screening and diagnosis (Martínez et al., 2019).

International studies led by the WHO have shown that general practitioners in primary health care are the first and foremost source of mental health care (Üstün & Sartorius, 1995; Wang et al., 2007). However, the WHO primary health-care study and Mitchell et al.'s meta-analysis observed that nearly half of depressed patients (47.3–54.2%) were correctly recognized by general practitioners, signaling the need for improved diagnosis (Mitchell et al., 2009; Üstün & Sartorius, 1995). The detection of depression by primary health-care clinicians in low- and middle-income countries is considerably lower, with rates typically in the ranges of 0–12% (Fekadu et al., 2020). Low detection rates might be influenced by illness behavior, as patients usually present somatic symptoms instead of psychological complaints (Üstün & Sartorius, 1995). Organizational factors might also shape detection accuracies, such as increased performance monitoring, periodic review of clinical outcomes, presence of an appointment system, and general practitioners assuming responsibility for coordination of patient care (Mitchell et al., 2011; Üstün & Sartorius, 1995).

A return on investment analysis for depression and anxiety disorders in 36 countries estimated that between 80% and 95% of depressed people do not receive basic psychosocial treatments or antidepressants, the usual primary health-care

treatments for depression, when available (Chisholm et al., 2016). Complementarily, Pence et al. conducted a literature review to study the depression treatment continuum in primary health care (Pence et al., 2012). The authors determined that of all primary health-care patients with a major depressive episode, 24% received any treatment, 9% were adequately treated, and 6% achieved remission (Pence et al., 2012). They also projected that improving the adequacy of treatment would have the largest single impact on remission rates. It is relevant to address the barriers to managing depression in primary health care because early detection and treatment of depressive disorders facilitates the treatment response and remission of mood symptoms and reduces the risk of a chronic course of illness (Ghio et al., 2014).

Several syntheses of qualitative and quantitative studies have explored the barriers to managing depression in primary health care (Barley et al., 2011; Carlsen et al., 2007; Holm & Severinsson, 2012; McPherson & Armstrong, 2012; Schumann et al., 2012). These syntheses underscore that one of the main issues primary health-care clinicians face is understanding depression either as social distress or as a chemical imbalance (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012). Acknowledging the social origins of depression leads primary health-care clinicians to confront the limits of their capabilities, feeling powerless in managing the disease (e.g., should social problems be medicalized?), whereas a "true" depression conforms to a biomedical disease model (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012). Another primary concern is detecting and diagnosing depression. General practitioners refer to depression as puzzling, usually masked in physical symptoms (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012). Making the diagnosis of depression requires a personalized assessment of patients, demanding time (a rare commodity), watchful waiting, and active listening (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012). Addressing patients' stigma and fears toward mental illness and having a good doctor-patient relationship are essential to overcoming the difficulties found in these processes (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012).

Regarding therapeutic options available, general practitioners admit that active listening, emotional support, and empathy are their best assets when treating depression (Barley et al., 2011; McPherson & Armstrong, 2012; Schumann et al., 2012). These resources also help them negotiate antidepressant use with patients (Barley et al., 2011). However, the management of depression in primary health care is further complicated by organizational factors. For instance, primary health-care clinicians complain about the lack of clear role definitions, difficulties in the coordination of teamwork, and the poor availability of specialized mental health care, perceived as burdened with patients having severe mental disorders (Barley et al., 2011; Carlsen et al., 2007; Holm & Severinsson, 2012; McPherson & Armstrong, 2012). These barriers are complemented by the perception of clinical guidelines for depression as not readily applicable to real clinical contexts and as a threat to the judicialization of the doctor-patient relationship (Carlsen et al., 2007; Holm & Severinsson, 2012). Finally, even when clinicians recognize the need for training in depression management, negative experiences with previous depression training programs and

prioritization of training in addressing physical health problems are limitations to furthering their skills (Barley et al., 2011; McPherson & Armstrong, 2012).

7.5 Evidence-Based Interventions for Adult Depression in Primary Health Care

In this section, the main findings of recent systematic reviews and meta-analyses on the effectiveness of psychological and pharmacological interventions that have been tested in primary health care are reviewed. Furthermore, acknowledging the relevance of combined psychological and pharmacological interventions, we introduce the principles of the collaborative care model. The collaborative care model is a complex, highly effective, and influential approach to treating depression in primary health care. We finalize with a brief mention of the integration of information technologies into the primary health-care treatment of depression.

Antidepressants are acceptable and more effective than placebo in adults with major depression (Cipriani et al., 2018). However, most of the evidence cannot be directly applied to primary health care: studies have been conducted in different settings and recruited individuals with moderate to severe depressive symptoms (Cipriani et al., 2018). Few clinical trials have evaluated the efficacy of antidepressants in primary health care, despite the availability of psychotropics being a principle in primary mental health care (World Health Organization & World Organization of Family Doctors, 2008). Arroll et al.'s (2016) meta-analysis found 17 studies comparing antidepressants to placebo in primary health care. In general, these studies enrolled patients with mild to moderate depressive symptoms and explored short-term outcomes. The authors concluded that tricyclic antidepressants (e.g., amitriptyline) and selective serotonin reuptake inhibitors (e.g., sertraline and escitalopram) provided significant benefits in terms of response (i.e., >50% reduction in depressive symptoms from baseline) (Arroll et al., 2016). However, they caution that their data does not shed light as to when, who, and for how long antidepressants should be used in primary health-care attendees (Arroll et al., 2016).

Cognitive behavioral therapy and problem-solving therapy are the most studied psychological treatments for adult depression in primary health care (Cuijpers et al., 2019; Zhang et al., 2019). While cognitive behavioral therapy aims to change dysfunctional thoughts and cognitive distortions (Hofmann et al., 2013), problem-solving therapy trains patients in adaptive problem-solving attitudes and skills (Bell & D'Zurilla, 2009). Cuijpers et al. (2019) found that psychotherapies for depression in primary health care are effective and that face-to-face comparisons revealed no significant differences between them. Moreover, the same evidence synthesis showed that psychotherapies for depression could be delivered by general practitioners and allied health-care workers (Cuijpers et al., 2019). The authors argue that such finding is relevant to scale-up primary health-care depression treatment in low- and middle-income countries (Cuijpers et al., 2019). Interestingly, research has

shown that psychotherapies' effectiveness for depression in primary health care is moderated by treatment modality: individual interventions and outside primary health-care facilities (i.e., closer to patients' homes) are more effective (Zhang et al., 2019).

More recently, a network meta-analysis by Cuijpers et al. (2021) provided the first comparison between pharmacological, psychological, and combined interventions for depression in primary health care. Cuijpers et al.'s network meta-analysis (2021) included 58 studies, totaling 9301 mostly adult primary health-care attendees. The authors found that the three types of treatments explored were more effective than treatment as usual and waitlist controls (Cuijpers et al., 2021). However, a clear preference for combined pharmacological and psychological interventions was evidenced, achieving better response, remission, and improvement in depressive symptoms (Cuijpers et al., 2021). Notably, the network meta-analysis found no significant differences in the acceptability of these interventions, underlining the relevance of adapting treatment offer to patients' preferences (Cuijpers et al., 2021).

The collaborative care model might be thought of as a model for the integration of combined interventions for managing depression in primary health care. A group of researchers in the United States, led by Wayne Katon et al. (1995, 1996, 1997, 1999), developed the collaborative care model based on chronic and recurrent illness care. This model provided a multicomponent intervention, with increased patient engagement and education, more regular treatment in the acute phase of the illness, and more intensive treatment for more severe patients (i.e., stepped treatment). This was complemented by strict monitoring of treatment adherence, training for primary care physicians in the management of depression, and closer collaboration between treating physicians and psychiatrists (i.e., mental health consultancies). Collaborative care proved feasible to implement in primary health care, acceptable to patients and general practitioners, effective in reducing depressive symptoms, and cost-effective (Katon et al., 1995, 1996, 1997, 1999).

Currently, the collaborative care model has robust evidence for its benefits: decreased depressive symptoms, increased adherence and response to treatment, improvements in quality of life and satisfaction with care, and economic efficiency, in a wide range of depressed patients (Miller et al., 2013; Vanderlip et al., 2016). According to Vanderlip et al. (2016), the collaborative care model involves:

(i) A general practitioner who leads a multidisciplinary health-care team in coordination with a case manager (e.g., a nurse). The primary health-care team receives consultation from a mental health specialist.
(ii) Improving the quality of care and health outcomes of a population, through a systematic review of cases periodically to redirect health resources, and analysis of aggregated patient data to identify and act on gaps in care in the population.
(iii) Health care is based on timely measurements for assessing progress in patients' health status through reliable, change-sensitive, and simple-to-apply instruments (e.g., the Patient Health Questionnaire-9, PHQ-9, in the case of depression).

(iv) The provision of evidence-based interventions, structured in a stepped manner (e.g., greater intensity of interventions as the case's complexity increases), and with instruments to support clinical decision making (e.g., mental health consultancies, clinical guidelines with standardized management algorithms, among others).

A panel of experts studied the effectiveness of the collaborative care model in clinical trials published between 2004 and 2009, reporting the finding of robust evidence for significant improvements in depressive symptoms, adherence, and response to treatment, quality of life, and satisfaction with care in a wide range of depressed patients (Thota et al., 2012). Complementarily, a systematic review of the economic efficiency of the collaborative care model (Jacob et al., 2012), conducted by the same expert panel, found positive economic benefits, lower programmatic costs, willingness-to-pay exceeding expenses, and greater cost-effectiveness in sites receiving the intervention.

Finally, scientific innovations in the management of depression in primary health care from developed countries have been presented, raising questions about the feasibility of implementing such models in under-resourced settings in developing countries. In this regard, Patel et al. (2009) reviewed the evidence on the efficacy of treatments and the provision of interventions for the management of depression in low- and middle-income countries. They proposed a "package" of care for depression in these settings (Patel et al., 2009). The authors concluded that a basic package for depression management should include routine use of culturally adapted instruments to improve depression screening; patient education about their health problem and treatment alternatives; context-specific antidepressant treatments and psychotherapy, such as generic antidepressants and problem-solving therapy; and that task shifting to nonspecialist health workers, who provide first-line care and are supervised by specialists, is essential to integrate this package into routine care in community services (Patel et al., 2009).

7.6 Conclusion

Depression is a very important public health problem worldwide. It is frequent in people who attend primary care clinics, and it is frequently associated with chronic diseases and psychiatric comorbidities.

The primary care team can play a crucial role in depression management. Therefore, it is necessary for the development of a mental health component in primary care based on the principles of the collaborative care model that has demonstrated a highly effective and influential approach to treating depression in primary health care.

Acknowledgments This work was supported by ANID – Millennium Science Initiative Program – ICS13_005, ANID – FONDECYT – 1180224, and U Redes Consolidación (Grant URC 007/18).

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Chapter 8
The Potential of Internet-Based Psychological Interventions for Perinatal Depression Prevention and Treatment

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8.1 Perinatal Depression Prevalence, Etiology, and Infant Consequences

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM), PND shares the characteristics of depression in other stages of the life cycle, with the peculiarity that its onset occurs during pregnancy or during the 4 weeks following delivery (American Psychiatric Association, 2013; Ferrari et al., 2013). However, in clinical practice and research, PND is defined as depression occurring during pregnancy (antenatal depression) and up to 1 year (O'Hara & McCabe, 2013) or 2 years after giving birth (postpartum depression) (Cuijpers et al., 2021). Studies show an overall PND prevalence of 11.9%, with a higher prevalence in low- and middle-income countries (Woody et al., 2017) or countries with high wealth disparities (Hahn-Holbrook et al., 2018). Between 6% and 38% of women develop

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_8

antenatal depression (Field, 2011), and between 3% and 38% develop postpartum depression (Fisher et al., 2012; Hahn-Holbrook et al., 2018). Approximately half of PND episodes spring during pregnancy (American Psychiatric Association, 2013; Raskin et al., 2016; Wisner et al., 2013), and evidence shows that depression at this stage is linked to a greater probability of developing postpartum depression (Figueiredo & Conde, 2011; Koutra et al., 2014; Toohey, 2012). Suicidal thoughts may affect approximately 20% of women with PND, and some of them also report thinking of harming their children (Wisner et al., 2013). Indeed, in some countries, suicide is a leading cause of maternal death (Knight et al., 2019; PMMRC, 2016).

