Mental Health Professionals' Attitudes towards Evidence-Based Practice and usage of Evidence-Based Practices for Children with Autism Spectrum Disorder in Bangladesh and Germany

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Declaration

I, herewith formally declare that I have written this dissertation entitled "**Mental Health Professionals' Attitudes towards Evidence-Based Practice and usage of Evidence-Based Practices for Children with Autism Spectrum Disorder in Bangladesh and Germany**" pursuant to § 13 Assessment and acceptance or rejection of the dissertation of the Georg-August University School of Science (GAUSS). The work contained in this thesis has not been previously submitted elsewhere in any form as part of another dissertation procedure. To the best of my knowledge and belief, the work in this dissertation is my own except for the quoted literature and other sources mentioned in the paper.

Göttingen, 28.10.2022   Mst. Maleka Pervin

Dedication

I would like to dedicate this work to my sweetheart (son) Md. Rafsan Abedin Khan Rami and all children with autism in entire the world.

All my love!

"All we have to decide is what to do with the time that is given us."

J. R. R. Tolkien

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Introduction

Autism spectrum disorder (ASD) is recognized as the leading mental health-related cause of the global burden of disease with lifelong effects on affected children and adolescents (Baxter et al., 2015; Li et al., 2022; Lord et al., 2020). Although a lot of research has been conducted on ASD and available treatments, almost everything we know about effective interventions comes from rich, mostly Western high income countries (HIC; National Autism Center, 2015; National Research Council, 2001; Odom et al., 2010, 2012; Wong et al., 2014, 2015) with elaborate and highly specialized health care systems. Very little is known about ASD and its treatment in low and lower middle-income countries (LMIC), which often have developing health care systems and provide little or even no services to children and adolescents with developmental disorders. To improve treatment and care in HIC, professional mental health care organizations have moved toward a widespread use of evidence-based practices (EBPs) that have their roots in different theoretical viewpoints and have clear evidence of efficacy. The situation in LMIC is rather different due to financial constraints, which limits the services and the level of care that can be provided, lower levels of education, which entails that even professional may not be trained in a broad spectrum of EBPs, and cultural differences, which may make the adoption of some practices more difficult. Moreover, cultural misperceptions and social practices may impede the implementation of EBPs.

For this dissertation, I first researched what is known about EBPs in LMIC and whether treatments, for which evidence from HIC exists are also effective and can be considered evidence-based in LMIC. Then I selected two countries, Germany as a HIC and Bangladesh as a LMIC, to investigate differences in attitudes towards evidence-based practice, the variety of EBPs used, and how these relate to socio-demographic factors.

The dissertation consists of three manuscripts based on three projects. The first two manuscripts have been published in 2022, the third is under revision. Each research paper investigates a different and specific set of research questions. The aim of the first project of this dissertation was to find out whether there are differences in the effectiveness of interventions in HIC vs. LMIC and which types of treatments can be considered evidence-based in LMIC. To find out, I conducted a meta- review analyzing systematic reviews on the effectiveness of treatments

and interventions for target outcomes in children and adolescents with ASD, which consider research studies from HIC and LMIC. In addition, individual research papers from LMIC were reviewed to find out whether they provide enough evidence to consider at least some of the studied interventions evidence-based.

The aim of the second project was to examine mental health professionals' and special teachers' attitudes towards evidence-based practice (EBP) and their usage of EBPs for children and adolescents with ASD and to explore how providers' demographic factors are related to the attitudes and the adoption of EBPs in Bangladesh. To this aim, I conducted a cross-sectional study to examine attitudes of professionals that work with towards EBP for children and adolescents with ASD and explored providers' demographic factors related to attitudes to and adoption of EBPs in Bangladesh.

The aim of the third project was to directly investigate potential differences in attitudes towards EBP, the usage of different EBPs, and their relation to sociodemographic variables in Bangladesh and Germany. To the best of my knowledge, this is the first time such a comparative study has been conducted. To allow for a meaningful comparison of findings on attitudes from the two countries, it is important to establish measurement invariance of the instrument used to assess attitudes. In addition, the study focused on professionals that work in a clinical setting with children and adolescents with ASD to ensure that all were supposed to provide treatment and care.

The dissertation consists of five chapters. Chapter 1 is a general introduction and gives some background information on ASD and its epidemiology in selected HIC and LMIC. The healthcare systems of Bangladesh and Germany are described as well as the organizations that provide services for children and adolescents with ASD. The terms "Evidence-based practice (EBP)" and "Evidence-based practices (EBPs)" are defined. Then, attitudes towards EBP and EBPs as well as what are the barriers and facilitators to the implementation and usage of EBP and EBPs are described. Respective theoretical models are presented. Next, goals, research questions, and basic structure of this dissertation are presented in this chapter. Finally, short summary of the three studies of this dissertation are presented.

Chapter 2 presents Paper 1— Pervin, M., Ahmed, H. U., & Hagmayer, Y. (2022). Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-

income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC. *Frontiers in Psychiatry, 13.*

Chapter 3 consists of Paper 2— Pervin, M., & Hagmayer, Y. (2022). Attitudes towards evidence-based practice of professionals working with children and adolescents with autism spectrum disorder in Bangladesh. *Administration and Policy in Mental Health and Mental Health Services Research, 49*(5), 861-880.

Chapter 4 is Manuscript 3— Pervin, M., Hansmann, N. M., & Hagmayer, Y. (submitted). Attitudes towards evidence-based practice and usage of evidence-based practices for children and adolescents with autism spectrum disorder: A comparison of mental health professionals in Bangladesh and Germany. *Journal of Autism and Developmental Disorders.*

Chapter 5 is the general discussion. It begins with a section summarizing and discussing findings from three papers. Part one discusses the evidence-based practices in HIC and LMIC (Paper 1), professional attitudes towards EBP and the usage of EBPs for children with ASD in Bangladesh (Paper 2), and differences in professionals' attitudes toward EBP, EBPs used and their relationship between Germany and Bangladesh (Manuscript 3). After that, the strengths and limitations of this dissertation are discussed. The implications are presented in light of the overall findings and the chapter ends with recommendations for future research. Finally, the concluding remarks wrap up the entire purpose of this dissertation. Appendices and general references are included in this dissertation.

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List of Abbreviations

AFIRM	Autism Focused Intervention Resources and Modules
APA	American Psychological Association
ASD	Autism Spectrum Disorder
BMRC	Bangladesh Medical Research Council
BSMMU	Bangabandhu Sheikh Mujib Medical University
CAM	Complementary and Alternative Medicine
CFIR	Consolidated Framework for Implementation Research
CRP	Centre for the Rehabilitation of the Paralysed
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, fifth edition
EBP	Evidence-Based Practice
EBPAS	Evidence-Based Practice Attitude Scale
EBPs	Evidence-Based Practices
EBT	Evidence-Based Treatment
EPIS	The Exploration, Preparation, Implementation, and Sustainment model
GKV	*Gesetzliche Krankenversicherung*
HIC	High-Income Country
ICD-11	International Statistical Classification of Diseases and Related Health Problems, 11th revision
IPNA	Institute of Pediatric Neurodisorders and Autism
JPUF	Jatiyo Pratibondhi Unnayan Foundation
LMIC	Lower Middle-Income Country
MOHFW	Ministry of Health and Family Welfare
NAAND	National Academy for Autism and Neurodevelopmental Disabilities
NCAEP	National Clearinghouse on Autism Evidence and Practice
NCDC	Non-Communicable Diseases Control
NCDs	Non-Communicable Diseases
NDDs	Neurodevelopment Disorders
NGOs	Nongovernmental Organizations
NIMH	National Institute of Mental Health
NPDC	National Professional Development Center on Autism Spectrum Disorder
NSCAND	National Steering Committee for Autism and NDD
NSPND	National Strategic Plan for Neuro-Developmental Disorders
PRISMA	Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines
SWID	Society for the Welfare of the Intellectually Disabled
UMIC	Upper Middle-Income Country
WHO	World Health Organizations
WWC	What Works Clearinghouse

List of Papers

1. Pervin, M., Ahmed, H. U., & Hagmayer, Y. (2022). Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC. Frontiers in psychiatry, 13. https://doi.org/10.3389/fpsyt.2022.834783

2. Pervin, M., & Hagmayer, Y. (2022). Attitudes Towards Evidence-Based Practice of Professionals Working with Children and Adolescents with Autism Spectrum Disorder in Bangladesh. *Administration and Policy in Mental Health and Mental Health Services Research*, *49*(5), 861-880. https://doi.org/10.1007/s10488-022-01205-2

3. Pervin, M., Hansmann, N. M., & Hagmayer, Y. (submitted). Attitudes towards evidence-based practice and usage of evidence-based practices for children and adolescents with autism spectrum disorder: A comparison of mental health professionals in Bangladesh and Germany. *Journal of Autism and Developmental Disorders.*

Chapter 1

General Introduction

1.1   Background

Autism spectrum disorder (ASD) refers to a group of neurodevelopmental disorders with a specific combination of impairments in social communication and interaction as well as restricted and repetitive patterns of behavior (DSM-5: American Psychiatric Association, 2013; ICD-11: World Health Organization, 2019). The symptoms of ASD emerge from early childhood and exist throughout the life cycle. They affect daily functioning negatively (Jackson et al., 2019; Lai & Baron-Cohen, 2015; Varcin & Jeste, 2017). There is an extreme variability of behavioral and communicative problems and co-existing conditions (Höglund Carlsson et al. 2013; Linnsand et al., 2021; Posserud et al. 2018; Reinvall et al. 2016; Soke et al. 2018).

Epidemiological studies reported that 1%-2% of children are affected by ASD worldwide with estimates being higher in high-income countries (HIC; Baxter et al., 2015; Hahler & Elsabbagh, 2015, Lord, et al., 2020; Lyall et al., 2017, Narzisi, 2020). The number of reported cases of ASD has increased over the past 30 years and the current prevalence has been estimated to be at least 1.5% in developed countries, but the rates vary considerably between regions and populations (Bachmann et al., 2018; Boilson et al., 2016; Dereu et al., 2010; Idring et al., 2015; Lyall et al., 2017; Parner et al., 2011; Saemundsen et al., 2013; Skonieczna-Żydecka et al., 2016; van Bakel et al., 2015). The prevalence rate for children with ASD was one in 44 in the U.S., with boys being four times more likely to be diagnosed than girls (Maenner et al., 2021). In the UK, one in 100 children were affected by ASD (British Medical Association, 2020).

The HIC with the lowest autism rates were in Europe. Germany has a rate of 72.2 per 10,000 people or 1 in 139 people (World Population Review, 2022). Another study estimated the rate to be between 0.22% and 0.38%, based on a sample of 0- to 24-year-olds from 2006 to 2012 (Bachmann et al., 2018). The frequency of diagnosis is increasing due to new, broader diagnostic criteria, improvement of diagnostic tools and increased awareness among parents and professionals (Klauber et al., 2016; Höfer, 2019; Poustka, et al., 2019).

The prevalence rate in lower middle-income countries (LMIC), by contrast, is rather uncertain (Elsabbagh et al., 2012) due to a lack of awareness, limited knowledge and scarcity of well-conducted scientific studies (Elsabbagh et al., 2012; Samms-Vaughan, 2014). A systematic review from Bangladesh reported a prevalence of ASD in South Asia ranging from 0.09% in India to 1.07% in Sri Lanka. For Bangladesh numbers ranged from 0.15–0.8% (Hossain et al., 2017). A survey conducted by the Ministry of Health, Family, and Welfare of Peoples Republic of Bangladesh estimated the prevalence as 0.15% (Global Autism Movement and Bangladesh, 2014). Another survey found that it was around 3% in urban areas (Dhaka city) and 0.068% in rural areas (NCDC & BMRC, 2013). Recently, a study conducted in a rural community in Bangladesh, reported a prevalence of 0.075% (Akhter et al., 2018). Several old studies using a community level approach found a prevalence of ASD of 0.02% and 0.08% (Mullick & Goodman, 2005; Rabbani et al., 2009). Figure 1 illustrates that variations in prevalence of ASD across the world.
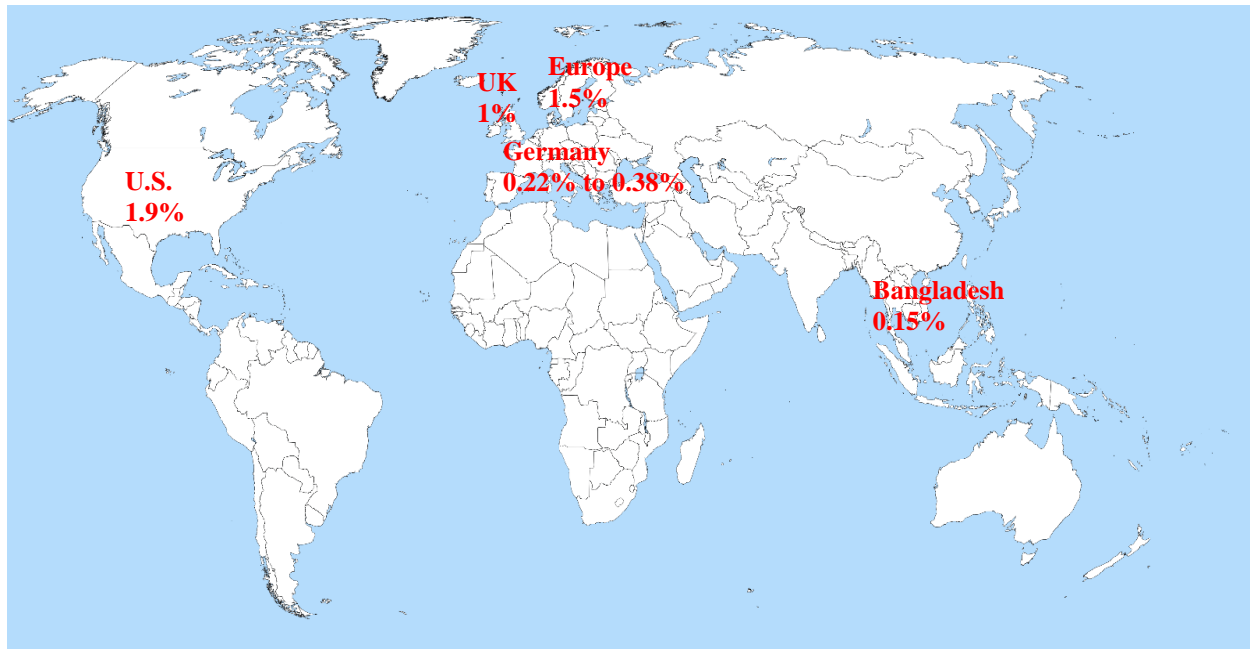
Fig. 1 The prevalence of ASD in various regions of the world

1.1.1 Health care system and ASD support in Germany and Bangladesh

In this dissertation, I focus on the attitudes towards and the usage of EBPs for autism care in Germany and Bangladesh. There are a lot of differences between Germany and Bangladesh due to cultural activities, language, professional perspectives, treatment facilities, training facilities, knowledge and awareness of ASD. Some of these differences are described below.

Currently, 83.37 million people live in Germany (World Population Review, 2022). With a population density of 233 per Km^2 (623 people per mi^2), Germany is one of the most densely populated countries in Europe. It is a rather typical High-Income Country (HIC), with a highly developed health care system that is available to all citizens. The total expenditures on health were 343.5 billion euros in 2015, equalling 11.3% of the gross domestic product (*Gesundheitsberichterstattung des Bundes*, 2017). The costs caused by mental and behavioral disorders amounted to 44.3 billion euros (Statistisches Bundesamt, 2015). However, the data on health service use and associated costs in children and adolescents with ASD are still scarce in Germany (Höfer, 2019). A recent study estimated the annual costs of supporting an individual with ASD as 3287 euros, with psychiatric inpatient care (19.8%), pharmacotherapy (11.1%), and occupational therapy (11.1%) being the largest cost components (Höfer, et al., 2022).

In Germany, almost all citizens must acquire a health insurance from companies, known as *Gesetzliche Krankenversicherung* (GKV), which covers the expenses for psychotherapeutic in-patient and out-patient treatments within a given set of regulations. Mental health services for those living with a mental illness are mainly provided by specialists. There are an estimated 14,354

psychiatrists working in Germany (Melcop et al., 2019; https://www.dgppn.de/_Resources/Persistent/17452fbcf559a53a36e71334cde8d18e8d6793fa/20 210727_Factsheet_Kennzahlen.pdf). The Federal Office of Statistics claimed that there were 48.000 psychotherapists providing services for children and adolescents across Germany in 2019 (https://www.destatis.de/DE/Presse/Pressemitteilungen/2021/03/PD21_N022_23.html). The average age of an ASD diagnosis was 6.3 years, which lies well above other European and other countries (Höfer et al., 2019; Noterdaeme & Hutzelmeyer-Nickels, 2010). On average, parents in Germany visit 3.4 different mental health professionals (range 1-20) before their child is diagnosed; 75% of parents see a paediatrician first. Almost 49% of children in Germany are diagnosed in special outpatient clinics for ASD; 38% of caregivers are unhappy with the process afterwards (Höfer, 2019).

Children and adolescents with developmental disorders have multiple options to access treatment facilities and comprehensive care, e.g. special education (Bürki et al., 2021), pharmacological treatment options (Jobski et al., 2017), social supports (Fortuna et al., 2016; Kamp-Becker et al., 2010), and supported employment (Frank et al., 2018; Vogeley et al., 2013). A broad range of services are available through different service providers, but there are significant regional differences in terms of service density (Bachmann & Hoffmann, 2015). Often multidisciplinary teams including psychiatrists, psychotherapist, psychologists, pedagogues, social pedagogues, special pedagogues, social workers, occupational therapists, and speech therapists offer services to those in need. Autism therapy in a specialized autism therapy centres is paid for by social security or youth welfare to improve the integration of those living with ASD (Bundesverband Autismus Deutschland e.V., 2017c; Bundesverband Autismus Deutschland e.V., 2020b). A study based on data from a health insurance found that individuals with ASD received different therapies, for example, 34,2% pharmacotherapy, 24,9% ergotherapy, 23,7% speech therapy, 6% psychotherapy (Bachmann & Hoffmann, 2016, 2015; Bachmann et al., 2018).

Bangladesh is one of the most densely populated countries in the world, the population density in Bangladesh is 1160 per sq. km in 2022 (3,276 people per mi^2) based on World Population Review, 2022. Bangladesh joined the LMIC on 1 July 2015 due to sustained economic growth (The World Bank, 2020). Over 50 years after independence, health care delivery in Bangladesh is still a daunting challenge. There is a lack of public health facilities, scarcity of skilled clinicians, financial constraint, and societal stigma (Ahmed et al., 2005; Ahmed et al., 2015; Mahmood, 2012). Mental health expenditures from the Ministry of Health and Family Welfare are minimal and amount to less than 0.5% (0.44%) of the total health budget (Alam et al., 2020; Hasan et al., 2021). Of all the expenditures on mental health, 67% are devoted to mental hospitals and 33% are dedicated to all other mental health sectors. In terms of affordability of mental health services, less than 0.11% of the population have access to free essential psychotropic medications. For those that pay out of pocket, the cost of antipsychotic and antidepressant medications in local

currency is Taka 5.00 (US$ 0.07) and Taka 3.00 (US$ 0.04) respectively. The per capita yearly income was $2,591 in 2020-21 according to data of Bangladesh Bureau of Statistics. Health insurance is a rarity and no mental disorders are covered in social security (Islam & Biswas, 2015). The fees pose a significant barrier to those who are living in the rural areas, who based on our estimates need to spend BDT 800-1600 (approx. USD 10-20) for each visit to Dhaka or other major cities.

The Constitution of Bangladesh obliges the government to ensure health care services for all citizens (IGS, 2012). Services are provided by four key actors: government institutions, private sector, nongovernmental organizations (NGOs), and donor agencies (Ahmed et al., 2015). The Government of Bangladesh has passed various acts and legislation for organizing the functions of public, private and NGO providers. The health care delivery system has expanded its reach in urban areas; the people of rural areas, however, have little access to facilities (Ahmed et al., 2011; Ahmed et al., 2015; Aldana et al., 2001). Mental health care services are delivered by psychiatrists, psychologist, psychiatric nurses, clinical psychologist, psychosocial counsellor, with little to no multidisciplinary team work. The same is true for autism service. There is no common framework for pediatrician, psychiatrists, psychologists, and other support service staffs (Ahmed et al., 2011). Approximately 200 psychiatrists and 50 psychologists currently serve a country of 168 million people. Access of mental health services for rural populations is limited since most of practitioners are located in urban areas. Like other LMICs, there are very few community care facilities for individuals with autism available throughout the country. Specialized professionals on autism are clustered in the urban area of Dhaka city.

Government hospitals and public institutes provide comprehensive services to children with neurodevelopmental disorders (NDDs) and address the needs of underprivileged children, who have been suffering from epilepsy, cerebral palsy, autism, and other behavioral problems. The Ministry of Health and Family Welfare (MOHFW) has made considerable efforts to strengthen the public sector health system. The activities of The Ministry of Health and Family Welfare are conducted through tertiary level institutions (Dhaka Shishu Hospital, Child Guidance Clinics [Shishu Bikash Kendra] of Government Medical College) and secondary and primary level institutions (Community Clinics and Family Welfare Clinics). These organizations provide support services for individuals with neurodevelopmental disorders and disabilities. The National Institute of Mental Health (NIMH), the Institute of Pediatric Neurodisorders and Autism (IPNA) and the child psychiatry wing of the department of Psychiatry of Bangabandhu Sheikh Mujib Medical University (BSMMU) provide specialist services for children with disabilities including autism. The National Academy for Autism and Neurodevelopmental Disabilities (NAAND) is part of the Ministry of Education and manages the provision of urban primary care services for individuals with Autism and other neuro-developmental disabilities. It also organizes training programs for mental health staff. Three departments of the University of Dhaka (Communication Disorders, Clinical Psychology, Educational and Counselling Psychology) also provide care for

children with disabilities in general and those with NDDs, who cannot attend mainstream educational facilities.

Private sector organizations and NGOs (non-profit organizations) have played a key role in the promotion of human rights and in the provision of support services for children with disabilities in Bangladesh. The first NGO dedicated to the rehabilitation of persons with ASD was established in 2000. They cooperate with the government in developing policies and programs. A number of disability service and support centers are functioning in the capital city Dhaka. Private and non-governmental autism centers and clinics offer a range of services to children with ASD. These institutions include the Autism Welfare Foundation, the Autistic Children Welfare Foundation, the Society for the Welfare of the Intellectually Disabled (SWID), the Bangladesh Protibonhi Foundation, the Hope Autism Center, the Square Child Development Center, the Centre for the Rehabilitation of the Paralysed (CRP), the Nishpap Autism Foundation, and the Rainbow Autism Care and Therapy Center.

Approximately 100 registered schools in Bangladesh address the special needs of children with disabilities (Ehsan et al., 2018). Most of the schools are run by private organizations and NGOs. Others are operated by the Jatiyo Pratibondhi Unnayan Foundation (JPUF), under the Ministry of Social Welfare. Typically, the schools are providing speech and language therapy, sensory integration therapy, behavior therapy, music therapy, play therapy, occupational therapy, and conventional education services.

However, treatment for children with autism is becoming more available in Bangladesh. The country has an old mental health policy named the Lunacy Act that was enacted and put in place in 1912 when the country was still a British colony (1757-1947). In 2006, Bangladesh adopted a mental health policy, strategy, and plan as part of its effort in promoting surveillance and prevention of non-communicable Diseases (NCDs). To protect the rights and to improve the quality of life for children with disabilities including autism, the Government of Bangladesh has enacted two important acts – the Rights and Protection of Person with Disability Act-2013 and the Protection of Persons with Neurodevelopmental Disability Trust Act, 2013. In 2012, NSCAND (National Steering Committee for Autism and NDD) was established. It focuses on increasing awareness and addressing situation for children with Autism and NDD. In 2016, the "Situation Assessment of Autism and Neurodevelopmental Disorders in Bangladesh" provided a situation analysis for Autism and Neurodevelopment Disorder (NDD) in Bangladesh. It found that targeted government-implemented strategies and interventions are required to reduce the socioeconomic, health and educational disparities impacting those with neurodevelopmental disabilities and their families. Recently, the Government of Bangladesh devised "The National Strategic Plan for Neuro Developmental Disorders (NDD) 2016-2021", which is one of the important initiatives to improve the quality of life for children and adolescent with autism and NDDs. One objective of this plan was to involve the pioneers, experts, and professionals, who work with children and adolescents suffering from NDD, to ensure that planned measures are feasible, efficacious, and adopted by

patients and service providers. The findings of this dissertation may support its success in implementing EBPs.

1.1.2 Evidence-based practice (EBP) and Evidence-based practices (EBPs)

In recent years, the dissemination and implementation of EBPs by mental health service providers has been a major focus in many countries to improve the quality of services delivered to children and adolescents with ASD (Becker, et al., 2009; Callaghan, 2001; Chorpita & Regan, 2009; Fixen, et al., 2005; Weisz, et al., 2000). In addition, there have been efforts to spread EBP among mental health professionals, e.g. by the American Psychological Association (American Psychological Association, 2005) but also by other professional bodies. The terms "EBP" and "EBPs" are often used synonymously in the literature although they originally had a different meaning.

EBP was first defined as "the integration of best research evidence with clinical expertise in the context of patient characteristics, culture, and preferences" in clinical decision-making (American Psychological Association, 2005, p. 5). Thus, EBP prescribes how decisions on treatment should be made. A more recent definition of EBP adds that "it requires the health professional to consider characteristics of the practice context in which they work" (Hoffman, et al., 2017, p. 337). Others have defined EBP as "the systematic search for, and appraisal of the best evidence in order to make clinical decisions that might require changes in the current practice, while taking into account the individual needs of the patient (Winter 2000, p. 55; Sackett et al., 1996, p. 71-72). When all three components of EBP (evidence, experience, patient's need and goals) are considered together, clinicians can make informed, evidence-based decisions and provide high-quality services reflecting the interests, values, needs, and choices of individuals with disabilities. The following figure illustrates the three aspects which constitute evidence-based practice (see Figure 2).

Fig. 2 Evidence-based practice (Source: https://www.pragmaticmom.com/2021/08/evidence-based-practice-ebp-introduction-to-the-approach-in-healthcare-education-and-practice/)

EBPs are therapies or treatment programs that have been proven efficacious through systematic empirical research. Sometimes the term evidence-based treatment (EBT) is also used. There is great demand for knowledge about practices that work for children with neurodevelopmental disorders including ASD. In turn, many respective research studies have been conducted, which have been summarized in many systematic reviews. For example, the National Standards Project (National Autism Center, 2009) and the National Professional Development Center on Autism Spectrum Disorder (NPDC; Odom et al., 2010) conducted comprehensive and systematic reviews of the literature and evaluated the various treatment options available. The NPDC has created online modules, called Autism Focused Intervention Resources and Modules (AFIRM), for each of the 27 identified EBPs (National Professional Development Center on Autism Spectrum Disorder [NPDC], 2017a, 2017b). Recently, the National Clearinghouse on Autism Evidence and Practice (NCAEP) identified 28 effective EBPs (Hume et al., 2021; Steinbrenner et al., 2020). A matrix that shows the outcomes for these 28 EBPs sorted by age group can be found in Figure 3.

Fig. 3 Evidence-based practices (Source: Hume et al., 2021, p. 16; Steinbrenner et al., 2020, p. 40)

Research also investigated whether health professionals engage in EBP and use EBPs in their work. Many studies found that not all health professionals use them despite the existing evidence that shows their efficacy (Beidas & Kendall, 2010; Beidas et al., 2012; Herschell, et al., 2010; Sholomskas et al., 2005; Williams & Beidas, 2019). Several theoretical approaches have been developed to explain why EBPs are not implemented in mental health care settings in the way they were designed. A number of frameworks describe the factors that may influence the

adoption of EBP as a general approach to clinical work and the usage of specific EBPs (cf. Michie et al., 2005). Factors are usually assigned to four major categories: individual, organization, community, and system.

Individual-level factors include attitudes of the professionals, their knowledge, skills, self-efficacy expectations, emotions, motivations, and social norms as well. Organizational-level factors include organizational culture, organizational climate, leadership support, staffing, access to resources. Community factors include social norms, social support, social pressure, social comparisons, social identity respectively. System factors include legal and regulatory factors, guidelines for EBP use, funding, and policy guidance from government, academia, and professionals affecting EBP implementation in health care delivery environments.

Implementation science has developed several theoretical approaches. A growing number of theories describe the implementation of EBPs in several stages and explain how the implementation is dependent on individual and organizational factors. A recent overview of the major theoretical frameworks summarized individual-level factors and organizational factors shared by the different frameworks (Williams & Beidas, 2019). Figure 4 depicts the factors that were shared across the different frameworks.

Individual-level factors	Organizational-level factors
Attitudes/Beliefs/Cognitions Knowledge Affiliation with organization Self-efficacy Stage of change Skills Emotions Motivations and goals/intention Behavioral regulation Nature of the behaviors	Organizational culture Organizational climate Leadership Implementation climate Relative priority Team working Resources

Fig. 4 Individual and organizational factors affecting the implementation of EBPs (see Williams & Beidas, 2019)

Interestingly, the identified individual-level factors fit very well with the theory of planned behavior and the theory of self-determination which are extremely well-supported empirically (cf. Deci & Ryan, 2002; Fishbein & Ajzen, 2010). According to the theory of planned behavior,

behavior is a function of attitudes toward the behavior, subjective norms, and perceived behavioral controls that are related to one's intention to perform a behavior (Albarracin, et al., 2001; Armitage & Conner, 2001; Fishbein & Ajzen, 2010; Sheeran, 2002; Sheppard, et al., 1988). Previous findings demonstrated a relationship between higher intentions and higher implementation rates for the usage of an evidence-based assessment tool (Casper, 2007). In recent study, Fishman and his colleagues (2018) reported that teachers' intentions to use EBPs for youth with autism were highly related with the actual usage of EBPs.

With regard to organizational factors, two theories (i.e., Organizational Culture Theory, Cameron & Quinn, 2011; Glisson & Williams, 2015; Hartnell, et al., 2011; Implementation Climate Theory, Klein, et al., 2001; Klein & Sorra, 1996) described multiple organizational factors including organizational culture and climate, organizational support, and leadership. Organizational culture theory aims to explain change at a higher-order social and system level (Walker, 2003). One important theme of this theory focuses on general and specific organizational activities to the implementation of EBPs. The organizational culture consists of employees' attitudes, cognitions, motivation, and behavior (Klein et al., 1994). Research confirmed that the successful implementation of EBPs is influenced by these factors as well as characteristics of the particular EBP or set of EBPs to be implemented (Williams & Beidas, 2019). One recent study, however, found that implementation leadership and climate did not predict EBP use in schools for children with autism (Locke, et al., 2019). Research also showed that multiple organizational factors, such as working environment, adequate organizational supports for EBPs, proper training and leadership influence on important decisions related to adoption of new interventions, might affect providers' attitudes and their willingness to adopt EBPs (Aarons, 2006; Aarons, et al., 2009; Powell et al., 2017; Rye et al., 2019).