Studies have shown that PND has a multicausal etiology. Risk factors include unplanned or unwanted pregnancies, ambivalence concerning motherhood (Bowen & Muhajarine, 2006), low income, absence of a support network, extreme ages (teenagers or >40 years), lack of a partner, insecure attachment pattern, a history of depression (Faisal-Cury & Rossi Menezes, 2007; Field, 2017a, b; Olhaberry et al., 2014), and adverse or traumatic experiences during childhood (Buist & Janson, 2001; Nelson et al., 2002). Stress, drug use, conflicts with a partner, domestic violence, and a low educational level have also been associated with PND (Field, 2017a, b).

One of PND's most relevant and worrying characteristics is its negative impact on both the mother and the baby (Clatworthy, 2012; Field, 2011; Slomian et al., 2019). When comparing non-depressed pregnant women with antenatal depression, evidence shows more frequent preterm deliveries and newborns with increased cardiac activity, smaller stature, or lower weight (Diego et al., 2009; Emory & Dieter, 2006; Fekadu Dadi et al., 2020; Hompoth et al., 2020). Negative consequences on children of mothers with PND have also been reported regarding their affective, cognitive, and behavioral development (Grace et al., 2003; Milgrom et al., 2008; Pearson et al., 2012), along with the greater risk of suffering from depression throughout life (Fox & Borelli, 2015; Pawlby et al., 2009; Slomian et al., 2019). Some of these negative consequences for children of depressed mothers can be explained by symptoms during pregnancy, regardless of the presence or absence of postpartum depression (Deave et al., 2008; Stein et al., 2014).

Evidence shows a larger presence of insecure and disorganized attachments in children of depressed mothers (Hayes et al., 2013; Martins & Gaffan, 2000), especially when mothers present severe and chronic depression (McMahon et al., 2006). Postpartum depression has also been linked to maternal anxiety symptoms and stress, which heightens PND influence on mother-baby dyadic adjustment (Rollè et al., 2017; Vismara et al., 2016), intensifying negative affect and reducing the maternal sensitive response to the baby's needs (Behrendt et al., 2019; Lefkovics et al., 2018). Given all this, postpartum depression is considered one of the most relevant risk factors for the quality of mother-baby interactions and infant development (Campbell et al., 2004; Stein et al., 2014; Slomian et al., 2019). Moreover, a negative impact on the quality of mother-baby interactions has been reported even when depressive symptomatology is subclinical (Tronick & Reck, 2009). The latter highlights the need to intervene early.

8.2 Perinatal Depression Prevention and Treatment

The United States Preventive Services Task Force recommends routine depression screening for all perinatal women (American College of Obstetricians and Gynecologists, 2014). Other countries around the world have also implemented routine perinatal depression screening (beyondblue, 2011; MINSAL, 2014). However, specific issues have been reported regarding PND detection and diagnosis since symptoms such as irritability, low mood, emotional lability, anxiety, and sleep disorders are commonly experienced during the perinatal period (Halbreich & Karkun, 2006). In contrast, depressive symptoms are normalized by perinatal women, their families, and caregivers, who attribute them to being part of the psychological adjustment to pregnancy and having a new baby (Sword et al., 2008). Additionally, being outspoken about depression is embarrassing for many women because of the cultural belief that defines the perinatal time as "a period of happiness" (Dennis & Chung-Lee, 2006). All of these facts hinder early screening and timely treatment.

Interventions to prevent or treat PND can include one or a combination of the following strategies: pharmacological treatments such as antidepressant medication; psychoeducation; psychological treatments such as cognitive behavioral or interpersonal therapy, individually or group-administered; maternal-child interaction guidance for bond promotion such as video-feedback; psychosocial interventions such as nondirective counseling; peer support such as periodic group reunions with other mothers; and other non-pharmacological/non-psychological treatments such as bright light therapy, acupuncture, exercise, and massage (Field, 2017a, b; Fitelson et al., 2010; Ladyman et al., 2020; Letourneau et al., 2017; Lucena et al., 2020; Olhaberry, Escobar, et al., 2015, Olhaberry, León, et al. 2015; Werner et al., 2015). Interventions for PND prevention are conducted during pregnancy or the postpartum period. They may target either all women (i.e., universal) or those with specific characteristics (e.g., at risk for depression) (Sockol et al., 2013).

Psychotherapy is recommended as the first-line approach for PND and may be combined with pharmacotherapy, depending on depression severity, available options, women's acceptance, and perinatal period (pregnancy or postpartum) (Molenaar et al., 2018). Among the theoretical models supporting psychological interventions, cognitive behavioral models are the most frequently applied (Cuijpers et al., 2021). Interventions may include psychoeducation on PND, identification of support networks, promotion of positive thoughts and pleasant activities, and the provision of written material (Huynh-Nhu et al., 2013; Kozinsky et al., 2012; Lara et al., 2010; Milgrom et al., 2011; O'Connor et al., 2016). Although the literature links PND with bonding difficulties between the mother and her baby (Martins & Gaffan, 2000), most psychological interventions on PND seek to reduce its symptoms and do not necessarily aim to improve the quality of the bond (Olhaberry et al., 2013). Interventions that simultaneously address PND symptomatology and the mother-baby bond use varied strategies, from psychodynamic approaches that seek to relate the mother's attachment patterns with the type of relationship she has with

her baby, to the promotion of strategies for increasing maternal sensitivity and mentalization (Santelices et al., 2010; Svanberg et al., 2010).

Pregnancy and postnatal periods provide PND screening, prevention, and intervention opportunities because of the increased assistance to health-care services for routine checkups (Sockol et al., 2013). However, PND is globally both underrecognized and undertreated (Pearlstein et al., 2009). Even when detected, women frequently do not receive assistance or do not adhere to treatments (Dennis & Chung-Lee, 2006; Rojas et al., 2015, 2018). Barriers to addressing perinatal depression have been identified at different levels (Byatt et al., 2012, 2013; Dennis & Chung-Lee, 2006; Goodman, 2009; Rojas et al., 2015). At the patient level, negative beliefs about PND and psychological treatments, stigma, fear of being judged as an unfit parent, lack of time or energy, childcare issues, lack of confidence in health-care professionals, and economic barriers have been identified. At the perinatal health-care professionals' level, lack of time, training, and knowledge on mental health have been identified. There is limited access to mental health care at the health-care system level, a long wait for appointments, and a lack of communication and continuity between perinatal and mental health providers. Therefore, there is an urgent need for friendly, easily accessible, low-cost, evidence-based interventions to reduce the burden of PND (Lee et al., 2016). To effectively address PND, the design of intervention modalities should consider treatment access barriers, mothers' preferences, available evidence, and the mother-child relationship.

8.3 Perinatal Women's Use of Internet Resources for Health Information and Advice

Worldwide, women are increasingly using the Internet as a source of health information during pregnancy and postpartum, regardless of their socioeconomic status (Guerra-Reyes et al., 2016; Osma et al., 2016; Slomian et al., 2017). Some key factors influencing information-seeking reported by perinatal women are dissatisfaction with the information provided by health professionals, lack of time to ask health professionals questions (Lagan et al., 2010), and the desire to find information "on their own" (Slomian et al., 2017). Nevertheless, studies have shown that many women perceive that the information they find on websites is not always reliable (Goetz et al., 2017). Some mothers have turned to social media, such as Facebook, to find social support (Morris, 2014) and share supposedly evidence-based information. In such cases, there is still the risk of accessing poor quality or inaccurate information (which can also quickly go viral) that may be evaluated mistakenly by women as evidence-based information and used to make health-care decisions (Dekker et al., 2016).

Studies have shown that most perinatal women, whether sampled from general populations or populations with PND symptomatology, have searched online for information on mental health (mostly on PND) and self-help strategies at least once

(Fonseca et al., 2016; Maloni et al., 2013). In the case of women with PND, peer-to-peer online forums have been found to provide social support and improve women's disclosure to health-care providers by enabling the expression of their self-stigmatization (Moore et al., 2017). Websites can also provide education about PND and its treatment, which is a significant help-seeking facilitator (Dennis & Chung-Lee, 2006). Nonetheless, studies in which experts have evaluated the content of websites that provide information on PND show a fair share of sites containing incomplete, not helpful, and even incorrect information (Moore & Ayers, 2011; Summers & Logsdon, 2005). On the other hand, the preference for websites or peer-to-peer forums has been related to women's education level. College graduates tend to gravitate toward specific websites linked to professional or academic organizations, while mothers with lower education levels tend to gravitate toward peer-to-peer forum sites (Guerra-Reyes et al., 2016). This preference might be related to women's levels of health literacy (Shieh et al., 2009).

The globally widespread presence of mobile phones has also prompted attention to smartphone apps' potential to provide information and interventions (Lal, 2019). Some advantages of these apps include the convenience of completing app assignments or other activities in people's day-to-day lives (Webb et al., 2017). An online survey conducted in Australia with women who were pregnant or had given birth to at least one child in the previous 3 years showed that almost 75% of respondents had used at least one pregnancy app, with 50% reporting using at least one parenting app (Lupton & Pedersen, 2016). In the wake of this trend, the market for health-related apps has proliferated. In China, an app store inspection allowed the detection of 6153 apps developed for maternal and child health care (Zhang et al., 2018). In Canada, a similar study found 1054 depression-related apps (Shen et al., 2015). However, available apps claiming to provide psychological psychoeducation or intervention have not usually been tested for efficacy (Schueller, 2018). The lack of evidence becomes evident when systematic reviews of studies that assess the effectiveness of apps for perinatal care or depression management identify only a small number of studies.

Thus, the Internet and digital technologies have the potential to reach an enormous number of women who are already seeking information online. Furthermore, the increasing use of Internet resources for health information is aligned with a trend today: patients are more invested in their health care, and this growing importance of "participatory health" requires innovative support (van Gemert-Pijnen et al., 2018).

8.4 Internet-Based Interventions for Mental Health Care

In response to the need to support and improve mental health conditions and mental health care and take advantage of the spread of technology, clinicians and researchers have taken advantage of the benefits of information and communication technologies. In particular, the many technologies related to the Internet are referred to

as “e-mental health” (Riper et al., 2010). E-mental health involves the use of digital technologies and new media for screening, health promotion, prevention, early intervention, treatment, and relapse prevention, as well as for improving health-care provision (e.g., electronic patient files), professional education (e-learning), and online research in the field of mental health (Riper et al., 2010). Technologies that have been leveraged for e-mental health services and interventions include, among others, websites, social media, videoconferencing solutions, virtual reality, chatbots, smartphone apps (i.e., software applications developed for mobile devices), and wearable devices with sensors (Lal, 2019).

This chapter will focus on psychological interventions delivered through the Internet (i.e., Internet-based interventions (IBIs)) for e-mental health prevention and treatment. During an IBI, patients typically log into a website or smartphone app to read, watch, hear, and download materials arranged into a series of modules (Andersson, 2018; Ebert et al., 2018). They often include homework assignments and the completion of self-administered questionnaires relevant to the presenting problems, allowing to monitor their progress and outcomes (Andersson et al., 2019). IBIs can be automated (i.e., unguided) or may include some form of human support from a clinician (i.e., guided). When interventions are guided, support is usually provided through a messaging system, email, or chat.

IBIs have the potential to overcome logistical and financial barriers for the benefit of both health-care providers and patients, allowing for cost-effective interventions (Krausz et al., 2019; Paganini et al., 2018). IBIs enable patients to access at any time and from anywhere with an Internet connection; may provide a high level of anonymity and privacy (helpful in particular for people who feel stigmatized); can improve continuity of care and patient empowerment; offer flexibility in terms of standardization and personalization; and provide opportunities for easy translatability and cultural adaptability (Lal & Adair, 2014; Schröder et al., 2016). Over the past decade, this field has grown in high-income countries (Lal, 2019) and has slowly but progressively increased its presence in low- and middle-income countries (Jiménez-Molina et al., 2019; Martínez et al., 2018).

8.5 Internet-Based Interventions for Perinatal Depression Care

Over the last few years, there has been a growing effort to develop and test IBIs for PND prevention and treatment with positive outcomes. Preliminary findings from meta-analyses suggest that IBIs may effectively reduce depressive symptomatology in perinatal women. Mu et al.’s (2021) meta-analysis, which is the most recently published meta-analysis, showed that IBIs can decrease the prevalence of PND and alleviate depressive symptoms in perinatal women (overall effect size of $d = 0.64$). Their meta-analysis included seven studies, six using treatment-as-usual controls

and one using a waitlist. Only one intervention was unguided, and it was the only intervention that failed to reduce depressive symptomatology. Previous meta-analyses have shown similar effect sizes, with values of 0.60 (Loughnan, Joubert, et al., 2019) and 0.59 (Lau et al., 2017). These effect sizes are similar to those reported in meta-analyses on face-to-face intervention for reducing PND symptoms (Cuijpers et al., 2007, 2021; Sockol et al., 2011). However, the number of studies identified in the meta-analyses on perinatal depression IBIs is small, and the methodological quality of those studies is mixed (Mu et al., 2021). Therefore, more studies are needed to draw more robust conclusions about their efficacy.

Women are reported as willing to participate in perinatal IBIs, independent of their age, race, income level, or having a child at home (Peragallo Urrutia et al., 2015). The same has been found when surveying women with PND (Maloni et al., 2013). Moreover, women who have participated in IBIs designed to prevent or treat PND usually find interventions helpful and positively evaluate their flexibility, accessibility, and convenience (O'Mahen et al., 2015; Pugh et al., 2016; Sawyer et al., 2019). When interventions are guided, women value therapists' assistance and are even able to perceive a strong therapeutic relationship (Pugh et al., 2016).

Nearly all efficacy studies on PND IBIs to date have been conducted in high-income countries. Most of those PND IBIs have a cognitive behavioral approach (Barrera et al., 2015; Fonseca et al., 2020; Forsell et al., 2017; Jannati et al., 2020; Loughnan, Butler, et al., 2019; Loughnan, Sie, et al., 2019; Milgrom et al., 2016; Pugh et al., 2016). Other therapeutic approaches include behavioral activation (O'Mahen, Richards, et al., 2013; O'Mahen, Woodford, et al., 2013), mindfulness (Yang et al., 2019; Sun et al., 2021), problem-solving therapy (Heller et al., 2020), or a combination of different therapeutic approaches (Haga et al., 2018; Sawyer et al., 2019). Some interventions have been adapted from existing IBIs for depression that was not perinatal specific (Heller et al., 2020; Loughnan, Butler, et al., 2019; Loughnan, Sie, et al., 2019; Pugh et al., 2016). Approximately half of the interventions are unguided (Barrera et al., 2015; Haga et al., 2018; Loughnan, Butler, et al., 2019, Loughnan, Sie, et al., 2019; Fonseca et al., 2020; Jannati et al., 2020; Sun et al., 2021). When guided, support is usually provided by a clinical psychologist. Interventions are typically divided into sequential modules (to be completed weekly) with multimedia-presented therapeutic content, accompanied by homework assignments for rehearsing the learned skills. Case examples are commonly included to illustrate therapeutic concepts. Recruitment for trials is usually carried out by advertisements on parenting websites and social media. Most interventions show promising results for reducing depressive symptoms with good levels of participant satisfaction (O'Mahen, Woodford, et al., 2013; Milgrom et al., 2016; Pugh et al., 2016; Forsell et al., 2017; Haga et al., 2018; Loughnan, Butler, et al., 2019; Loughnan, Sie, et al., 2019; Yang et al., 2019; Fonseca et al., 2020; Jannati et al., 2020; Sun et al., 2021). However, many studies showed high intervention attrition (O'Mahen, Richards, et al., 2013; Barrera et al., 2015; Forsell et al., 2017; Haga et al., 2018; Fonseca et al., 2020; Heller et al., 2020; Sun et al., 2021).

8.6 Recommendations for Researchers, Clinicians, and Policymakers

8.6.1 Internet-Based Interventions' Development Process

Although IBIs for PND have proven to be effective, attrition rates are often high and problematic even when the intervention is guided (Forsell et al., 2017; Lau et al., 2017; Lee et al., 2016; O'Mahen, Richards, et al., 2013; O'Mahen, Woodford, et al., 2013). IBIs' attrition is a common problem. A recent meta-analysis of IBIs for depression found that, on average, only 55.3% of participants completed the full intervention (Moshe et al., 2021). One issue identified to work on is how to appropriately tailor the IBI design to ensure usability, acceptability, and engagement among target users while retaining clinical effectiveness (Nicholas et al., 2017). Development methods that are only theory or expert driven have been indicated as possible causes for attrition and adoption problems (van Gemert-Pijnen et al., 2011). These methods do not include the potential end user in the development process of the IBI.

Recent research on intervention development suggests integrating theory- and expert-based approaches with other methods that promote the involvement of the user (and other possible key stakeholders) from an early stage of intervention development and throughout the different stages of the process (van Gemert-Pijnen et al., 2011). The same has been suggested by studies that have assessed mothers' use and preferences for eHealth (Guerra-Reyes et al., 2016; Ramphos et al., 2019; Walker et al., 2017). An intervention development process that creates a good fit between technological, human, and contextual factors may increase the chances of reaching its goals (van Gemert-Pijnen et al., 2011). For example, some PND IBIs were included in their development process interviews, focus groups, and usability tests with postpartum women (Danaher et al., 2012; O'Mahen et al., 2012). Likewise, future studies need to clearly describe the developmental process of the IBIs that are tested for efficacy (Lee et al., 2016). Disclosing the developmental process enhances the intervention's reproducibility, increases the validity of the study findings, and serves as a guide to other researchers who plan to develop similar interventions (Hoddinott, 2015).

The need to involve the potential end user (and other possible key stakeholders) from an early stage of intervention development not only applies to interventions delivered from scratch. It is also very important when adapting an existing evidence-based face-to-face intervention for PND to an IBI. For example, the "Mothers and Babies Course" has been evaluated in several randomized controlled trials, with evidence suggesting that it is a successful evidence-based intervention for PND prevention (Muñoz, Pineda et al., 2021). However, the IBI version of the intervention study showed high attrition and failed to demonstrate a significant reduction in PND. A subsample of participants from the clinical trial was then invited to provide feedback on the IBI to improve it (Ramphos et al., 2019). The authors of the qualitative study conclude that users have valuable input. Nevertheless, for the benefit of

time and economic resources, the sooner the involvement of key stakeholders, the better. Later, the intervention can still be updated or adapted (which is a strength of IBIs), but significant changes may imply high costs.

On the other hand, designing IBIs with a persuasive systems approach is highly recommended (for a meta-analysis of the relationship between persuasive technology principles, adherence, and the effect of IBIs on mental health, see Wildeboer et al., 2016). In the persuasive systems approach, the technology is designed to reinforce, change, and shape attitudes, behaviors, or both without coercion or deception (Oinas-Kukkonen & Harjumaa, 2009). Some examples of persuasive features are the reduction and tunneling of therapeutic content (reducing online content into simple tasks, leading users), self-monitoring, and the possibility to tailor the content.

Thus, how can formative work be best guided when designing a hopefully successful intervention? The choice of methods depends on the research questions and goals of each individual project. To aid eHealth intervention developers, van Gemert-Pijnen et al. (2018) developed "the CeHRes Roadmap," a guide that offers practical and valuable suggestions derived from evidence-based strategies (including designing from user-based and persuasive approaches). The roadmap is not a prescriptive theory or approach but provides a multidisciplinary framework in which different methods and approaches can be used.

8.6.2 Cultural Adaptation of Internet-Based Interventions

Newly developing interventions for each population require significant effort. A more resource-saving possibility could be using an evidence-based existing intervention and culturally adapting it for the new target group. In such cases, evidence on traditional treatments shows that culturally adapted interventions are more effective than non-adapted versions of the intervention (Hall et al., 2016). Likewise, a greater extent of cultural adaptation seems to lead to higher effectiveness (Soto et al., 2018). IBIs have been mostly developed and evaluated in high-income countries, so for them to be implemented in low- and middle-income countries (or any culturally differing target group), they should go through a structured process of cultural adaptation. One of the benefits of IBIs is their easy cultural adaptability (Schröder et al., 2016). However, research on the cultural adaptation of IBIs for mental disorders is in its early stages, and there is a lack of studies on a direct comparison of a culturally adapted IBI with a non-adapted IBI (Spanhel et al., 2021). Nevertheless, Spanhel et al. (2021) reviewed the literature on cultural adaptations of IBIs for mental disorders and extracted 17 content, methodological, and procedural components that may provide a valuable base for future researchers to adapt IBIs systematically.

Including the end user in PND IBI development, cultural adaptation, or perinatal content adaptation (when using an existing IBI for depression that is not specific to perinatal women) is particularly relevant when addressing this target group. When addressing perinatal women at risk or with PNDs, we face not only the specific

group's beliefs surrounding depression (and its treatment) but also their beliefs and expected behaviors related to motherhood and parenting. Cultural variations in motherhood and parenting beliefs and behaviors can be striking, whether observed among different groups in one society or across societies (Bornstein, 2012).

8.6.3 The Role of Guidance in Internet-Based Interventions

Perhaps the most significant and consistent finding regarding the impact of IBIs for depression on effectiveness is the role of guidance (Moshe et al., 2020). Karyotaki et al.'s (2021) recent "individual participant data" network meta-analysis that included 39 randomized controlled trials on IBIs for depression (including PND) demonstrated that both guided and unguided IBIs are associated with a greater reduction in depressive symptoms than treatment-as-usual and waitlist at posttreatment. Differences were maintained at 6 months and 12 months following randomization (Karyotaki et al., 2021). However, guided interventions lead to larger effect sizes than unguided interventions (Karyotaki et al., 2021). Several randomized controlled trials and meta-analyses support this finding (Baumeister et al., 2014; Moshe et al., 2021; Richards & Richardson, 2012). Indeed, guided interventions' effectiveness has been shown to be comparable to face-to-face, group, or telephone interventions, but this comparability has not been found for unguided interventions (Cuijpers et al., 2019).

One explanation for why guided interventions lead to greater therapeutic outcomes than unguided interventions is the higher level of adherence found in the first ones. Studies have found that guided interventions result in a higher number of completed modules and lower attrition than unguided interventions (Baumeister et al., 2014). Likewise, adherence has a significant influence on effect size (Moshe et al., 2021). On the other hand, for guidance to be beneficial, it seems that it is not necessary for the supporter to spend much time with each participant (contact can be minimal), to communicate synchronously, or to have much expertise (Baumeister et al., 2014; Shim et al., 2017). However, as technology further develops, improvements in automated support strategies may help to increase the adherence and effectiveness of unguided interventions (van Gemert-Pijnen et al., 2018). For example, the use of chatbots (a system that can converse and interact with human users) for mental health is an emerging promising research field (see Abd-Alrazaq et al., 2019, for a scoping review on chatbots for mental health).

Nevertheless, baseline depression is an important modifier of the relative association for the efficacy of guided vs. unguided IBIs. Karyotaki et al.'s (2021) meta-analysis found that differences between unguided and guided IBIs in people with baseline symptoms of subthreshold depression (PHQ-9 scores 5–9) were small, while guided IBIs were associated with overall better outcomes in patients with baseline moderate and severe symptoms (PHQ-9 greater than 9). These findings open new avenues for treatment decision-making. Given that individuals with mild depressive symptoms may benefit comparably from guided and unguided IBIs, the

latter could be disseminated to a large number of people experiencing mild depressive symptoms at a favorable cost, with therapeutic guidance being prioritized for patients with moderate and severe symptoms (Karyotaki et al., 2021).

Moreover, unguided interventions have the potential to benefit the global community (Muñoz, Le, et al., 2021; Paganini et al., 2018). Providing face-to-face or guided IBIs for prevention or treatment all over a nation or the world to every woman at risk or presenting PND is not feasible (Muñoz, 2019). Consumable interventions are costly (Muñoz, Pineda, et al., 2021). However, unguided IBIs can be used repeatedly by an unlimited number of people anytime, anywhere, without losing their therapeutic or preventive power (Muñoz, Le, et al., 2021). Unguided IBIs could be provided at no charge to every expectant or new mother in the world as "massive open online interventions" (MOOIs), following the example of massive open online courses (MOOCs) (Muñoz et al., 2016). MOOCs are online courses available to anyone in the world, usually for free. In communities where few people have access to the Internet, health clinics could provide resource rooms where people could access MOOIs, and in remote locations where there are no clinics, local providers could use tablets, laptops, or mobile phones to share MOOIs with the people they assist (Muñoz, 2019).