Studies on the usage of EBPs or the implementation of new EBPs for ASD are not available for Germany (see Wiegand et al., 2016). Interestingly, various studies have reported that complementary and alternative medicine (CAM), for which there is no evidence of effectiveness on ASD, is rather frequently used. In Germany, 46.3% of parents of children under 12 with ASD reported that their children had already used CAM. 22.9% reported current use (Höfer et al., 2019). The prevalence of CAM use appears to be higher in ASD than in the general population, as well as higher than in other mental health conditions (Höfer, et al., 2017). The most commonly used methods are special diets and dietary supplements, some of which can have significant undesirable side effects (Levy & Hyman, 2015). Media-effective or pseudoscientific therapy offers for autism spectrum disorders, such as "Tomatis therapy", "supported communication" or "dolphin therapy", for whose effectiveness there is no evidence, are probably not harmful, but can be time-consuming and cost-intensive and lead to false hopes and frustration among those affected (Poustka, et al., 2019). The third project of this dissertation (see Chapter 4) is the first comparative study between Germany as a HIC and Bangladesh as a LMIC on the attitudes towards EBP and the usage of

different types of EBPs and found that overall, favourable attitudes of professionals in both countries, however, most of the EBPs (e.g., social skill training, cognitive behavioural interventions, behavioural interventions, and parent-mediated interventions respectively) were more likely to be used by clinicians in Germany than in Bangladesh.

In most LMICs, there are very few trained professionals, who have expertise with respect to ASD-specific interventions. There often is a shortage in mental health care provision, an absence of government initiatives, insufficient training, financial constraints and limited resources in LMIC (Adugna et al., 2020; Blake et al., 2017; Dababnah & Bulson, 2015; Eid et al., 2017; Harrison et al., 2016; Saraceno et al., 2007; Saxena et al., 2007). Previous research found that in LMIC, 75-85% of individuals with disabilities including autism do not receive any type of treatment. Like in many LMIC, progress in implementing EBPs for children with autism has been slow in Bangladesh. The second project of this dissertation (see Paper 2) is the first study on the usage of EBPs in Bangladesh.

1.1.3 Attitudes towards EBP and EBPs

Attitudes are a determinant of the decision of whether or not to try a new practice (Candel & Pennings, 1999; Frambach & Schillewaert, 2002; Rogers, 1995). In general, attitudes are defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly & Chaiken, 1993, p. 1). Attitudes towards EBPs refer to opinions and perceptions about EBPs and the implementation process (Aarons, 2004).

As knowledge about effective interventions and practices has grown, research has increasingly focused on mental health professionals' attitudes that may facilitate or hinder the implementation of EBPs (Aarons et al., 2012; Greenhalgh et al., 2004; Lilienfeld et al., 2013; Rye et al., 2017; Wisdom et al., 2014). Within this growing body of research, professionals' attitudes have been found to be important determinants of the actual implementation and use of innovations (Aarons, 2005), as well as the intentions to try new practices (Aarons, 2004; Aarons, 2005; Aarons et al., 2012; Candel & Pennings 1999; Frambach & Schillewaert 2002; Rogers 1995). Research on the adoption and implementation of EBPs has shown that the attitudes of the professionals, who are supposed to deliver the treatments, are critical (Burgess et al., 2016; Glasman & Albarracin, 2006). For example, Aarons (2004) showed that therapists, who had a negative attitude towards using EBPs, were significantly less likely to use them in practice. Therefore, it is important to investigate mental health professionals' attitudes towards EBPs for children and adolescents with ASD. In my dissertation project, I examined mental health professionals' attitudes toward EBPs for children and adolescents with ASD (see Chapters 3 and Chapter 4).

There are several instruments to measure attitudes regarding EBPs (Aarons, 2004; Aarons et al., 2012; Rye et al., 2017). A brief measure of mental health provider attitudes towards the

adoption of EBPs was developed by Aarons (2004) covering four dimensions (the intuitive *appeal* of the practice, the likelihood of adopting a practice given the *requirements* to do so, *openness* to new practices, and the perceived *divergence* between research-based interventions and current practice). The EBPAS-15 was translated and validated in diverse service and national contexts, e.g., Dutch version, Greek version, Brazilian Portuguese version (Baumann et al., 2022; van Sonsbeek et al., 2015; Zampetakis, et al., 2010).

The EBPAS was expanded to a version with 50 items by Aarons et al., (2012) covering eight additional domains: *limitations* of EBPs and their inability to address client needs, EBPs *fit* with the values and needs of the client and therapist, negative perceptions of *monitoring*, *balance* between perceptions of clinical skills and science as important in service provision, the time and administrative *burden* of learning and using EBPs, *job security* related to expertise in EBPs, perceived *organizational support* for adoption, positive perceptions of receiving *feedback* as well. To shorten the EBPAS-50, the EBPAS-36, which contains 12 subscales each with 3 items, was developed and validated with US and Norwegian sample (Rye et al., 2017). Recently, a German version of the EBPAS-36, validated in a sample of psychotherapists, was published (Szota et al., 2021). In this dissertation, nine subscales of EBPAS-36 (openness, divergence, appeal, fit, balance, burden, limitations, job security and requirements) were used for research on attitudes in Germany and Bangladesh.

Researchers have used the EBPAS to examine factors that may affect practitioners' attitudes towards EBPs. Findings indicated that attitudes towards EBP are likely to depend on therapists' demographic variables (e.g., gender, years of experience) and organizational factors (e.g., leadership, social climate and organizational support, policies and system factors; Aarons, 2004, Aarons et al., 2010, 2011, 2012; Beidas et al., 2015; Connors et al., 2018; Damschroder et al., 2009; Greenhalgh et al., 2004; Locke et al., 2019; Okamura et al., 2018; Powell et al., 2017; Rye et al., 2019; Smith, 2013; Vassos & Carroll, 2016; Wisdom et al., 2014). For instance, highly educated therapists showed more positive attitudes toward adoption of EBPs given their intuitive appeal (Aarons, 2004; Aarons et al., 2010), whereas, Jensen-Doss et al. (2009) found that those who are less educated have more favorable attitudes towards EBPs. In addition, higher levels of experience were associated with a perception of therapy as a balance between art and science (Aarons et al., 2012). Interns or less experienced clinicians claimed a greater openness to trying new interventions and a higher willingness to try or use more structured or manualized interventions (Aarons, 2004; Aarons et al., 2010). They also perceived more organizational support and job opportunities by learning EBPs (Okamura et al., 2018). On the other hand, several research findings found no differences in practitioners' attitudes depending on the level of clinical experience (Brookman-Frazee et al. 2009; Nelson & Steele 2008; Stewart & Chambless, 2007). Females, compared to males, have reported a greater perceived fit of EBPs with characteristics and needs of patients (Aarons et al., 2010; Aarons et al., 2012, Rye et al., 2019). Younger

participants had more positive attitudes than older participants that means younger clinicians assigned greater value to job security and organizational support for learning new EBPs (Aarons et al., 2009; Gray et al., 2007; Okamura et al., 2018; Rye et al., 2019). However, Aarons and others (2010) found that older providers were more willing to adopt EBPs given requirements to do so. In regard to service settings, those working as private practitioners as well as clinicians compared to non-clinicians had a lower score on attitudes related to requirements indicating negative attitudes toward adoption of EBPs if required to do so (Rye et al., 2019). Additionally, social workers and nurses had more positive attitude towards adopting EBPs than psychologists (Rye et al., 2019). On the other hand, an earlier study reported that psychologists practicing in academic settings held more positive attitudes (Addis & Krasnow, 2000), while one study did not find such differences (Nelson & Steele, 2008). Overall, findings are mixed with regard to the service settings in which a professional works. Furthermore, providers with higher caseloads have perceived greater administrative burdens related to the use of EBP and clinicians working in public clinical settings, compared to private clinical settings, have reported poorer fit of EBP with their clinical practice (Aarons et al., 2012, Okamura et al., 2018; Rye et al., 2019). A study examined knowledge utilizations as well as attitudes of social workers toward the use of research-based practice methods in Germany (James et al., 2019). Findings indicated overall positive attitudes toward research based methods if methods were appealing, made sense and sufficient support and training was provided (James et al., 2019).

To sum up, findings indicate that attitudes could significantly influence the successful implementation and use of EBPs attitudes. Findings on the predictors of attitudes are rather mixed. Moreover, almost all findings come from HIC. No research coming from LMIC could be identified. Therefore, it is important to conduct respective research find out which practitioner-level variables are related to attitudes towards adoption of EBP and EBPs and how attitudes are related to the usage of EBPs. In addition, it is important to make a direct comparison between HIC and LMIC to ensure that potential differences are not due to methodological issues. The research for this thesis investigates professionals' attitudes towards EBP for children with ASD and in usage of EBPs in Bangladesh and also to explore the differences in the context of Germany as a HIC and Bangladesh as a LMIC.

1.1.4 Barriers and Facilitators to the implementation and usage of EBP and EBPs

A substantial literature addresses barriers to and facilitators of the adoption and successful implementation of EBPs (Aarons, 2004, 2005; Glisson & Schoenwald, 2005; Glisson et al., 2008; Greenhalgh et al., 2004; Grol & Wensing, 2004; Lau et al., 2015; Raghaven et al., 2008; Rye et al., 2019). In their systematic review of reviews, Lau and colleagues (2015) identified a list of crucial barriers and facilitators, which were found in a majority of reviews. Among the identified

factors are knowledge and competencies of mental health professional, support and guidance by superiors, and available resources including time. A very recent systematic review looking at barriers to accessing treatment for ASD (Adams & Young, 2021) identified practitioner-related barriers, e.g., lack of knowledge or expertise in autism or an inability or unwillingness to tailor approaches to the needs of those with ASD. Service-related barriers found were long waiting lists, not being able to access a service, and being "bounced" between mental health and disability services. Client-based barriers were for example not knowing how to access services and poor emotional literacy of issues (Adams & Young, 2021).

The Consolidated Framework for Implementation Research (CFIR, Damschroder et al., 2009), provides a framework and typology for the complex and interacting factors. It also provides guidance for a systematic assessment. The major domains of the framework were (a) intervention characteristics, (b) outer setting, (c) inner setting, (d) characteristics of individuals, and (e) the implementation process itself.

Previous studies have identified a number of barriers and facilitators for the successful implementation of EBP (Lau et al., 2015; Rye et al., 2019). In a study on psychotherapists by Cook and others (2009), the most frequently mentioned barriers were insufficient training, negative attitudes, lack of administrative support and extensive caseload. Lack of access to resources and organizational supports, lack of time, lack of confidence in EBPs skills, have been found to be substantial barriers to adoption of EBP in several studies (Dalheim et al., 2012; Gerrish et al., 2007; MacEwan Dysart & Tomlin, 2002; Nelson et al., 2006; Pagoto et al., 2007; Stewart et al., 2012; Turk & Gatchel, 2013). Research concerning the situation in LMIC describe financial, organizational, social, and cultural barriers which hinder access to services and treatment. This includes social and contextual factors, social policy and legislation, low awareness and experienced stigma impacting demand for autism care; and the prevalence of specialist models for diagnosis and treatment which are not scalable in LMIC (Adugna et al., 2020; Dababnah & Bulson, 2015; Divan et al., 2019; Saraceno et al.2007; Saxena et al.2007). The second study of this dissertation (see Chapter 3) explored a selected group of potential barriers and facilitators to the widespread use of EBPs for ASD in Bangladesh as a LMIC.

1.2   Goals of this dissertation

The previous research findings have shown that there are effective EBPs for ASD, which have been developed and are in widespread use in HIC. Currently there is no international consensus on which treatments and interventions are effective in treating ASD in LMIC. Very few studies come from and very few reviews focus on evidence from LMIC. At present, it is unclear, which interventions and treatments can be considered evidence-based for LMIC. The first aim of the present dissertation was to find out which types of treatments and interventions can be considered evidence-based in LMIC and also find out which practices are used.

Previous research also showed that professionals' attitudes may significantly influence the successful implementation and usage of EBPs and the attitudes may differ as a function of demographic variables and organizational factors. Mental health professionals' attitudes towards EBP have been investigated in Western HIC (e.g., US, Germany, the Netherlands, Norway) and found to be predictive for the usage of EBPs. Currently there is no study on mental health professionals' attitudes towards EBP regarding autism in Bangladesh. Overall, research on EBP and attitudes towards it is scarce in LMIC. The second aim of this dissertation was to examine professionals' attitude towards EBP for children and adolescents with ASD and their usage of evidence-based treatments considered for wider implementation in Bangladesh.

Despite ongoing research efforts, little is currently known about the possible role of demographic variables, attitudes toward EBP, EBPs used and their relationship in HIC and LMIC. The third aim of this dissertation was to explore differences in professionals' attitudes towards EBP for children with ASD and in usage of EBPs in Germany as a HIC and Bangladesh as a LMIC.

1.3 Research questions of this dissertation

1. Which types of treatments and interventions for children and adolescents with autism spectrum disorders can be considered evidence-based in LMIC?

2. What are the attitudes towards EBP in Bangladesh? Are the attitudes towards EBP predicted by demographic variables? Is the usage of EBPs predicted by attitudes?

3. Which EBPs do mental health professionals in Bangladesh use?

4. Do attitudes toward EBP, EBPs used and their relationship differ between Germany and Bangladesh?

1.4 Basic structure of this dissertation

This dissertation project consists of three projects. Each project addresses some of the research questions outlined above.

Project 1: In the past decade many systematic reviews have been published summarizing the evidence on treatments for ASD in children and adolescents. According to these reviews many types of interventions can be considered evidence-based. However, most of the reviewed research comes from HIC. But the situation in LMIC is rather different due to underdeveloped health systems, financial constraints, lower levels of education, and cultural differences. In this project, I investigated which types of treatments and interventions for children and adolescents with autism spectrum disorders could be considered evidence-based in LMIC through a meta- review of

systematic reviews and a narrative review of research papers from LMIC. The aim of the project one was to address the research question one.

Project 2: There is almost no research on professionals' attitudes towards EBPs for children with ASD in LMIC including Bangladesh. The aim of the project 2 was to examine the attitudes towards EBP of professional who work with children and adolescents with ASD, to study the usage of EBPs, and to explore how professionals' demographic factors are related to the attitudes and the adoption of evidence-based practices in Bangladesh. For this project, a cross-sectional survey study was conducted, using paper questionnaire. Research questions 2 and 3 were addressed.

Project 3: The aim of the project three was to examine cross-cultural differences in attitudes towards EBP, in the number and types of EBPs used, and in the relations between demographic variables, attitudes, and EBPs between mental health professionals who work in a clinical setting and provide treatments to children and adolescents with ASD in Bangladesh and Germany. A survey method was used to collect data from Bangladesh and Germany. This project addressed research question four.

The Basic Structure of the dissertation project is summarized in Figure 5
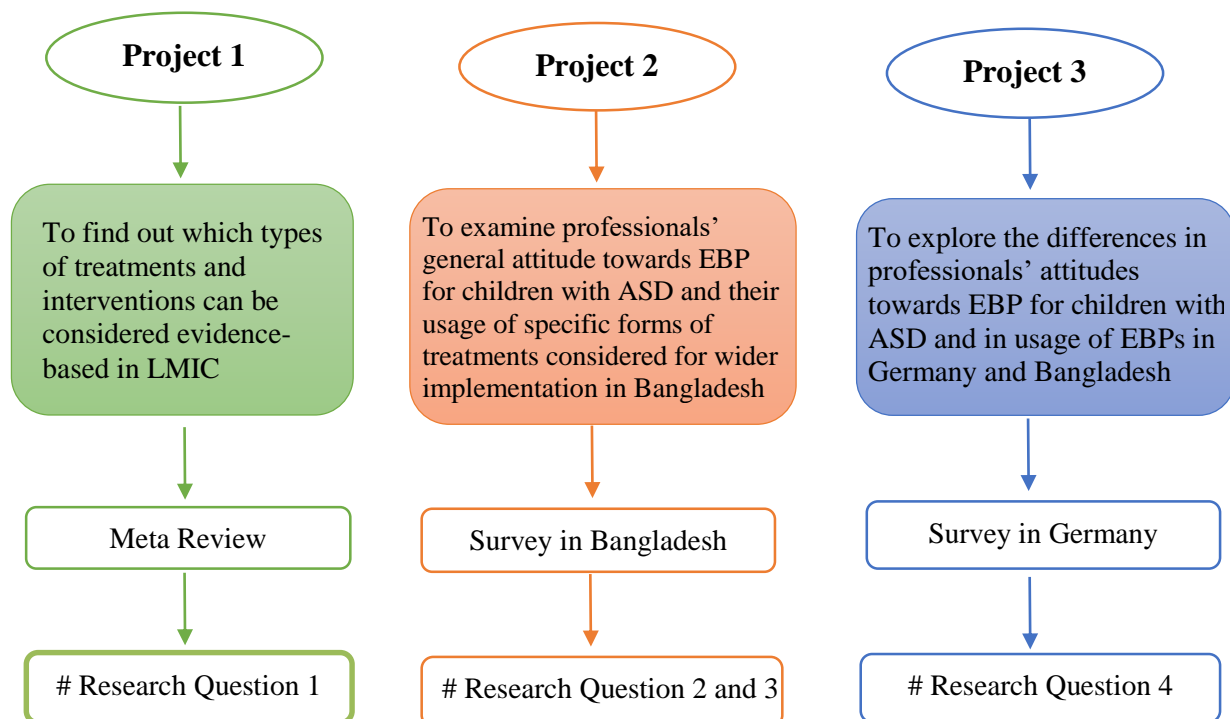
Fig. 5 Basic structure of this dissertation

1.5 Brief description of the studies carried out

Paper 1: (Published). Pervin, M., Ahmed, H. U., & Hagmayer, Y. (2022). Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC. *Frontiers in Psychiatry*, *13*.

For the first manuscript, we conducted a meta-review analyzing systematic reviews on the effectiveness of treatments and interventions for target outcomes in children and adolescents with ASD in HIC and LMIC from 2011 until the end of 2021. In addition, we analyzed individual papers from LMIC, which were included in these reviews. Our aims were to find out (i) whether there are differences in the effectiveness of different types of treatment in HIC vs. LMIC and (ii) which types of treatments can be considered evidence-based in LMIC. The systematic review of reviews was carried out in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines (PRISMA, Moher et al., 2009). Three electronic databases (PsycINFO, PubMed, Cochrane reviews) were searched for reviews on interventions for ASD in children and adolescents from January 2011 through December 2021, which included studies from non-HIC. Reviews meeting the predetermined inclusion criteria were included and relevant data including quality and evidence assessments were extracted. Evidence for different types of interventions in HIC vs. LMIC was planned to be compared, but none of the reviews assessed potential differences. Therefore, a narrative review of the studies from LMIC was conducted including an assessment of quality and evidence using the What Works Clearinghouse standards handbook of the institute of educational sciences (version 4.1, https://ies.ed.gov/ncee/wwc/Resources/ResourcesForReviewers).

In the systematic review of reviews, we identified 35 systematic reviews, which fulfilled inclusion criteria. No review compared the evidence from HIC and LMIC. Thus, systematic reviews on interventions for children and adolescents with ASD did not look for potential differences in effectiveness of interventions in HIC and LMIC. The review of the individual studies from LMIC found some promising results, showing that the treatments can be effective in LMIC. However, these studies did not provide sufficient evidence for the different types of interventions to consider them evidence-based. This was due to a small number of studies, sometimes poor quality, and often small sample sizes. Non-specialist mediated interventions, especially parent mediated interventions, had the most evidence and yielded the most promising findings. Overall, there was rather little research from LMIC.

We concluded that more research needs to be conducted in LMIC on the effectiveness of different treatments and interventions for children and adolescents with ASD. We recommended mental health providers, clinicians, and primary caregivers to look into the cited and summarized reviews and maybe even individual studies for more details on the specific treatments and interventions that proved effective. The summary and synthesis of the literature hopefully provides

an easy access to relevant findings for mental health professionals who are working with children with ASD in LMIC.

Paper 2: (Published). Pervin, M., & Hagmayer, Y. (2022). Attitudes towards evidence-based practice of professionals working with children and adolescents with autism spectrum disorder in Bangladesh. *Administration and Policy in Mental Health and Mental Health Services Research*, *49*(5), 861-880.

In the second manuscript, we examined professionals' attitudes towards EBP for children and adolescents with ASD, perceived barriers to their usage, and the types of EBPs used. We also explored whether providers' demographic factors were related to attitudes and the adoption of EBPs in Bangladesh. To find out, we conducted a cross sectional survey (Lavrakas, 2008) among professionals from three service settings (public clinical, private clinical, and special school) who provide services for children and adolescents with ASD in the Urban area of Dhaka. A total of 150 professionals participated in the survey. Nine subscales of the Evidence-based Practice Attitude Scale-36 were used to measure professionals' attitudes towards EBP. Further, newly developed items inquired about barriers, the usage of nine types of EBPs, and demographic variables. The present study was approved by the Ethics Committee of Bangladesh Medical Research Council (BMRC), Dhaka, Bangladesh (Ref: BMRC/NREC/2019-2022/386).

Findings indicated that professionals had positive attitudes towards EBP and the usage of EBPs for children with ASD. Their attitudes varied depending on service setting (private clinical, public clinical, and special school) and caseload per year. Professionals in Bangladesh, who were working in private and special school settings, claimed to be more willing to adopt an EBP when required and perceived a higher fit of EBPs and their work. The number of different EBPs used also differed by service setting. Every type of intervention (except medication) was used by more professionals in special schools than in private and public clinical settings. Many professionals reported rather few barriers to the implementation of EBPs, although a considerable number of participants reported limited access to literature and training.

Based on the results, we concluded that professionals have attitudes that are conducive to implementing new EBPs in Bangladesh. We recommended that healthcare providing institutions should be aware of the barriers and facilitators professionals experience within their organization and develop effective plans to overcome them. The findings of this study may also be helpful for the realization of the Bangladesh government's plan (national strategy plan for Neurodevelopmental disorders 2016 to 2021) to improve services and outcomes for children and adolescents with ASD and other neurodevelopmental disorders.

Manuscript 3 (Submitted): Pervin, M., Hansmann, N. M., & Hagmayer, Y. Attitudes towards evidence-based practice and usage of evidence-based practices for children and adolescents with autism spectrum disorder: A comparison of mental health professionals in Bangladesh and Germany. *Journal of Autism and Developmental Disorders.*

In the third manuscript, we examined cross-cultural differences in attitudes towards EBP, in the number and types of EBPs used, and in the relations between demographic variables, attitudes, and EBPs between mental health professionals providing treatment to children and adolescents with ASD in Bangladesh and Germany. For this study, the responses of two-hundred-ninety-two mental health professionals to a cross-sectional survey were analysed (101 in Bangladesh, 191 in Germany). The present study was the first to investigate psychometric properties and internal consistencies of nine subscales of EBPAS-36 in Bangladesh and Germany and to test for measurement invariance across countries. We found no invariance across countries for all nine subscales, but partial scalar measurement invariance across countries for four of them. A comparison of the scores of the four subscales showed that professionals in both countries were equally open to using EBPs, but German practitioners were more likely to use EBPs when they appealed to them. By contrast, Bangladeshi professionals claimed to be more willing to adopt an EBP when required and to be more willing to learn new EBPs to enhance job security. Concerning the number and the types of EBPs, German professionals reported a higher number of different EBPs used than Bangladeshi professionals. Most of the EBPs (e.g. social skill training, cognitive behavioral interventions, behavioral interventions, and parent-mediated interventions as well) were more likely to be used by mental health professionals in Germany than in Bangladesh. We found that caseload and age were related to attitudes and the relation of caseload and attitudes varied between countries.

Our study was the first to compare the attitudes towards EBPs and the usage of different EBPs in a HIC (Germany) and a LMIC (Bangladesh). It was also the first to explore factors that may influence professionals' attitudes towards EBP in both countries in parallel. We concluded that country specific factors need to be investigated before formulating implementation strategies for EBPs as different strategies may be effective. We recommended to conduct further comparative studies to investigate potential factors within and beyond professionals' attitudes to generate a more comprehensive understanding of the factors that drive successful implementations of EBPs. For example, working conditions need to be explored in more detail. We hope that the findings of this study may help generate strategies to support the more widespread implementation of EBPs for ensuring a high quality of mental health services for children and adolescents with ASD.

Chapter 2

Paper 1

Pervin, M., Ahmed, H. U., & Hagmayer, Y. (2022). Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC. *Frontiers in Psychiatry*, *13*.

Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC

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Background: There is a multitude of systematic reviews of interventions for children and adolescents with autism spectrum disorder (ASD). However, most reviews seem to be based on research conducted in High-Income Countries (HIC). Thus, summary findings may not directly apply to Lower Middle-Income Countries (LMIC). Therefore, we conducted a Meta-Review analyzing systematic reviews on the effectiveness of interventions for target outcomes in children and adolescents with ASD to find out whether there are differences in effectiveness between HIC and LMIC and which interventions can be considered evidence-based in LMIC.

Methods: Electronic databases (PsycINFO, PubMed, Cochrane database of systematic reviews) were searched for reviews on interventions for ASD in children and adolescents from January 2011 through December 2021, which included studies not coming from HIC. Systematic reviews with qualitative and quantitative syntheses of findings were included. Two investigators independently assessed studies against predetermined inclusion/exclusion criteria and extracted relevant data including quality and evidence assessments. Evidence for different types of interventions in HIC vs. LMIC was planned to be compared, but none of the reviews assessed potential differences. Therefore, a narrative review of the studies from LMIC was conducted including an assessment of quality and evidence.

Results: Thirty-five reviews fulfilled the inclusion criteria. Eleven considered findings from HIC and LMIC. Sixty-nine percent included studies with various research designs; 63% provided a qualitative synthesis of findings; 77% percent assessed the quality of studies; 43% systematically assessed the level of evidence across studies. No review compared evidence from HIC and LMIC. A review of the studies from LMIC found some promising results, but the evidence was not sufficient due to a small number of studies, sometimes poor quality, and small sample sizes.

Conclusion: Systematic reviews on interventions for children and adolescents with ASD did not look for potential differences in the effectiveness of interventions in HIC and LMIC. Overall, there is very little evidence from LMIC. None of the interventions can be considered evidence-based in LMIC. Hence, additional research and mutually agreed methodological standards are needed to provide a more secure basis for evidence-based treatments in LMIC trying to establish evidence-based practices.

Introduction

Autism Spectrum Disorder (ASD) is characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, in non-verbal communicative behaviors, and in skills required for developing, maintaining, and understanding relationships. In addition, restricted, repetitive patterns of behavior, interests, or activities have to be present for a diagnosis (1). Symptoms emerge during the first 3 years of life (2, 3). The symptoms of ASD vary in severity and may present differently in children with a mixture of cognitive abilities (4). The extreme variability of behavioral and communicative problems and coexisting conditions make it difficult for mental health professionals and non-specialists to identify ASD as early as possible (5, 6), although respective diagnostic tools exist for children as young as 18 months. The American Academy of Pediatrics (AAP), for example, recommends standardized screening for ASD at 18 and 24 months of age with ongoing developmental surveillance in primary care.

Worldwide, there is an increasing number of children, who meet the diagnostic criteria for ASD (7, 8). The estimated number of cases is 52 million worldwide, which means that 1–2% of children are affected (9–12). The prevalence rate for children was one in 44 in the U.S, based on a sample of 8-year-old children (13) and one in 100 in the UK (14). In Europe (Germany, Poland, France, Belgium, Denmark, Iceland, Sweden, Ireland), China, and North America the reported prevalence of ASD is close to 1.5%, but varies considerably between regions and populations (11, 15–22). The majority of the epidemiological studies were conducted in HIC. According to the World Bank (23), HIC are defined as countries with an average income of more than 12,353 U.S. dollars per year, upper middle-income countries (UMIC) by an average income between 4,046 and 12,535 dollars, and LMIC by an average income between 1,036 and 4,045 dollars per year. The prevalence rate in LMIC is rather uncertain due to a lack of research (24). A systematic review on the prevalence of ASD in Asia revealed

that it was around 1.9/10,000 before 1980 and 14.8/10,000 from 1980 to 2008 (25). For South Asia, a systematic review estimated the prevalence as 0.09% in India, 1.07% in Sri Lanka, and 3% in Bangladesh (26).

ASD is considered an emerging public health issue by the World Health Organization (27). Still, research, public awareness, and mental health services are mostly concentrated in HIC. In these countries, large efforts have been made to bridge the gap between evidence and practice. By contrast, a large gap exists in LMIC due to a lack of public awareness, professional knowledge, and well-conducted scientific studies (28). International studies found that 75–85% of individuals with mental disorders including autism do not receive particular treatment services in LMIC (29), which prevents children from realizing a healthy life (30). Major barriers to increasing services for childhood mental disorders in these countries include financial constraints, absence of government initiatives, inadequately trained healthcare professionals, and an overcentralized health system (31–37). In addition, there might be limited knowledge about effective evidence-based treatments and a lack of competencies required for their implementation (38).

Many different types of treatments for children and adolescents with ASD have been developed and investigated [cf. (39)]. With respect to cognitive and/or behavioral interventions, it is important to delineate comprehensive treatment models and focused interventions. Comprehensive treatment models (CTM) are conceptually organized sets of practices, which address the core deficits of ASD over a lengthy period of time (e.g., 1–2 years). Multiple developmental domains (e.g., social communication, daily living skills, and repetitive behaviors) are targeted by using multiple interventions (e.g., The UCLA Young Autism Program by Lovaas (40), the TEACCH program developed by Lord and Schopler (41), the LEAP model, the Early Start Denver model). Many comprehensive programs aim at young children, which underlines the importance of an early diagnosis. By contrast, focused interventions are a set of individual instructional strategies that are designed to address a

specific behavioral or developmental problem, for instance, joint attention or repetitive behaviors. Further examples are social skills training or visual support in academic instruction.

A special sub-group of treatments is psychosocial interventions delivered by non-specialists (parents or caregivers, peers, and teachers). In many LMIC, interventions for children and adolescents with ASD have to be delivered by these non-specialists due to a lack of other resources. Therefore, we considered these treatments separately, although the interventions themselves overlap with focussed interventions. In community settings, these interventions have been found to produce benefits in development, social-communication skills, daily living skills, comprehension or academic performance, behavior, or family outcomes (42, 43).

In recent years, technological devices have been used more often to deliver treatments, train, and support health care professionals as well as parents. Technology-based interventions make use of a broad range of devices such as speech-generating devices or robots, and software applications like computer-assisted instructional programs, or mobile- and tablet-based applications (44–47). Educational computer games (e.g., EmotionTrainer, FaceMaze, FaceSay, Squizzy, TeachTown) were designed for enhancing a broader set of skills, including social, emotional, as well as cognitive, and academic skills (48–53). As technological devices and software programs require substantial financial resources to acquire and maintain them, we decided to treat respective treatments as a separate sub-group to provide respective information for readers coming from LMIC.

In addition to cognitive and behaviorally oriented treatments, medical and alternative treatments have been developed and tested (47, 54). The use of medical treatments to address behavioral problems in children and youth with ASD has increased significantly since the publication of the AAP's clinical report in 2007 [cf. (55, 56)]. The U.S. Food and Drug Administration (FDA) has approved the use of some antipsychotic drugs, such as aripiprazole and risperidone, for the treatment of irritability/ aggression and repetitive behaviors in children and youth with ASD.