8.6.4 Internet-Based Interventions' Characteristics

Therapeutic Approach IBIs for depression show no significant differences in effect sizes between different therapeutic approaches (Moshe et al., 2021). A recent meta-analysis on face-to-face, group, and guided self-help (including Internet-based) psychological interventions for PND showed the same result (Cuijpers et al., 2021). Most likely, the personalization of the components and content of the intervention is more likely to make a difference. In cognitive behavioral-based IBIs for depression, some components are more helpful than others. For example, evidence suggests that behavioral activation may be beneficial and that relaxation might be harmful (for more information about optimizing and personalizing cognitive behavioral-based IBIs for depression, see Furukawa et al., 2021). Personalization of the intervention according to the user's characteristics and specific needs can also be carried out in other ways, for example, by designing a particular group (e.g., an IBI for first-time mothers and college students), by tailoring the messages users receive, or by designing the intervention in such a way that it can be changed or set up to match user preferences (Ludden et al., 2015).

The Mother-Baby Relationship Research on face-to-face psychological interventions shows that a reduction or remission of depressive symptoms does not necessarily improve the mother-baby relationship (Murray et al., 2003, 2014; Olhaberry et al., 2013) or child development (Tsivos et al., 2015). However, when interventions for PND are aimed at improving the quality of the mother-baby interaction, significant improvements in maternal sensitivity and baby attachment may be

observed (Kersten-Alvarez et al., 2011; Olhaberry, León, et al., 2015). Nevertheless, the literature shows that interventions for the prevention or treatment of PND tend to focus on depressive symptomatology reduction without including the baby or mother-baby relationship or by including them in a very minimal way (Olhaberry et al., 2013). The same has been observed with most IBIs for the prevention or treatment of PND. Considering the severe consequences of PND on the baby's affective, cognitive, and behavioral development, there is the need to stress the importance of intervening, including a mother-baby dyad approach. Moreover, this approach should be included in pregnancy, as the presence of antenatal depressive symptoms has been shown to influence the subsequent mother-infant interaction style (Binda et al., 2020). If future research concludes that IBIs for PND effectively improve the mother-baby relationship and were massively implemented, improvements in public health outcomes would be significant.

Peer-Based Support Peer support interventions have shown promising results for reducing PND symptoms and incidence of the disorder (Huang et al., 2020), even when support is provided through technology-based channels such as email or WhatsApp (Shorey et al., 2019). Transitioning to motherhood itself can cause significant disruption to social life (Lee et al., 2016), and a weak support system and social isolation are identified as predisposing factors for developing and maintaining PND (Hawes, 2020). A couple of PND IBIs have integrated peer-based support into the intervention, giving the possibility to interact with other mothers through chat or forums (Milgrom et al., 2016; O'Mahen, Woodford, et al., 2013). However, more research is needed to determine if the inclusion of this kind of support adds to the clinical efficacy of IBIs, which channels are best for interaction, and if moderation by a clinician is needed.

Intervention Length The number of intervention modules on IBIs for depression has a significant influence on effect size and adherence. A recent meta-analysis concluded that an optimal effect and maximum acceptability were achieved in interventions with approximately seven modules (Moshe et al., 2021). Longer interventions risk having higher dropout rates, and therefore, the desired outcome may be compromised. On the other hand, because a high proportion of users do not invest as much effort in IBIs as intended by their developers, some researchers have started to study shorter and more focused interventions. These kinds of interventions are called "microinterventions" (for a conceptualization of "microinterventions," see Baumel et al., 2020), and they are usually single-session interventions. They provide new ways of delivering mental health interventions to perinatal women who have difficulties engaging in longer interventions or when a highly focused objective is intended to be achieved (e.g., how to respond to a crying baby). Microinterventions could also be delivered through tablets (or other devices) in maternity hospital waiting rooms or during hospitalization after childbirth.

8.6.5 Design and Quality of Clinical Trials for Evaluating Internet-Based Interventions

More high-quality randomized controlled trials with larger samples and an examination of long-term effects are required to further assess the effectiveness of IBIs for PND (Loughnan, Joubert, et al., 2019; Zhou et al., 2020). Moshe et al. (2021) reviewed the last three decades of the Internet- and computer-based interventions for the treatment of depression (including PND) and found that nearly half of the studies were underpowered because of small sample sizes and suggested the need for 106 participants (53 in each condition) to detect a statistically significant difference with a power of 80% (t-test, alpha 5%, 1:1 allocation ratio assumed).

Additionally, the results of Moshe et al.'s (2021) meta-analysis highlight the need to use treatment-as-usual as a control (instead of the waiting list), to conduct more effective trials, to use current standards for missing data handling (e.g., using multiple imputations, mixed-effects models, or full information maximum likelihood) to lower the risk of bias, and to conduct further research into processes mediating adherence. Regarding the latter, future studies on mediators and moderators are needed to inform who benefits most from PND IBIs and who is most likely to drop out.

8.6.6 Integration of Internet-Based Interventions in Routine Care Settings

A challenge with IBIs is knowing how to integrate them into the existing pathways of care. One possibility is integrating them into a stepped-care approach (Mental Health Commission of Canada, 2014). Within stepped-care approaches, the degree of support patients receive depends on their actual individual needs. Universal screening for PND should be provided to all pregnant and postpartum women. Based on PND risk or severity and the presence of comorbidities, a decision tree can be developed with different approaches to care. IBIs could be included in the base of the chain for women at risk of developing PND and at the early stages of the disorder. Additionally, an IBI can be offered as preparation for face-to-face treatment (e.g., providing PND psychoeducation or key information about the treatment), as an adjunct to face-to-face treatment (i.e., "blended treatment"), or for relapse prevention when the treatment is completed (Newby et al., 2021). In blended treatments, patients can access the IBI between sessions, combining the strengths of both approaches (Erbe et al., 2017). Blended treatment for PND is a new field (Branquinho et al., 2020), so more research is needed to determine its benefits and for whom and in what scenarios it is suitable.

When offering an IBI, women should be provided with information that may improve the acceptance of such tools (Fonseca et al., 2016). Dissemination actions directed toward potential users include information about the benefits, costs, and

efficacy results of IBIs but may also include providing the opportunity to experiment with the technology and clarify doubts about their use (Fonseca et al., 2016).

Future studies should seek to understand how IBIs can complement existing screening, diagnosis, and treatment resources for PND in health-care services, how to best implement them in such contexts, and what type of changes would be needed, for example, training for therapists (Arnberg et al., 2014; Fonseca et al., 2016).

8.7 Conclusion

Access to the Internet is growing worldwide. However, as mentioned in the previous sections, most evidence on IBIs for PND is based on high-income countries. This fact is not specific to PND, as insights from a few high-income countries account for the majority of scientific literature on e-mental health (Zale et al., 2021). Variances in economic resources, digital inequities, science investment, and cultural affinity for technology are possible explanations for the geographical distribution of the studies (Zale et al., 2021). However, in low- and middle-income countries, PND is highly prevalent and has the most significant treatment gap (Gelaye et al., 2016). Efforts are needed so that these countries can also take advantage of IBIs' benefits. One possible way to address this problem is with international collaborative research (Zale et al., 2021). More broadly, increased demand and interest due to the COVID-19 pandemic may accelerate the growth of e-mental health worldwide, resulting in a paradigm shift in the field of psychology, moving from mostly face-to-face treatments to a majority of interventions assisted by or conducted exclusively through digital means (Zale et al., 2021).

Finally, it is essential to emphasize the importance of universal screening, prevention, and early intervention strategies. Screening should focus not only on depressive symptoms but also on risk factors for identifying women who do not have detectable symptoms but are at higher risk than average. Suppose that IBIs for PND prevention and early intervention were massively implemented and that this implementation was cost-effective. In that case, the overall impact in absolute terms could be substantial, resulting in dramatic improvements in public health outcomes such as mental health, quality of life, disease burden, and cost (Rigabert et al., 2020). Tackling mental disorders before they arise in pregnant women and new mothers would aid the overall health of populations, contributing to the healthy development of their children and, conversely, the healthy development of the generations that follow (Muñoz, 2019).

Acknowledgments This work was supported by ANID – Millennium Science Initiative Program – ICS13_005. PF received funding from the Chilean National Agency for Research and Development (ANID)/Scholarship Program/DOCTORADO NACIONAL/2019–21190745. AM received funding from the Chilean National Agency for Research and Development (ANID)/Scholarship Program/DOCTORADO NACIONAL/2020–21200074.

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Chapter 9
Preventive and Early Treatment of Depression in Older Adults

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9.1 Background

The aging population is a visible trend across the world, more accelerated in higher-income countries but with notable manifestations in the entire world. In Latin America and the Caribbean, people over 60 currently represent 12% of the total population, and it is estimated that, by 2037, the proportion of older people will surpass the proportion of children under 15 (20%) (Huenchuan, 2018). In this context, the promotion and protection of the well-being and mental health of older adults is an increasingly relevant challenge.

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_9

The age of onset of what is classified as "older" is relative, with important local variations according to variables like general health of the population, income status, and medical facilities to reduce the burden of old age. The increase in life expectancy and improved population health have postponed the start of this life stage to later years. Many older adults have relatively normal health up to advanced age and have shown the trend towards a more generalized physical and mental decline after the age of 80, in what is called the "fourth age" (Broderick & Blewitt, 2015).

Contradicting certain social stereotypes, many older adults experience "successful aging" and positive emotional well-being (Bar-Tur & Malkinson, 2014). However, mental problems and disorders that can significantly affect the well-being and quality of life of older adults are not uncommon. Using current diagnostic criteria, the annual prevalence rates of mental disorders, as per the limited Latin American studies (Andrade et al., 2002; Kohn et al., 2008; Torres de Galvis & Montoya, 1997), vary from 8.0% to 26.0%, analogous to studies in high-income countries (Kirchberger et al., 2012; Baladón et al., 2015).

9.2 Depression in Later Years of Life

Depression in late life is the term used to refer to depressive episodes that occur in the later years. The term includes both people who have already had episodes of depression (early-onset depression) and those who these episodes appear for the first time in late adulthood (late-onset depression).

Late-life depression is frequently under-recognized for various reasons. One of them is that it presents characteristics that are slightly different from depression in other stages of life, such as a greater prevalence of somatic symptoms (e.g., fatigue, sleep disturbance, chronic pain, appetite loss, etc.) or concerns about physical health, social relationships, or economic burdens. It is also frequently observed that manifestations of late depression such as hopelessness, sadness, tiredness, anhedonia, sleep disturbances, hypochondriasis, and subjective cognitive complaints (e.g., poor concentration and memory) are confused with aspects of aging processes (Hegeman et al., 2012). The presence of "subclinical" depression in older adults, that is, a universe of depressive symptoms that do not completely fit the set of typical diagnostic criteria, is often associated with the same negative consequences as the depressive episodes that do satisfy these diagnostic criteria, including a reduction of well-being and quality of life, a worsening of the state of health, greater disability, morbidity, and mortality (Cherubini et al., 2012), which is why "subclinical" depression must not be written off a priori.

Late-life depression can be influenced by a broad and interdependent set of factors (Fiske et al., 2009). Blazer (2010) proposes an etiological model that highlights the following factors: (1) biological (genetic predisposition, comorbid diseases), (2) psychological (loss of interest in pleasurable activities, maladaptive cognitions, comorbid psychiatric disorders), and (3) social (daily stressors and negative life

events, poor social support). In late depression, the general health of the person may be particularly important. Some diseases may share some etiological elements with late depression or may favor it by affecting the person's daily life and physical or mental abilities. Many older adults are deprived of the ability to live independently due to mobility issues, chronic pain, frailty, or other mental or physical problems. It has been suggested that the reduction of daily activities would be a common final pathway predisposing to late-life depression (Fiske et al., 2009).

The decline in socioeconomic status and social integration due to retirement can be another important factor as well as the exposure to painful experiences, such as the loss of closely related friends or family (Cole & Dendukuri, 2003). Isolation, poor living conditions, and the loss of social roles are sociocultural factors that can significantly affect the mental health of older adults, as well as the exposure to forms of abandonment, mistreatment, violence, and abuse (Dong et al., 2013).

Having wide-reaching and diverse social networks and experiencing higher levels of perceived social support both instrumental and social are important protective factors against depression (Jacobson et al., 2017; Santini et al., 2015). It has been seen that the relationship between functional disability and the presence of symptoms of anxiety and depression in adults over the age of 75 is mediated by perceived social support (Feng et al., 2014). Low levels of social support and a higher need for affiliation are associated with greater depression in older adults, with an increased vulnerability seen in men (Sonnenberg et al., 2013). The recovery of older adults from depressive episodes is also affected by the social support perceived. It has particularly been seen that having a partner, and the amount of time they share with others, is linked to the recovery from depressive episodes in hospitalized older people (Li et al., 2013).