Complementary and alternative medicine (CAM) treatments refer to a broad set of health care practices that are not part of that country's own tradition and are not integrated into the dominant health care system (57). These encompass diets (e.g., gluten-free diet, ketogenic diet), nutritional supplements (e.g., omega 3 fatty acids, vitamins, melatonin), traditional alternative medicine (e.g., acupuncture), exercise (e.g., yoga), body therapies (e.g., massage, touch therapy). CAM treatments are frequently used to treat behavioral problems (e.g., aggression, irritability, hyperactivity). Some interventions classified as CAM were found to be ineffective, some potentially harmful (58, 59).

The research on the effectiveness of the different types of treatments looked at various outcomes, including language development, interpersonal skills, behavior, and academic achievement. Systematic reviews often summarize the findings for a specific type of treatment and/or for a specific type of outcome. Very few try to collate the evidence across all types of treatments [see (47, 54, 60), for exceptions]. Based on the findings, some treatments have been identified as evidence-based practices, that is, as treatments for which sufficient evidence is available that they are beneficial for the outcome under investigation. The latest review of the National Standards Project (NSP) and the National Professional Development Center (NPDC) identified 27 evidence-based practices (61, 62).

Research has shown that clinical features of ASD present the same in HIC and LMIC (63–65). However, the significant contextual differences between HIC and LMIC may result in very different consequences (66). HIC provide treatment facilities and comprehensive care for children and adolescents with ASD. A rather large number of mental health professionals with a specific focus on developmental disorders (psychiatrists as well as clinical psychologists) are available. The awareness of ASD is generally high. The situation in LMIC is rather different. In many aspects, it is quite the opposite. In most LMIC, there are very few trained professionals, who have expertise with respect to ASD-related interventions. In addition to insufficient training, there are financial constraints and limited resources within health care systems, which are much less elaborated than in HIC (33, 36, 37). Finally, there are substantial cultural differences and medical traditions in LMIC than in the mostly Western HIC. Therefore, interventions designed and tested in HIC may turn out to be less applicable and less effective in LMIC (43, 67–71). Hence, it is important to look for potential differences.

In the past two decades, many reviews (systematic and unsystematic) on treatments for children and adolescents with ASD and other developmental disorders have been published. Most of these come from researchers in HIC, although ∼95% of individuals with ASD do not live in these countries (64, 72, 73). There are very few reviews that come from and focus on evidence from LMIC, although some studies have been conducted (see Table 2 for on overview). Hence, there is a need for conducting a systematic review of reviews to summarize and compare the results from HIC and/or LMIC. This is the aim of the present meta-review. It provides an overview of the existing systematic reviews published from the beginning of 2011 up to the end of 2021, analyzes potential differences in findings from HIC and LMIC, summarizes the effectiveness of the different types of interventions, and describes the quality and findings of the studies coming from LMIC.

The following research questions were addressed:

- Do systematic reviews of treatments for children and adolescents with ASD consider research findings from LMIC?
- Are there differences in the effectiveness of interventions in HIC and LMIC?

- Which types of treatments can be considered evidence-based in LMIC?

Methods

Search strategy

A systematic review of reviews was carried out in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines [PRISMA, (74)]. Eligible review articles were obtained by searching three electronic databases: PsycINFO, PubMed and Cochrane Database of Systematic Reviews. The research team developed a series of search terms appropriate for each database using medical subject headings (MeSH). These terms included "Review" OR "Review as literature" AND "Autism" OR "Autism spectrum disorders" AND "Evidence based practice" OR "Evidence based treatment" OR "Treatment program" OR "Interventions" AND "High-income countries" OR "Lower middle-income countries." A manual search of the reference lists of all included reviews was conducted to identify additional reviews.

Eligibility criteria

Criteria for inclusion were defined in advance. To be included, the review had to be systematic (i.e., a clear objective and research questions had to be specified and the methodology including a search and data extraction strategy had to be described in enough detail to be replicable). Reviews had to be published between January 2011 and December 2021 in English. The population had to be children and adolescents (up to 18 years of age) diagnosed with ASD. There were no restrictions with respect to treatment, treatment setting, or outcome. Reviews had to include studies coming not only from HIC. Following the classification of countries from the World Bank, this includes studies from LMIC and UMIC, although we were interested in LMIC. Note that we decided to be overinclusive at this point to provide a good overview on how research not coming from HIC is taken into account in systematic reviews. Reviews with a qualitative and/or quantitative synthesis of findings were included. Reviews not meeting these inclusion criteria were excluded.

Study selection

The first author screened all review papers, initially on the basis of title and abstract to identify potentially eligible reviews. All titles and abstracts were screened independently by the third author. Following this, full articles were assessed independently by the first author and third author with respect to the

inclusion criterion. Initial agreement was 92%. Disagreements were resolved through discussion. Reviews not meeting the inclusion criteria were excluded. The flow of studies is presented in the respective PRISMA diagram shown in Figure 1.

Data extraction and management

Data were extracted from all eligible reviews and tabulated by the first reviewer using a set of data extraction forms, which were developed for the present meta-review. The following information were collected: name of the first author, year of publication, age group, countries of included studies [HIC, LMIC, or UMIC, as defined by the (23)], number of included studies, study designs, data synthesis method, quality assessment method for individual studies, method for evidence rating across studies, types of treatments, types of outcomes, evidence for each type of treatment according to the authors of the review. Treatments and outcomes were classified following the categories proposed by the National Autism Center (61, 62, 75). To provide a better overview, we organized treatments into the seven major groups outlined in the introduction: Comprehensive treatment programs (e.g., Early Start Denver Model, UCLA/Lovaas-based interventions), Focused interventions (e.g., social skill training), Treatments delivered by non-specialists (e.g., parent-mediated interventions), Technology-assisted interventions (e.g., video modeling), Medical treatments (e.g., risperidone), Complementary and Alternative Medicine (e.g., acupuncture), and Other (e.g., weighted vests). We selected these groups of treatments, as they might be most informative for LMIC. With respect to outcomes, we differentiated between communication and language skills, social behavior, joint attention, play, cognitive/intellectual functioning, academic performance/comprehension skills, restricted/repetitive/stereotyped behavior, challenging/problematic behaviors/irritability, hyperactivity, adaptive behavior, emotion regulation, ASD symptoms, daily living skills, sensory-motor skills, and others, respectively. Adverse effects were reported for medical as well as CAM treatments.

Narrative summary of individual studies from LMIC

It turned out that none of the reviews addressed potential differences between HIC and LMIC even when studies from both classes of countries were considered. Therefore, we further analyzed the studies coming from LMIC, which were included in the reviews to find out which types of interventions are effective in LMIC and can be considered evidence-based. All empirical studies investigating outcomes of children and adolescents were analyzed in detail. Information on study

FIGURE 1
PRISMA flow diagram [modified from Moher et al. (74)].
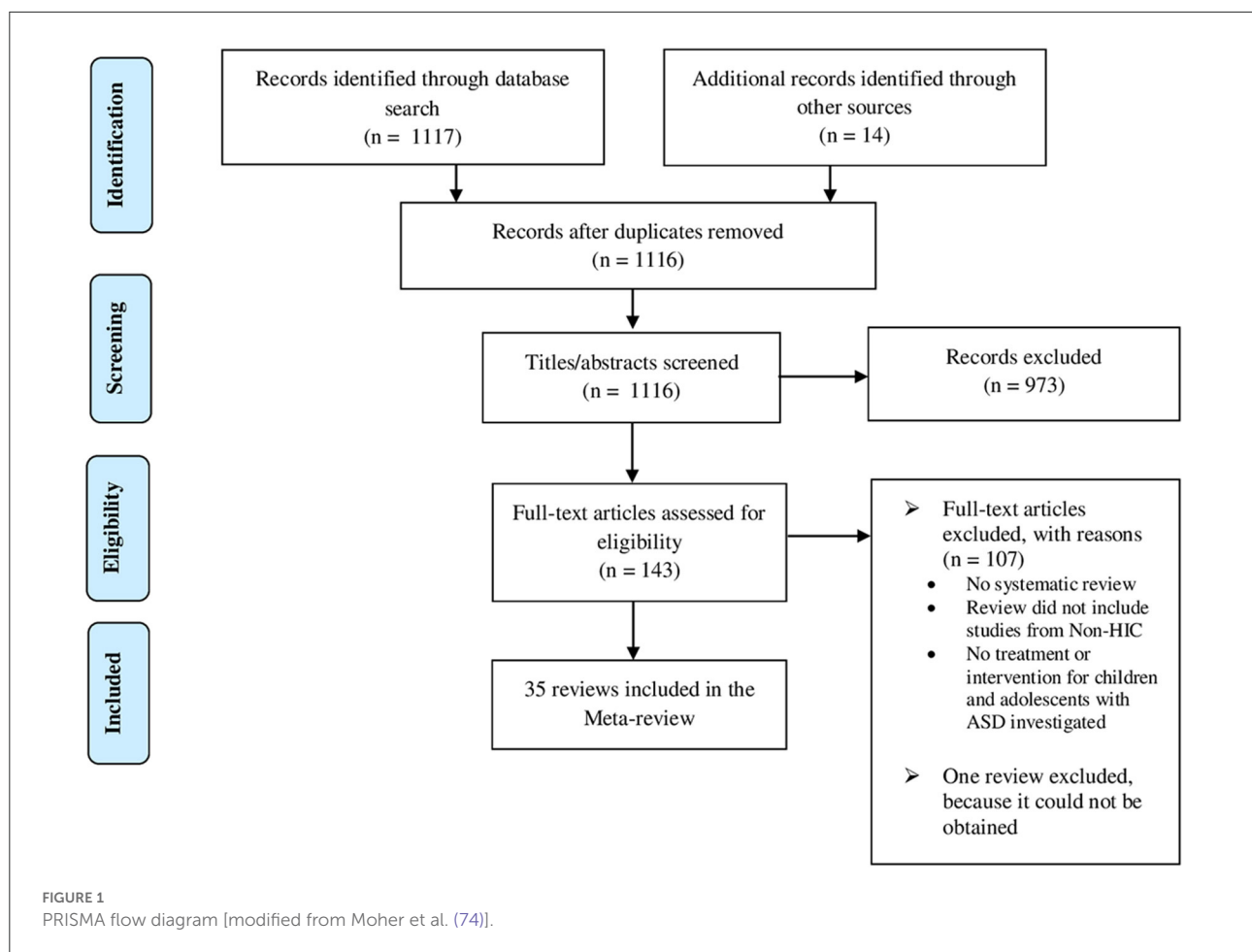
design, number of participants, interventions investigated, and major findings were extracted. Findings were summarized in a qualitative way because research designs varied widely. In addition, the quality of the studies and evidence across studies was assessed. We used the What Works Clearinghouse standards (version 4.1, https://ies.ed.gov/ncee/wwc/Resources/ResourcesForReviewers) (76), as they are applicable to group-based and single-subject designs. Data extraction and rating of studies were performed by the first and last author independently. Initial agreement was 93 and 92%, respectively (see Table 2).

Results

Review selection

Electronic database search identified a total of 1,117 review papers. Fourteen additional reviews were found by manually searching reference lists. From a total of 1,131 review papers, 15 duplicate reviews were removed. One thousand one hundred sixteen review papers were assessed for eligibility, 973 of which

were excluded based on abstract and title. The full text of the remaining 143 reviews was examined against the inclusion criteria. One hundred seven reviews were excluded because they failed to meet inclusion criteria, 46 reviews because they considered only studies from HIC. One review was not considered, because it could not be obtained (77). Finally, 35 reviews were included in the current meta-review (see Figure 1).

Description of reviews

An overview of included reviews can be found in Table 1. Eight out of 35 reviews considered findings from HIC, UMIC, and LMIC, 21 from HIC and UMIC, three from HIC and LMIC, and three only from LMIC. Considering also the 46 reviews, which only included studies from HIC but met all other inclusion criteria (see Online Appendix for full list), this means that 32 of 81 reviews (40%) included research from HIC and other countries.

Reviews included between 6 and 85 different studies (M = 21.3, SD = 14.1). Reviews included either none or only very few studies from LMIC. Across all reviews, only 29 studies from

TABLE 1 Overview of systematic reviews including studies from high-income countries (HIC), lower middle-income countries (LMIC), and upper middle-income countries (UMIC).

References	Year	Abbre-viated title	Age group				Countries of studies			Studies			Synthesis method		Systematic assessment of quality and/or evidence	
			Under 3 years	Pre-school (up to 6/7)	Up to 12	Adoles-cents 13-18	HIC	UMIC	LMIC	Total number	Single case studies	RCT	Quali-tative	Quanti-tative	Quality or evidence of individual studies	Evidence across studies
Ameis et al. (78)	2018	Management of core and psychiatric symptoms	✓	✓	✓	✓	✓	✓ (Brazil, Iran)	✓ (India, Pakistan)	44	0	40	✓	✓	Cochrane's risk of bias tool (79)	Review specific
Bond et al. (80)	2016	Educational interventions	✓	✓	✓	✓	✓	✓ (South Africa)		85	54	30	✓		(81, 82)	Review specific [based on Wong et al. (47)]
Cheuk et al. (83)	2011	Acupuncture	✓	✓	✓	✓	✓	✓ (China)	✓ (Egypt)	10	0	10		✓	Cochrane's risk of bias tool (79)	No
Dababnah et al. (67)	2018	Autism interventions in India	✓	✓	✓	✓			✓ (India)	13	3	1	✓		No	No
Dawson-Squibb et al. (84)	2020	Parent education and training	✓	✓	✓	✓	✓	✓ (China, Turkey, Iran, Jordan)	✓ (India, Bangladesh, Tanzania)	37	0	5	✓		Mixed methods appraisal tool (85)	No
Dean and Chang (86)	2021	School-based social skills interventions	✓	✓	✓	✓	✓	✓ (China)		18	7	10	✓		(81, 87, 88)	No
Deb et al. (89)	2020	Parent training for Children with ASD	✓	✓	✓		✓	✓ (Thailand)		17	0	15	✓	✓	Cochrane's risk of bias tool (90)	No
Dijkstra-de Neijs et al. (91)	2021	Play-based interventions	✓	✓	✓		✓	✓ (Iran)		32	0	32	✓	✓	Cochrane's risk of bias tool (92)	No
Ferguson et al. (93)	2019	Telehealth with behavior analytic interventions	✓	✓	✓	✓	✓		✓ (Georgia)	28	18	4	✓		(81)	(81, 82)
Geretsegger et al. (94)	2016	Music therapy	✓	✓	✓		✓	✓ (Brazil)		10	0	10		✓	Cochrane's risk of bias tool (79)	GRADE system (95)
Harrop (96)	2015	Parent-mediated interventions	✓	✓			✓	✓ (Thailand)		29	2	19	✓		(81)	No
Koly et al. (97)	2021	Parent-mediated intervention programs	✓	✓	✓	✓			✓ (South Asian countries)	9	0	5	✓		The Kmet appraisal checklist (98)	No
Lee et al. (99)	2016	Movement-based interventions	✓	✓	✓	✓	✓	✓ (Iran)		14	9	5	✓		Mixed methods appraisal Tool (100)	No
Lee and Meadan (101)	2020	Parent-mediated interventions	✓	✓	✓	✓	✓	✓ (Albania, Brazil, China, Jordan, Macedonia)	✓ (India, Pakistan, Nigeria, Tanzania)	12	1	1	✓		No	No
Liu et al. (69)	2020	Parent-mediated interventions	✓	✓	✓	✓	✓	✓ (China)		21	0	16	✓	✓	Cochrane's risk of bias tool (90). QualSyst (98)	GRADE system (102)
Logan et al. (103)	2016	Augmentative and alternative communication interventions to increase communication		✓	✓	✓	✓	✓ (South Africa)		30	24	0	✓		Review specific [based on (104, 105)]	No
Mazon et al. (106)	2019	Technology-based interventions	✓	✓	✓	✓	✓	✓ (Brazil, Thailand, Romania)		31	0	13	✓	✓	(107)	No
McPheeters et al. (108)	2011	Medical treatments	✓	✓	✓		✓	✓ (Iran)		18	0	10	✓		Review specific	AHQR standards (109)
Mercer (110)	2017	DIR/Floortime^{TM}	✓	✓	✓		✓	✓ (Thailand)	✓ (India)	10	1	5	✓		No	No
Naveed et al. (111)	2019	Non-specialist mediated interventions	✓	✓	✓	✓	✓		✓ (India, Pakistan)	24	0	24		✓	Cochrane's Risk of Bias Tool (79)	GRADE system (112)

(Continued)

TABLE 1 Continued

References	Year	Abbreviated title	Age group				Countries of studies			Studies			Synthesis method		Systematic assessment of quality and/or evidence	
			Under 3 years	Pre-school (up to 6/7)	Up to 12	Adoles-cents 13-18	HIC	UMIC	LMIC	Total number	Single case studies	RCT	Quali-tative	Quanti-tative	Quality or evidence of individual studies	Evidence across studies
Ona et al. (113)	2020	Pivotal response treatment	✓	✓	✓	✓	✓	✓ (Iran)		7	0	7	✓	✓	Cochrane's risk of bias tool (114)	GRADE system, (115, 116)
Oono et al. (117)	2013	Parent-mediated early interventions	✓	✓			✓	✓ (Thailand)		17	0	17		✓	Cochrane's risk of bias tool (79)	GRADE system (118)
Patra and Kar (119)	2020	Autism spectrum disorder in India	✓	✓	✓	✓			✓ (India)	26	4	3	✓		No	No
Pi et al. (120)	2021	Technology-assisted parent-mediated interventions	✓	✓	✓		✓	✓ (Macedonia)		16	0	16	✓	✓	(81, 82)	GRADE system
Piwowarczyk et al. (121)	2017	Gluten- and casein-free diet	✓	✓	✓	✓	✓		✓ (Indonesia)	6	0	6		✓	Cochrane's risk of bias tool (122)	No
Sathe et al. (123)	2017	Nutritional and dietary interventions	✓	✓	✓		✓	✓ (Iran)	✓ (Egypt, Indonesia)	22	0	19	✓		(124)	Review specific (based on AHQR, 2014)
Siegel and Beaulieu (125)	2012	Psychotropic medications	✓	✓	✓	✓	✓	✓ (Iran)		33	0	33	✓		(81)	(81)
Smith and Iadarola (126)	2015	Psychological and behavioral interventions	✓	✓			✓	✓ (Thailand)		29	0	23	✓	✓	JCCAP criteria (127)	JCCAP criteria (127)
Spector (128)	2011	Sight word instruction		✓	✓	✓	✓	✓ (Turkey)		9	9	0	✓		(81)	(81)
Sullivan and Wang (129)	2020	Autism spectrum disorder interventions	✓	✓	✓	✓		✓ (China)		33	14	9	✓		No	No
Syriopoulou-Delli and Gkiolnta (130)	2020	Assistive technology		✓	✓	✓	✓	✓ (Malaysia, Romania)		13	1	1	✓		No	No
Tan et al. (131)	2021	Probiotics, prebiotics, synbiotics, and fecal microbiota transplantation		✓	✓	✓	✓	✓ (China, Thailand)	✓ (Egypt)	13	0	7	✓		Cochrane's risk of bias tool (132)	No
Tseng et al. (133)	2020	Social cognitive interventions				✓	✓	✓ (China)	✓ (Kenya)	18	0	18	✓		No	No
Vetter (134)	2018	Parent-child interaction therapy	✓	✓	✓		✓	✓ (Iran)		9	2	0	✓		No	No
Weitlauf et al. (124)	2017	Interventions targeting sensory challenges	✓	✓	✓		✓	✓ (Brazil, Iran, Thailand Turkey)		24	0	20	✓		Review specific	Review specific [based on (135)]

LMIC investigating children's and adolescents' outcomes could be identified (see Table 2).

Only randomized control trials (RCTs) were considered in 10 reviews, one considered only single case studies, the remaining included studies with various research designs. To integrate the findings, 22 (63%) provided only a qualitative synthesis, 5 (14%) only a quantitative synthesis, and 8 (23%) reported both. None of the reviews analyzed potential differences in the effectiveness of treatments for different classes of countries. This is also true for the eleven reviews, which included studies from HIC and LMIC.

Twenty-seven reviews (77%) assessed the quality or evidence provided by each individual study using a specific methodology. These methodologies varied considerably between studies. Most often Cochrane's risk of bias tool (79, 164) and the criteria proposed by Reichow et al. (81) were used. Fifteen (43%) assessed the evidence for types of treatments across studies using a specific methodology. Again, methodologies varied substantially. The Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) system (95, 112) and the criteria by Reichow et al. (81) were most frequently utilized.

Evidence for different types of treatment

Although most of the thirty-five reviews focused on a particular topic [e.g., parent-mediated early interventions, (117), see Table 1], many of the thirty-five reviews addressed more than one type of treatment according to our classification [e.g., comprehensive treatment programs, focused interventions, and parent-mediated interventions in the case of (117)]. Six reviews including 36 studies (two from LMIC) addressed comprehensive treatment programs; 14 reviews including 191 studies (five from LMIC) addressed various focused interventions; 15 reviews including 203 studies (eight from LMIC) addressed non-specialist mediated interventions; 15 reviews including 171 studies (five from LMIC) technology-assisted interventions, four reviews including 65 studies (two from LMIC) medical interventions, and 11 reviews including 67 studies (seven from LMIC) complementary and alternative medicine interventions. Hence the percentage of studies from LMIC ranged from 2.6% for focused interventions to 10% for complementary and alternative medicine. In the individual reviews only very few studies came from LMIC (0–4). This was true even for the three reviews that focused on research from LMIC (67, 97, 119). Many of the cited studies in these reviews did not investigate the ASD-related outcomes for children or adolescents.

The following sections first briefly describe which types of treatments are judged evidence-based in systematic reviews which only consider research from HIC (see Online Appendix for more detailed information on these reviews and their findings). Second, the results of the individual studies from LMIC for the respective type of treatment are summarized and their quality as well as the quality of the evidence is evaluated. Details on the studies can be found in Table 2.

Comprehensive treatment programs

As described above, comprehensive treatment programs integrate various types of interventions (i.e., applied behavior analysis, early intensive behavioral interventions, the UCLA young autism program by Lovaas and colleagues, ESDM, ToM, LEAP, TEACCH as well) over a prolonged period and are usually designed for preschoolers. The specific interventions differ between programs (60, 165).

There was consensus across reviews from HIC that comprehensive Applied Behavior Analysis (ABA) programs are evidence-based (126, 166, 167) as are Lovaas-based programs [UCLA Early Autism Project; (167, 168)].

With respect to LMIC, one single case study from India was cited in the reviews (136). It reported a positive effect of a comprehensive program on ASD symptoms and theory of mind. Another study investigated DEALL (Developmental Eclectic Approach to Language Learning), an indigenous early intervention program for children with autism, using an uncontrolled pre-post group design (137). Significant improvements in social-communication skills, motor skills, adaptive behaviors, language, and reduced behavioral problems were found.

The quality of the studies was low. The single case study did not meet the standards due to the absence of an experimental manipulation of the independent variable (136). The other study (137) did not meet the standards for group designs due to missing controls (see Table 2).

Focused interventions

Overall, focused interventions addressing social behavior (e.g., social skill training, play-based interventions, social stories) were considered established evidence-based treatments [(80, 91, 111, 169, 170); see also (171–173)]. The same was true for educational interventions aiming to improve academic performance by discrete skills teaching, response prompting strategies, and self-determination instructions (80, 169, 174). In addition, reviews judged joint attention-based interventions as evidence-based (80, 111, 167, 175).

Regarding LMIC, two reviews (67, 119) summarized studies from India on various focused interventions. One uncontrolled study investigated a vocabulary language program and reported significant improvement in language and social-communication skills at posttest (139). One single case study reported a positive effect of PECS on communication and repetitive behaviors while another single case study found that social stories reduced

TABLE 2 Studies from LMIC included in systematic reviews from 2011 to 2021 investigating the effectiveness of treatments.

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Intervention	Control if applicable	Primary outcome	Major findings	Group-designs						Single case designs							Overall quality rating
											Quality assessment / Randomized assignment	Acceptable attrition	Baseline equilvalence	Eligible outcome	No confounding	Data available	Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	
Comprehensive treatment programs	Gupta (136)	2015	5	India	Single case	1	Program based on theory of mind		Social behavior, ASD symptoms	Improved theory of mind and ASD symptoms						Yes	No	No	NA	Yes	Yes	Yes	Does not meet standards
Comprehensive treatment programs	Karanth et al. (137)	2010	2–6	India	Uncontrolled group design (pre vs. post)	30	Program based on ABA: "Communication DEALL"		Social-communication skills, adaptive skills, problematic behavior	Significantly improved communication skills, undesirable behavior reduced post intervention	No	Yes	NA	Yes	No								Does not meet standards
Focused interventions	Banerjee and Ray (138)*	2013	4–14	India	Controlled group design	20	Play therapy plus other regular management program	Other regular management program	Communication, problematic behavior, cognition, social behavior	According to abstract: improvements in communication and social skills given play therapy													
Focused interventions	Lal (139)	2010	9–12	India	Uncontrolled group design (pre vs. post)	8	Alternative and augment. Communication program		Communication and language skills, social behavior	Significantly improved language and communication skills, improved social behavior	No	Yes	NA	Yes	No								Does not meet standards
Focused interventions	Lal and Chhabria (140)	2013	3–6	India	RCT	26	Floor time intervention based on DIR model	Usual early intervention	Social behavior	Significant improvement of the treatment group, treatment group superior to control group at post test	Yes	Yes	Yes	Yes	Yes								Meets standards without reservations
Focused interventions	Malhotra et al. (141)	2010	7	India	Single case	1	Picture exchange communication system (PECS)		Communication and language skills	Improvements in communication skills and repetitive behavior						No	No	No	NA	Un-clear	Yes	Un-clear	Does not meet standards

(Continued)

TABLE 2 Continued

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Intervention	Control if applicable	Primary outcome	Major findings	Quality assessment	Randomized assignment	Acceptable attrition	Baseline equivalence	Eligible outcome	No confounding	Data available	Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	Overall quality rating
																	(Group-designs)	(Single case designs)						
Focused interventions	Rai et al. (142)	2015	9	India	Single case	1	Social stories		Problematic behavior	Improvement of undesirable behavior							Yes	No	No	No	Yes	Yes	Yes	Does not meet standards
Non-specialist mediated interventions	Bello-Mojeed et al. (143)	2016	3–17	Nigeria	Uncontrolled group design (Pre vs. Post)	20	Parent mediated behavioral intervention		Problematic behavior	Significantly reduced aggressive and self-injurious behaviors		No	Yes	NA	Yes	No								Does not meet standards
Non-specialist mediated interventions	Divan et al. (144)	2019	2–7	India	RCT	40	Community health-workers mediated intervention	Usual care	Autism symptom severity, Dyadic social communication, Adaptive behavior	Significantly improved autism severity scores and dyadic social communication skills with large effect size		Yes	Yes	Yes	Yes	Yes								Meets standards without reservations
Non-specialist mediated interventions	Juneja et al. (145)	2012	1.5–6	India	Uncontrolled group design (Pre vs. Post)	16	Individualized parent mediated behavioral intervention		ASD symptoms	Significant improvements in ASD symptom severity, social and language skills		No	Un-clear	NA	Yes	No								Does not meet standards
Non-specialist mediated interventions	Krishnan et al. (146)	2016	4	India	Uncontrolled group design (Pre vs. Post)	77	Parent-mediated multi-component, early intervention		Sensory, motor, and adaptive skills	Significant improvement of developmental age, motor skills, and cognitive performance		No	Un-clear	NA	Yes	Un-clear								Does not meet standards
Non-specialist mediated interventions	Louis and Kumar (147)	2015	2.5–5	India	RCT	30	Home-based program with additional training for fathers	Home-based program	Language, adaptive skills, and problematic behaviors	Significant improvement in social-communication skills, adaptive behaviors, and repetitive behaviors		Yes	Un-clear	Yes	Yes	Yes								Meets standards with reservations

(Continued)

TABLE 2 Continued

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Intervention	Control if applicable	Primary outcome	Major findings	Quality assessment	Group-designs: Randomized assignment	Acceptable attrition	Baseline equivalence	Eligible outcome	No confounding	Data available	Single case designs: Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	Overall quality rating
Non-specialist mediated interventions	Manohar et al. (148)	2019	2–6	India	RCT	50	Brief parent-mediated intervention	Treatment as usual	Joint attention, imitation, social and adaptive skills	Significant improvement in autism severity, joint attention, dyadic interaction, language and communication skills, adaptive and intellectual functions		Yes	Yes	Yes	Yes	Yes								Meets standards without reservations
Non-specialist mediated interventions	Nair et al. (149)	2014	2–6	India	Uncontrolled group design (Pre vs. Post)	52	Low-intensity, parent-mediated early intervention		ASD symptoms, social behavior, communication and language skills	Significant improvements in ASD symptom severity, social and language skills		No	Un-clear	NA	Yes	No								Does not meet standards
Non-specialist mediated interventions	Rahman et al. (71)	2016	2–9	India and Pakistan	RCT single blind	65	Parent-mediated intervention for ASD in South Asia (PASS) + treatment as usual	Treatment as usual	Parent child interaction	Significantly better parent-child interaction after PASS with large effect size, no differences with respect to problematic behavior and communication skills		Yes	Yes	Yes	Yes	Yes								Meets standards without reservations
Technology assisted interventions	Barkaia et al. (150)	2017	4–6	Georgia	Single-case experiment design: multiple baseline	3	Telehealth coaching of therapists		Communi-cation and language skills	Some effects on language in all three children								Yes	Yes	Yes	NA	Yes	Yes	Yes	Meets standards without reservations

(Continued)

TABLE 2 Continued

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Intervention	Control if applicable	Primary outcome	Major findings	Quality assessment	Randomized assignment	Acceptable attrition	Baseline equivalence	Eligible outcome	No confounding	Data available	Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	Overall quality rating
Technology assisted interventions	Lahiri et al. (151)	2015	13–18	India	Single case	8	Virtual reality technology (computer assisted)		Social-communication skills	Improvements in socio-communication skills and language in individuals with ASD								Yes	No	No	No	Yes	Yes	Yes	Does not meet standards
Technology assisted interventions	Lal and Bali (152)*	2007	5–10	India	Controlled trial	30	Visual strategy training	unclear	Communication and language skills	According to abstract: improvements in communication skills														
Technology assisted interventions	Padmanabha et al. (153)	2019	3–12	India	RCT	40	Home-based sensory interventions+ speech therapy and ABA	Speech therapy and ABA	Sensory skills	Significant reduction in sensory abnormalities and improvement in overall wellbeing and health-related quality of life		Yes	Yes	Yes	Yes	Yes								Meets standards without reservations
Technology assisted interventions	Paul et al. (154)	2015	3–4	India	Single case design: alternating treatment	3	Music-based intervention		Social-communication skills	Sung instructions were more effective for improving socio-communicative responsiveness than spoken language								Yes	Yes	Yes	NA	Yes	Yes	Yes	Meets standards without reservations
Medical treatments	Nagaraj et al. (155)	2006	2–9	India	RCT double blind	40	Risperidone	Placebo	Problematic behaviors	Significant reductions in problematic behaviors given risperidone, improvement in social-communication skills, weight gain, and increased sedation		Yes	Yes	Yes	Yes	Yes								Meets standards without reservations

(Continued)

TABLE 2 Continued

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Inter-vention	Control if applicable	Primary outcome	Major findings	Quality assessment	Group-designs						Single case designs						Overall quality rating
											Quality assessment	Randomized assignment	Acceptable attrition	Baseline equivalence	Eligible outcome	No confounding	Data available	Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	
Medical treatments	Desousa (156)	2010	5–16	India	Controlled group design	40	Risperidone	Fluoxetine	Problematic behaviors	Improvement in irritability and hyperactivity given risperidone, improvement of speech and stereotypy behavior given fluoxetine	No	Un-clear	Yes	Yes	No									Does not meet standards
Complemen-tary and alternative medicine	Allam et al. (157)	2008	4–7	Egypt	RCT single blind	20	Scalp acupuncture plus language therapy	Language therapy alone	Communication and language skills	Significant improvement in some aspects in both groups, more improvement in attention and receptive semantics given additional acupuncture	Yes	Yes	Yes	Yes	Yes									Meets standards without reservations
Complemen-tary and alternative medicine	Fahmy et al. (158)	2013	2.5–8.5	Egypt	RCT double blind	30	L-Carnitine	Placebo	ASD symptoms	Significantly stronger improvement given L-Carnitine therapy (but less severe symptoms in Placebo-group at baseline)	Yes	Yes	No	Yes	Yes									Meets standards without reservations
Complemen-tary and alternative medicine	Narasingharao et al. (159)	2017	5–16	India	Controlled trial	64	Yoga	School curriculum	Sleep, gastro-intestinal, behavior problems	Improvement in all three areas in yoga group but not in control group	No	Yes	Yes	Yes	Un-clear									Does not meet standards
Complemen-tary and alternative medicine	Pusponegoro et al. (160)	2015	4–7	Indonesia	RCT double blind	74	Diet with gluten and casein supplement	Diet without supplement	Problematic behaviors	Significant decrease of maladaptive behavior in both groups. No difference between groups.	Yes	Yes	Yes	Yes	Yes									Meets standards without reservations

(Continued)

TABLE 2 Continued

Type of treatment	References	Year	Age group (Years)	Country	Study design	N	Intervention	Control if applicable	Primary outcome	Major findings	Quality assessment	Group-designs						Single case designs						Overall quality rating
											Quality assessment	Randomized assignment	Acceptable attrition	Baseline equivalence	Eligible outcome	No confounding	Data available	Experimental manipulation independent variable	Interassessor agreement	No residual treatment effects	Enough data points	Eligible outcome	No confounding	
Complementary and alternative medicine	Radhakrishna (161)	2010	8–14	India	Single case	6	Yoga		Imitation skills	Improvement in children's non-verbal communication skills, cognitive skills, and social behavior							No	No	No	NA	Un-clear	Yes	Un-clear	Does not meet standards
Complementary and alternative medicine	Saad et al. (162)	2015	3–9	Egypt	RCT double blind	101	Digestive enzymes	Placebo	ASD symptoms	Significantly better improvement in emotional response, ASD symptoms, and behavior given digestive enzyme treatment	Yes	Yes	Yes	Yes	Yes									Meets standards without reservations
Complementary and alternative medicine	Shaaban et al. (163)	2018	5–9	Egypt	Uncontrolled group design (Pre vs. Post)	30	Probiotics		ASD symptoms and gastrointestinal symptoms	Significant improvements in the severity of ASD and gastrointestinal symptoms	No	No	NA	Yes	No									Does not meet standards

*Only abstract could be obtained.

problematic behavior (141, 142). One RCT (140) found that a Developmental, Individual-Difference, Relationship-Based (DIR)/Floortime™ intervention improved social behavior. A second controlled study (138) reported a positive effect of play therapy in addition to the regular treatment (see Table 2 for details).

According to the WWC Procedures and Standards Handbook, one RCT met all basic design standards (140). The other controlled trial could not be evaluated because only the abstract could be obtained (138). The uncontrolled trial failed to meet standards (139) as did the two single case studies [(141, 142); see Table 2 for details].

Non-specialist mediated interventions

Most reviews focused on parent-mediated interventions, rather few considered peer-mediated interventions or teacher-mediated interventions (cf. Table 1). Several reviews judged parent training or parent-mediated interventions as evidence-based [(43, 117, 126, 167, 175, 176); see also (173)]. There was a consensus among two reviews on peer-mediated interventions (80, 111) that these interventions are effective and can be considered evidence-based. There is also some evidence for the effectiveness of teacher-implemented interventions (43, 126).

Regarding LMIC, four recent reviews looked into parent-mediated interventions for children with ASD (84, 97, 101, 119). However, most of the cited studies did not investigate the outcomes for children but looked into outcomes for parents (e.g., gain in knowledge, perceived helpfulness of intervention). Eight studies did assess ASD-related outcomes in children. Three uncontrolled studies from India (145, 146, 149) found that parent-mediated interventions improved ASD symptoms as well as social and language skills, sensory-motor and adaptive skills. One RCT from India and Pakistan (71) investigated the effectiveness of the Parent-mediated intervention for Autism Spectrum Disorder in South Asia (PASS), which is a program adapted from a program developed in the UK. They found that adding the program to a treatment as usual resulted in better parent-child interaction, but no further improvement in other outcomes. A second RCT from India by Manohar et al. (148) reported significant improvements in child-related measures such as autism severity, joint attention, social-communication skills, and adaptive behavior after a parent-mediated intervention. A third Indian RCT by Divan et al. (144) found positive effects of a community health worker-mediated communication intervention on autism severity scores and dyadic social communication skills. Louis and Kumar (147) found a positive effect of an intensive training for fathers added to a home-based program on social-communication skills, adaptive behaviors, and repetitive behaviors. One uncontrolled trial from Nigeria reported a significant effect of a parent-mediated behavioral intervention on challenging behaviors (143).

By WWC criteria, three RCTs were of good quality because they fulfilled the standards without reservations (71, 144, 148). One RCT (147) fulfilled the standards with reservations due to missing information on the randomization procedure and attrition. Four uncontrolled studies (pre-post design) did not meet the standards due to a lack of a control group (143, 145, 146, 149). According to the WWC standards at least two studies meeting standards without reservations are required for an intervention to be eligible for being considered evidence-based. There were three well-conducted RCTs. However, only one of the two studies investigating parent-mediated interventions (71, 148) reported positive effects on ASD symptoms. The third study (144) concerned community-health worker mediated interventions. In addition, <50% of the evidence comes from studies meeting standards without reservations. Hence there is not sufficient evidence.

Technology-assisted interventions

In line with previous research, we considered technology-assisted interventions to be interventions in which technology is the central feature supporting the acquisition of a goal of the learner such as social or academic skills, challenging behaviors, or daily living activities (44–47). Interventions include computer-based interventions, video-modeling music therapy, visual strategies training, video modeling, neurofeedback, Ayres Sensory Integration, and Augmented Auditory Integration. Overall, there was no consensus among reviews that technology-based interventions can be considered evidence-based, although promising results have been reported in quite a number of studies [see the reviews by (106, 120, 130, 177); for more information].

Regarding LMIC, one single case experimental study from Georgia investigating the effect of distance coaching of therapists found some effects of the intervention on the language skills of three children (150). A single case experimental study from India (154) found that sung instructions, as compared to spoken directives, were more effective in improving socio-communicative responsiveness in children. A non-experimental single case study from India on virtual reality-based interventions reported positive effects on social-communication skills [(151); see Table 2]. One controlled trial from India reported a significant effect of technology-based visual strategy training on communication skills (152). One RCT from India on home-based sensory interventions reported significant improvement in sensory abnormalities as well as overall wellbeing and health-related quality of life (153).

According to WWC Procedures and Standard Handbook, the two studies with single-case experimental designs met the standards (150, 154), while the other single case study did not (151). One RCT met all basic design standards (153). Unfortunately, the quality of one controlled trial could not be assessed as the full article could not be acquired (152).

Medical treatments

Overall, quite a number of reviews based on research from HIC considered aripiprazole and risperidone as evidence-based treatments for irritability, hyperactivity, repetitive behaviors, and inappropriate speech. However, significant side effects including marked weight gain and sedation were found for these medications (78, 108, 125, 178–180). Two Cochrane reviews pointed out lacking evidence for a long-term use of aripiprazole and risperidone (178, 180). The cited reviews also addressed other pharmacological treatments (including SSRIs, stimulants, sympatholytic agents, and chelating agents), none of which were considered evidence-based.

No evidence from LMIC was mentioned in the reviews until 2019. A more recent review (119), cites one RCT from India, which found risperidone to be effective in reducing behavioral problems (aggressiveness, hyperactivity, and irritability) and in improving social responsiveness and non-verbal communication skills (155). The same review also considers a non-randomized trial from India, which compared the efficacy and safety of risperidone and fluoxetine (156). A significant positive effect of risperidone on irritability and hyperactivity was found, while fluoxetine reduced speech deviance, social withdrawal, and stereotypic behavior. While the RCT met the standards of the WWC without reservations, the non-randomized trial did not. In addition, sample sizes were rather small.

Complementary and alternative medicine

In general, none of the treatments in this category have been considered evidence-based [see (78, 83, 111, 123, 124, 131)].

Regarding LMIC, one RCT from Indonesia found inconclusive results with respect to gluten and casein supplementation (160). One RCT from Egypt (162) investigated the effect of digestive enzymes and found significant improvement in emotional response and autistic behaviors. Another RCT from Egypt (158) showed an effect of L-Carnitine therapy in improving autistic behaviors. An RCT on acupuncture from Egypt (157) found that acupuncture in conjunction with language therapy may have an additional positive effect on some aspects of communication and language [see Cochrane review from (83), for more findings on acupuncture mostly coming from China a UMIC). A recent review from India (119) cited two studies on yoga. A controlled trial found that structured yoga improved gastrointestinal symptoms, sleep problems, and behavioral problems (159). A small uncontrolled study reported that integrated yoga therapy (IAYT) increased imitation skills (161). Another recent review by Tan et al. (131) cited one study from Egypt on probiotics and reported significant improvements in the severity of ASD and gastrointestinal symptoms (163). The four RCTs met the WWC standards without reservations, while the three other studies did not meet the standards (see Table 2 for more details).

Summary of evidence

Comprehensive treatment programs are well-investigated in HIC and some are considered evidence-based [see (47)]. Evidence from LMIC is lacking apart from two low-quality studies from India (136, 137), which entails that none of these programs can be considered evidence-based for LMIC.

Research on focused interventions also comes mostly from HIC [(61, 62); see (173), for a recent summary]. There are a few isolated studies on different types of focused interventions from LMIC, not providing sufficient evidence to consider them evidence-based. There were, however, two controlled studies looking into interventions addressing social-communication skills (a DIR/Floortime intervention and a play-based intervention) with reported positive findings (138, 140).

Non-specialist mediated interventions are particularly interesting for LMIC, as they require less resources and may be used to provide care for a larger number of children and adolescents. Reviews judged parent training or parent-mediated interventions as effective with good evidence, especially for preschoolers in HIC [(42, 43, 176); see also (173)]. In LMIC, however, the evidence is still insufficient to judged parent-mediated interventions as evidence-based. Two reviews from India and one review from Bangladesh judged parent-mediated interventions as effective (67, 97, 119). It is important to note, however, that in the review by Dababnah et al. (67) the total number of studies with respect to ASD was low. Two recent reviews by Patra and Kar (119) and Koly et al. (97) reported only three RCTs with good quality, while the other studies were mostly low-quality. Three other reviews also looked into parent-mediated interventions and/or parent training citing studies from LMIC (69, 84, 101). However, most of these studies did not look into children's outcomes in LMIC.

Many technology-based interventions have been tried for children and adolescents in HIC. For most interventions, high-quality evidence is still lacking. Recently, Steinbrenner et al. (173) judged video modeling and technology-aided instruction and intervention as evidence-based. Concerning LMIC, there is a lack of studies exploring the effect of technology-based interventions.

With respect to medical interventions, most studies were conducted in HIC focusing on the effect of pharmacological agents on behavioral problems. A new review from India [LMIC, (119)] included two studies on risperidone and found this medical agent to be effective for reducing behavioral problems (155, 156). These findings on antipsychotic medication conform to the findings in HIC.

Research on complementary and alternative medical treatments comes from HIC, UMIC, and LMIC. The existing evidence base is still too limited for the various types of CAM treatments. Again, evidence from LMIC is scarce and scattered across different treatments. Hence, none can be considered evidence-based.

Discussion

In line with the significant increase in the prevalence of ASD in children and adolescents over the past two decades worldwide, a lot of research on different types of treatments for many different types of outcomes has been completed. Many systematic reviews have been published summarizing the respective research and more are published every year. We conducted a meta-review analyzing systematic reviews on the effectiveness of treatments and interventions in children and adolescents with ASD from 2011 until the end of 2021, which also considered research not coming from HIC. Our aims were to find out whether there are differences in the effectiveness of treatments in HIC *vs.* LMIC and which types of treatments can be considered evidence-based in LMIC.

Summary of key findings

In this systematic review of reviews, we identified 35 systematic reviews that included research from LMIC and/or UMIC. Thirty-one of these considered also research from HIC. In the same time span (2011–2021) another 46 reviews on interventions for children and adolescents with ASD were published only including studies from HIC. There are many potential reasons why research studies from LMIC (and UMIC) may not be included in a systematic review. One is that these studies may be difficult to find and/or obtain. Another is that many of the studies were not RCTs and many not of high quality. Thus, these studies may have been excluded due to the inclusion criteria of the respective review.

Although eleven of the identified reviews included research from HIC and LMIC, none of the reviews looked for potential differences in effectiveness for a particular type of intervention. One obvious reason was the low number of studies from LMIC, which precluded any meaningful statistical comparison. Another seems to be lack of awareness that there may be relevant differences.

When we went back to the original studies from LMIC, which were cited in the reviews, we found studies with many different research questions, various research designs, and often a rather low quality. Nevertheless, we analyzed these studies and provided a narrative synthesis. Because of their heterogeneity, it did not make sense to integrate their findings statistically and compare them to the average findings from HIC. Thus, we were unable to determine, whether there are differences in the effectiveness of treatments in HIC and LMIC.

Finally, we evaluated the studies from LMIC for quality and evidence. Due to the low number of high-quality studies, no type of treatment fulfilled the criteria for being evidence-based according to the What Works Clearinghouse standards (version 4.1, https://ies.ed.gov/ncee/wwc/Resources/ResourcesForReviewers). One reason, why research from LMIC

is still scarce, is probably the limited amount of funding available [cf. (33, 36, 37)]. Another reason may be that the awareness of the importance of research and knowledge about respective research methodologies is still moderate in some LMICs. A final reason might be that international publication fees are often prohibitively expensive, despite the price reductions for researchers from LMIC. This may reduce the international visibility of existing research.

Limitations

Because of the many choices that have to be made when conducting a review of reviews with many methodological differences, some limitations exist. First, we decided to include only reviews that were published in English. Despite English being the common language of science, some reviews especially from LMIC might have been published in other languages. Therefore, some reviews and the findings summarized in them may be missing.

Second, we decided to include reviews being published between 2011 and the end of 2021 that consider research from HIC and LMIC and/or UMIC by searching only three electronic databases (PsycINFO, PubMed, Cochrane Database of Systematic Reviews). An updated version of this meta-review in the future should use more databases including databases collating research papers published in the languages of LMIC.

The third important decision, which limits our findings, was to consider only reviews that systematically reviewed the literature on interventions. While assessing the full texts we found some interesting unsystematic reviews of research from LMIC [e.g., (181)]. Following our inclusion criteria, we excluded these reviews. If the results from these unsystematic collections of research studies had been included, more research from LMIC might have been taken in account.

Fourth, we used the classification scheme of high-income, upper middle-income, and lower middle-income countries provided by the World Bank, which is the commonly used standard (e.g., by the WHO). This classification scheme is based on average income. As it does not specifically consider the health care system, some researchers have criticized using this classification scheme for making comparisons between countries [e.g., (101)]. They suggest to compare low-resource settings in health care to high resource settings instead.

Implications for practice and future research

Although we were able to identify 35 systematic reviews summarizing the results from many empirical studies, there was very little evidence from LMIC. The eleven reviews including research from LMIC ran no analyses comparing results from

HIC and LMIC. This finding has two important implications. First, more research needs to be conducted in LMIC on the effectiveness of different treatments and interventions for children and adolescents with ASD. The research should be of high quality no matter whether single case experimental designs or randomized group-based designs are used. Second, findings for HIC and LMIC need to be compared systematically. HIC and LMIC countries differ in many respects, including differences in health care systems but also in cultural and medical traditions. Hence, findings from HIC on specific treatments cannot be easily transferred to LMIC. There is no alternative to conducting the respective studies and to comparing the findings.

Nevertheless, there are some tentative implications for practice in LMIC. Many of the treatments that have been established as evidence-based by previous research, have to be considered as evidence-based only for HIC (see https://mn.gov/mnddc/asd-employment/pdf/09-NSR-NAC.pdf and https://www.nationalautismcenter.org/national-standards-project/phase-2/ for a good overview of these treatments). As shown in the present meta-review, there is currently not sufficient evidence for these interventions and treatments in LMIC to consider them evidence-based. There seems to be one notable exception: parent-mediated interventions. The reviews by Dababnah et al. (67), Koly et al. (97), Lee and Meadan (101), and Patra and Kar (119) concluded that these interventions are effective in LMIC. The evidence, however, was mostly indirect showing that parents acquire more knowledge and skills through these interventions. As shown here, direct evidence with respect to children's outcomes is still limited and studies were often of low quality. The review by Reichow et al. (43), however, supports the conclusion of the four reviews by showing that educating parents to deliver behavioral interventions is effective to address developmental disorders in LMIC. Thus, parent-mediated interventions can be considered at least promising and probably effective.

Another interesting option for LMIC might be the delivery of interventions by paraprofessionals, e.g., nurses, teaching assistants, social workers [cf. (182)]. At present respective research is almost completely lacking, but it might be interesting to explore this option in the future [see (144) for a first trial]. It also important to note that other evidence-based treatments and interventions from HIC might be promising for LMIC when being adapted to the respective context. Given the biological basis of ASD and the similar presentation of ASD in LMIC and HIC, treatments could work in both contexts.

Conclusion

Treatments for children and adolescents with ASD, which are considered evidence-based in HIC, are still rarely investigated in LMIC. The findings presented here may still support mental health researchers, government organizations, and NGOs that seek to improve an uptake of effective treatments for children with autism in LMIC by summarizing the present state of research and pointing out, what evidence is still missing. It also shows that parent-mediated interventions at present have the best evidence for being effective, although the evidence is not sufficient when high standards are applied. We hope that the overview of reviews considering studies from LMIC and/or UMIC provides an easy access to mental health professionals (both specialists and non-specialists) in LMIC to the respective research. We recommended mental healthcare providers, clinicians, and other caregivers to look into these reviews and maybe even individual studies for more details on the specific treatments and interventions. This information along with their personal experience may allow them to engage in evidence-based practice when delivering treatments to children and adolescents with ASD.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

MP, HA, and YH contributed to the conception and design of the meta-review. MP organized the database, wrote the first draft of the manuscript, and extracted the data. MP and YH made the bibliographic search and selected papers for the meta-review. HA contributed with comments to the draft, especially the introduction and the LMIC context. All authors contributed to the revision of the first draft, read, and approved the submitted version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2022.834783/full#supplementary-material

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Supplementary material: Online Appendix: Overview of Systematic Reviews 2011-2021 on Interventions for Children and Adolescents diagnosed with ASD which consider only Research from high-income countries (HIC) (https://www.frontiersin.org/articles/10.3389/fpsyt.2022.834783/full#supplementary-material)

Name	Year	Abbreviated Title	Age group				Total number	Studies		Synthesis method		Systematic assessment of quality and/or evidence	
			Under 3 years	Preschool (up to 6/7)	Up to 12	Adolescents 13-18		Single case studies	RCT	Qualitative	Quantitative	Quality or evidence of individual studies	Evidence across studies
Aldabas	2020	Peer-mediated interventions (PMIs)		✓	✓	✓	16	16	0	✓		No	No
Baril	2017	Early Start Denver Model	✓	✓			10	3	2	✓		Yes (Reichow et al., 2008, Reichow, 2011)	Yes (Reichow et al., 2008, Reichow, 2011)
Boudreau	2015	Peer-mediated pivotal response treatment		✓	✓		5	5	0	✓		Yes (Reichow et al., 2008)	Yes (Reichow et al., 2008)
Bozkurt	2014	Social stories in teaching for social skills		✓	✓	✓	32	32	0	✓	✓	Yes, review specific	No
Brignell	2018	Communication interventions for minimally verbal children	✓	✓	✓		2	0	2	✓		Yes (Cochrane´s risk of bias tool, Higgins et al., 2017)	Yes (GRADE system, Guyatt et al., 2008)
Cappadocia	2011	Social skills group training		✓	✓	✓	10	0	1	✓		No	No
Ching	2012	Aripiprazole		✓	✓	✓	2	0	2		✓	Yes (Cochrane's risk of bias tool, Higgins, 2008)	Yes (GRADE system, Guyatt et al. 2011)
Dubin	2020	Naturalistic Interventions	✓	✓	✓		25	11	13	✓		No	No
Fuller	2020	Early Intervention	✓	✓			29	0	29		✓	Yes (Cochrane´s risk of bias tool, Higgins et al., 2011)	No
Fung	2016	Pharmacologic Treatment	✓	✓	✓	✓	11	0	11		✓	Yes (Cochrane's risk of bias tool, Higgins and Thompson, 2003)	Yes (GRADE system, Guyatt et al., 2008)
Hillman	2018	Child-centered play therapy		✓	✓		4	2	0	✓		No	No
Hirsch	2016	Aripiprazole		✓	✓	✓	3	0	3		✓	Yes (Cochrane's risk of bias tool, Higgins and Green, 2011)	Yes (GRADE system, Guyatt et al. 2011)
Hong	2016	Primary caregiver-implemented communication intervention	✓	✓			11	11	0	✓		Yes (Kratochwill et al., 2010; Maggin et al 2013)	No
James	2016	Chelation		✓	✓		1	0	1	✓		Yes (Cochrane 's risk of bias tool, Higgins and Green, 2011)	No
Kent	2020	Play-based interventions	✓	✓	✓		19	0	19	✓	✓	Yes (QualSyst, Kmet et al., 2004)	No

Knight	2015	Comprehension strategies for students		✓	✓	✓	23	23	0	✓		Yes (Reichow, 2011)	Yes (Reichow et al., 2008, Reichow, 2011)
Knight	2013	Technology-based interventions for academic skills		✓	✓	✓	29	17	0	✓		Yes (Honer et al., 2005, Gersten et al., 2005 NSTTAC, 2010)	Yes (Honer et al., 2005, Gersten et al., 2005)
Kreslins	2015	Psychosocial interventions for anxiety	✓	✓	✓	✓	10	0	10	✓	✓	Yes (Cochrane 's risk of bias tool, Higgins and Green, 2011	No
Krishnaswami	2011	Secretin	✓	✓	✓		8	0	7	✓		Yes (Owens et al., 2010)	Yes (Owens et al., 2010)
Kuhaneck	2020	Occupational therapy	✓	✓	✓	✓	20	3	3	✓		Yes (AOTA guidelines for systematic reviews, AOTA, 2017)	Yes (AOTA guidelines for systematic reviews, AOTA, 2017)
Lorah	2021	Mobile technology		✓	✓	✓	9	9	0	✓		Yes (Horner et al., 2005)	No
Maw	2018	Cognitive, developmental, and behavioral interventions for preschool-aged children	✓	✓			14	0	14	✓	✓	Yes (Cochrane's risk of bias tool, Higgins, 2008)	Yes (Reichow, 2011)
Moon	2020	Mobile device applications		✓	✓		7	0	7	✓	✓	Yes (Cochrane risk of bias (RoB)-2 tool)	No
Morin	2018	Augmentative and alternative communication interventions	✓	✓	✓	✓	24	24	0	✓		Yes (WWC Procedures and Standards Handbook, USDE, 2016)	Yes (WWC Procedures and Standards Handbook, USDE, 2016)
Mrachko	2017	Interventions by non-experts - social communication	✓	✓	✓	✓	7	7	0	✓		Yes (Horner et al., 2005)	No
Munsell	2018	Interventions supporting self-management of life tasks			✓	✓	14	0	5	✓	✓	Yes (NTACT evidence hierarchy, no reference)	Yes (NTACT evidence hierarchy, no reference)
Nahmias	2019	Community-based early interventions	✓	✓			33	0	0		✓	No	No
Parsons	2017	Pragmatic language interventions	✓	✓	✓	✓	21	0	21	✓	✓	Yes (Kmet et al., 2004)	No
Parsons	2017	Parent-mediated Intervention training	✓	✓	✓	✓	9	2	3		✓	Yes (Kmet et al., 2004)	No
Qi	2018	Social stories interventions		✓	✓	✓	22	22	0		✓	Yes (Kratochwill et al., 2010; Maggin et al 2013)	Yes (Kratochwill et al., 2010, 2013; Maggin et al., 2013)

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Author	Year	Intervention										Risk of bias assessment	Quality of evidence
Ramdoss	2011	Computer-based interventions		✓	✓	✓	10	1	0	✓		Yes (Schlosser and Sigafoos, 2007)	No
Ratliff-Black	2021	Parent-mediated interventions	✓	✓	✓	✓	18	13	0	✓	✓	No	No
Reichow	2018	Early intensive behavioral intervention (EIBI)	✓	✓			5	0	1		✓	Yes (Cochrane's risk of bias tool, Higgins, 2008)	Yes (GRADE system, Guyatt et al., 2008)
Reichow	2013	Non-specialist psychosocial interventions given intellectual disability or lower-functioning ASD	✓	✓	✓	✓	29	0	15	✓	✓	Yes (Cochrane's risk of bias tool, Higgins, 2008)	Yes (GRADE system, no specific reference)
Schoen	2019	Ayres sensory integration intervention		✓	✓		3	0	2	✓		Yes (CEC standards, Cook et al., 2015)	Yes (CEC standards, Cook et al., 2015)
Shalev	2020	Parent-Mediated Interventions	✓	✓	✓	✓	11	0	8	✓		No	No
Stray	2012	Social stories		✓	✓	✓	19	18	1	✓		No	No
Sturman	2017	Methylphenidate		✓	✓	✓	4	0	4	✓	✓	Yes (Cochrane's risk of bias tool, Higgins et al., 2017)	Yes (GRADE system, Grade working group, 2004, GRADEpro sofware (2015)
Tomeny	2020	Caregiver-Implemented Intervention	✓				26	9	13	✓		No	No
Tachibana	2017	Comprehensive interventions for pre-school children	✓	✓			33	0	33		✓	Yes (Cochrane's risk of bias tool, Higgins and Green, 2011)	Yes (GRADE system, Guyatt et al., 2008)
Taylor	2017	Weighted vests		✓	✓		7	7	0	✓		Yes (Kratochwill et al., 2010, 2013)	Yes (Kratochwill et al., 2010, 2013)
Vasa	2014	Psychopharmacological and non-psychopharmacological treatments for anxiety		✓	✓	✓	15	0	8	✓		Yes (USPSTF, 2008)	Yes (GRADE system, Guyatt et al., 2008)
Warren	2011	Early intensive intervention	✓	✓	✓		34	17	2	✓		Yes, review specific (based on Berkman et al., 2013)	Yes (AHQR evidence grading, Berkman et al., 2013)
Williams	2012	Secretin	✓	✓	✓	✓	16	0	16		✓	Yes (Cochrane's risk pf bias tool, Higgins, 2008)	No
Zarafshan	2016	Non-pharmacological interventions for stereotyped and repetitive behaviors of pre-school children	✓	✓			15	12	2	✓		No	No
Zwaigenbaum	2015	Early Interventions under 3 Years of Age	✓				24	0	12	✓		Yes (GRADE system, Guyatt et al., 2008)	Yes (GRADE system, Guyatt et al., 2008)

Chapter 3

Paper 2

Pervin, M., & Hagmayer, Y. (2022). Attitudes towards evidence-based practice of professionals working with children and adolescents with autism spectrum disorder in Bangladesh. *Administration and Policy in Mental Health and Mental Health Services Research*, *49*(5), 861-880.

ORIGINAL ARTICLE

Attitudes Towards Evidence-Based Practice of Professionals Working with Children and Adolescents with Autism Spectrum Disorder in Bangladesh

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Abstract

Like in many lower-middle-income countries (LMIC), progress in implementing evidence-based practices (EBPs) for children with autism spectrum disorder (ASD) has been slow in Bangladesh. This cross-sectional study examined professionals' attitudes towards evidence-based practice (EBP) for children and adolescents with ASD and explored how providers' demographic factors are related to attitudes to and adoption of EBPs in Bangladesh. The sample consisted of 150 mental health professionals and special teachers from the urban area of Dhaka. Attitudes were assessed by the Evidence-based Practice Attitude Scale-36. Findings indicated that professionals have favorable attitudes towards EBP. Their attitudes varied depending on service settings (public clinical, private clinical, and special school) and caseload per year. Professionals who work in private and special school settings claimed to be more willing to adopt an EBP when required and perceived a higher fit of EBPs and their work than those in public clinical settings. The number of different EBPs used also differed by service setting. Every type of intervention (except medication) was used by more professionals in special schools than in private and public clinical settings. Many professionals reported few barriers to the implementation of EBPs. These findings indicate conditions that are often conducive to the implementation of EBPs. However, these results do not reflect the situation in rural areas, in which poverty is more widespread and the number of specialized professionals is low.

Keywords Mental health professionals · Attitudes · Evidence-based practice · Autism spectrum disorder

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and interaction as well as restricted and repetitive patterns of behavior (DSM-5: American Psychiatric Association, 2013; ICD-11: World Health Organization, 2019). The symptoms of ASD emerge during the first three years of life and exist throughout the life cycle (Jackson & Volkmar, 2019; Lai & Baron-Cohen, 2015; Varcin & Jeste, 2017).

Individuals with autism have difficulty interacting with others: building relationships, using language, regulating their emotions, and understanding others' points of view.

Recently, many epidemiological studies reported a prevalence of ASD that is higher than previously thought. Worldwide, there is an increasing number of children who meet the diagnostic criteria for ASD. It is estimated that approximately 1.5% of children in Europe (Germany, Poland, France, Belgium, Denmark, Iceland, Sweden, Ireland), China, and North America can be diagnosed with ASD, but the rates vary considerably between regions and populations (Bachmann et al., 2018; Boilson et al., 2016; Dereu et al., 2010; Idring et al., 2015; Lyall et al., 2017; Parner et al., 2011; Saemundsen et al., 2013; Skonieczna-Żydecka et al., 2017; Van Bakel et al., 2015). The prevalence of ASD in the U.S., for example, is 1.9%, with boys being four times more likely to be diagnosed than girls (Maenner et al., 2020; Shaw et al., 2020).