Loneliness is defined as feelings of sadness, frustration, anxiety, or anguish that accompany the perception that the social needs of the person are not satisfied by the amount, and especially, the quality of their social relationships. Unlike isolation, which is an objective measurement of poor social integration, loneliness is an experience and a complex construct that includes three dimensions: (a) intimate loneliness, (b) relational loneliness, and (c) collective loneliness (Hawkley & Cacioppo, 2010). This experience of loneliness is particularly intense in subgroups of older people, although there are differences highlighted among countries and cultural contexts (Yang & Victor, 2011). Knowledge about how social and environmental experiences affect the experience of loneliness at advanced ages is limited. A systematic revision of the experiences and predictors of loneliness in older people found an association with women, being unmarried, being older, low-income level, low qualification, living alone, low-quality social relationships, poor self-reporting of health, lack of belief in self-efficacy, negative life events, and cognitive shortcomings (Cohen-Mansfield et al., 2016). Loneliness is positively associated with depression in older adults. Individuals with higher levels of loneliness show a lower satisfaction with life, more negative emotions, and depressive symptoms (Hansen et al., 2013; Hawkley & Cacioppo, 2010). Cross-sectional and longitudinal studies show reciprocal influences over time between loneliness and symptoms of

depression, often co-occurring but loneliness is considered a consistent and strong risk factor for depression (Luanaigh & Lawlor, 2008).

Many of the studies on risk factors for depression are not longitudinal, raising questions as to whether some of the factors reported are mere correlates of depression or whether they are true risk factors (Kraemer et al., 1997). A recent systematic review of risk and protective factors in older adults found that the most consistent predictors were physical activity, the presence of chronic diseases, difficulties in initiating sleep, motor impairment, visual impairment, and disabilities in daily activities (Maier et al., 2021). Depression in later years of life has been associated with poorer physical health, impaired cognitive functioning, decreased quality of life, limited social functioning, increased suicide risk, and high overall mortality (Corrêa et al., 2021; Power et al., 2017). Late-life depression has been also associated with other mental health problems and disorders, such as anxiety disorders, substance and medication abuse, and cognitive functioning impairment. Suicidal ideation and attempts in depressed older adults are relatively less than in depressed people in other stages of life. However, the increment in the age in older adults is associated with an increased suicidal risk and, compared to younger adults, suicidal behavior is more related to health problems than alcohol use and is more likely to be lethal (Kim et al., 2018; Power et al., 2017).

9.3 Prevention of Depression in Older Adults

Efforts focused on preventing late depression are a relevant line of action to favor the well-being and mental health of the older adult population (Norton et al., 2014). However, depression prevention must not be conceived as an isolated goal. Preventive actions for depression in older people make sense in a broader context that addresses the care and promotion of the quality of life and mental health of this group (Petersen et al., 2014; Norton et al., 2014). Conditions that allow older adults to conserve and strengthen their social integration, have an active and meaningful life, keep the highest possible degree of control over their decisions, and preserve and develop valuable ties with others are core lines of care and protection for mental health in this population (Forsman et al., 2011a). For this reason, mental health promotion actions along these lines may also have a preventive effect on depression in older adults.

The mental health of older adults is greatly affected by their prior biographical path and its determining factors: the social conditions throughout their life, the experiences they have lived, and the habits and behaviors they have had for years, all have effects that are ingrained throughout life (Beard & Bloom, 2015). Thus, there is a need to plan ahead of time when it comes to older people's mental health. Improving living conditions, promoting health throughout the life cycle, suitable prevention and handling of chronic diseases, and access to health and mental health-care in earlier stages of life are the determining actions for the later mental health of older adults (Patel et al., 2008; Mangialasche et al., 2012).

The interaction between physical and mental health is especially accentuated in older adults (Wang & Kim, 2020). Prompt and effective care for the overall health of older adults can prevent harmful cycles of a loop between poorly treated health conditions, progressive isolation, loss of autonomy, sense of handicap, and progressive deterioration of mental health. The regular control of risk factors for cardiovascular and chronic diseases is essential for the physical and mental well-being of the older population (Mangialasche et al., 2012).

Preventive programs, depending on their nature and goals, can be categorized differently. It is usual to distinguish universal programs, namely, those directed at the entire population that has a condition, in this case, older people in general, or focused ones. Focused programs can be broken down into selective programs, aimed at people who have one or several risky health conditions, or indicated programs, where the risk factor considered is the subthreshold presence of the condition to be prevented. The so-called early interventions comprise indicated programs and programs that aim at the early treatment of people who already have the target condition. Preventive programs also have a promotion dimension, especially those of universal prevention (Cova et al., 2006).

Although it is expected that focused programs show more measurable effects than the universal ones do, as they are specifically aimed at the high-risk population, no clear differences in the effectiveness have been observed between both types of preventive programs in the field of depression in older people. In general, depression prevention programs at different ages have shown positive effects, though small, without clarity as to what would be the core aspects of the most successful interventions (van Zoonen et al., 2014). The same has been observed in depression prevention programs in older adults (Cole, 2012; Forsman et al., 2011a, b).

In recent decades, special attention has been paid to selective and indicated prevention programs. Lee et al. (2012) summarize the findings of five studies, which included an older adult population with sub-syndromic depressive symptoms. These include psychotherapeutic interventions as a core component, or complemented with other actions, with the different psychotherapeutic strategies showing benefits, including the revision of their own life, behavioral activation, problem-solving, and broader cognitive behavioral strategies. In general, and consistent with the observations by Lee et al. (2012), the typical components of depression prevention programs for older adults are encouraging physical exercise, cognitive and skill training, group support, evoking memories, and developing social activities (Forsman et al., 2011a).

From a public health perspective, a relevant preventive strategy would be that professionals identify people who are at risk of major depression, as well as people with subsyndromal symptoms to prevent or mitigate those disorders. For example, people with functional limitations resulting from strokes, with limited social support, and with subsyndromal symptoms could be the best targets for preventive interventions. This also may prove to be the case with other conditions that limit physical functioning (e.g., chronic obstructive pulmonary disease, macular degeneration, hip fracture) (Hindi et al., 2011). An intervention format of particular interest that integrates prevention and early intervention actions is multistage or

multicomponent intervention, which includes different and successive support activities depending on the level of risk and the difficulties of the older adults whom these activities target and considering the evolution they start having. Currently, there are some previous studies with interesting results along this line (van't Veer-Tazelaar et al., 2011; van der Aa et al., 2017).

9.4 Psychosocial Preventive Programs for Depression

In recent decades, several preventive programs for depressive symptoms or disorders have been developed and evaluated in people aged 55 or older using randomized controlled trials (RCT) or quasi-experimental designs. In these studies, four main types of programs can be identified according to their dominant components: exercise-based, mind-body-based, psychology-based, and multicomponent interventions.

9.4.1 Exercise-Based Interventions

The World Health Organization defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure. Components of exercise-based preventive interventions in the older people include resistance, strength, aerobic, and combinations, ranging from moderate to vigorous physical activity. RCT studies support its usefulness in preventing depression. One study applied a 9-month resistance training program whose focus was specific muscular endurance in the first 3 months, and for the remaining 6 months, the training groups were split into different training frequencies ranging from reduced to increased. This program found a decrease in depressive symptoms in the initial 3 months, findings that were maintained until the end of the intervention (Kekäläinen et al., 2018). Resnick et al. (2008) developed a training program comprised of stretching, resistance, and aerobic exercise activities with a self-efficacy component, with statistically significant improvements in depressive symptoms (Resnick et al., 2008), while Huang et al. (2015) designed a physical approach intervention including warm-up, cardiovascular exercises, muscle strength, and a cooldown period, showing decreased depressive symptoms. A similar study trialed a DVD-delivered, home-based, physical activity intervention focused on flexibility, muscle strength, and balance, finding a marginally significant effect in the total sample. However, in the participants who reported elevated depression, the intervention demonstrated effects that were two to four times greater than the control group (Aguiñaga et al., 2018). Other studies focus on aerobic training, such as Underwood et al. (2013) and Bouaziz et al. (2019), with the former using 45-min physiotherapist-led group exercise sessions with no effect on depressive symptoms, and the latter, an interval aerobic training program with active recovery bouts to improve functional, cognitive

performances and mental health, which had significant improvements in depression scores.

One study randomized participation to three different exercise training programs: dancing, walking, and strengthening/stretching/stability, where each group increased intensity as sessions progressed and the findings suggest that physical activity can be effective in reducing depressive symptoms (Awick et al., 2017). A more recent study used a multisystem physical training program consisting of three levels (beginner, intermediate, and advanced) of proprioception training, muscle strength training, reaction time exercise training with auditory cues, and postural balance training, with a significant decrease in depression symptoms at 12 weeks post-intervention (Chittrakul et al., 2020).

9.4.2 Mind-Body-Based Interventions

Mind-body interventions that focus on interactions among the brain, body, mind, and behavior by including different combinations of breathing exercises (Lavretsky, 2009), meditation, and structured movements (Bo et al., 2017) are one of the potential approaches to prevention programs that address not only physical but also psychological health.

Yoga is an ancient mind-body practice rooted in India, which focuses on the present moment by using mediation techniques consisting of physical postures (*asanas*), breathing control (*pranayama*), and the use of meditation (*dhyana*) (Büssing et al., 2012). The influence of yoga in the reduction of depression scores in older subjects is evident in some studies (Noradechanunt et al., 2017; Ramanathan et al., 2017). However, it is not recommended as a first-line intervention but rather as a complementary one if the older person presents depressive symptoms since it could provide a healthy and positive alternative to depressing negative thoughts (Ramanathan et al., 2017) where they are more likely to benefit from the intervention.

Mindfulness therapy is a well-accepted mind-body intervention that involves developing awareness in the present moment in a nonjudgmental way and with acceptance (Kabat-Zinn, 2003). A common type of mindfulness-based intervention (MBI) is the mindfulness-based stress reduction (MBSR) program, which teaches mindfulness meditation and yoga (Kabat-Zinn, 1990). Mindfulness-based cognitive therapy (MBCT) integrates elements of cognitive behavioral therapy (Beck, 1976) with systematic training in mindfulness meditation (Kabat-Zinn, 1990). In a quasi-experimental study conducted by O'Connor et al. (2014), they found a significant interaction effect of MBCT on depressive symptoms at follow-up between the intervention and the waiting list group, which reflected a significant decrease in depressive symptoms in the intervention group, but not in the waiting list group. The frequency of elevated depressive symptoms went from 50% post-intervention to 0% at follow-up in those who completed their participation in the intervention group, while the frequency of elevated depressive symptoms remained stable at 29% in the waiting list group. MBCT may be an effective way of reducing depressive

symptoms in older bereaved people, especially those with clinically relevant depressive symptoms. The result of another study with a quasi-experimental design revealed a significant reduction in depression among the older people in the experimental group, who were subjected to the MBSR program (Kumar et al., 2014). The results suggest that the MBSR program improves depressive symptoms in older adults (over 75 years of age) with chronic insomnia (Zhang et al., 2015). Similarly, the results of an RCT study regarding the effect of flow meditation revealed a significant decrease in geriatric depression in older adults in the experimental group compared to the control group, confirming the effectiveness of mindfulness techniques in reducing this condition (Franco et al., 2017).

Qigong intervention is a form of mind-body approach involving meditative movement, breathing, meditation, and relaxation (Ladawan et al., 2017). Two Qigong intervention studies with an RCT design have been conducted (Phansuea et al., 2020; Tsang et al., 2013). The findings of the study performed by Phansuea et al. (2020) support that the Qigong program was effective in reducing the depression scores both in mild and moderate depression community-dwelling older adults. Also, Tsang et al. (2013) found that Qigong significantly reduced depressive symptoms compared to a control group. However, the available reviews focused on Qigong and Yoga for older adults, are limited and do not provide strong evidence about their effects on quality of life and depression (Gouw et al., 2019).