The prevalence rate in low-income countries (LIC) and lower middle-income countries (LMIC) is rather uncertain

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due to a lack of awareness, limited knowledge, and scarcity of well-conducted scientific studies (Samms-Vaughan, 2014). A systematic review regarding South Asia reported a prevalence ranging from 0.09% in India to 1.07% in Sri Lanka. For Bangladesh, numbers ranged from 0.15 to 0.8% (Hossain et al., 2017). According to a survey conducted by the Ministry of Health, Family, and Welfare of the Peoples Republic of Bangladesh, the prevalence of ASD is 0.15% (Global Autism Movement & Bangladesh, 2014). A prevalence of 3% in Dhaka city and 0.068% in rural areas was reported (Non-Communicable Diseases Control [NCDC] et al., 2013). Two early studies using a community-level approach found a prevalence of ASD of 0.02% and 0.08% (Mullick & Goodman, 2005; Rabbani et al., 2009). Recently, another study conducted in a rural community in Bangladesh, reported a prevalence of 0.075% (Akhter et al., 2018).

The increase in prevalence over the years has intensified the demand for practices that work for children with ASD. As a consequence, a wide array of treatments has been developed and various types of effective treatment are available in most high-income countries (HIC; National Autism Center, 2015; National Research Council, 2001; Odom et al., 2010, 2012; Wong et al., 2014, 2015). The National Standards Project (National Autism Center, 2009, 2015) and the National Professional Development Center on Autism Spectrum Disorder conducted comprehensive and systematic reviews of the literature and identified 27 EBPs (National Professional Development Center on Autism Spectrum Disorder [NPDC], 2017a; 2017b). Recently, the National Clearinghouse on Autism Evidence and Practice (NCAEP) identified 28 effective EBPs (Steinbrenner et al., 2020).

There are substantial differences in the financing for the treatment and prevention of neurodevelopmental disorders (NDD) across countries. The lifetime societal cost of supporting an individual with ASD in a HIC was $2.4 million per individual in the United States and £1.5 m in the UK, of which 56% is accounted for by service use (Buescher et al., 2014; Iemmi et al., 2017; Olusanya et al., 2018). Children and adolescents with ASD also exhibit higher rates of healthcare utilization and higher medical care costs compared to other NDDs (Croen et al., 2006; Kim et al., 2020; Tregnago & Cheak-Zamora, 2012). Financing for the treatment and prevention of mental disorders remains insufficient in LIC and LMIC. Median annual mental health expenditures per capita range from US$ 0.20 in LIC to US$ 44.84 in HIC (World Health Organization, 2011). As a consequence, there often is a shortage in mental health care provision, an absence of government initiatives, insufficient training, and a lack of research in LIC and LMIC (Adugna et al., 2020; Blake et al., 2017; Dababnah & Bulson, 2015; Eid et al., 2017; Harrison et al., 2016; Saraceno et al., 2007; Saxena et al., 2007).

Health Care System and ASD Support in Bangladesh

In this paper, we focus on the implementation of EBPs for autism care in Bangladesh. Bangladesh is one of the most densely populated countries in the world. The majority of its population continues to live by subsistence farming in rural areas. Over the last few decades, Bangladesh has made remarkable progress in poverty reduction, supported by sustained economic growth. As a result, Bangladesh joined the LMIC category on 1 July 2015 (The World Bank, 2020).

Despite the current economic growth and the constitutional obligation of the government to provide health care services to all citizens, health and education levels are relatively poor. Basic health services are provided by four key actors: government institutions, private sector, nongovernmental organizations (NGOs), and donor agencies (Bangladesh Health System Review, 2015). Health staff and specialists are mostly concentrated in urban areas and are much more likely to provide services to upper socioeconomic status (SES) families (Ahmed et al., 2015), whereas the people of rural areas have little access to facilities (Ahmed et al., 2011). Access to specialty mental health care is limited due to missing resources, few skilled professionals, and the concentration of resources in the capital and a few urban areas. Mental health expenditures from the Ministry of Health and Family Welfare amount to less than 0.5% of the total expenditure on health (Alam et al., 2020; Hasan et al., 2021).

Public healthcare for children with disabilities is coordinated by the Ministry of Health and Family Welfare (MOHFW), which has made considerable efforts to strengthen the public sector health system. Specialist services for children with disabilities including autism are managed by the respective public institutes (e.g., the National Institute of Mental Health, the Institute of Pediatric Neurodisorders and Autism).

Private sector organizations and NGOs have played a key role in the promotion of human rights and in the provision of support services for children with disabilities. They cooperate with the government in developing policies and programs. A number of disability service and support centers are functioning in the capital city Dhaka (e.g., The Autism Welfare Foundation, The Rainbow Autism Care and Therapy Center).

Approximately 100 registered schools in Bangladesh address the special needs of children with disabilities (Ehsan et al., 2018). Most of the schools are run by private organizations and NGOs. Others are operated by the Jatiyo Pratibondhi Unnayan Foundation (JPUF), under the Ministry of Social Welfare (e.g., Society for the Welfare of Autistic Children (SWAC) School for Autism, Beautiful Mind).

In the last ten years, the Government of Bangladesh (GOB) has taken several steps toward providing essential services to people with NDD. Two important legal acts have been enacted: (i) The Persons with Disabilities' Rights and Protection Act 2013 and (ii) The Neuro-Developmental Disability Protection Trust Act 2013. In 2012, a National Steering Committee for Autism and NDD (NSCAND) was established. It focuses on increasing awareness and addressing the situation of children with Autism and NDD. In 2016, the "Situation Assessment of Autism and Neurodevelopmental Disorders in Bangladesh" was published. It found that targeted government-implemented strategies and interventions are required to reduce the socioeconomic, health, and educational disparities impacting those with NDD and their families. The report recommended a phased implementation of a national strategic plan for neurodevelopmental disorders from 2016 to 2021, with the objective to ensure a better quality of life for children with autism and other NDDs (National Strategic Plan for Neurodevelopmental Disorders 2016). Apart from measures to increase public awareness of ASD and NDD, their early identification, early intervention, and employment services, the more widespread use of EBPs was considered a crucial aspect to improve the care provided to patients and their families.

Attitudes Towards EBP[1] and EBPs[1]

Many of the organizations and institutions described in the previous section strive to implement EBPs (e.g., applied behavior analysis, social skill training, parent-mediated interventions) to improve the care provided to children and adolescents with autism and other NDDs. There are many factors that may influence the adoption of EBP as a general approach to clinical work and the usage of specific EBPs (cf. Michie et al., 2005). Among them are both organizational-level as well as individual-level factors. A recent overview of the major theoretical frameworks (Williams & Beidas, 2019) identified ten individual-level factors shared by the frameworks. Among them are the attitudes of the professionals, which together with knowledge, skills, self-efficacy expectations, and social norms affect professionals' intentions and usage of EBPs. The same review also identified seven organizational level factors, including leadership,

implementation climate, and available resources. The present research is guided by the findings of this review of theories.

Attitudes are an important individual-level factor and are a determinant of the decision of whether to try and later implement a new EBP (Aarons et al., 2012; Burgess et al., 2017; Frambach & Schillewaert, 2002; Glasman & Albarracin, 2006). For example, Aarons (2004) showed that therapists who had a negative attitude towards using EBPs were significantly less likely to use them in practice. Therefore, it is important to measure professionals' attitudes towards EBP for children and adolescents with ASD. In Bangladesh, these professionals include mental health professionals as well as specialized teachers. Hence, the first goal of the present study was to examine the attitudes towards EBP of professionals who provide care to children with ASD. As there are many different types of EBPs, we intended to study professionals' general attitudes towards EBP and their usage of specific forms of treatments being considered for wider implementation in Bangladesh. The findings will show whether mental health care providers have attitudes which support the implementation and use of EBPs.

Research also showed that attitudes towards EBP may differ as a function of demographic variables and organizational factors (Aarons, 2004, Aarons et al., 2010, 2011, 2012; Beidas et al., 2015; Connors et al., 2019; Damschroder et al., 2009; Greenhalgh et al., 2004; Locke et al., 2019; Okamura et al., 2018; Powell et al., 2017; Rye et al., 2019; Smith, 2013; Vassos et al., 2016; Wisdom et al., 2014). For instance, females, compared to males, have reported a greater perceived fit of EBPs with the characteristics and needs of patients (Aarons et al., 2010, 2012; Rye et al., 2019). Younger participants considered EBP more relevant for job security and observed more organizational support for learning new EBPs (Aarons et al., 2009; Okamura et al., 2018; Rye et al., 2019). Providers with higher caseloads have perceived greater administrative burdens related to the use of EBPs and clinicians working in public clinical settings, compared to private clinical settings, have reported a poorer fit of EBP with their clinical practice (Aarons et al., 2012). Higher levels of experience were associated with a perception of therapy as a balance between art and science (Aarons et al., 2012). Less experienced clinicians claimed a greater openness to trying new interventions and a higher willingness to try or use more structured or manualized interventions (Aarons et al., 2010). Therefore, the present study explored how providers' demographic variables are related to attitudes to and adoption of EBPs in Bangladesh.

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[1] Evidence-based practice is the integration of best research evidence with clinical expertise in the context of patient characteristics, culture, and preferences (American Psychological Association, 2005, p. 5). Evidence-based practices (EBPs) are treatments or programs that have been proven efficacious through research (NPDC, 2017a; 2017b). Thus, EBP should use EBPs.
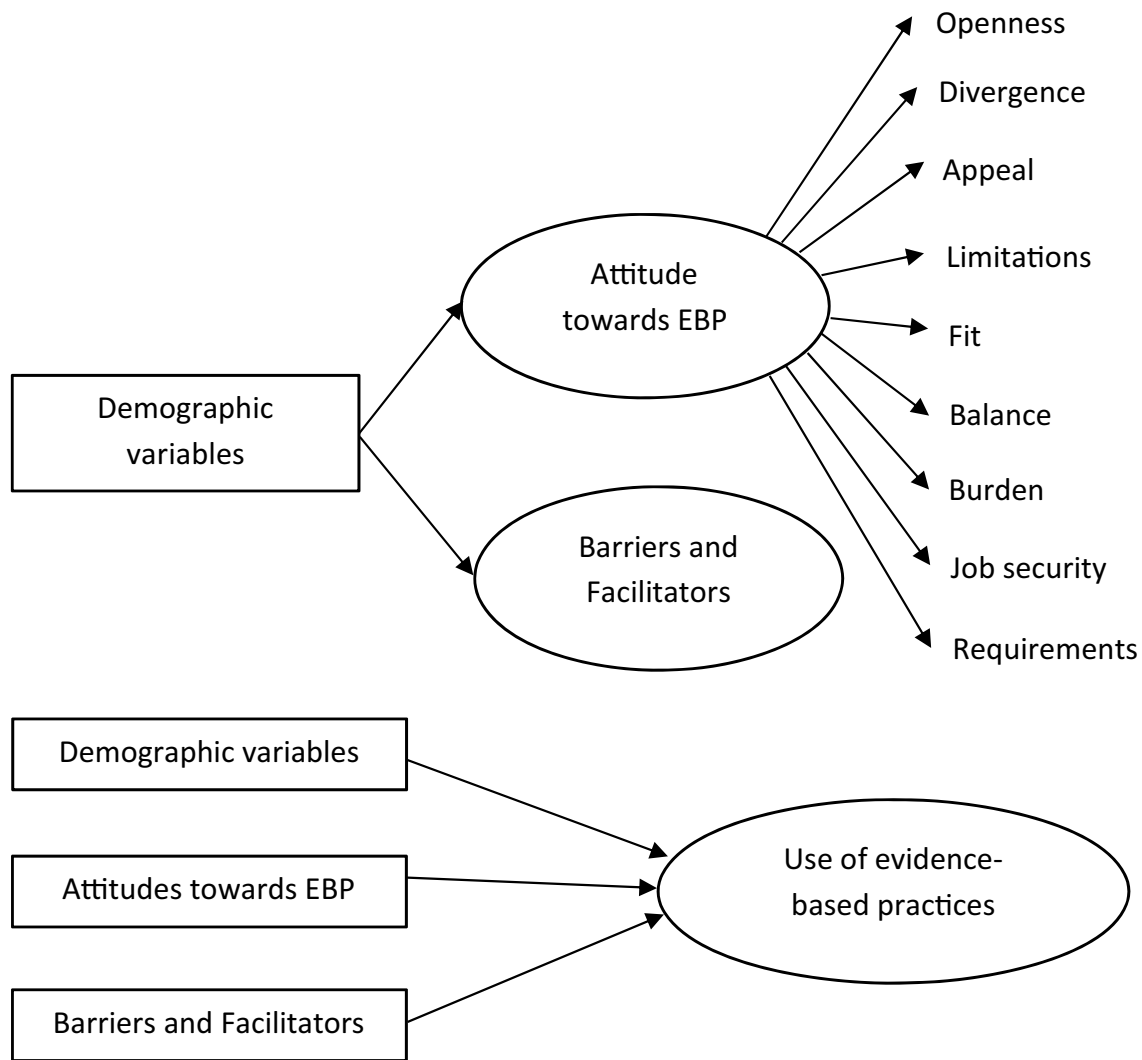
Fig. 1 Conceptual framework of the present study. Predictors are shown by squared boxes, predicted outcomes by circles. In the upper half the investigated relations between demographic variables as predictors and attitudes as well as barriers as outcome variables are shown. In the lower half, the relation between demographic variables, attitude, and barriers as predictors and the use of EBPs as outcome are shown

Barriers and Facilitators to the Implementation and Usage of EBP and EBPs

Research also showed that the adoption and successful implementation of EBPs depend on professional, social, organizational, and contextual factors (Aarons, 2004, 2005; Glisson & Schoenwald, 2005; Glisson et al., 2008; Greenhalgh et al., 2004; Grol & Wensing, 2004; Lau et al., 2015; Raghaven et al., 2008). In their systematic review of reviews, Lau et al. (2015) identified a list of crucial organizational and contextual barriers, for example, support and guidance by superiors, and available resources including time.

As no research on this topic has been conducted in Bangladesh, the second objective of our study was to assess, which of the potential organizational and contextual barriers to the use of EBPs for ASD are present in Bangladesh. From the factors identified by Lau and colleagues we selected variables which are potentially relevant in Bangladesh (cf. Khan et al., 2018; Mannan, 2017, see method section for details).

Research Questions and Hypotheses

The conceptual framework of the study is illustrated in Fig. 1. The framework builds upon theoretical models of EBP implementation including the Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2009), the theoretical review by Williams and Beidas (2019), and the empirical research summarized in the

previous section. We decided not to use a specific theoretical framework from the literature, as these tend to be more comprehensive and we were not able to cover all aspects due to limited available resources. Instead, we focused on professionals' attitudes on one hand and potential barriers on the other hand.

Based on the conceptual framework shown in Fig. 1, the following research questions were addressed:

What are the attitudes of mental health professionals and special teachers in Bangladesh towards EBP for children and adolescents with ASD?
What are the potential barriers to the use of EBPs perceived by these professionals?
Do demographic variables predict the attitude towards EBP?
Which EBPs[2] for children and adolescents with ASD do mental health professionals and special teachers in Bangladesh use?
Do attitudes towards EBP, perceived barriers, and demographic variables predict the number of different EBPs that are being used?

Based on the conceptual framework and the previous literature (Aarons, 2004; Aarons et al., 2010, 2012; Lau et al., 2015), hypotheses were developed prior to data collection and examined in this study. We anticipated that attitudes toward EBP (Hypothesis 1), perceived barriers for implementing and using EBPs (Hypothesis 2), and the types of interventions being used (Hypothesis 3) would vary by professionals' demographic characteristics and the settings they worked in. However, given the lack of prior literature conducted in South Asia, the analyses with respect to these hypotheses were exploratory in nature. As visualized in the conceptual framework, we hypothesized that more positive attitudes and fewer perceived barriers would be related to using a broader variety of EBPs (Hypothesis 4).

Research questions were addressed and hypotheses were tested by conducting a survey among professionals working with children and adolescents with ASD in a clinical or a school setting.

Method

Settings and Participants

We conducted a cross-sectional survey (Lavrakas, 2008) among professionals in the Urban area of Dhaka, who provide services for children and adolescents with ASD. We recruited participants from three service settings (public clinical, private clinical, and special school). Public organizations provide comprehensive services to individuals with NDD, including autism. Private and non-governmental autism centers and clinics offer a range of services to children with ASD. Special schools provide care for children with autism and other disabilities, who cannot attend mainstream educational facilities. Typically, the schools are providing speech and language therapy, sensory integration therapy, behavior therapy, music therapy, play therapy, occupational therapy, and conventional educational services. A list of potentially eligible professionals was collected from the websites of the Bangladesh Association of Psychiatrists, Bangladesh Society for Child Neurology, Bangladesh Clinical Psychology Society, Bangladesh School Psychology Society, Bangladesh Psychological Association, Disability service, and support centers, Institute of Special Education and Special Schools.

Inclusion criteria were the following: Mental health professionals (psychiatrists, pediatric neurologists, psychologists, developmental psychologists, counselors) and/or special teachers working with children and adolescents with ASD and their supervisors. Participants had to be fluent in Bangla or English. Exclusion criteria were: (i) Professionals not working with children and adolescents with autism and (ii) Professionals in training.

Concerning sample size, we strived for a sample as large as possible to get representative results for research questions 1, 2, and 4. A sample size calculation with respect to the hypotheses concerning the prediction of attitudes towards EBP and perceived barriers yielded a target sample size of N = 157, assuming a medium effect of a model with seven demographic variables as predictors, a significance level of 0.05, an intended power of 0.8, and ten models to be tested.

Measures

The survey comprised of multiple-choice items and open-ended questions. Whenever possible, scales and items of existing questionnaires in English were used. The survey was available in English and Bangla. A main part of the survey consisted of the nine subscales of the Evidence-based Practice Attitude Scale-36 (EBPAS-36; Rye et al., 2017, see below for details). The EBPAS has been used in culturally diverse contexts. It has been found to have sound content validity and internal consistency. A translation and back-translation procedure for all items was used to create the Bangla version of the questionnaire. Translators were academic researchers familiar with ASD and the study of professionals' attitudes (the first and second author of the paper). The process included several rounds of translation

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[2] See section on current use of EBPs in the method section for details.

and back-translation with rigorous comparisons between the original and the translated versions according to guidelines for questionnaire adaptation in order to achieve the highest possible content validity. The dimension of EBPAS-36 that was most challenging to translate was the divergence subscale. A pre-test with mental health clinicians working at the University of Dhaka was conducted to ensure that all items were understood correctly. Due to limited resources, a separate evaluation of the questionnaire and its psychometric properties was not possible.

Demographic Variables

These included gender, age, years of experience (the number of years working as a mental health professional), caseload per year (the number of patients worked on average per year), workplace (public, private, special school), professional background (medicine, psychiatry, psychology/clinical psychology, counseling, special teachers and others), and theoretical orientation (psychoanalytic/psychodynamic, cognitive-behavioral, behavioral, humanistic, eclectic and others).

Attitudes Toward EBP

Attitudes toward EBP were measured using the EBPAS-36 (Rye et al., 2017, a short version of the Evidence-based Practice Attitude Scale-50 (EBPAS-50; Aarons et al., 2012). It assesses mental health providers' attitudes towards EBP including the usage of EBPs. It was validated with US and Norwegian samples (Aarons et al., 2012; Rye et al., 2017), but not in the context of Bangladesh. According to our inclusion criteria, all our participants were academically trained and many had spent time abroad during their studies. Therefore, we considered it adequate to use a Western validated instrument. As described above, the questionnaire was translated into the local language. Participants rated their agreement with the presented statements using a five-point Likert scale (from 0 "not at all" to 4 "to a very great extent"). The EBPAS-36 contains 12 subscales, each with 3 items, and a total score indicating attitudes towards EBP in general. For the present study, nine subscales were used, which we considered appropriate for the context of Bangladesh: *openness* to using EBPs (e.g., 'I like to use new types of therapy/interventions to help my clients'), the perceived *divergence* of professionals' usual practice from evidence-based interventions (e.g., 'Clinical experience is more important than using manualized therapy/treatment'), the intuitive *appeal* of adopting EBPs (e.g., 'If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if it made sense to you?'), *limitations* of EBPs and their inability to address client needs (e.g., 'EBP is not useful for clients with multiple problems'), EBPs' *fit* with the values and needs of the client and therapist ('If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if it fit with your clinical approach?'), *balance* between perceptions of clinical skills and science as important in service provision (e.g., 'Therapy is both an art and a science'), the time and administrative *burden* with learning EBPs (e.g., 'I don't have time to learn anything new'), *job security* related to expertise in EBPs or professional marketability provided by learning an EBP (e.g., 'Learning an EBP will help me keep my job'), and the likelihood of adopting EBPs given *requirements* to do so (e.g., 'If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if it was required by your regulatory body?'). Rye et al. (2017) confirmed the factor structure of the EBPAS-36. Subscales had good internal consistency.

Barriers and Facilitators

Organizational and contextual barriers to implementing EBPs, which were identified in the systematic review of reviews by Lau et al. (2015), were assessed using 13 newly constructed items. Items were formulated as statements (e.g., "My organization's goals and objectives support the usage of EBPs"; "The current policy and legislative framework in Bangladesh enable me to use EBPs"; see Fig. 3 for all items). Participants indicated their agreement with the statement on a five-point Likert scale ranging from 0 ("Not at All") to 4 ("To a Very Great Extent"). A higher total score indicates that more facilitators and lower score that more barriers are perceived. Given that the items were based on existing findings (Lau et al., 2015), the content validity related to barriers and facilitators to implementing EBPs can be considered good.

Current Use of EBPs

Use of nine types of EBPs that were found to be effective by the National Standard Project (NSP) and the National Professional Development Center (NDPC) (Wong et al., 2014, 2015) and the systematic review of medical treatments for children with ASD (McPheeters et al., 2011) was examined. The EBPs were: Behavioral Interventions (e.g. imitation training, reinforcement schedules, video modeling), Cognitive Behavioral Intervention (i.e., behavior modification and cognitive restructuring), Comprehensive Behavioral Treatment for Young Children (e.g. the UCLA Young Autism program by Lovaas and colleagues), Language Training (e.g. Functional verbal communication), Naturalistic Teaching Strategies (e.g. verbal prompting), Parent Training (i.e., individual or group training by using training manuals), Peer Training (e.g., peer networks, integrated playgroups), Social Skills Training (i.e., behavioral interventions to improve

social and communicative competencies), and Antipsychotic Medications (Risperidone, Aripiprazole). The examples given here were also provided in the survey. Participants were asked to indicate whether they currently use the type of treatment by ticking a check box.

Ethical Considerations

The present study was approved by the Ethics Committee of Bangladesh Medical Research Council (BMRC; Ref: BMRC/NREC/2019-2022/386). Participants were informed that the survey was anonymous and the responses of the participants would be stored electronically on secured servers at the University of Goettingen, Germany, and the University of Dhaka, Bangladesh, to ensure confidentiality. At the end of the survey, contact details of the participants were removed from all records.

Procedure

Initially, eligible professionals in Bangladesh were contacted by phone, email, or met in person to make an appointment for the paper survey. After getting a positive response, research assistants met the participant in person, distributed an information sheet, which described the purpose of the study and the rights of the participants. All participants were assured that participation was voluntary and that they could stop the survey at any time without giving reasons. When participants agreed to participate, they signed the consent form and then filled in the questionnaire. Filling in the questionnaire took on average 45 min. Participants returned the completed surveys to the research assistants. The research assistants were present to give instructional support and to thank participants for completing the survey.

Statistical Analyses

All statistical analyses were performed using R (R Core Team, 2020). *P*-values less than 0.05 were considered statistically significant. Descriptive statistics were computed for all variables of interest. Means and standard deviations for the scores of the EBPAS-36 subscales as well as all barriers and facilitators items were calculated. Internal consistencies of subscales were assessed by Cronbach's alpha. Types of EBPs used were described by frequency rates.

To test Hypothesis 1, general linear models were built to assess the relationships between attitudes towards EBP (EBPAS-36 subscales) and demographic variables of Bangladeshi mental health professionals (working experience, caseload per year, gender, age, and service setting). Note that respondents' professional background and theoretical orientation were not included in the analyses due to multicollinearity with other predictors. Separate models were created for the scores of the nine subscales. To correct for multiple testing, a significance level of alpha $= 0.05/9 = 0.0056$ was used. For each significant model, ANOVAs were computed for the predictor variables. Again, we corrected for multiple testing.

To test Hypothesis 2, a general linear model for the sum score of the barriers and facilitators items and the demographic variables as predictors was set up and tested for significance. To find out which demographic variables (working experience, caseload per year, gender, age, and service setting) predict the perceived barriers, ANOVAs were run. Again, a correction for multiple testing was used.

To test Hypothesis 3, model comparisons were computed for each of the nine practices inquired about. A model including the factor service setting as a predictor of the usage of the respective type of intervention was compared to a model without the predictor. Due to the outcome being a categorical variable (usage yes *vs.* no) a likelihood ratio test was used for statistical comparisons. To correct for multiple testing, a significance level of alpha $= 0.05/9 = 0.0056$ was used.

To test Hypothesis 4, a general linear model was used to model the relationship between attitudes towards EBP, demographic variables, and perceived barriers and the number of different types of EBPs used. ANOVAs were run to assess the significance of individual predictors.

Results

Participants

Three hundred and two potential participants were identified through the initial search. Of them, 105 did not meet the inclusion criteria and were excluded. The total number of eligible participants was 197, of which 27 were not interested to participate. During this stage, one hundred and seventy participants were enrolled. Of the 170 participants, 13 participants declined to participate in the survey before signing the consent form. Written consent was obtained from 157 participants. Participants worked in seven public and seven private organizations serving children with ASD and seven special schools. Seven participants refused to complete the survey. A total of 150 mental health professionals and special teachers completed the survey (see Fig. 2 for the flow of participants). Thus, the response rate was 76.1%.

The mean age was 30.5 years and the majority of the participants fell into the age category of 21 to 30 years (n = 86, 57.33%). There were 107 females (71%) and 43 males (29%), who completed the survey. Professionals' years of experience ranged from two months to twenty-five years (Mean = 4.93 years, SD = 4.60). Participants had an average caseload of 416, but numbers varied widely. Therefore,
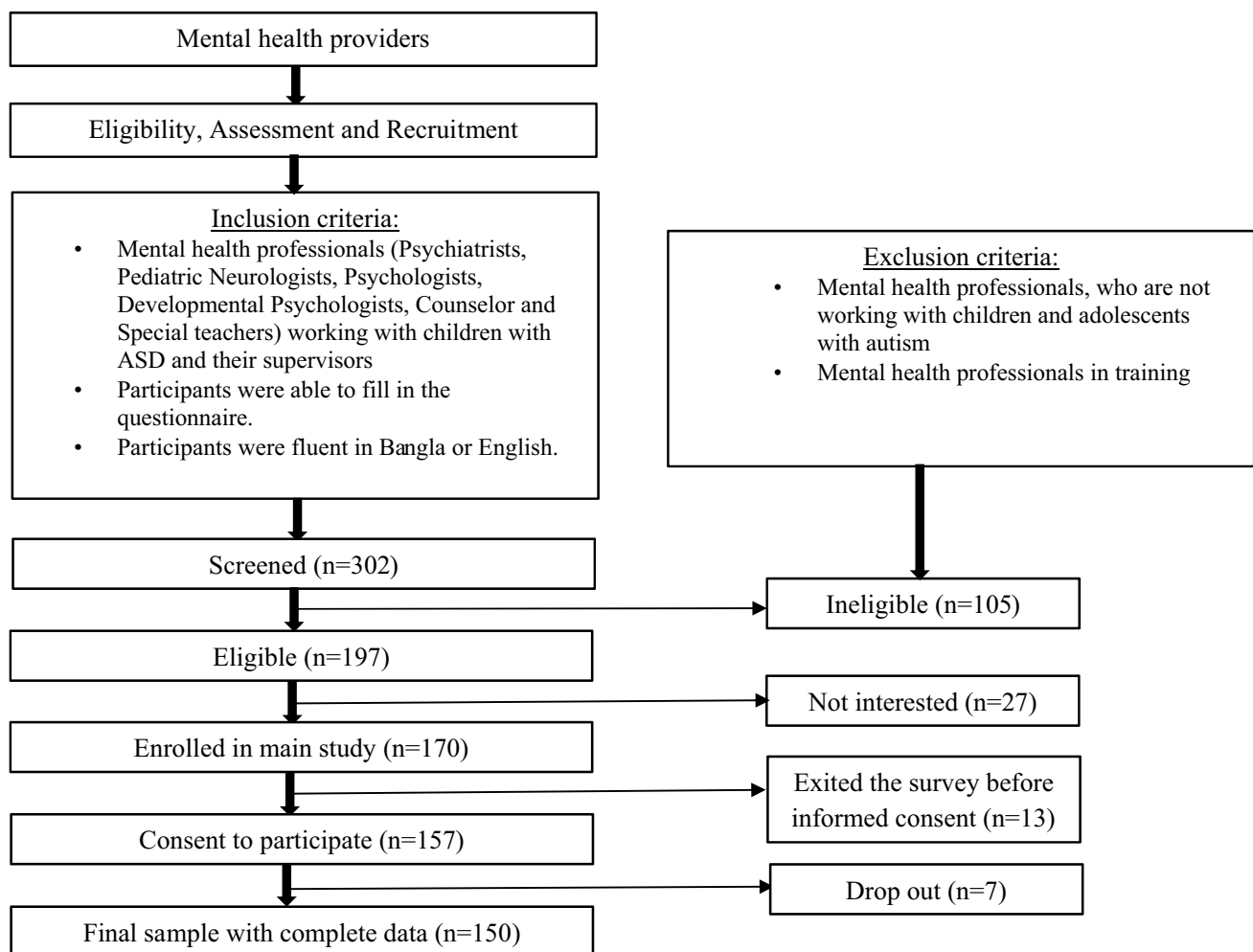
Fig. 2 Flow of participants

caseload was classified into three categories (see Table 1). In terms of service settings, 47.33% of participants worked in private clinical settings, 22% in public clinical settings, 27.33% in school settings; the remaining 3.34% were missing. Professions were special teachers (27.33%), medicine (11.33%), counselling (8.67%), psychology (12.67%). The majority of respondents reported having a variety of different professional backgrounds (n = 58, 38.67%). These professionals were assigned to the "other" category. Only 2 respondents (1.33%) did not report any profession. The respondents' theoretical orientations were eclectic (44%), cognitive-behavioral (36.67%), and others (18.66%), with data missing for one respondent. Participant demographic characteristics are provided in Table 1.

Attitudes Towards EBP

First, the internal consistencies of the nine EBPAS-36 subscales used in this study were analyzed. Six subscales had

acceptable to excellent internal consistencies: Openness, Limitations, Appeal, Fit, Job security, and Requirements (see Table 2 for details). The Divergence, Burden, and Balance subscales, however, had low consistencies (0.28, 0.48, and 0.56), which did not improve removing the least consistent item (Gliem & Gliem, 2003).

Mean ratings (and SD) of EBPAS-36 subscales can be found in Table 2. Overall, Bangladeshi mental health professionals had a mean score of 2.70 on the nine subscales, which indicates an overall favorable attitude towards EBP. Most participants assumed that learning an EBP and having respective expertise increases their job prospects (job security subscale). They also would be likely to adopt EBPs if it was required by the supervisor, agency, or state (requirements subscale). They also claimed that they would be likely to adopt an EBP if it 'made sense' to them, could be used correctly, or was being used by colleagues, who were happy with it (appeal subscale). Most were open to trying new interventions and would be willing to use structured or

Table 1 Demographic characteristics of participants (N = 150)

Characteristics	Mean	SD
Age	30.5	7.79
Years of experience	4.93	4.60
Caseload (per year)	416.30	863.36
	N	%
Gender		
Female	107	71.33
Male	43	28.67
Service settings		
Private	71	47.33
Public	33	22.00
Special school	41	27.33
Missing	5	3.34
Professional background		
Medicine	17	11.33
Psychology	19	12.67
Counselling	13	8.67
Special teachers	41	27.33
Other	58	38.67
Missing	2	1.33
Theoretical background[a]		
Cognitive-behavioral	55	36.67
Eclectic	66	44.00
Other	28	18.66
Missing	1	0.67

[a]Theoretical background refers to the theoretical framework of the intervention models the professionals are using

Table 2 Attitudes towards evidence-based practice, mean ratings EBPAS-36 subscales, standard deviations, confidence intervals (CI), and Cronbach's alpha values of internal consistency

Sub-scales	*M*	*SD*	*CI*	Cronbach's α
Openness	2.94	0.82	[2.81, 3.07]	0.75
Divergence	2.33	0.80	[2.20, 2.46]	0.28
Appeal	3.06	0.79	[2.93, 3.19]	0.69
Limitations	2.51	1.03	[2.35, 2.67]	0.60
Fit	2.87	0.87	[2.73, 3.01]	0.76
Balance	1.26	0.83	[1.13, 1.39]	0.56
Burden	2.90	0.85	[2.76, 3.04]	0.48
Job-security	3.29	0.83	[3.16, 3.42]	0.86
Requirements	3.14	1.05	[2.97, 3.31]	0.87

Scores were inverted for the subscales divergence, limitations, balance, and burden as recommended by the manual. Scales range from 0 "not at all" to 4 "to a very great extent"

manualized interventions. Many professionals perceived a fit of EBP with the characteristics and needs of the client and clinician. Some participants, however, perceived an inability of EBPs to address client needs (limitations subscale). The mean scores of the divergence, balance, and burden subscales were difficult to interpret due to their low internal consistency.

Perceived Barriers

The Cronbach alpha value of the thirteen items of the barrier and facilitators subscale was $\alpha = 0.88$, which indicates a high level of internal consistency. The mean score of all items was (2.41 ± 0.73), indicating that many participants perceived conditions as facilitating the widespread use of EBPs for ASD.

To simplify the results regarding individual barriers, responses were categorized as disagree (i.e., not at all or slight extent) or agree (i.e., great extent or very great extent), while the response "I agree to some extent" was considered neutral. Figure 3 shows these results. A majority of professionals (72.7%) agreed that their supervisors promoted the usage of EBPs compared to only 8.7% of practitioners, who disagreed. In addition, the majority of the professionals (71.3%) agreed that their organizations' goals and objectives were supportive to use the EBPs and that the existing
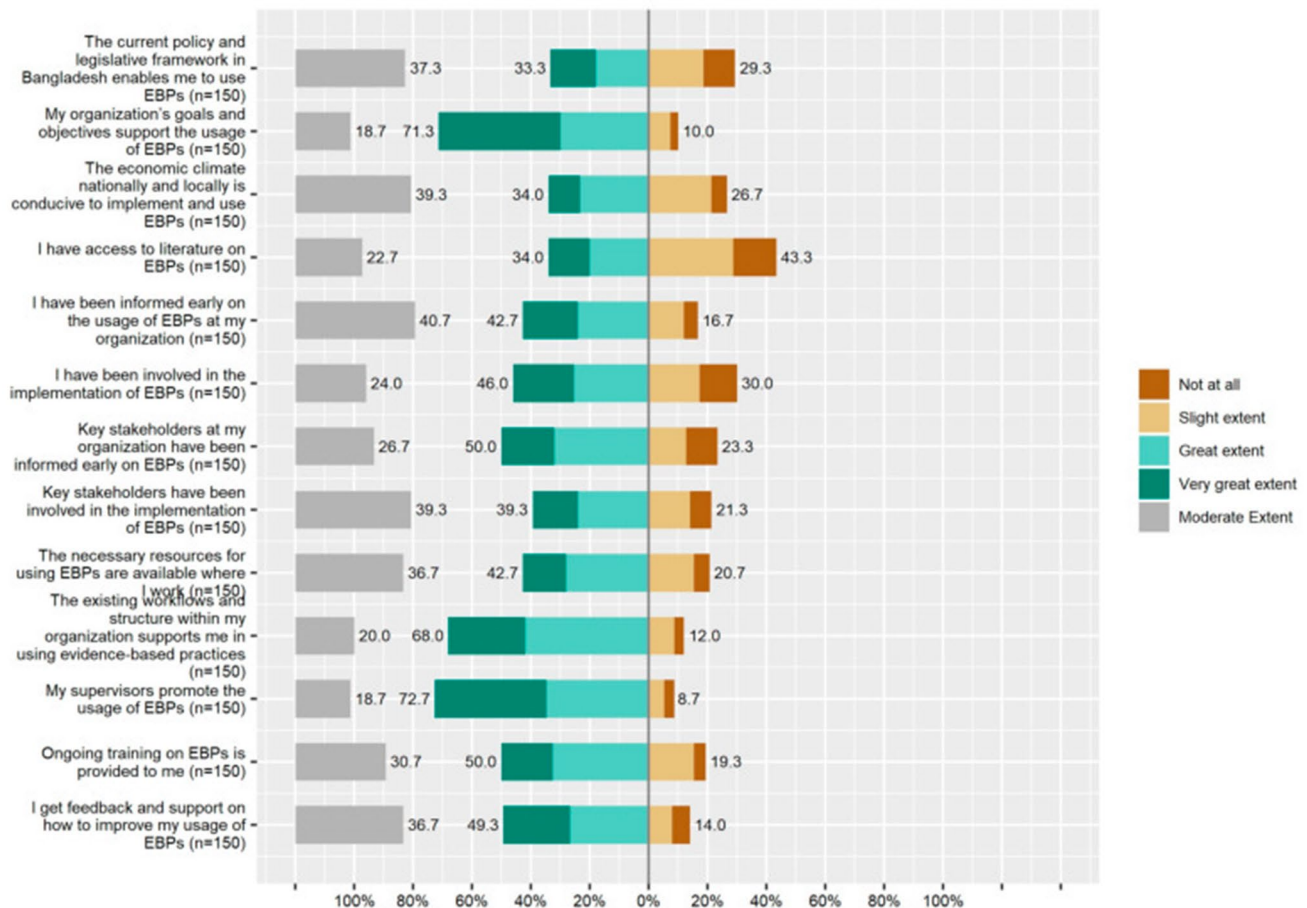
Fig. 3 Perceived barriers

workflows and structures within their organizations were helpful to use EBPs (68%). On the other hand, 43.3% disagreed with the statement "I have access to literature on EBPs (e.g. clinical or academic journals)", whereas 34% said that they had access. Half of the participants said that ongoing training on EBPs was provided to them, but 19.3% said that an ongoing training program was not available. Almost half of the participants (49.3%) agreed that they received feedback and support from their organizations to learn the usage of EBPs. Forty-six percent of participants said they were involved in the implementation of EBPs. Thirty-four percent agreed with the statement "The economic climate nationally and locally is conducive to implement and use EBPs" whereas 26.7% disagreed. Thirty-three percent agreed with the item "The current policy and legislative framework in Bangladesh enable me to use EBPs", while 29.3% did not. Forty-three percent agreed that the necessary resources (e.g. funding, adequate staff with appropriate skills, training, and ongoing support) for using EBPs were available where they worked, but 20.7% claimed they were not (see Fig. 3 for more results).

Relationships Between Attitudes Towards Evidence-Based Practice, Perceived Barriers, and Demographic Variables

Results are shown in Table 3. Results are provided for all EBPAS-subscales although three had low internal consistencies (divergence, balance, burden). Some demographic variables (gender, age, working experience, caseload per year, and service settings) predicted some types of attitudes towards EBP. For five of the nine subscales, no demographic predictors were significant (openness, divergence, limitations, burden, and job security, see Table 3 for details). Models were significant for the appeal, fit, balance, and requirements subscales and explained between 20% (balance) and 34% (fit) of the variance. Patients seen per year and the service setting were the most consistent predictors of attitudes. For the appeal subscale, caseloads per year ($F_{(2,129)} = 6.863$, $p = 0.001$) and service setting ($F_{(2,129)} = 9.645$, $p = 0.001$) were significant predictors. For perceived fit, working experience ($F_{(1,120)} = 13.162$, $p = 0.001$), caseload per year ($F_{(2,120)} = 14.943$, $p = 0.001$),

Table 3 Relationships between attitudes towards evidence-based practice (EBPAS-36 subscales), perceived barriers, and demographic variables of Bangladeshi mental health professionals

Outcomes EBPAS Subscales and Perceived Barriers	Predictors	df	Mean square	F	p-value	Model test
Openness	Gender	1	0.041	0.061	0.805	$R^2 = 0.075$ $F(7,128) = 1.475$
	Age	1	0.146	0.217	0.642	
	Working experience	1	0.006	0.008	0.927	
	Caseload (per year)	2	2.165	3.214	0.043	
	Service settings	2	1.218	1.807	0.168	
Divergence	Gender	1	3.263	5.447	0.021	$R^2 = 0.118$ $F(7,121) = 2.320$
	Age	1	0.059	0.099	0.754	
	Working experience	1	0.029	0.048	0.828	
	Caseload (per year)	2	1.163	1.942	0.148	
	Service settings	2	2.026	3.383	0.040	
Appeal	Gender	1	0.001	0.002	0.989	$R^2 = 0.216$ $F(7,129) = 5.086*$
	Age	1	1.127	2.194	0.141	
	Working experience	1	0.202	0.392	0.532	
	Caseload (per year)	2	3.526	6.863	0.010*	
	Service settings	2	4.955	9.645	0.001*	
Limitations	Gender	1	0.451	0.402	0.527	$R^2 = 0.024$ $F(7,128) = 0.452$
	Age	1	0.017	0.015	0.904	
	Working experience	1	1.186	1.058	0.306	
	Caseload (per year)	2	0.233	0.208	0.813	
	Service settings	2	0.714	0.637	0.531	
Fit	Gender	1	0.268	0.532	0.467	$R^2 = 0.335$ $F(7,120) = 8.640*$
	Age	1	0.671	1.333	0.251	
	Working experience	1	6.621	13.162	0.001*	
	Caseload (per year)	2	7.517	14.943	0.001*	
	Service settings	2	3.915	7.782	0.001*	
Balance	Gender	1	0.587	1.002	0.319	$R^2 = 0.197$ $F(7,122) = 4.264*$
	Age	1	1.633	2.784	0.098	
	Working experience	1	0.322	0.549	0.460	
	Caseload (per year)	2	4.642	7.916	0.001*	
	Service settings	2	2.838	4.840	0.010*	
Burden	Gender	1	1.069	1.449	0.231	$R^2 = 0.069$ $F(7,125) = 1.316$
	Age	1	1.388	1.880	0.173	
	Working experience	1	0.068	0.093	0.761	
	Caseload (per year)	2	2.045	2.770	0.067	
	Service settings	2	0.093	0.126	0.881	
Job security	Gender	1	0.225	0.320	0.573	$R^2 = 0.039$ $F(7,127) = 0.734$
	Age	1	0.003	0.004	0.949	
	Working experience	1	0.278	0.394	0.531	
	Caseload (per year)	2	0.106	0.150	0.861	
	Service settings	2	1.453	2.059	0.132	
Requirements	Gender	1	0.067	0.081	0.777	$R^2 = 0.219$ $F(7,128) = 5.130*$
	Age	1	3.369	4.082	0.045	
	Working experience	1	1.334	1.617	0.206	
	Caseload (per year)	2	4.961	6.011	0.003*	
	Service settings	2	7.473	9.053	0.001*	

Table 3 (continued)

Outcomes EBPAS Subscales and Perceived Barriers	Predictors	*df*	*Mean square*	*F*	*p*-value	Model test
Barriers and facilitators	Gender	1	0.428	0.780	0.380	$R^2 = 0.067$ $F(7,113) = 1.155$
	Age	1	0.935	1.702	0.195	
	Working experience	1	0.001	0.001	0.987	
	Caseload (per year)	2	1.228	2.237	0.112	
	Service settings	2	0.310	0.564	0.570	

*p-value < 0.05 after correcting for multiple testing

Table 4 EBPs currently used by mental health professionals, who are working with children and adolescents with ASD in different service settings

Intervention type	Private clinical setting		Public clinical setting		Special school setting		Model test for service setting
	n	%	n	%	n	%	
Behavioral Interventions (e.g., imitation training, reinforcement schedules, video modeling)	29	40.9	16	48.5	31	75.6	$Chi^2(2) = 13.37$*
Cognitive Behavioral Intervention(i.e., behavior modification and cognitive restructuring)	31	43.7	10	30.3	35	85.4	$Chi^2(2) = 28.77$*
Comprehensive Behavioral Treatment for Young Children (e.g., LOVAAS program)	14	19.7	5	15.2	19	46.3	$Chi^2(2) = 11.62$*
Language Training(e.g., Functional verbal communication)	29	40.9	17	51.5	33	80.5	$Chi^2(2) = 17.62$*
Naturalistic Teaching Strategies (e.g., verbal prompting)	22	31.0	17	51.5	32	78.1	$Chi^2(2) = 24.18$*
Parent Training (i.e., individual or group training by using training manuals)	35	49.3	12	36.4	26	63.4	$Chi^2(2) = 5.48$
Peer Training (e.g., Project LEAP, peer networks, integrated play groups)	15	21.1	9	27.3	22	53.7	$Chi^2(2) = 12.67$*
Social Skill Training (i.e., behavioral interventions to improve social and communicative competencies)	36	50.7	15	45.5	35	85.4	$Chi^2(2) = 17.93$*
Antipsychotic Medications (Aripiprazole, Risperidone, Chlorpromazine, Prochlorperazine, Clozapine)	17	23.9	5	15.2	0	0	$Chi^2(2) = 17.22$*

*p-value < 0.05 after correcting for multiple testing

and service setting ($F(2,120) = 7.782$, $p = 0.001$) were significant predictors. For balance (i.e., the matching of EBP with client´s and clinician´s values and needs), caseload per year ($F(2,122) = 7.916$, $p = 0.001$) and service setting ($F(2,122) = 4.840$, $p = 0.01$) were significant predictors. Requirement subscale scores were significantly predicted by caseload per year ($F(2,128) = 6.011$, $p = 0.01$), and service setting ($F(2,128) = 9.053$, $p = 0.001$). The mean ratings of the barriers and facilitators scale were not significantly related to professionals' demographic variables.

EBPs Currently Used by Mental Health Professionals Who are Working in Public, Private, and Special School Settings

Sixteen percent of respondents (n = 24) did not use any of the nine types of interventions, 12.7% (n = 19) of participants reported that they were using one type of intervention,

2.7%, (n = 4) selected two, 12.7% (n = 19) three, 10.7% (n = 16) four, 14.0% (n = 21) five, 10.7% (n = 16) six, 11.3% (n = 17) seven, and 9.3% (n = 14) reported using eight different types of interventions.

Table 4 shows the types of interventions being used by professionals as a function of service setting. As expected, some differences between service settings were found. The use of social skills training, cognitive-behavioral intervention, and language training were reported by more than 80% of the respondents in special school settings, while less than half of the respondents from private and public clinical settings reported using them. We found significant differences among service settings concerning the usage of all different interventions other than parent training interventions (see Table 4 for details). Providers in special school settings were more likely than those in public and private clinical settings to use social skills training, cognitive-behavioral intervention, and language training. In addition, more than

Table 5 Relationships between number of EBPs used, attitudes towards EBP, and demographic variables

Outcome	Predictors	df	Mean square	F	p-value	Model test
Number of evidence-based practices used	Gender	1	0.311	0.058	0.810	$R^2 = 0.404$ $F (17,73) = 2.908*$
	Age	1	0.006	0.001	0.973	
	Working experience	1	0.322	0.060	0.806	
	Caseload (per year)	2	1.900	0.356	0.702	
	Service settings	2	52.938	9.926	0.001*	
	Openness	1	0.399	0.075	0.785	
	Divergence	1	0.217	0.041	0.841	
	Appeal	1	0.680	0.128	0.722	
	Limitations	1	0.187	0.035	0.852	
	Fit	1	0.161	0.030	0.863	
	Balance	1	1.870	0.351	0.556	
	Burden	1	6.306	1.182	0.280	
	Job security	1	13.110	2.458	0.121	
	Requirements	1	130.390	24.448	0.001*	
	Barriers and facilitators	1	0.027	0.005	0.944	

*p-value < 0.05 after correcting for multiple testing

75% of the respondents from special schools indicated that they were currently using behavioral interventions and naturalistic teaching strategies, 63.4% were implementing parent training, and 53.7% were using peer training. These types of interventions were reported considerably less often in public and private clinical settings. Overall, comprehensive behavioral treatments and antipsychotic medications were used by less than 1 in 4 respondents (see Table 4 for details).

Relationships Between the Number of EBPs Used, Attitudes to EBP, and Demographic Variables

Professionals' attitudes towards EBP, perceived barriers, and the five demographic variables (age, gender, working experience, caseload per year, and service settings) were included as predictors in a model with the number of EBPs used as the outcome variable. The results are presented in Table 5. The overall model was significant $F (17, 73) = 2.908$, $p = 0.001$) and explained about 40% of the variance in the number of different practices used. ANOVAs revealed that only service setting ($F (2, 73) = 9.926$, $p = 0.001$) and the requirement subscale were significant predictors ($F (1, 73) = 24.448$, $p = 0.001$). The result indicates that professionals used a broader variety of EBPs when they agreed that they would adopt an EBP if it was required by the supervisor, agency, or state. As shown in Table 4, special school teachers used more EBPs than professionals in other settings.

Discussion

The aims of the present study were to examine mental health care professionals' and special teachers' attitudes towards EBP and their usage of EBPs for children and adolescents with ASD and to explore how providers' demographic factors are related to the attitudes and the adoption of EBPs in Bangladesh. A further aim was to identify potential barriers to the implementation and usage of EBPs. Based on the results, recommendations could be derived to support the more widespread use of EBPs.

The findings indicate a generally positive attitude of professionals towards EBP. A majority was open to the usage of manualized EBPs and found them appealing. They agreed that EBPs contribute to job security and that they would use them when required. Such a positive attitude is not unexpected, given the positive value assigned to EBP in academic training programs in Bangladesh and elsewhere. With respect to barriers, we inquired about the external context and the organization the professionals work in. These factors were found to be crucial according to the review of Lau et al. (2015). Many respondents judged the external and the organizational context as facilitating the implementation and usage of EBPs. For example, many agreed that their supervisors, organization, existing workflows and structures support the usage of EBPs.

There was, however, a substantial minority that perceived the situation differently. Roughly 20% said that they did not have the necessary resources and did not receive ongoing training. Given the very limited spending on mental health in Bangladesh (cf. Alam et al., 2020; Hasan et al., 2021), this number is rather low. Note, however, that participants

worked in many different institutions, some public, some private and for-profit, and some funded by NGOs.

Participants' responses were less clear concerning the presence of a national and local economic climate conducive to the implementation and usage of EBPs. Many only partially agreed with the statements on these topics. The same was true for the current policy and legislative framework in Bangladesh. Almost 30% of participants said that the present policies and legislative framework did not enable them to use EBPs. This finding seems surprising given recent legislation and government initiatives (see the introduction for details). One potential explanation might be a lack of awareness of these initiatives. Previous findings in other LMICs indicate that an appropriate legislative mechanism, as well as supportive national and local policies, can promote the implementation of EBPs (Adugna et al., 2020; Fontaine et al., 2010; Leonard et al., 2020). A lack of stated goals, clear priorities, and missing directions were found to be barriers (Eisner et al., 2011). Our findings suggest that such barriers sometimes still exist in Bangladesh.

A considerable number of participants (43%) reported that they had no access to literature on EBPs. This finding, however, is not specific to Bangladesh or other LMICs (see Aarons et al., 2012; Holzer et al., 2007; Kauth et al., 2011; Okamura et al., 2018; Pagoto et al., 2007; Rye et al., 2019; Toth & Manly, 2011).

The first hypothesis was that attitudes towards EBP depend on professionals' demographic characteristics. This hypothesis was supported by our findings. Clinicians with higher caseloads and clinicians who are working in private clinical and special school settings were more open to EBPs, found them more appealing, judged that they allowed for a good fit of values and needs of patients and clinicians, and said that they were inclined to use them when required. This finding was consistent with some previous findings which indicated that private professionals reported a greater perceived fit of EBPs with the characteristics and needs of clients (Aarons et al., 2012). It was inconsistent with findings by Rye et al. (2019), who found private practitioners to have a lower score on attitudes related to requirements. A possible explanation might be that surveyed clinicians working in a private setting in Bangladesh are less independent than clinicians working in private practice in Western HIC, as many participants worked in institutional settings.

Interestingly, we found no relation between caseload and perceived burden. This was inconsistent with previous findings from HIC that clinicians with higher caseloads associated EBP with more burden (Aarons et al., 2012; Okamura et al., 2018). Maybe the guidance and structure provided by EBPs are considered more helpful than the effort required. Work setting was also not related to the perception of high temporal demands and administrative burden. This finding is consistent with Aarons et al. (2012).

Contradicting to our second hypothesis, we found no relation of demographic characteristics and perceived barriers. This finding was somewhat surprising given the differences between settings in organization, funding, and patients cared for. One reason might be that there is also substantial heterogeneity within service settings when it comes to barriers. A second possible explanation might be that the significant efforts to promote, integrate, coordinate, and expand services to children with ASD have been successful. Another explanation is that organizational initiatives have been undertaken to implement EBPs.

Supporting Hypothesis 3, the number of different EBPs being used varied as a function of service settings. Specifically, professionals who are working in special school settings tended to use these interventions and a broader variety. This could indicate that special teachers seek out a multitude of interventions for children with autism compared to other practitioners. The present study found that social skill training and cognitive-behavioral interventions were the most commonly used practices in special schools and private clinical settings. This might not be surprising given that social-communication skill deficits are a common feature of autism (DSM-5; APA, 2013). Special teachers were also more likely to use peer training programs than clinicians (both in public and private settings). In these programs, peers play an active role in helping children with autism to develop social skills.

The type of treatment used most in all settings was parent-mediated interventions. Utilizing parent-mediated interventions helps to ensure cost-efficiency and sustainability in LMIC (Blake et al., 2017). In addition, non-specialist mediated interventions are particularly important, as preschool-age children with ASD and other NDDs spend most of their waking hours at home with their caregivers (Parsons et al., 2017; Reichow et al., 2013).

Comprehensive behavioral interventions were used by less than 50% of respondents in special school settings and below 20% both in public and private clinical settings. Comprehensive treatment programs are well investigated in HIC (National Research Council, 2001; Odom et al., 2010; Wong et al., 2015), but not in LMIC (Pervin et al., 2021). The high costs of these programs are likely to prevent their application.

Antipsychotic medications were the type of treatment used least. Several reviews have found these medications to be effective for severe behavioral problems at least short term (Ching & Pringsheim, 2012; Fung et al., 2016; Hirsch & Pringsheim, 2016; Khaleghi et al., 2020; McPheeters et al., 2011; Siegel & Beaulieu, 2012; Yu et al., 2020). They were used successfully in LMIC, although few studies have been conducted (Patra & Kar, 2021). Given the considerable side effects, practitioners in Bangladesh may not be confident to use them.

Sixteen percent of respondents used none of the listed EBPs and a further 15% only one or two. Thus, a considerable number of professionals did not use as many EBPs as they could. Limited resources, an underdeveloped health system; a lack of knowledge about ASD, and insufficient training may be reasons. A lack of knowledge, however, is unlikely, as all participants worked with children and adolescents with ASD. But, only 43% said they had the necessary resources and only 50% claimed to receive ongoing training. Other studies also reported these factors as reasons for inadequate access to treatments in LMIC including Bangladesh (Bangladesh Bureau of Statistics, 2018; Dababnah & Bulson, 2015).

Hypothesis 4 was that practitioners' attitudes and demographic variables, as well as barriers, predict the use of EBPs. This hypothesis was partially supported. Only the requirement subscale and service setting were significant predictors of the number of different treatments used. One explanation why perceived barriers and attitudes were not predictive of the usage of EBPs in Bangladesh is that public health organizations have a strong formalization of rules, many regulations, and hierarchical authority structures. Thus, the types of treatments used are highly regulated. Our findings seem inconsistent with previous research (Aarons et al., 2009; Jensen-Doss et al., 2009; Reding et al., 2014) showing perceived barriers, limitations, and lack of appealing features to hinder the implementation and usage of EBPs. Note, however, that we did not investigate how often and how intensive participating professionals use EBPs, but how many different types they use. It could be that barriers and attitudes are not predictive of usage per se, but of the frequency and intensity with which the treatments are used.

Limitations

There are some limitations that should be considered. First, the sampling procedure may have limited the representativeness of the sample. To be included, professionals had to be listed in one of the registries we assessed and had to be specialized on working with children with ASD and other NDDs. It turned out that the final sample only came from the area of Dhaka. Health care providers from rural areas were lacking from our sample. Therefore, the generalizability of the findings may be limited to the capital of Bangladesh.

A second limitation is the sample size. As outlined above, the number was sufficient to establish small to medium effects with respect to Hypotheses 1 and 2. Further analyses investigating the three different settings and differences within these settings, however, were not possible. Note that the overall number of eligible professionals was rather small, which reflects the situation in Bangladesh. There are only a few trained professionals caring for children with ASD. Of the eligible professionals, a large number participated (76%).

A third limitation is that the study considered only a limited set of factors potentially relevant for the implementation and usage of EBPs. The survey included demographic variables, attitudes, and perceived barriers, but not other aspects that are known to contribute to the use of EBPs in mental health settings, such as leadership, organizational climate, and system factors. As described above, the current survey already took 45 min to complete. Given the temporal constraints and the high workload of professionals in Bangladesh, we were not able to address more factors in the survey.

A fourth limitation was that we had to translate the EBPAS-36 (Rye et al., 2017) into Bangla for this study. Although the EBPAS-36 is a well-validated instrument in Western countries (e.g., Norway, USA, the Netherlands, and Germany), it has not been validated in the context of Bangladesh. Therefore, we cannot be sure that measurement invariance is given. The low internal consistency of some of the subscales may indicate respective problems. Note, however, that the internal consistencies of the subscales for which significant results were found, were good. Excluding the inconsistent subscales, would not have changed our results and the interpretation of the findings.

Implications for Practice and Future Research

Despite the limitations, this study has important implications. The dissemination and implementation of EBPs to improve the quality of mental health services and outcomes for children with ASD is a relatively new field in Bangladesh and other LMICs. Increasing EBP delivery has the potential to enhance treatment outcomes for youth and families. A clearer understanding of the factors precipitating providers' adoption of EBPs may help to bridge the evidence-practice gap when implementing EBPs. The current study's findings may be helpful for the realization of the Bangladesh government's plan to improve services and outcomes for children and adolescents with ASD and other NDDs. The results show the barriers that have to be addressed when implementing the strategic plan. Considering the rather low number of participants who receive ongoing training, the government and non-governmental organizations should develop certifying training programs, research programs, and treatment dissemination strategies for mental health professionals, special teachers, and associate service staff. These programs should increase the knowledge about EBPs and address concerns related to EBPs use.

Within organizations, conditions (e.g., support by supervisors, available resources, processes and systems) seem to support the usage of EBPs quite often, but not always. Therefore, these conditions should be explored in each organization, before the implementation of new EBPs starts. Implementation strategies should be tailored to the specific

organization and its professionals to improve attitudes and thereby increase the usage of EBPs.

Parent-mediated interventions are being used in many low-resource settings, yet inequalities in access to these programs remain a challenge, due to financial, geographic, and cultural barriers (Gillespie-Lynch & Brezis, 2018). The same is true for Bangladesh. The findings indicate that 1 in 3 participating professionals did not use parent training. The use of existing parent-mediated ASD interventions, which are designed in HICs, is difficult and the materials usually require a great deal of modification and adaptation. The government should strengthen efforts towards increasing awareness of these interventions and support researchers, who are developing community-based ASD interventions in the context of Bangladesh.

The current research showed that attitudes towards EBP and perceived barriers varied between professionals and within different service settings. Therefore, it is important to do further research using mixed methods in the specific branches of the Bangladeshi health system as described above. Furthermore, future research should examine the extent to which patient outcomes vary depending on attitudes towards EBP, barriers, and implemented EBPs.

These recommendations may support the success of "The National Strategic Plan for Neuro-Developmental Disorders 2016–2021" by the Government of Bangladesh, which aims to spread the use of EBPs. We hope that the findings help to successfully implement EBPs, which reduce the disability and improve the quality of life of people with ASD.

Declarations

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

Ethical Approval The study was approved by the National Research Ethics Committee (NREC) of Bangladesh Medical Research Council (BMRC) (Reference Number: BMRC/NREC/20I 9-2022/ 386).

Informed Consent Informed consent was obtained from all individual participants included in the study.

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Chapter 4

Manuscript 3

Attitudes Towards Evidence-Based Practice and Usage of Evidence-based Practices for Children and Adolescents with Autism Spectrum Disorder: A Comparison of Mental Health Professionals in Bangladesh and Germany

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Abstract

The dissemination and implementation of evidence-based practices (EBPs) to ensure a high quality of mental health services for children with autism spectrum disorder (ASD) is a critical concern worldwide. Research examining factors facilitating the implementation of EBPs found that providers' attitudes are an important factor. The present study examined cross-cultural differences in attitudes towards EBP, in the number and types of EBPs used, and in the relations between demographic variables, attitudes, and EBPs between mental health professionals providing treatment to children and adolescents with ASD in Bangladesh and Germany. Two-hundred-ninety-two professionals who worked in a clinical setting responded to the survey and fulfilled the inclusion criteria (101 in Bangladesh, 191 in Germany). Reported use of different EBPs was higher in Germany than in Bangladesh. Measurement invariance across countries could be established for four of nine subscales of the Evidence-Based Practice Attitude Scale. Comparative analyses showed that professionals in both countries were open to using EBPs, but German practitioners were more likely to use EBPs when they appealed to them. By contrast, Bangladeshi professionals claimed to be more likely to adopt an EBP when required and to be more willing to learn EBPs to enhance job security. Caseload and age were related to attitudes and the relation of caseload and attitudes varied between countries. The findings highlight the importance to consider country-specific factors when implementing EBPs. Directions for conducting international comparison studies on mental health professionals' attitudes towards EBP including methodological considerations are discussed.