A systematic review examining the efficacy of mind-body interventions designed to reduce depressive symptoms among older adults (Bo et al., 2017), showed that mind-body interventions had short-term effects in reducing depressive symptoms in older adults with depressive symptoms. Subsequently, the findings may suggest the capacity of mind-body interventions to impact a range of symptom expressions from the most severe to less severe or subsyndromal symptom expressions (Bo et al., 2017). Nonetheless, mind-body interventions have not yet confirmed their long-term effect in alleviating depressive symptoms among older adults.

9.4.3 Psychology-Based Interventions

Psychological interventions cover a broad group that includes diverse non-pharmacological interventions focused on psychological or social factors. Lee et al. (2012) summarize the findings of five studies conducted with an older adult population with sub-syndromic depressive symptoms. These include psychotherapeutic interventions as a core component or complemented with other actions, showing the usefulness of the different psychotherapeutic strategies including life review, reminiscence therapy, cognitive behavioral therapy (CBT), problem-solving treatment (PST), psychosocial programs, and behavioral activation. Some of these are not only preventive but rather early intervention programs.

Reminiscence group therapy refers to a group activity, where the participants are encouraged to recall personal past events with one another. This group therapy differs from life review interventions, which is a more structured activity that can be

done individually or in a group. Life review interventions are based on Erik Erikson's theory of human development to make the participant reflect and tell stories about their entire lifespan. Two RCT studies in the Netherlands found a significant decrease in depressive symptoms, with programs where the effect lasted 9 months after the intervention: The first study used three core elements – integration of difficult life events from the past, development of agentic life stories, and the retrieval of specific positive memories (Korte et al., 2012). The second developed an intervention for older adults called "Looking for Meaning" including sensory recall exercises, creative activity, and verbal exchange of experiences related to the course of life, linking the past and the present of the participants (Pot et al., 2010).

Behavioral activation (BA) interventions use the concepts of operant conditioning and scheduling to help people reconnect with positive reinforcement in their surroundings. Dozeman et al. (2011) did an RCT study with a self-help activity scheduling program that consisted of four steps, where participants learned to monitor their mood and daily activities and designed a pleasurable activity plan. Two similar RCT studies aimed at preventing depression in older people samples, using BA interventions to enhance daily routine activities, reduce avoidance behaviors and increase pleasurable, meaningful, or important activities (Almeida et al., 2021; Gilbody et al., 2021); overall, these studies found positive improvements in depression symptoms, but none were statistically significant.

Regarding cognitive behavioral therapy (CBT) interventions for the prevention and treatment of depression in older adults, the main aim is to restructure misconceptions and promote positive thinking and behavior. RCT evidence favors this type of intervention: Some studies have used a CBT-developed plan for depression consisting of three phases, the first one being behavioral activation (scheduling), the second cognitive assessment and restructuring, and the third, altering core beliefs that trigger negative thoughts, as well as behavioral analysis of dysfunctional coping mechanisms and problem-solving strategies (Huang et al., 2015). Another study developed an intervention consisting of receiving a CBT manual, psychoeducation, case reformulation, identifying, evaluating, and responding to automatic negative thoughts, homework assignments, evaluation, and feedback (Longchoopol et al., 2018). Other studies have also presented Internet-delivered CBT interventions (Read et al., 2020; Titov et al., 2015), consisting of five lessons in the form of a slideshow format over 8 weeks. The first lesson is psychoeducation; the second is the basics of CBT; the third is controlling physical symptoms of depression and anxiety; the fourth is education and guidelines about behavioral activation and graded exposure; and the last is information about relapse prevention and plans. Overall, these CBT studies found significantly fewer symptoms of depression in the intervention groups.

A variant of CBT intervention is problem-solving therapy. These interventions aim to break down problems into manageable components, generate strategies to find solutions, to later implement and evaluate their results. RCT studies carried out with older samples aim at teaching participants a positive problem orientation and active problem-solving skills instead of avoidant coping, where the most common problems are interpersonal issues and practical problems related to service needs

(Albert et al., 2019; Dias et al., 2019). In their study, Albert et al. (2019) found a small, yet significant decrease over time in depression scores, and Dias et al. (2019) reported that the intervention led to a reduced incidence of major depressive episodes.

A recent RCT study developed an active learning program consisting of 24-week 90-min sessions that addressed health promotion in old age, including group discussions, generation of individual ideas, and self-reflection as key components. This program was effective on improving depressive symptoms, communicative health literacy, and lifestyle behaviors among older adults (Uemura et al., 2021).

A quasi-experimental study conducted by Winocur et al. (2007) focused on cognitive aspects and developed a cognitive rehabilitation program for the older people consisting of three modules – memory skills training, modified goal management training, and psychosocial training; another study with the same design, aimed at reducing depressive symptoms in older adults through a humor intervention which consisted of a series of warm-up practices, watching humorous videos, game time, and humor sharing components (Zhao et al., 2020); both of these studies reported a significant improvement in depressive symptoms after the intervention.

9.4.4 Multicomponent Program-Based Interventions

Multicomponent interventions refer to combinations of educational interventions, support, psychotherapy, or group psychoeducation and therapeutic-psychosocial activities, physical exercise, and skill training (Forsman et al., 2011a). In this regard, there are several multicomponent intervention studies that used an RCT design (Uemura et al., 2021; Stahl et al., 2020; van der Aa et al., 2017; Dozeman et al., 2012; van't Veer-Tazelaar et al., 2011, 2010) as well as a quasi-experimental design (Hong et al., 2020; Greenawalt et al., 2019).

Life-Love program therapeutic activities and strategies involve providing education about depression and suicide, managing negative emotions, and promoting a more accurate and positive self-image among the older people, challenging their distorted, negative self-conception through group psychoeducation and therapeutic-psychosocial activities (Hong et al., 2020). The program showed effects in reducing the perception of being a burden and in reducing suicidal ideation among the participants.

Music and Tai Chi combined intervention is a variant of multicomponent programs. Tai Chi is a traditional Chinese martial art and is commonly believed to increase physical activity and lower depression among older persons (Sherman, 2012), by combining mind management with body movement, as well as increasing social participation (Chan et al., 2013). Combined music and Tai Chi reduced depressive symptoms among community-dwelling older people. This may represent an economically viable solution to manage depression in highly populous and developing nations. The potential synergistic effect of exercise and music as well as

the long-term effects of the intervention will need to be explored in future studies (Uemura et al., 2021).

A positive psychology intervention program, called the Art of Happiness, based on key concepts including defining happiness, stress management, reflecting on happiness, compassion, and human connection, forgiveness, transforming suffering, mindfulness, and humor, has been incorporated into 8 weekly 90-min classes, which were specifically tailored to older adults to promote positive aging and overall mental well-being among this population (Greenawalt et al., 2019). Results showed that the intervention participants were significantly less stressed at the end of the program and there were significant improvements in both subjective happiness and depression. Such positive psychological states are closely intertwined with enhanced physical and mental health outcomes (Chida & Steptoe, 2008; Greenawalt et al., 2019).

In a digital monitoring (DM) study conducted by Stahl et al. (2020), participants randomized to DM recorded the times of sleep, meals, and physical activity behaviors twice daily using a diary-like app on a tablet for 12 weeks. The app also provided real-time feedback about the participants' sleep, meals, and physical activity. In addition to DM, participants received weekly calls from a health coach who used motivational interviewing (MI) techniques to strengthen participants' intrinsic motivation to engage in a regular behavioral routine. The results revealed that depression symptoms significantly decreased but the interaction between time and intervention was not significant. However, it was concluded that behavioral intervention that uses both digital monitoring and motivational health coaching is feasible and acceptable to older bereaved adults.

Another type of multicomponent depression prevention program is the stepped-care program. Prevention studies by Dozeman et al. (2012) and van't Veer-Tazelaar et al. (2011, 2010) have shown considerable promise. These authors have demonstrated that stepped-care prevention programs are effective in reducing the cumulative incidence of depression among older adults who were considered at risk of depression based on subsyndromal depressive symptoms. The intervention decreased the 12-month incidence of depressive disorders, from 0.24 (20 of 84) in the usual care group to 0.12 (10 of 86) in the stepped-care group (RR, 0.49; 95% CI, 0.24–0.98) (van't Veer-Tazelaar et al., 2011). Briefly, the four steps of the program, each lasting 3 months, include watchful waiting (step one), cognitive behavioral therapy (CBT) (step two), problem-solving therapy (PST) (step three), and referral to a primary care physician (step four). The stepped-care program is consistent with the suggestions of Reynolds III et al. (2012), who encouraged the use of brief, learning-based approaches that have proven to be effective with affective disorders and insomnia.

In another study, van der Aa et al. (2017) applied a stepped-care program consisting of four steps including watchful waiting, a guided self-help course based on cognitive behavioral therapy (CBT), problem-solving treatment (PST), and a referral to the general practitioner (GP) to discuss other treatments and the use of medication. The total intervention period lasted 12 months, and significant differences were found in the incidence of depressive disorders, but no significant difference

was found for the symptoms of depression, although the stepped-care program was effective in preventing major depressive disorder when compared to usual care. Stepped-care programs allow limited resources to be used efficiently and, thus, help a larger portion of the population (van der Aa et al., 2017).

9.5 Discussion

Population aging demands that society generate responses to support this age group's well-being and mental health, both at a level of public policies, programs, and resources specifically designed for this population.

Care for the well-being and mental health among older adults must start several decades before this vital stage begins. Alongside this, it is necessary to develop promotional and preventive mental healthcare models for the current old population that are sensitive to their main difficulties and needs. This includes actions at very different levels to reduce risk factors and strengthen protective and promoting factors. At a macro level, the care of living conditions, the alignment of the health systems with the needs and human rights of older people, the development of friendly environments, increased opportunities for education, recreation, and playing sports, and the strengthening of the quality of long-term care are important (Patel et al., 2008). The actions that foster joining social networks that benefit social interaction and affective support require special attention; peer groups, volunteer, and intergenerational projects are some examples of interest along this line (Petersen et al., 2014). Evidence of the cost-effectiveness of psychosocial interventions to reduce social isolation and loneliness is emerging. One study in the United Kingdom (Coulton et al., 2015) evaluated the impact of participating in a community choir group on well-being, with promising results benefiting the intervention group, which reported better mental health indicators at a low cost. It is necessary to develop more group and volunteer programs.

The growing interest in depression prevention in older adults is leading to different initiatives, both at a level of broader social policies and in specific programs, although valuing the effectiveness of these initiatives from an empirical point of view has a series of complexities. One of the reasons behind this complexity is the broad age range this target population considers, which is even broader with the progressively longer life expectancy. In addition, older adults of similar ages have an accentuated heterogeneity of conditions and health statuses (Kessler et al., 2014). The evaluation of programs must consider this double source of diversity.

Effective studies of preventive interventions in mental health require long follow-up times and very large samples, even more so if the goal is the reduction of the incidence of certain mental disorders (Cuijpers, 2003). This complexity is even greater in universal programs, where many of the beneficiaries do not present difficulties when they start taking part in a program. Some authors opt for the development of highly focused programs to facilitate the detection of effects (Cuijpers et al., 2015). However, more universal programs have the potential of reaching more

people that can benefit from them than focused programs do. At a population level, intervening with many people with moderate risk leads to a more effective frequency than doing so with fewer people with an elevated risk (Hotopf et al., 2015). In the prevention of depression in older adults, it is still premature to assert the superiority of universal programs over the focused ones. Furthermore, it does not seem to be appropriate to use the same indicators to evaluate both types of programs. The first tends to have a much more relevant promotional component and is a challenge that transcends the strict healthcare area. Care and promotion of mental health in older adults must be, by nature, an intersectoral effort.

On the other hand, it is debatable whether the evaluation of mental health prevention programs must be focused on the reduction of the incidence of particular disorders, identified with the standardized diagnostic criteria used for this. The presence/absence of a depressive disorder according to these criteria can underestimate the limitations of people who do not fully satisfy the criteria and overestimate the durability and seriousness of the condition in those that do satisfy them (Spitzer & Wakefield, 1999). The dichotomic nature of these analyses and the exclusion of other possible relevant outcomes also relativize its importance.

Although evidence is insufficient, the available reviews of psychosocial or psychological interventions show interesting efforts of implemented preventive programs, without being possible to state which are the most effective or what their essential components are (Cole, 2012; Forsman et al., 2011a; Hall & Reynolds III, 2014; Lee et al., 2012; van Zoonen et al., 2014). It should also be noted that most studies compare changes in depressive symptoms or quality of life indicators between experimental and control groups and not the reduction of depression incidence.