Keywords: Mental Health Professionals. Attitudes. Evidence based practice. Autism spectrum disorder

Introduction

Autism spectrum disorder (ASD) is a pervasive neurodevelopmental disorder with a specific combination of impairments in social communication, repetitive behaviors, highly restricted interests, and/or sensory behaviors beginning early in life (APA, 2013; AWMF, 2015; Lai, Lombardo, & Baron-Cohen, 2014; Le Couteur & Szatmari, 2015; Lord et al., 2020). The full spectrum of autism includes a wide range of symptoms and diagnostic labels (e.g., Autistic Disorder, Asperger's Disorder, Rett Syndrome, Pervasive Developmental Disorder Not Otherwise Specified). High rates of co-occurring somatic and psychiatric disorders are found in this population (Fortuna et al., 2016; Hossain et al., 2020; Lai et al., 2019; Muskens et al., 2017).

ASD is a global public health concern because of its prevalence and its effects on individuals and families (Catalano, et al., 2018; Hou, et al., 2018; Kamp-Becker et al., 2011; Lyall et al., 2017). In recent years, cases of autism have been on the rise. The estimated global prevalence of ASD is 1–2%, but estimates are higher in high-income countries (HIC; Baxter et al., 2015; Elsabbagh et al., 2012). The World Bank and the World Health Organization classify countries according to their Gross National Income (GNI) per capita. In 2021, the year in which the data for the present study were collected, the thresholds for Lower Middle-Income Countries (LMIC) were 1,046US$ - 4,095US$ per year; for HIC more than 12,695US$ per year. Germany (a HIC) has a low rate of autism with 72.2 per 10,000 people or 1 in 139 people (World Population Review, 2021). The rate is lower than in other HICs. An earlier study reported rates between 0.22% and 0.38% for the period 2006 to 2012 based on a sample of 0- to 24-year-olds (Bachmann et al., 2018). The prevalence rates of ASD in LMICs are uncertain. A systematic review from Bangladesh reported that the prevalence in South Asia ranged from 0.09% in India to 1.07% in Sri Lanka (all countries were LMIC). In Bangladesh (a LMIC), the observed prevalence ranged from 0.15% to 0.8% (Hossain et al., 2017; WHO, 2021). A study conducted in a rural community in Bangladesh reported an even lower prevalence of 0.075% (Akhter et al., 2018).

ASD is a cost-intensive disorder, and the strain on health care systems increases with age (Barrett et al., 2012; Barrett et al., 2015). The costs of providing support and care can be quite substantial. The estimated lifetime societal costs in HIC are $2.4 million per individual in the US and $1.5 million in UK (Buescher, et al., 2014). In Germany, the average annual costs of an individual with ASD were €3287 (Höfer, et al., 2022). These costs are covered by the statutory health insurance or social services for people living with disabilities (ASD is considered a disability according to German law). There are specific regulations which restrict the treatments and services paid for, whose discussion is beyond the scope of the current paper.

In Bangladesh, ASD-related costs are unclear. Overall mental health expenditures by the Bangladeshi Government are 0.44% of the total health budget (Alam, et al., 2020; Hasan et al., 2021). Of all the expenditures on mental health, 67% are devoted to mental hospitals and 33% are dedicated to all other mental health sectors. Health insurance is a rarity and no mental disorders are covered by social insurance schemes (Islam & Biswas, 2015). Professionals, who provide treatment and care, usually charge BDT 320−1600 per visit (approx. $4−20) (Ehsan et al., 2018). These costs are covered by donor agencies or the families of patients. As children and adolescents often require several visits per year, the costs to be covered by families can by quite high.

Healthcare delivery services for ASD in Germany and Bangladesh

In Germany treatments and services for those living with mental disorders are mainly provided by specialized mental health professionals. There are an estimated 14,354 psychiatrists working in a country of 83.29 million people (Melcop et al., 2019; https://www.dgppn.de/_Resources/Persistent/17452fbcf559a53a36e71334cde8d18e8d6793fa/20210727_Factsheet_Kennzahlen.pdf). A report by the Federal Office of Statistics found that there were approximately 48,000 psychotherapists providing services for children and adolescents in 2019 and that the number was increasing by 2,000 psychotherapists per year

(https://www.destatis.de/DE/Presse/Pressemitteilungen/2021/03/PD21_N022_23.html). There are also several specialized psychiatric outpatient services (Bachmann & Hoffmann, 2015). Autism Therapy Centres provide outpatient therapeutic support and treatment (Bundesverband autismus Deutschland e.V., 2020a; 2020b). The Federal Association of Autism Germany currently lists 145 therapy centres throughout Germany (Bundesverband autismus Deutschland e.V., 2022). Social or youth welfare services provide specialized autism therapy for a better integration and participation of patients (Frese, 2021). The multimodal and multi-professional therapy involves psychiatrists, psychotherapists, psychologists, pedagogues, social workers, occupational therapists, and speech therapists (Bundesverband Autismus Deutschland e.V., 2017). Surveys showed that individuals with ASD receive a wide variety of different treatments, for example, pharmacotherapy, ergotherapy, speech therapy, and psychotherapy (Bachmann & Hoffmann, 2015, Bachmann et al., 2018).

In contrast, mental healthcare services in Bangladesh are scarce due to a lack of funding, inadequately trained healthcare professionals, a lack of assistive technology as well as the stigma associated with disability (Islam & Biswas, 2015; Hasan et al., 2021). Currently, only 200 psychiatrists and 50 psychologists are available for roughly 163 million people (WHO, 2011; Soron, 2016). The National Institute of Mental Health (NIMH) and the Institute of Pediatric Neurodisorders and Autism (IPNA) provide comprehensive services to children with neurodevelopmental disorders and address the needs of underprivileged children, who have been suffering from epilepsy, cerebral palsy, autism, and other behavioral problems. In addition, private and non-governmental autism centers and clinics offer a range of services to children with ASD. Special schools are operated by public institutions, private organisations, and NGOs and provide speech and language therapy, play therapy, sensory integration therapy, music therapy, occupational therapy, and special education services (Situation Assessment of Autism and Neurodevelopmental Disorders in Bangladesh, 2016). A National Steering Committee for Autism and NDD (NSCAND) was established in 2012 which focuses on increasing awareness and improving the situation for children with Autism and NDD. It recommended a phased implementation of a national strategic plan for Neurodevelopmental disorders from 2016 to 2021 to ensure a better quality of life for children with autism and other NDDs.

Currently, there are no mandatory guidelines concerning ASD in Bangladesh or Germany. However, in May 2021 an evidence-based guideline "Autism Spectrum Disorders in Childhood, Adolescence, and Adulthood. Part 2: Therapy" was published by the Association of Scientific Medical Societies in Germany (http://www.awmf.org/leitlinien/detail/ll/028-018.html). It provides guidance on the assessment and treatment of ASD. In Bangladesh, there are no evidence-based guidelines. Every institution follows their own guidelines. Mental health service providers often follow recommendations of guidelines by the National Institute for Health and Care Excellence (NICE) in UK or the American Psychiatric Association (APA) (Ehsan et al., 2018). Nevertheless, a substantial gap between research findings and practice is evident in LMIC (Adugna et al., 2020; Blake et al., 2017; Dababnah & Bulson, 2015; Eid et al., 2017; Harrison et al., 2016; Saraceno et al., 2007; Saxena et al., 2007).

Mental health professionals' attitudes towards EBP and EBPs

Worldwide, there has been an increasing emphasis on the science of implementation and application of EBPs. Research findings indicate that a better implementation is related to better outcomes for patients (Durlak & DuPre, 2008; Schoenwald, et al., 2004), and increased cost-effectiveness of treatments (Andrews et al., 2004; Fortney et al., 2014; Hoagwood et al., 2014). The Exploration, Preparation, Implementation, Sustainment (EPIS) framework, for example, was developed to describe and guide an implementation process and to support respective research (cf. Moullin et al., 2019). The EPIS framework has been used in various service sectors, including child welfare, community mental health, and school settings (Aarons et al., 2011; Brookman-Frazee et al., 2019; Moullin et al., 2019; Stahmer et al., 2018). Studies building upon this framework found that the attitudes of practitioners towards the use of new practices indicate their readiness to implement EBPs and predict their uptake of EBPs (Aarons, et al., 2012; Moullin et al., 2019). Specifically, professionals' attitudes have been found to be important determinants of the actual implementation and use of innovations as well as the intentions to try new practices (Aarons, 2004; Aarons, 2005; Aarons et al., 2012; Candel & Pennings, 1999; Frambach & Schillewaert, 2002; Rogers, 1995).

Attitudes of mental health professionals in turn seem to depend on a multitude of factors including individual demographic factors (e.g., gender, years of experience) and organizational factors (e.g., leadership, social climate and organizational support, policies, and system factors; Aarons, 2004, Aarons et al., 2010, 2011, 2012; Beidas et al., 2015; Connors et al., 2019; Damschroder et al., 2009; Greenhalgh et al., 2004; Locke et al., 2019; Okamura et al., 2018; Powell et al., 2017; Rye et al., 2019; Smith, 2013; Vassos & Carroll, 2016; Wisdom et al., 2014). For example, in some studies men reported more negative attitudes towards adopting EBPs than females, whereas other studies found no sex differences (Aarons et al., 2012; Egeland et al., 2016; Rye et al., 2019; Sonsbeek et al., 2015). Private practitioners (compared to the public) tend to garner more positive attitudes toward adopting EBPs (Aarons et al., 2012) and professionals with higher caseloads associated EBP with more burden (Aarons et al., 2012; Okamura et al., 2018). Older practitioners considered EBP less relevant for job security and observed less organizational support for learning new EBPs (Aarons et al., 2009; Okamura et al., 2018; Rye et al., 2019). More experienced clinicians have perceived therapy as a balance between art and science (Aarons et al., 2012), however, they were less open to trying new interventions and a lower willingness to try or use more structured or manualized interventions (Aarons et al., 2010).

Basically, all of the research on attitudes and their relation towards the usage of EBPs has been conducted in HIC. Whether there are differences in the attitudes between professionals in LMIC and HIC is mostly unknown. Recently one study has been conducted in Bangladesh (Pervin & Hagmayer, 2022). It found that many Bangladeshi professionals who are working with children and adolescents had positive attitudes towards EBP and the usage of EBPs for children with ASD. Attitudes in turn were predicted by the service setting participants worked in and the number of cases seen. Interestingly, professionals working in special schools and those seeing more patients found EBP more appealing. A second major finding was that the service setting was predictive for

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the usage of EBPs. Special school teachers were more likely to use EBPs and a broader variety of EBPs, although it was not investigated how often these treatments were used with patients (Pervin & Hagmayer, 2022).

Unfortunately, the findings from Bangladesh by Pervin and Hagmayer (2022) cannot be directly compared to findings on attitudes from HIC, despite the fact that the Evidence-based Practice Attitude Scale-36 (EBPAS-36, Rye et al., 2017) was used to measure attitudes. The EBPAS was translated into several Western languages and psychometrically evaluated. It is unclear, however, whether there is measurement invariance between HIC and LMIC, which would be requirement for direct comparisons (Putnick & Bornstein, 2016). In addition, it's important to establish that the same aspects of attitudes are assessed in HIC and LMIC before (i) the relations of attitudes and demographic factors of professionals and (ii) the relations of attitudes and the usage of EBPs are explored across different countries.

The aim of the present study was to investigate potential differences in attitudes towards EBPs, in the number and types of EBPs used, and in the relations between demographic factors, attitudes, and EBPs between mental health professionals providing treatment to children and adolescents with ASD in Bangladesh and Germany. As explained above, there are substantial differences between Bangladesh as a LMIC and Germany as a HIC, including the number of mental health professionals, their training, the funding of services, and the services available to patients and their families. These differences may create differences in attitudes towards EBP and EBPs offered to patients.

Research Questions

The main research questions of the present study were:

1. Do mental health professionals' attitudes toward EBP, the number and types of EBPs used differ between Germany as a HIC and Bangladesh as a LMIC?
2. Which socio-demographic factors predict professionals' attitudes in Bangladesh and Germany?
3. Do attitudes predict the number of different types of EBPs used by professionals in Bangladesh and Germany?

Given the many differences between Germany and Bangladesh with respect to cultural activities, language, funding of healthcare, treatment facilities for individuals with mental health problems, training facilities for professionals, and knowledge as well as awareness about ASD among healthcare providers, we expected to find differences. However, as there was no comparative research before, we were not able to derive specific hypotheses. In consequence, the present research is exploratory in nature.

Method

Sample

The current study is part of a larger research project investigating the attitudes of professionals working with children and adolescents with ASD and their relation to the usage of

evidence-based treatments. For the present study, only professionals working in a clinical setting providing treatments were included. As these professional engage in active therapeutic interventions, we considered them mental health professionals. We decided to use purposeful sampling and to search directly for professionals who are likely to work with children and adolescents with ASD.

Sampling Bangladesh

A list of potentially eligible professionals was collected from the websites of the Bangladesh Association of Psychiatrists, Bangladesh Society for Child Neurology, Bangladesh Clinical Psychology Society, Bangladesh School Psychology Society, Bangladesh Psychological Association, Disability service and support centers, Institute of Special Education and Special schools. To be included, professionals had to be licensed mental health professionals (psychiatrists, pediatric neurologists, psychologists, developmental psychologists, counselors), and/or special teachers working with children and adolescents with ASD and their supervisors. Participants had to be fluent in Bangla or English. Potentially eligible participants were contacted by email or phone. Of the initially identified 302 professionals, 105 did not meet the inclusion criteria. Of 197 eligible professionals, 157 gave informed consent to participate in the study. The survey was completed by 150 participants (see Pervin & Hagmayer, 2022, for more details). Of these participants, 101 worked in a clinical setting, 44 in a special school, and 5 did not provide respective information. The 101 mental health professionals were included in the current study.

Sampling Germany

A list of potentially eligible participants and organizations (i.e., associations of professionals, therapy centers, specialized clinics) was collected from respective websites (Psychotherapie-Informationsdienst, Deutsche Psychoanalytische Vereinigung, Verband Sonderpädagogik, Deutscher Verband für Ergotherapie, Bundesverbandes für Ergotherapeuten in Deutschland, Informationsportal Frühförderstellen.de, Bundesverband autismus Deutschland, Berufsverband für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie, Bundesarbeitsgemeinschaft der Leitenden Klinikärzte für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie, Bundespsychotherapeutenkammer, Psychotherapeutenkammer Niedersachsen, Kassenärztliche Vereinigung Niedersachsen, Ärztekammer Niedersachsen, see Hansmann, 2022, for further details). 1127 professionals and organizations were contacted by email and asked to participate. In addition, 159 practices were contacted by mail. Inclusion criteria were the same as for the Bangladeshi sample. Of the 255 respondents, who provided informed consent, 10 did not meet the inclusions criteria and forty did not complete the survey. These respondents were excluded. Of the 205 valid participants, 14 worked in a special school setting and were excluded for the purpose of the current study leaving 191 participants.

Measures
Demographic characteristics
Participants' gender, age, years of experience (the number of years working as a mental health professional), caseload per year (the number of ASD patients worked with on average per year), workplace, professional background, and theoretical orientation were collected.
Attitudes
The Evidence-based Practice Attitude scale (EBPAS-36, Rye et al., 2017) was used. It measures mental health and social service providers' attitudes towards adopting EBPs. It was validated in US and Norwegian samples including psychologists, psychiatric, nurses, and psychology students (Rye et al., 2017). The EBPAS-36 has 12 subscales, with 3 items each. For the present survey, nine subscales were selected as being appropriate for the context of Germany and Bangladesh: *openness* to using EBPs, the intuitive *appeal* of adopting EBPs, the perceived *divergence* of professionals' usual practice from research-based or evidence-based interventions, *limitations* of EBPs and their inability to address client needs, EBPs *fit* with the values and needs of the client and therapist, *balance* between perceptions of clinical skills and science as important in service provision, the time and administrative *burden* with learning EBPs, *job security* related to expertise in EBPs or professional marketability provided by learning an EBP, the likelihood of adopting EBPs given *requirements* to do so. Participants respond to respective statements using a five-point Likert scale ranging from 0- "not at all" to 4- "to a very great extent". The EBPAS-36 had not been validated in the context of Germany and Bangladesh prior to the collection of data. Recently, a translation and validation study of a German version of the EBPAS-36 has been published showing good psychometric properties (Szota et al., 2021).

The English version of EBPAS-36 was translated into Bangla by the first author (MP) and into German by the second author (NH), and back-translated by the second and third author, respectively. The process included several rounds of translation and back-translation with rigorous comparisons between the original and the translated version according to guidelines for cross-cultural translation, adaptation, and validation of instruments (Sousa & Rojjanasrirat, 2011, WHO, 2019). For the Bangla version, a pre-test with mental health clinicians working at the University of Dhaka and mental health clinicians working at the University of Goettingen for the German version was conducted to ensure that all items were understood correctly. The questionnaire was pre-tested by five participants per country.
Perceived Barriers
Thirteen new items were developed to assess perceived barriers to the usage of EBPs. Responses to these items were not considered in the present study.
Current use of EBPs
In this section, participants were presented with nine EBPs for ASD. These treatments were established as evidence-based by the National Standards Project (NSP) and the National Professional Development Center (NPDC) (Wong et al., 2014, 2015) and a systematic review of medical treatments for children with ASD (McPheeters et al., 2011). The nine types of treatments were: behavioral interventions (e.g. imitation training, reinforcement schedules, video modeling),

cognitive behavioral interventions (i.e., behavior modification and cognitive restructuring), comprehensive behavioral treatments for young children (e.g. LOVAAS program), language training (e.g. functional verbal communication), naturalistic teaching strategies (e.g. verbal prompting), parent training (i.e., individual or group training by using training manuals), peer training (e.g., peer networks, integrated play groups), social skills training (i.e., behavioral interventions to improve social and communicative competencies) and antipsychotic medications (risperidone, chlorpromazine, prochlorperazine, clozapine). The examples shown were also given in the survey to describe each type of treatment. Participants were asked to tick a box when they currently used the type of treatment.

Procedure

Data were collected by a paper survey administered by research assistants in Bangladesh and an online as well as a paper survey in Germany. We decided to use these different methodologies to ensure a sufficient sample size in Bangladesh, where the total number of potential participants is rather low. By contrast, the number of potential participants in Germany is very large, as explained above. Therefore, we decided to use a widely distributed online survey in combination with a smaller postal survey.

In Bangladesh, potential participants were contacted by phone or email and informed about the study. When professionals agreed to participate, they were visited by a research assistant who obtained informed consent before providing the printed questionnaire. Questionnaires were available in Bangla and English, but all participants preferred the Bangla version. Participants filled in the questionnaire on their own. Research assistants provided clarifications when questions arose and thanked participants for completing the survey. All raw data were stored securely on a server of the University of Dhaka.

In Germany, potential participants were contacted by email and informed about the study. A link to an anonymous online survey was provided. The online survey first informed participants about the study, their rights as participants, and data protection. Participants were asked to provide their informed consent by pressing a respective button. The online survey was constructed using LimeSurvey (LimeSurvey, 2021) and hosted on a server of the University of Goettingen. Paper surveys were sent out to professionals working in private practices. The contacted practitioners received a cover letter, an information sheet on the study, a printed paper version of the questionnaire, and a prepaid envelope to return the questionnaire. The explanation of the study's purpose and the participants' rights in the paper version corresponded to the online version. Data were collected anonymously. All raw data were stored securely at the University of Goettingen, Germany.

Ethics

The present study was approved by the Ethics Committee of Bangladesh Medical Research Council Dhaka, Bangladesh (BMRC; Ref: BMRC/NREC/2019-2022/386). The Internal Review Board of the Georg Elias Mueller Institute for Psychology at the University of Goettingen adopted the approval by the BMRC. As explained in the previous section, all participants gave their informed consent. All data were collected anonymously.

Statistical Analyses

Statistical analyses were carried out using R (R Core Team, 2020). *P*-values less than 0.05 were considered statistically significant. Scores of the subscales of the EBPAS-36 were computed as described in the handbook (Rye et al. 2017). Before comparisons can be made between Bangladesh and Germany, it is crucial to establish measurement invariance for the subscales of the EBPAS. First the internal consistencies were assessed by Cronbach's alpha for each country. Next, confirmatory factor analyses (CFA) were computed for each country individually to test the assumed latent factor structure of the nine EBPAS-36 subscales used in the present survey. A combination of model fit indices was used to evaluate the results: the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Values greater than .95 for the CFI and TLI indicate acceptable fit (Hu & Bentler, 1999). RMSEA values less than .06, and SRMR values less than .08 also indicate acceptable fit (Hu & Bentler, 1999; Kelloway, 1998). Finally, multi-group confirmatory factor analyses were computed to test for configural, metric, and scalar measurement invariance (MI). Scalar MI is required before means can be compared (Putnick & Bornstein, 2016).

It turned about that MI could not be established for all nine subscales of the EBPAS. Therefore, a second set of analyses was computed for the four subscales of the EBPAS which had a good internal consistency in both countries. Again, confirmatory factor analyses for each country and a multi-group confirmatory factor analysis across countries were used to investigate MI. If necessary, assumptions were relaxed to establish at least partial scalar MI.

To answer Research Question 1a concerning differences in attitudes between countries, the means of the four EBPAS subscales for which partial scalar MI was given were compared using t-Tests. The significance level was adjusted to .0125 to correct for multiple testing. Research Question 1b concerned the number of EBPs used in Bangladesh and Germany. Mean numbers of different EBPs used were compared by t-Test. Research Questions 1c concerned differences in the usage of different types of EBPs. Differences between frequencies of usage for the nine individual EBPs were tested by Fisher's exact test. The significance level was adjusted to .0056.

To answer Research Question 2, which inquired about socio-demographic predictors of attitudes, we computed multi-level models for each of the four EBPAS subscales for which partial scalar MI could be established. Predictors were age, gender, caseload per year (as a categorical variable), professional background (psychiatry and psychology vs. other), and theoretical background (cognitive behavioural or behavioural vs. eclectic vs. other). We excluded the years of experience as a predictor due to a high correlation (>.8) with age. Country was used as a grouping variable, as participants were nested within country. Model comparisons (analyses of deviance) were used to find out which predictors were significant. Finally, model comparisons (fixed vs. random slope models) were used to find out whether the significant predictors differed in their predictiveness across countries. Note that we used this procedure to explore which variables are predictive and whether there are differences in predictiveness between countries. We had no specific hypotheses to be tested.

Research Question 3 asked whether attitudes predict the number of different types of EBPs used in Bangladesh and Germany. Again, we used multi-level modelling with country being the grouping variable. The four attitude subscales for which partial scalar MI could be established were used as predictors. As before, model comparisons were used to identify which predictors were significant and whether their predictiveness differed between countries. These analyses were again exploratory in nature.

Results

Participants

A total of 292 professionals working in a clinical setting and providing treatments to children and adolescents with ASD were included in the current study (n=191 for Germany; n=101 for Bangladesh). Table 1 provides an overview of the socio-demographic data. Participants from Bangladesh were on average 32.7 years old, participants from Germany 44.5 years. The mean years of experience were 5.9 years in Bangladesh and 16.5 years in Germany. In both countries the majority of participants were female. As the number of cases per year varied widely, numbers were categorized into three groups, up to 10 patients with ASD, 11 to 100 patients, and more than 100 patients per year. In Bangladesh numbers were considerably higher with more than a third of participants seeing more than 100 patients per year. In Germany a vast majority of participants worked with up to 10 patients and very few with more than 100 patients. In Germany almost half of the participants had a degree in psychiatry, medicine, or psychology, while only one in four did in Bangladesh. In Germany many of the participants categorized as having another profession were certified as a speech or occupational therapist (n=45). In Bangladesh, many of the participants categorized as other had a degree in counseling (n=13) or had several degrees (e.g. in special education and some sub-specialty of psychology). The theoretical orientation of most German participants was cognitive-behavioral (79.8%), followed by humanistic (32.5%), psychoanalytic or psychodynamic (18.8%). Note that participants were allowed to choose several options here. The Bangladeshi respondents' theoretical orientations were eclectic (49.5%) and cognitive-behavioral (37.6%). In both countries, most participants worked in an outpatient setting. In Germany, slightly more than a third of participants (37.7%) worked in their own practice, while only 15.8% of the participants from Bangladesh did.

Table 1 *Socio-demographic characteristics of the participants*

	Bangladesh		Germany	
Characteristics	Mean	SD	Mean	SD
Age	32.7	8.2	44.5	11.3
Years of Experience	5.9	10.2	16.5	10.2
	N	Percent	N	Percent
Gender				
Female	75	74.3%	134	70.2%
Male	26	25.7%	52	27.2%
Non-binary	-	-	3	1.6%
NA	-	-	2	1.0%
Caseload (per year)				
1-10	36	35.6%	130	68.0%
11-100	24	23.8%	49	25.7%
More than 100	37	36.6%	3	1.6%
Professional Background				
Medicine (incl. Psychiatry)	9	8.9%	20	10.5%
Psychology	17	16.8%	74	38.7%
Special Education	4	4.0%	33	17.3%
Other or double degree	69	72.3%	64	33.5%
Theoretical background[1]				
Psychoanalytic/Psychodynamic	3	3.0%	36	18.8%
Cognitive-behavioral	38	37.6%	162	79.6%
Humanistic	7	6.9%	62	32.5%
Eclectic	50	49.5%	26	13.6%
Other	19	18.8%	35	18.3%
Setting[1]				
Outpatient	81	80.2%	173	90.6%
Inpatient	16	15.8%	34	17.8%
NA	4	4.0%		
Private Practice				
Works in own private practice	16	15.8%	72	37.7%

[1] Multiple options could be chosen. Therefore, numbers add to more than 100%

Analysis of measurement invariance of subscales of Evidence-based Practice Attitude Scale

Internal Consistencies

For the German sample, consistencies of the nine subscales of the EBPAS-36 ranged from a standardized Cronbach's α of .45 to .92. The Divergence, Limitations, and Balance subscales had insufficient consistencies (.45, .52, and .52 respectively). Four subscales had acceptable levels of internal consistency: Openness (.77), Appeal (.75), Fit (.63), and Burden (.72). Two subscales had good internal consistencies: Job security (.83) and Requirements (.92). For the Bangladeshi sample, Cronbach's α ranged between .23 and .91. Like in the German sample, the subscales Divergence (.23), and Limitations (.55) had low consistencies. Acceptable consistencies were obtained for the subscales Burden (.60), Balance (.62), and Appeal (.70). Good internal consistencies were found for the subscales Openness (.83), Job security (.85), Requirements (.91), and Fit (.83).

Measurement invariance

An analysis of the configural model for all nine subscales did not indicate a good fit for the German sample, $\chi2 = 454.4$***, CFI = .91, TLI = .89, RMSEA = .055, SRMR = .064, or the Bangladeshi sample, $\chi2 = 396.0$***, CFI = .90, TLI = .88, RMSEA = .061, SRMR = .079. A multi-group analysis did not yield a good fit for the configural model, CFI = .90, TLI = .88, RMSEA = .061, SRMR = .071, or the model assuming the same factor loadings for both samples (i.e. weak measurement invariance), CFI = .88, TLI = .86, RMSEA = .066, SRMR = .085. Moreover, the more constrained model was significantly worse, $\chi^2 = 69.4$, $p < .001$. A model also assuming the same intercepts (i.e., strong measurement invariance) did not converge, which indicates that a respective model did not fit the data.

Four subscales of the EBPAS showed a Cronbach's alpha >=.70 in both samples: Openness, Appeal, Requirements, and Job security. Therefore, measurement invariance was tested for a model with these four subscales only. It turned out that the fit of the model in German sample was good, $\chi2 = 98.5$***, CFI = .96, TLI = .94, RMSEA = .074, SRMR = .058, and excellent in the Bangladeshi sample, $\chi2 = 59.1$, CFI = .98, TLI = .98, RMSEA = .048, SRMR = .046. The results for the multigroup analyses are shown in Table 2. It turned out that for these four subscales at least partial scalar invariance could be achieved. Note that scalar invariance (i.e. same structure of latent factors, same factor loadings, and same intercepts) are a requirement for meaningful comparisons across groups. Scalar invariance could not be fully obtained, as the respective model was significantly worse than the models making less strict requirements, although the model fit was still very good (see Table 2). However, by releasing some assumptions, partial scalar invariance resulted. That means that the respective model was not significantly worse than a simple configural model just assuming the same structure of latent factors. The following assumptions were released: for the subscale Appeal the same factor loading for item A24 ("If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if you felt you had enough training to use it correctly?") and same intercepts across countries for items A23 ("If you received training in a therapy or intervention that was new to you, how likely would you be to adopt it if it was being used by colleagues who were happy with it?") and A24 ("If you received training in a

therapy or intervention that was new to you, how likely would you be to adopt it if you felt you had enough training to use it correctly?"). For the subscale Openness the same intercepts for items A2 ("I am willing to try new types of therapy/interventions even if I have to follow a treatment manual") and A3 ("I am willing to use new and different types of therapy/interventions developed by researchers"). This means that the two subscales Requirements and Job security can be directly compared, while the comparisons for the subscales Appeal and Openness should be interpreted with caution.

Table 2 *Analysis of measurement invariance MI by multi-group confirmatory factor analyses. Model contains four subscales of the EBPAS: Openness, Appeal, Requirements, and Job security*

CFA models	χ^2	df	TLI	CFI	RMSEA (90% CI)	AIC
Configural MI	153.3***	96	0.97	0.95	0.066 [0.046-0.085]	7755.6
Metric MI	169.5***	104	0.96	0.95	0.068 [0.049-0.086]	7755.8
Partial Scalar MI[1]	171.5***	107	0.96	0.95	0.066 [0.047-0.084]	7751.8
Scalar MI	210.3***	112	0.94	0.93	0.080[0.063-0.096]	7780.6
Model comparisons	χ^2	df	p			
Configural vs. metric	16.2	8	.04*			
Configural vs. partial scalar	18.2	11	.08			
Weak vs. partial scalar	1.95	3	.58			

Note: *p<.05, **p<.01, ***p<.001.

[1] For the partial scalar invariance model the following assumptions were released: subscale appeal: same loading for one item and same intercepts of two items, subscale openness: same intercepts for items (see main text more information on specific items).

Research Question 1a: Differences in Attitudes towards EBP between Bangladesh and Germany

Mean ratings (and SD) of the EBPAS-36 subscales in Bangladesh and Germany can be found in Table 3. Note that only the four subscales are presented for which partial scalar MI could be established. The t tests revealed that German and Bangladeshi participants differed significantly on three subscales (Appeal, Requirement, and Job security). German participants had a significantly higher score (*M*=3.34) than Bangladeshi participants (*M*=3.08) on the Appeal subscale, indicating that German sample are more likely than Bangladeshi sample are to adopt a

new practice if it is intuitively appealing, "make sense" to them, could be used correctly, or it is being used by colleagues who are happy with it. For the Requirements and Job security subscales means were significantly lower for the German participants. This implies that German mental health professionals were less likely to adopt a new practice if it was required by an agency, supervisor or state and that they assigned lower value to job security for learning new EBPs than Bangladeshi participants. There were no significant differences between the German and Bangladeshi professionals on the Openness subscale. It is important to note that partial scalar measurement invariance was achieved, but some assumptions for the subscales Openness and Appeal had to be released. Therefore, the respective comparisons of means should be interpreted with caution.