Preventive interventions based on physical exercise are very interesting for the older population since they improve psychological well-being and, at the same time, prevent the deterioration of physical health, which is a paramount aspect in older adulthood. While the results to date are promising, more follow-up studies are needed. Mind and body interventions contain varied interventions that could facilitate acceptance in large population groups of both Eastern and Western cultures. Despite their large increase, it should be noted that mind-body interventions have no evidence of long-term effectiveness in reducing depressive symptoms in older adults, except for mindfulness-based cognitive therapy (MBCT) interventions, which have proved their efficacy in adults and begun to accumulate evidence in older people. There are numerous programs for the prevention and treatment of depression based on psychotherapeutic interventions. Several of them have favorable, although still preliminary, evidence for older adults, especially compared to those available for the adult population. As noticed by van der Aa et al. (2017), stepped-care programs allow for the efficient use of resources that are always limited and, therefore, reach a greater proportion of the population.

Reynolds III et al. (2012) argued that, regarding indicated and early intervention programs, psychological interventions are preferable to antidepressants because antidepressants have demonstrated little efficacy with mild depression, and they have several potential adverse effects, particularly, when used with older adults.

9.6 Conclusion

Generating conditions for older adults to maintain the highest possible degree of control of their lives, participation in significant activities, and social ties, are crucial for promoting well-being and helping to prevent depressive disorders in this population. Even when there is a sustained accumulation of evidence of the efficacy, effectiveness, and cost-effectiveness of different programs, some challenges remain. Programs' capacity to generate significant clinical changes needs to be improved, and a more accurate understanding of the risk factors and processes involved, and the protection and promotion implied in the well-being and mental health of older adults, is required (Greenberg & Riggs, 2015; Toth et al., 2016). This need is amplified if the preeminence of evidence comes from high-income countries, with a gap in knowledge and experience from low- and middle-income ones, which becomes a relevant problem because factors that affect mental health have a strong contextual component (Patel et al., 2008).

Both depression and depressive symptoms are mental health problems that diminish well-being in older people with negative consequences on daily life. The United Nations' sustainable development goals include ensuring healthy lives and promoting mental health and well-being for all at all ages. Public mental health strategies that target screening and early diagnosis and offer preventive interventions are necessary and should increase the coverage in this population by delivering accurate and effective interventions.

Acknowledgments SS, FC, and CI received funding from ANID – FONDECYT – 1201158. JA received funding from the National Agency for Research and Development (ANID)/Scholarship Program/Doctorado Nacional/2018–21181769. MF received funding from ANID – FONDECYT – 3190275 as well as the ANID Millennium Science Initiative Program – ICS13_005 and ICS2019_024.

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Chapter 10
Depressive Disorders Among Family Caregivers of People Living with Dementia

Claudia Miranda-Castillo, Thamara Tapia-Muñoz, Déborah Oliveira, and Sebastián Sáez

10.1 Dementia

The global number of older people (aged ≥60 years) is expected to more than double by 2050 and more than triple by 2100, increasing from 962 million in 2017 to 2.1 billion in 2050, and 3.1 billion in 2100 (United Nations, 2020). Although dementia does not affect only older people, it is one of the leading causes of care dependency and disability among older people, being one of the top ten causes of years of healthy life lost due to disability (YLDs) (World Health Organization, 2021). The WHO estimates that 55.2 million people are living with dementia worldwide, and this number is forecasted to rise to 78 million by 2030 and 139 million by 2050 (World Health Organization, 2021). In 2019, the estimated global cost of dementia was US$1.3 trillion and is projected to increase to US$1.7 trillion by

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
https://doi.org/10.1007/978-3-031-13029-8_10

2030. However, if projections are corrected for increases in care costs, global dementia costs can reach US$2.8 trillion by 2030 (World Health Organization, 2021).

Dementia is a neuropsychiatric syndrome characterized by progressive and chronic cognitive impairment, behavioral and psychological symptoms, and decreased functional capacity. It is a multifaceted condition caused by a myriad of brain disorders, such as Alzheimer's disease, vascular diseases in the brain, and Lewy body dementia, among others. Approximately 40% of all cases of dementia are thought to be caused by modifiable risk factors, such as diabetes, obesity, hypertension, tobacco smoking, alcohol abuse, brain injury, hearing impairment, and excessive exposure to air pollution (Livingston et al., 2020b). Known non-modifiable causes of dementia include advanced age, female sex, and genetic causes. The number of people with dementia is significantly higher in lower-income countries, with nearly 70% living in such settings, and dementia is twice as likely to affect women (World Health Organization, 2021). In the United Kingdom, for example, 61% of all people living with dementia are women, and dementia is the leading cause of death in all women (Alzheimer's UK, 2018).

The symptoms and other disease manifestations affecting each person living with dementia will vary and depend on, for example, the type of the disease affecting the brain, the parts of the brain affected by the disease, and the point of the disease trajectory at which the person is. Some pharmacological and non-pharmacological interventions can help control the neuropsychiatric manifestations that affect the quality of life of both the person living with dementia and their family caregivers (Watt et al., 2019). However, dementia has no cure and no treatment can effectively modify the disease progression.

10.2 Care and Support for People Living with Dementia

Throughout the years, dementia progressively leads to a deterioration in the person's ability to independently perform activities of daily living, which leads to an increase in the need for care and support from others. In more advanced stages of dementia, the person will need care and support to perform basic activities, such as cooking and feeding, as well as personal hygiene.

Most people living with dementia live at home, particularly in low- and middle-income countries (96%) (World Health Organization, 2021), and receive the care and support they need from family members and friends. Family caregivers (often also called "care partners," "informal caregivers," or "unpaid caregivers") perform this role without receiving any payment and with little support and training from services and governments. Globally, 70–80% of all family caregivers are women (World Health Organization, 2021), who bear not only the physical and mental health impact of care provision but also most of the care-related costs (Wimo et al., 2018).

The majority of the family caregivers of people living with dementia are spouses or adult and middle-aged daughters. Spouses are often older people themselves and

have their own health needs, whereas adult and middle-aged daughters are likely to have to compete for other caring needs (i.e., childcare), household chores, and work responsibilities (Conde-Sala et al., 2010; Greenwood & Smith, 2016; Oliveira et al., 2019; Rigby et al., 2019). Several studies show that providing unpaid care can impact the mental and physical health of caregivers differently depending on their age, gender, and relationship to the person cared for, suggesting that interventions might need to be tailored to each group to have optimal effects (Walter & Pinquart, 2020).

10.3 Depression in Family Caregivers of People Living with Dementia

It is widely known that family caregivers of people living with dementia experience a negative impact on their physical and emotional health. Possible explanations for this effect have been formulated around two main perspectives. The first relates to stress. It has been reported that the experience of stress in caregivers can lead to high risks of illness (Haley et al., 2010; Martire & Schulz, 2012) and death (Perkins et al., 2013). The second explanatory perspective considers emotional, economic, and family-related costs that dementia caregivers have to face, which have been linked to mental health problems such as burden, anxiety, and depression (Cheng, 2017; De Fazio et al., 2015; Madaleno et al., 2019; Pinquart & Sörensen, 2003). According to a recent review, the latter is one of the most studied issues in dementia caregivers (Queluz et al., 2020).

Depression differs according to symptomatology and timing. The World Health Organization's diagnostic manual, ICD-11, classifies different types of depressive disorders as single episode depressive disorder, recurrent depressive disorder, dysthymic disorder, mixed depressive and anxiety disorder, going from single episodes to chronic disorders (World Health Organization, 2018). Depending on the methodology and instrument used to measure depression, there is a 30–60% prevalence in dementia caregivers (Madaleno et al., 2019; Sallim et al., 2015; Tzuang & Gallagher-Thompson, 2015). Furthermore, there have been reports indicating that there is a higher prevalence of depression and/or depressive symptomatology in caregivers of people living with dementia compared to individuals caring for people with chronic or psychiatric disorders (D'Aoust et al., 2015; Schoenmakers et al., 2010) and anxiety (Cooper et al., 2007; Joling et al., 2010).

Characteristics of caregivers themselves, which have been related to depressive symptoms, are being younger (O'Rourke et al., 2010), having a close relationship with the person with dementia (Fauth et al., 2012; Ornstein et al., 2014), high levels of burden (Epstein-Lubow et al., 2008), low levels of self-efficacy, few leisure activities (Romero-Moreno et al., 2012), low levels of mastery in dealing with caregiving (Mausbach et al., 2007), poor perception of caregiving as a challenge and lack of control over the situation (O'Rourke et al., 2010), perception of poor physical health, and previous presence of depressive symptoms (Joling et al., 2015).

In addition, more dysfunctional, disengaging, or less emotional coping is more robustly associated with depressive and anxious symptoms (García-Alberca et al., 2012; Li et al., 2014). A review by Watson et al. (2019) identified a set of factors that are consistently associated with the presence of depressive symptoms in dementia caregivers, namely, being a female and adult-child caregiver, coping strategies employed, activity restrictions, the severity of problematic behaviors associated with dementia, as well as the nature and quality of relationships that caregivers establish with care recipients (Watson et al., 2019).

Contextual factors that have been related to higher depressive symptomatology in family caregivers include low socioeconomic status, lower satisfaction with social support received (Clay et al., 2008), higher educational level (O'Rourke et al., 2010), and unemployment (Ornstein et al., 2014).

Evidence also suggests that family caregivers of people living with dementia are a high-risk group for suicide. In this regard, O'Dwyer et al. (2016), in a cross-sectional study of over 500 caregivers, found that 16% of caregivers had contemplated suicide more than once in the previous year. In addition, low satisfaction with social support received and the use of dysfunctional coping strategies had an indirect effect on suicidal ideation through depression. Meanwhile, Joling et al. (2018) assessed 192 family caregivers who did not have a clinical diagnosis of depression or anxiety at baseline for 2 years. Thirty-nine percent of them presented depressive symptomatology, and of the latter, 11.8% (4.7% of the total sample) reported suicidal thoughts at different times in the caregiving trajectory. This last group, compared to the rest of the sample, had more severe depressive and anxious symptoms and a lower sense of competence and mastery, felt less happy, and had more health problems, less family support, and more feelings of loneliness.

There is little evidence related to trajectories of depressive disorders among dementia caregivers. A study by Joling et al. (2012) reported that, after 18 months, 24.8% of 725 at-risk caregivers developed depression, with 58% of them showing high levels of depressive symptoms at all points of assessment. In addition, several cohort studies have shown that increases in caregiver depressive symptoms over time are related to factors associated with the person with dementia, the caregivers themselves, and the context. The severity of behavioral and psychological symptoms, as well as more time since the diagnosis of dementia, has been associated with higher levels of caregivers' depression over time (Cheng, 2017; O'Rourke et al., 2010).

A relevant dimension to understanding depressive symptomatology in caregivers of people living with dementia is gender. It is known that women are more likely to carry out the duties of caregiving. In addition, there is current evidence suggesting that female caregivers of people living with dementia are at higher risk for depression and have worse mental health outcomes overall (Verma & Anand, 2012; Watson et al., 2019; Xiong et al., 2020).

Although different perspectives have been proposed to address gender differences relative to mental health in caregivers, such explanations are linked to traditional gender role expectations. Stress and coping theory have shown the main evidence relative to differences between male and female caregivers. It has been

reported that female dementia caregivers experience higher impacts from caregiving, as well as a larger effect on their depressive symptoms and somatic activity, which, in turn, has been explained by their inefficient use of coping styles (Pillemer et al., 2018). However, so far, evidence about the role of coping strategies by gender is limited and sometimes contradictory (Sharma et al., 2016). Additionally, literature also shows that women who provide care for their spouses are at higher risk of presenting depressive symptoms, which are more likely to appear near the end of the caregiving trajectory (Kaufman et al., 2018; Schulz & Sherwood, 2008).

Given this background, Sharma et al. (2016) proposed that the impact of gender may be mediated by other variables such as sociodemographic characteristics of patients and caregivers, as well as the sociocultural context. For example, specifically focusing on Latin America and the Caribbean, with their unique particularities in confronting dementia compared to the European scenario (Baez & Ibáñez, 2016), it can be noted that there are structural/systemic problems that contribute to the difficulties that dementia caregivers face in terms of prevention and promotion of mental health. Among such obstacles, the following have been mentioned: a scarcity of mental health facilities, cultural barriers and socioeconomic vulnerabilities, and shortage of formal long-term care (Ibáñez et al., 2021; Parra et al., 2018). All of this has placed most of the burden on informal care (Thrush & Hyder, 2014) and consequently led, in this group, to a higher vulnerability to experiencing depressive symptoms.

10.4 Management of Depressive Symptoms Among Dementia Caregivers

An early diagnosis improves the prognosis and effective management of mental health disorders. The WHO Mental Health Gap Action Program (mhGAP) recommends a combination of both antidepressant drugs and psychosocial interventions to address moderate to severe disorders (World Health Organization, 2011). Depression among caregivers of people living with dementia is managed with the same treatments available in primary and specialist care (NICE guideline, 2018). There are, however, specific interventions for dementia caregivers that have shown to be cost-effective with long-term effects in reducing depressive symptoms (Livingston et al., 2020a).

10.4.1 Psychoeducational Programs

Psychoeducational interventions have shown the most positive results in reducing depression symptoms among caregivers (Chien et al., 2011; Lee et al., 2020; Liu et al., 2017; Piersol et al., 2017). A recent systematic review compared the efficacy

of remotely delivered interventions offering information (determined by the professional with the participant having a passive role), training (practical skills to manage the burden of care with an active role of caregivers) and support (participants discuss and share feelings, problems, or issues related to caring with peers or professionals), or a mixture of these. When compared to usual treatment, waiting list, or attention control, any of the above interventions have little or no effect on depressive symptoms (SMD = −0.05; 95% CI = −0.22 to 0.12). However, compared to a control group with only information, remotely delivered interventions involving training, support, or both had a small effect on caregivers' depressive symptoms (SMD = −0.25; 95% CI = −0.43 to −0.06; $I_2 = 53\%$) (González-Fraile et al., 2021).

10.4.2 Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) has had the largest amount of evidence and has shown significant effects to reduce depressive symptoms among caregivers (Lee et al., 2020). CBT aims to empower people and promote self-agency, by working on automatic and dysfunctional thoughts (Hopkinson et al., 2019). In the case of caregivers, the principal outcomes are to change dysfunctional thoughts about caregiving and behavioral activation that enhances self-care strategies including leisure activities (Losada et al., 2011).

CBT has shown effectiveness in reducing depressive symptoms among caregivers of people living with dementia (Cheng et al., 2019). In a meta-analysis carried out by Hopkinson et al. (2019) including 25 randomized controlled trials (RCTs) published between 1996 and 2016, moderate quality of evidence was found for the effectiveness of CBT to reduce depression among caregivers. The authors reported statistically significant improvements of depression symptoms immediately after completing the intervention (standardized mean differences (SMD) = −0.34; 95% CI = −0.47–0.21; $p < 0.001$) and after up to 3 months of follow-up (SMD = −0.99; 95% CI = −1.35–0.64; $p < 0.001$). The authors also reported that brief versions (up to eight sessions) and longer versions (more than eight sessions) significantly improved caregivers' depressive symptoms.

Similarly, Sun et al. (2022) conducted a meta-analysis that aimed to compare CBT formats. They included 37 RCTs published between 2000 and 2021, obtaining standardized mean differences (SMD) and conducting a rank analysis based on P-scores to compare different formats to control groups. Higher P-score indicated a higher probability of a specific format being the best intervention. They found no significant differences between the formats of CBT. However, compared to control groups (no intervention or treatment as usual), CBT delivered over the Internet (SMD = −1.45; CI = −2.31, −0.28), telephone (SMD = −1.28; CI = −1.78, −0.53), and individual (SMD = −1.19; CI = −2.29, −0.31) reduced depressive symptoms and had the higher probabilities of being the best treatment for caregivers ($P_{\text{Internet}} = 0.811$; $P_{\text{telephone}} = 0.803$; $P_{\text{individual}} = 0.771$; $P_{\text{group}} = 0.440$; $P_{\text{combine}} = 0.334$; $P_{\text{control}} = 0.107$).

Finally, low-intensity CBT, which includes the delivery of the intervention in a short format or by a nonspecialized therapist, has shown effectiveness in reducing depressive symptoms among caregivers. Even though the effect size is smaller than the one found for traditional CBT, this format might be useful for countries with fewer resources for highly trained therapists (Kaddour et al., 2019).

10.4.3 Mindfulness-Based Interventions

Mindfulness interventions are based on meditative exercises, like meditation or yoga, to connect people with the present while helping them be aware of their experiences (thoughts, feelings, body sensations) and accept them. Mindfulness-based interventions (MBIs) are combinations between psychological therapies and mindfulness practices (Zhang et al., 2021). The most recognized ones are mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) (Han, 2021). Acceptance and commitment therapy (ACT) is also considered an MBI, but it will be reviewed separately in the following section.

MBIs have shown positive results to help caregivers with depression (Cheng & Zhang, 2020). Liu et al. (2017) reviewed seven RCTs focused on MBIs for dementia caregivers. The authors reported small heterogeneity across studies ($I_2 = 7\%$) and, compared with control groups, mindfulness training significantly decreased caregivers' depressive symptoms (SMD = −0.58; 95% CI = −0.79 to −0.37). Moreover, Cheng et al. (2020) analyzed 131 studies (RCTs and quasi RCTs) published between 2006 and 2018, including nine MBI studies. They converted the SMD to Hedges to correct for small samples bias. The authors found that MBIs were effective in reducing depressive symptoms ($g = 0.58$; $k = 7$; $N = 258$). Similarly, Han (2021) carried out a meta-analysis of 15 RCTs published between 1966 and 2021. From them, 11 were exclusively for caregivers with dementia and 4 had caregivers of other chronic conditions. The study analyzed the effectiveness of MBIs including MBCT, MBSR, ACT, and other forms of mindfulness. The authors reported that the effect of MBIs on reducing depressive symptoms was related to the type of control groups. At immediate posttest, a large effect was found when compared to passive control groups (SMD = 1.21; 95% CI = 0.67, 1.75), and a medium effect was found when compared to active control groups (SMD = 0.60; 95% CI = 0.39, 0.80).

10.4.4 Acceptance and Commitment Therapy

ACT is part of the contextualistic approaches of CBT, but it does not completely fit into traditional categories because of its flexibility in integrating mindfulness (Hayes, 2004). It addresses topics like feelings, values, or spirituality within specific contexts using techniques to overcome avoidant behaviors and thoughts while

keeping the person in the present instead of focusing on the past or future experiences (Hayes, 2004).

According to ACT theory fundaments, psychological problems are rooted in six processes: (1) experiential avoidance, (2) cognitive fusion or controlling behavior through rigid verbal use, (3) loss of contact with values, (4) inaction produced by unalignment between behavior and values, (5) loss of contact with the present moment, and (6) conceptualized self, judging one's thoughts and emotions (Hayes, 2004; Hayes et al., 2006; Pachana & Laidlaw, 2014). Therefore, ACT's clinical aim is to reach behavioral flexibility to adapt and accept difficult scenarios. It focuses on helping people to solve problems by validating and accepting their experiences (feelings, thoughts, and behaviors) and connecting them with their values in life (Márquez-González et al., 2014). Rigidly believing the content of our thoughts, feelings, and body sensations, disconnected from our immediate experiences with the environment, creates avoidant behaviors and dysfunctional coping mechanisms and ultimately an unalignment between values and meaning of life. Therefore, ACT works with the client's use of language to redefine the problem and potential solutions (Hayes, 2004).

ACT has shown a moderate size effect and quality of evidence to reduce depression among the general population (Bai et al., 2020) and family caregivers of children, people with cancer or in palliative care, and people living with dementia (Han et al., 2020).

In the case of dementia caregivers, ACT aims to change the ideas or verbal rules related to caregiving (Pachana & Laidlaw, 2014). ACT has gained notice to support dementia caregivers because of the challenges of caring for a relative with multiple needs and progressive levels of dependency (Losada et al., 2015). Most dementia caregivers think about their relatives as completely dependent; therefore, they focus their lives to become the perfect caregiver. They usually reject help and avoid engaging in leisure activities or using their time to take care of themselves, including seeking health support. They also experience confronted feelings for their relatives (love, pain, frustration, tiredness, anger) and, consequently, feelings of guilt (Márquez-González et al., 2014). So far, ACT effectiveness for dementia caregivers' depression has been evaluated in two RCTs. Losada et al. (2015) carried out an RCT with 135 dementia family caregivers in Madrid, Spain. They designed a specific ACT intervention for caregivers that was compared to a minimal treatment condition. The intervention improved depressive symptoms immediately after the intervention (time by treatment effect estimate = 10.47; $p < 0.001$), but these differences did not remain at 6-month follow-up (time by treatment effect estimate = 3.48; $p = 0.196$). The authors also compared ACT with CBT for depressive symptoms. They did not find significant differences from baseline to posttreatment or from baseline to follow-up. Similarly, Márquez-González et al. (2020) conducted an RCT with 92 dementia caregivers. They were allocated to functional analysis-guided modular intervention (FAMI), ACT, CBT, or control group (CG) with 2 hours of psychoeducation workshop. The authors found that there was a higher decrease in depressive symptoms among the three treatment conditions compared to CG ($p < 0.005$), and this improvement was maintained in time (6-month follow-up).

There were no significant differences between FAMI, ACT, and CBT to treat caregivers' depression ($F_{(4, 78)} = 0.250$; $p = 0.909$). These promising results should, however, be further explored because of their attrition rate and sample sizes.

10.4.5 Other Non-pharmacological Interventions

Due to their easy access during the daytime and their adaptability, telephone- and computer-delivered interventions have been developed to support caregivers of people living with dementia. Telephone counseling and face-to-face technology-based counseling are effective interventions to address mental health issues among dementia caregivers (Teahan et al., 2020; Waller et al., 2017; Zhu et al., 2021). However, the effectiveness of both technological systems, used separately or combined, to reduce depressive symptoms, has had inconsistent results, and the quality of the studies has been rated as low or moderate. Thus, their impact still needs to be verified (Teahan et al., 2020; Waller et al., 2017; Zhu et al., 2021).

Physical exercise interventions have been widely recommended because of the number of RCTs that had reported statistically significant effects on reducing depressive symptoms and other mental health issues. However, the internal validity of their evidence makes it difficult to determine the quality of those results (Cuthbert et al., 2017).

Finally, multicomponent interventions have been developed to support family caregivers. Recently, Cheng and Zhang (2020) did not find advantages of multicomponent interventions over single interventions. However, the Strategies for Relatives (START) program, a multicomponent intervention for dementia caregivers, showed to be cost-effective for reducing depressive symptoms with an effect lasting from after the intervention up to 5 years. START is a manualized intervention delivered by graduate psychologists with no clinical training, which is key in health systems with a low rate of clinical specialists (Knapp et al., 2013; Livingston et al., 2013; Livingston et al., 2020b).

10.5 Conclusion

The relationship between caregivers' mental health and the quality of life and prognosis of people living with dementia has led to the inclusion of caregivers in dementia policies and national care plans (Livingston et al., 2020a). Comprehensive management of dementia usually encompasses psychoeducation, training, and counseling in coordination with mental health-care interventions. Linking caregivers with support networks is essential for helping them, and it has been considered among different dementia national plans in Europe and countries in other regions (Tokovska et al., 2021). In addition, exchanging experiences with people living with dementia and other relatives has improved caregivers' mental health, including the

reduction of depressive symptoms (Carter et al., 2020). Evidence confirms the use of non-pharmacological interventions to manage caregivers' depressive symptoms (González-Fraile et al., 2021), especially CBT, and mindfulness-based programs (Cheng et al., 2019; Han, 2021; Hopkinson et al., 2019; Kaddour et al., 2019; Liu et al., 2017; Sun et al., 2022). ACT has shown promising results; however, more research is needed to find out whether its effects are long-lasting and cost-effective (Losada et al., 2015; Márquez-González et al., 2020). Other interventions have been analyzed including social peer support groups, exercise, and counseling or a combination of all. Evidence does not support dyadic or multicomponent interventions over single-component interventions (Cheng & Zhang, 2020).

Acknowledgments This work was supported by ANID – Millennium Science Initiative Program – ICS13_005 and ICS2019_024. In addition, CM-C received funding from ANID – FONDECYT – 1191726, and TT-M from ANID – Doctorado Internacional/2020-72210393.

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V. Martínez, C. Miranda-Castillo (eds.), *Prevention and Early Treatment of Depression Through the Life Course*, Depression and Personality,
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