Table 3 *Attitudes towards EBPs of mental health professionals in Bangladesh and Germany. Mean ratings (SD and CI) of four subscales of the EBPAS-36*

EBPAS-36 scale	Bangladesh			Germany			Comparison		
	M	*SD*	CI	*M*	*SD*	CI	t	df	*p*
Openness	2.92	0.82	[2.76-3.08]	3.04	0.74	[2.94-3.15]	-1.289	287	.198
Appeal	3.08	0.76	[2.92-3.24]	3.34	0.61	[3.24-3.43]	-2.934	157.8	.004**
Requirements	3.10	1.05	[2.89-3.31]	2.49	1.06	[2.33-2.64]	4.642	286	<.001***
Job security	3.21	0.85	[3.05-3.39]	1.55	1.12	[1.39-1.71]	14.098	250.9	<.001***

Note. Partial scalar measurement invariance was achieved, but some assumptions for the subscales Openness and Appeal had to be released. Therefore, the respective comparisons of means should be interpreted with caution. *$p<.05$, ** $p < .01$, *** $p < .001$.

Research Question 1b: The Number of EBPs used in Bangladesh and Germany

Figure 1 shows the percentages of participants that used zero to nine different types of evidence-based practices. As the figure shows, German participants used more types of EBPs than Bangladeshi participants. Interestingly, almost eighteen percent of Bangladeshi clinicians (n=18) did not use any of the nine types of interventions, whereas only 5% of German professionals (n=10) reported that they did not use any of them. The mean numbers differed significantly (Germany: M=4.31, SD=1.97, Bangladesh: M=3.28, SD=2.49, $t(167.98) = 3.61$, p=.0004). Thus, clinicians seem to use a broader variety of different types of treatment for children with ASD in Germany than in Bangladesh.
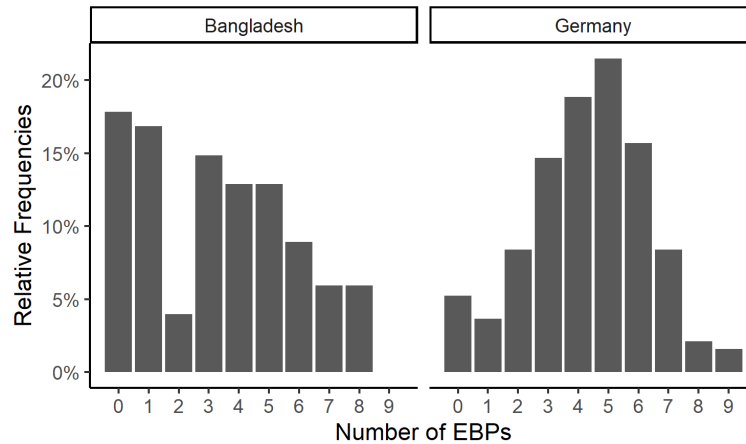
Fig. 1 *Number of different types of EBPs used in Bangladesh and Germany*

Research Question 1c: Types of EBPs used in Bangladesh and Germany

Table 4 shows how many participants in Bangladesh and Germany reported using each individual type of EBP. The use of behavioral interventions was reported by more than 80% of the respondents (n=161) in Germany, while around 45% of the respondents in Bangladesh reported using this type of intervention. In addition, more than 75% of the respondents in Germany (79.1%) indicated that they were currently using social skills training, 64.9% were implementing parent training, 62.8% were using cognitive behavioral interventions and 61% were using language training. These types of interventions were used less often by Bangladeshi respondents. The usage of these interventions differed significantly between the two countries (see Table 4 for details). There were no significant differences, however, with respect to comprehensive behavioral interventions, naturalistic teaching strategies, peer training, and antipsychotic medications). Interestingly, comprehensive behavioral interventions and antipsychotic medications were used only by a small number of respondents in both countries.

Table 4 *EBPs currently used by mental health professionals for children and adolescents with ASD in Bangladesh and Germany*

Intervention type	Bangladesh		Germany		Odds ratio and Fisher's exact test
	n	%	n	%	
Behavioral Interventions (e.g., imitation training, reinforcement schedules, video modeling)	45	44.6	161	84.3	6.63***
Cognitive Behavioral Intervention(i.e., behavior modification and cognitive restructuring)	40	39.6	120	62.8	2.57***
Comprehensive Behavioral Treatment for Young Children (e.g., LOVAAS program)	18	17.8	22	11.5	0.60

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Language Training (e.g., Functional verbal communication)	46	45.5	61	31.9	0.56*
Naturalistic Teaching Strategies (e.g., verbal prompting)	39	38.6	86	45.0	1.30
Parent Training (i.e., individual or group training by using training manuals)	47	46.5	124	64.9	2.12*
Peer Training (e.g., Project LEAP, peer networks, integrated play groups)	24	23.8	62	32.5	1.54
Social Skill Training (i.e., behavioral interventions to improve social and communicative competencies)	51	50.5	151	79.1	3.68***
Antipsychotic Medications (Aripiprazole, Risperidone, Chlorpromazine, Prochlorperazine, Clozapine)	21	20.8	36	18.8	0.89

* $p < .05$, ** $p < .01$, *** $p < .001$.

Research Question 2: Differences in the Predictive Values of Demographic Characteristics for Attitudes towards EBP between Bangladesh and Germany

The results of all analyses are presented in Table 5. Relations between demographic characteristics, which turned out to be predictors of the respective subscales are graphically depicted in Figures A1 – A4 in the appendix.

EBPAS-36 Openness

The comparison of a Nullmodel and a model with a random intercept model for country showed no significant improvement in model fit, $\chi2$ (1) = 0.001, $p = .984$. Adding demographic characteristics as predictors with fixed effects (age, gender, caseload, professional background, theoretical background, work in own practice) improved model fit, $\chi2$ (8) = 16.037, $p = .042$. Correcting for multiple testing for the four subscales, this improvement is not significant though. An analysis of deviance investigating the individual predictors showed age, $\chi2$ (1) = 7.935, $p = .005$, and caseload, $\chi2$ (2) = 6.033, $p = .049$, to be significant predictors of openness towards EBP. Adding random slopes for age, $\chi2$ (2) = 4.363, $p = .113$, as well as caseload, $\chi2$ (5) = 5.922, $p = .313$, did not significantly improve model fit. The relations between age and openness as well as caseload and openness are visualized in the Figure A1 in the appendix. The figure shows that overall age was negatively related to openness, but the relation tended to be positive in Bangladesh, but negative in Germany (due to the larger number of German participants and their higher age, the overall relation was negative). For caseload, openness tended to increase with caseload in Bangladesh, while openness tended to decrease in Germany when more than 100 patients were seen. As the analyses presented above show, these diverging tendencies were not significant though.

EBPAS-36 Appeal

Comparing a Nullmodel to a model with a random intercept for country showed a significant improvement in model fit, $\chi2$ (1) = 5.522, p = .019. This reflects the higher ratings of appeal in Germany (see Table 3). Adding demographic characteristics as predictors with fixed effects to the random intercept model significantly improved model fit, $\chi2$ (8) = 24.517, p = .002. An analysis of deviance showed gender, $\chi2$ (1) = 6.065, p = .014, and caseload, $\chi2$ (2) = 8.575, p = .014, to be significant predictors of the appeal of EBP. A random slope for gender, $\chi2$ (2) = 0.414, p = .813, did not significantly improve model fit, which indicates that there were no differences between countries. By contrast, a random slope for caseload, $\chi2$ (5) = 14.009, p = .016, did improve model fit. Figure A2 visualizes the relations. Interestingly, appeal increased with caseload in Bangladesh, while there was a tendency towards a negative relation in Germany.

EBPAS-36 Requirements

The comparison of a Nullmodel with model with a random intercept for country showed significant improvement in model fit, $\chi2$ (1) = 14.894, p < .001. As shown in Table 3, ratings for requirements were significantly higher in Bangladesh. Adding demographic characteristics as predictors with fixed effects to the random intercept model resulted in further significant improvement in model fit, $\chi2$ (8) = 35.451, p < .001. An analysis of deviance found that working in one's own practice, $\chi2$ (1) = 9.813, p = .002, and caseload, $\chi2$ (2) = 22.887, p < .001, were significant predictors for attitudes regarding requirements. Neither a random slope for working in one's own practice, $\chi2$ (2) = 2.673, p = .263, nor for caseload, $\chi2$ (5) = 5.531, p = .355, showed significant improvement in model fit. The relations are shown in Figure A3 in the appendix. While in Bangladesh the willingness to use EBPs when required clearly increased with caseload, no such relation was visible in Germany. In both countries the willingness to use EBPs when required was lower for professionals working in their own practice.

EBPAS-36 Job security

The comparison of a Nullmodel with model with a random intercept for country showed significant improvement in model fit, $\chi2$ (1) = 126.600, p < .001. Table 3 shows that mean ratings were substantially higher in Bangladesh. Adding demographic characteristics as predictors with fixed effects to the random intercept model did not significantly improve model fit, $\chi2$ (8) = 7.568, p = .477. Thus, demographic variables overall did not predict the willingness to learn new EBPs to improve job security. An analysis of deviance, however, found that age, $\chi2$ (2) = 3.876, p = .049, was a significant predictor for attitudes regarding job security. A random slope for age, $\chi2$ (2) = 0.037, p = .982, did not improve model fit. As Figure A4 in the appendix shows there was slight decrease in attitudes concerning job security, which was mainly driven by the on average older Germany participants.

Table 5 *Multi-level models for the EBPAS-36 "Openness", "Appeal", "Requirements" and "Job security" subscales and ANOVA of potential predictors age, gender, caseload per year (10 and less, 11-100, more than 100), professional background (medicine, psychiatry, or psychology vs. other), theoretical background (cognitive and/or behavioral vs. eclectic vs. other), work in own practice*

Openness

Models	AIC	Test	Likelihood Ratio	p	*Pseudo R^2*
1 Random intercept	623.2	1 vs Nullmodel	0.0 1	.984	<.001
2 Random intercept fixed effects	623.2	2 vs. 1	16.0	.042	.058
3 Random intercept random slope age	622.8	3 vs 2	4.363	.113	.016
4 Random intercept random slope caseload per year	627.3	4 vs. 2	5.922	.313	.022

ANOVA for predictors	df	Chi-squared	p
Age	1	7.93	.005
Gender[a]	1	1.11	.291
Caseload per year (categories)	2	6.03	.049
Professional background (Medicine or Psychology vs. other)	1	0.23	.630
Theoretical background (cognitive behavioral vs. eclectic vs. other)	2	2.78	.249
Works in own practice	1	1.56	.212

Appeal

Models	AIC	Test	Likelihood Ratio	p	*Pseudo R^2*
1 Random intercept	542.2	1 vs Nullmodel	5.522	.019	.021
2 Random intercept fixed effects	533.7	2 vs. 1	24.517	.002	.088
3 Random intercept random slope gender	537.3	3 vs 2	0.414	.813	.002

	AIC	Test	Likelihood Ratio	p	Pseudo R^2
4 Random intercept random slope caseload per year	529.7	4 vs. 2	14.009	.016	.051

ANOVA for predictors	df	Chi-squared	p
Age	1	0.001	.980
Gender[a]	1	6.065	.014
Caseload per year (categories)	2	8.575	.014
Professional background (Medicine or Psychology vs. other)	1	1.725	.189
Theoretical background (cognitive behavioral vs. eclectic vs. other)	2	2.127	.345
Works in own practice	1	3.392	.066

Requirements

Models	AIC	Test	Likelihood Ratio	p	Pseudo R^2
1 Random intercept	785.4	1 vs Nullmodel	14.894	<.001	.055
2 Random intercept fixed effects	765.9	2 vs. 1	35.451	<.001	.125
3 Random intercept random slope own practice	767.2	3 vs 2	2.673	.263	.010
4 Random intercept random slope caseload per year	770.4	4 vs. 2	5.531	.355	.021

ANOVA for predictors	df	Chi-squared	p
Age	1	1.360	.244
Gender[a]	1	2.414	.120
Caseload per year (categories)	2	22.887	<.001
Professional background (Medicine or Psychology vs. other)	1	0.000	.993

Theoretical background (cognitive behavioral vs. eclectic vs. other)	2	1.887	.389		
Works in own practice	1	9.813	.002		

Job security

Models	AIC	Test	Likelihood Ratio	*p*	*Pseudo R²*
1 Random intercept	763.2	1 vs Nullmodel	126.600	<.001	.383
2 Random intercept fixed effects	771.6	2 vs. 1	7.568	.477	.028
3 Random intercept random slope age	775.6	3 vs 2	0.037	.982	<.001

ANOVA for predictors	df	Chi-squared	*p*		
Age	1	3.876	.049		
Gender[a]	1	1.474	.225		
Caseload per year (categories)	2	0.650	.722		
Professional background (Medicine or Psychology vs. other)	1	0.098	.754		
Theoretical background (cognitive behavioral vs. eclectic vs. other)	2	0.561	.755		
Works in own practice	1	.001	.978		

Research Question 3: Attitudes and the Number of Different Types of EBPs used by Professionals in Bangladesh and Germany

The comparison of a Nullmodel with a model with a random intercept for country showed a significant improvement in model fit, χ^2 (1) = 7.104, p = .008. This finding reflects that German participants used a broader variety of evidence-based practices (see Table 3). Adding the scores of the EBPAS-36 subscales Openness, Appeal, Requirements, and Job Security as predictors with fixed effects to the random intercept model significantly improved model fit, χ^2 (8) = 98.232, $p <$ .001. An analysis of deviance showed that appeal was the only significant predictor for the number of different EBPs used by clinicians, χ^2 (1) = 8.087, p = .004 (see Table 6). A random slope for appeal, χ^2 (2) = 2.561, p = .278, did not significantly improve model fit. **Figure A5** depicts the relation between appeal and the number of EBPs in Bangladesh and Germany. In both countries the relation is positive.

Table 6 *Multi-level models for the number of EBPs used and ANOVA of potential predictors EBPAS-36 four subscales "Openness", "Appeal", "Requirements" and "Job security"*

Number of EBPs

Models	AIC	Test	Likelihood Ratio	*p*	*Pseudo R^2*
1 Random intercept	1187.8	1 vs Nullmodel	7.104	.008	.026
2 Random intercept fixed effects	1097.6	2 vs. 1	98.232	<.001	.321
3 Random intercept random slope appeal	1099.0	3 vs 2	2.561	.278	.010

ANOVA for predictors	df	Chi-squared	*p*		
Openness	1	0.186	.666		
Appeal	1	8.087	.004		
Requirements	1	1.939	.164		
Job Security	1	3.610	.057		

Discussion

The aim of this study was to investigate potential differences in professionals' attitudes towards EBP, in the number and types of EBPs used, and in the relations among demographic characteristics, attitudes, and EBPs between mental health professionals proving treatment to children and adolescents with ASD in Bangladesh and Germany. While Bangladesh is a lower middle-income country (LMIC) with only few mental health professionals and a rather underdeveloped health care system especially with respect to mental health, Germany is a high-income country (HIC) with many mental health professionals and institutions specialized to delivering care and treatment to children and adolescents with developmental disorders including ASD. Therefore, it is interesting to know, whether there are differences in attitudes towards EBP, the usage of different EBPs, and the relations among demographic characteristics, attitudes, and the number of different EBPs used.

To allow for a meaningful comparison, we focused on mental health professionals working in a clinical setting delivering care to children and adolescents with ASD. We chose such a specific group of participants to ensure that potential differences were not due to the work of participants or the treatments and practices which are evidence-based in their respective field. In principle the evidence is the same for Bangladesh and Germany, although very little of the evidence comes from LMIC (see Pervin et al., 2022).

Second, we tested measurement invariance for the subscales of the structured questionnaire we used to assess participants' attitudes before making comparisons. The EBPAS-36 (Rye et al., 2017) is well established and evaluated in Western HIC. The present study is the first to investigate psychometric properties and internal consistency of nine subscales of EBPAS-36 in Bangladesh and Germany. The internal consistencies of the subscales ranged from acceptable to good, with the subscales Divergence, Limitations, and Balance demonstrating the lowest internal consistencies in the German sample and the subscales Divergence and Limitations had low consistency in the Bangladeshi sample, which mirrors findings in a US sample (Rye et al., 2017). The previous findings indicate that the EBPAS-36 has adequate psychometric properties in a US (clinics providing mental health services) and a Norwegian sample (psychologists, psychiatric nurses, and psychology students; Rye et al., 2017). In Germany, one study reported good item properties, internal consistency, and convergent validity (Szota et al., 2021). Testing for measurement invariance, we found no invariance across countries for the nine subscales. This entails that the constructs measured had a different meaning or structure in the two countries and/or the questions were understood differently (Putnick & Bornstein, 2016). For four sub-scales, however, partial scalar invariance could be established: Openness, Appeal, Requirements, and Job security. Therefore, only these four subscales were used for comparisons between countries and other statistical analyses.

Our first research question (RQ 1a) concerned potential differences in attitudes towards EBP. Overall, the findings indicate a rather positive attitude of professionals in Germany and Bangladesh. A comparison of the scores of the four subscales showed that practitioners in both countries were similarly open to using EBPs. Studies from LMIC and upper middle-income countries (UMIC) (Hall et al., 2022; Busse et al., 2021; Vasudevan et al., 2020; Chetwin, 2018; Sico, 2019) reported higher levels of openness than studies from HIC (Aarons et al., 2010; James et al., 2019; Rye et al., 2017; Szota et al., 2021). It is important to note, however, that none of these studies made direct comparisons establishing measurement invariance before.

With respect to appeal, German professionals gave significantly higher ratings than Bangladeshi professionals, i.e. they would be more likely to use these EBPs if they seemed personally useful, if they felt sufficiently trained, and if colleagues were satisfied with them. One possible explanation might be that certified mental health professionals in Germany are rather free in using new treatments when there is evidence for them. This is especially true for those working in their own practice. Bangladeshi professionals, by contrast, often work in institutions with many regulations, which entails that they might be less flexible to try new things even when they are appealing. This finding is consistent with the previous findings from Germany reported that attitudes of social workers towards EBP were mostly positive if methods made sense, were appealing and enough training had been received to use the methods correctly (James et al., 2019). Aarons (2004) related appeal to processes of persuasion (Cialdini, et al., 1999; Tormala & Petty, 2002; Watkins, 2001, as cited in Aarons, 2004). Previous studies showed that there are differences between collectivist and individualist cultures with respect to persuasion processes (Alnunu, et al.,

2021; Aksit, 2020; Cialdini et al., 1999; Orji, 2016). Therefore, differences in appeal may reflect these cultural influences.

Concerning requirements, German professionals showed a significantly lower willingness to adopt an EBP if it was required at work, by their supervisor, or the state than Bangladeshi professionals. Other studies from HIC (Aarons et al., 2010; James et al., 2019; Rye et al., 2017; Szota et al., 2021) and from UMIC and LMIC (Busse et al., 2021; Chetwin, 2018; Hall et al., 2021; Sico, 2019; Vasudevan et al., 2020) also showed more positive attitudes on the requirement subscales in the latter countries, with the exception of Indonesia, but no direct comparisons exist in the literature. One possible explanation for the findings is that certified mental health clinicians in Germany are rarely required to use a specific type of treatment. In fact, there are no mandatory guidelines. Not being used to requirements, they may be less willing to concede and adopt them. By contrast, Bangladeshi professionals may welcome new requirements, which provide guidance and could simplify their daily work.

German professionals assigned a lower value to job security than Bangladeshi professionals. This means they were less willing to learn a new EBP to keep or find a new job. One explanation might be that a majority of German participants had a cognitive behavioral theoretical background and CBT practices are generally evidence-based. Thus, they may have felt little necessity to learn new EBTs. In addition, many had long years of experience and a third worked in their own practice, which entails that they had a high job security. By contrast, many Bangladeshi professionals claimed various theoretical backgrounds. They were also younger and had less experience. Therefore, the learning of new EBTs may be important for their future career.

Our second and third research question (RQ 1b & RQ1c) asked about differences in the number and the types of EBPs used in the two countries. We found that German professionals reported a higher number of different EBPs used than Bangladeshi professionals. Most of the EBPs (e.g. social skill training, cognitive behavioral interventions, behavioral interventions, and parent-mediated interventions as well) were more likely to be used by mental health professionals in Germany than in Bangladesh. There are numerous possible explanations for this finding. One is differences in training. More participants in Germany were had CBT theoretical background. Another possible explanation is that professionals in Bangladesh might be reluctant to use certain EBPs as evidence for them comes mostly from HIC (NPDC 2017a; 2017b; Parsons et al., 2017; Reichow et al., 2013; Steinbrenner et al., 2020; Ratliff-Blake & Therrien, 2021; Pervin et al., 2022). A final reason may be related to financial constraints. For example, comprehensive treatment programs, which are highly costly, were used infrequently in both settings. As described in the introduction, treatments can be financially demanding to parents in Bangladesh. Therefore, mental health professionals may often just provide counseling, but not implement EBPs. An interesting case are parent trainings. Although half of the participants in Bangladesh reported using them, more did in Germany. This is surprising, as parent-mediated interventions are commonly used LMIC due to their cost efficiency (Blake et al., 2017). In a previous study from the same project, we found that a broader variety of EBPs was used in special school settings than in clinical settings in Bangladesh (Pervin & Hagmayer, 2022). This was also true for parent trainings. The

infrequent usage of antipsychotic medications (e.g., Aripiprazole, Risperidone) in both countries might be due to the low number of psychiatrists and other physicians participating. Non-medical professionals are usually not allowed to use them. In addition, clinicians may be reluctant to use them due to their significant side effects (National Research Council, 2001; Odom et al., 2010; Pervin et al., 2022; Wong et al., 2015; Ching & Pringsheim, 2012; Hirsch & Pringsheim, 2016).

Research Question 2 inquired about the relation of demographic characteristics and attitudes as well as potential differences in these relations between countries. It was analysed whether age, gender, caseload, work in one's own practice, and professional as well as theoretical background predicted attitudes. We found that demographic characteristics were associated with the intuitive appeal of EBP and the willingness to implement them when required. The relation was marginally significant for openness.

Caseload was the most important predictor being related to appeal, openness, and requirements. Overall higher caseloads were related to more positive attitudes. The relation, however, seems to vary between countries. Bangladeshi practitioners with higher caseloads reported a higher appeal of EBP, more openness, and more willingness to follow requirements, while in Germany the relations tended to be negative or non-existent. This difference between countries was significant for appeal. The same, although non-significant difference emerged for openness and requirements. Previous literature from HICs reported that caring for a higher number of patients was associated with more negative attitudes towards EBP (Aarons, 2004; Aarons et al., 2012; Rye et al., 2019). In South Africa, a UMIC, in which practitioners are confronted with a high number of patients, higher caseloads were also associated with more negative attitudes, especially with respect to openness (Magidson et al., 2018). A possible explanation for the positive effect of caseload on Bangladeshi practitioners' attitudes might stem from the conditions mental health professionals, especially governmental health professionals face. Many are confronted with an inadequate infrastructure and supplies, high caseloads, administrative problems, or patients commonly seeking the help of unqualified private practitioners (Cockcroft et al., 2011, Hall et al., 2022). EBPs, which are derived from clinical research and provide an effective and structured approach to treatment, may be therefore perceived as very attractive, in particular for those that have to provide services to many patients.

We also found an effect of age on professionals' openness towards EBPs. Overall the association was negative, but there seems to be a difference between the two countries, with attitudes becoming increasingly negative with age in Germany and increasingly positive in Bangladesh. This difference, despite being apparent, was not statistically significant though. The negative relation in Germany may be explained by cohort effects related to changes in psychotherapy training, with EBPs becoming more important and more familiar to clinicians (van Sonsbeck et al., 2015; Szota et al., 2021; Aarons, et al., 2012; Gray et al., 2007; Rye, et al., 2019; James et al., 2019, Institute for Quality and Efficiency in Health Care, 2016). The comparably negative attitudes of younger practitioners in Bangladesh are consistent with findings of Cockcroft et al. (2011), who reported that practitioners under 40 years of age reported more work-related difficulties in Bangladesh, which may result in less openness to further types of treatment. Other

studies from LMIC and UMIC, however, reported no age effects (Hall et al., 2021; Busse et al., 2021; Vasudevan et al., 2020; Chetwin, 2018; Sico, 2019).

In both countries, females reported a significantly higher appeal of EBP. This finding is consistent with many previous studies (Aarons & Sawitzky, 2006; Aarons et al., 2010; Aarons et al., 2012; Rye, et al., 2019; Szota et al., 2021; van Sonsbeek et al., 2015), although a few reported no gender differences (Gray, et al., 2007; Melas et al., 2012).

Practitioners working in their own practice reported significantly more negative attitudes towards requirements in Germany and in Bangladesh. This finding is consistent with previous findings (Rye, et al., 2019), who found clinicians working in private practice to be less willing to adopt an EBP when required. A possible explanation might be that clinicians working in their own practice prefer to be more independent and decide on their own on treatments for their patients.

Research Question 3 asked about the relation of attitudes and the number of different EBPs used and potential differences in this relation between countries. We found that only the intuitive appeal of EBPs was significantly and positively related to the number of different EBPs used. Professionals, who said that they would use a new EBP when they felt adequately trained, thought that it made sense, and knew that colleagues were happy with it, used a greater variety of EBPs. This was true for both Bangladesh and Germany. This finding is consistent with previous findings that a lack of appealing features hinders the implementation and usage of EBPs (Aarons et al., 2009; Jensen-Doss et al., 2009; Reding et al., 2014).

Overall, the results showed interesting similarities and differences in attitudes towards EBP and usage of different EBPs between countries. The openness towards trying new EBPs did not differ, despite all the differences between Bangladesh and Germany. German professionals found EBPs more appealing than their Bangladeshi colleagues, but appeal was positively related to the variety of EBPs used in both countries. The willingness to use EBPs when required and the willingness to learn EBPs to improve job security was higher in Bangladesh, which is understandable given the different circumstances and work conditions of mental health professionals outlined above. An interesting and rather unexpected finding was the differential effect of caseload on attitudes. In Bangladesh, a high number of patients treated per year was associated with more positive attitudes towards EBP, while this was not the case in Germany. Future research will have to explore the probably complex relations between caseload, training, available resources, experience, and attitudes as well as EBPs used.

Limitations

Some limitations of the present work should be considered. One concern was the low response rate in Germany, which is a familiar problem in online surveys (Van Horn et al., 2009). In addition, contacted professionals may have based their decision to participate depending on their interest in EBPs. Therefore, the composition of the sample may not be representative for mental health professionals working with children and adolescents with ASD in Germany. The same problem may be present in Bangladesh, but to a much smaller degree as a much larger proportion of the potentially eligible participants responded to the survey. Nevertheless, we cannot assume that the results are representative in both countries (Nübling et al., 2014).

A related concern may be the limited sample size, which did not allow to make comparisons between different groups of professionals in the two countries (e.g., psychologists or psychiatrists). A sample size calculation was performed in advance for the survey in Bangladesh (see Pervin & Hagmayer, 2022), which resulted in a required sample size of 150 participants to be able to analyse relations between demographic characteristics, attitudes, and EBPs used. The intended sample size of the German survey was matched to the Bangladeshi survey. These numbers, however, were calculated for all professionals working with children and adolescents with ASD which includes teachers in specialized schools. For the present study we focused only on participants that worked in a clinical setting in order to make the samples more comparable. In consequence, the overall sample size was slightly below 300. Note that this sample size is sufficient to detect small to medium effects between countries with high statistical power.

Another limitation is that we used different methodologies to collect our data in Bangladesh and Germany. We opted for paper surveys being personally delivered to participants in Bangladesh, and a mixture of a large online survey and a smaller postal survey in Germany. The reasons for doing so were explained above. This methodological difference may have affected results. We suspect, however, that the major impact were the different response rates already mentioned in the first paragraph of the limitations.

A specific problem of the Germany survey was that a new guideline for ASD was published during the survey, which was due to the publication being delayed by several months. Although we cannot rule out that this may have impacted the answers of the participants responding late, we suspect that this was not the case. It is unlikely that the professionals changed their practice or their attitudes within a few weeks after the publication.

A limitation was also that we could not establish measurement invariance across countries for all subscales of the EBPAS-36. This might be due to the fact that we had to translate the English version of the questionnaire into local languages as no translations were available when the surveys were conducted. The translations may have resulted in unintended differences in the meanings of particular items. In consequence, we refrained from computing an overall score for the attitude towards EBP. For the four subscales Openness, Appeal, Requirements and Job security subscales we were able to establish partial scalar measurement invariance, which allowed us to use the respective scores in our analyses. The fit of the respective model was very good. Nevertheless, we had to ease a few assumptions for the Openness and Appeal subscale.

Implications for Implementation of EBPs and Future Research

Despite the limitations outlined in the previous section, this study has implications for the implementation of EBPs and for further research. The differences between the countries indicate that findings in one country cannot be transferred to another country. Therefore, attention should be paid to country-specific factors when formulating implementation strategies for EBPs. Relevant differences were found for the appeal of EBPs and requirements concerning the use of EBPs. The high willingness of Bangladeshi professionals to adopt an EBP when required points out that mandatory guidelines could be successful in Bangladesh. In Germany, by contrast, it might better to avoid requirements and to spend more effort to make EBPs appealing to practitioners. The

appeal of EBPs could be increased by providing respective trainings, which may also help to prevent misunderstanding of the concept of evidence-based practice (cf. Evidence-Based Medicine Working Group, 1992; Spies, 2019; Szota et al., 2021). Positive feedback by colleagues using EBPs may also be helpful to increase the appeal. Future studies will have to show, which of these strategies work the best in different countries.

Our study also provides some information for future international comparison studies on professionals' attitudes. Structured assessment tools for attitudes towards EBPs like the EBPAS-36, which have been successfully translated and validated in various Western HIC are a good starting point. But translating them into the language and the cultural context of non-Western LMIC (or UMIC) in a way that ensures measurement invariance will require new efforts in the future. Respective projects will require substantial funding and the collaboration of practitioners, language experts, and researchers from the respective countries. In addition, heterogeneous samples should be avoided as they may affect measurement invariance negatively. Thus, larger samples from the different countries should be investigated, which would allow researchers to focus on specific sub-groups of practitioners or to control for more potentially relevant factors than we did.

With respect to potentially relevant demographic variables, future studies may want to re-investigate the effect of age and caseload. In addition, the working conditions of the professionals should be investigated in more detail, including working hours, responsibilities, resources, leadership by superiors, on the job training, and the freedom to make decisions (cf. Lau et al., 2015). The resulting more specific findings may provide new effective leverage points for implementation strategies.

Conclusion

This is the first study that directly compared the attitudes towards EBPs and the usage of different EBPs in a HIC (Germany) and a LMIC (Bangladesh). It also represents one of the first endeavours to explore factors that may influence professionals' attitudes towards EBP in both countries. Future international comparison research needs to examine potential factors within and beyond professionals' attitudes to generate a more comprehensive understanding of the critical issue of professionals' attitudes by applying a mixed-methods design. This may help generate strategies to support the more widespread implementation of EBPs which improve the life not only of children and adolescents with ASD.

Appendix

Figure A1 *Relations between respondent's age and caseload per year (categorized as few=1-10 patients, moderate = 10-100, and many = more than 100) and openness subscale of the EBPAS-36 for Bangladesh and Germany. Note that age and caseload per year were the only significant predictors of openness.*
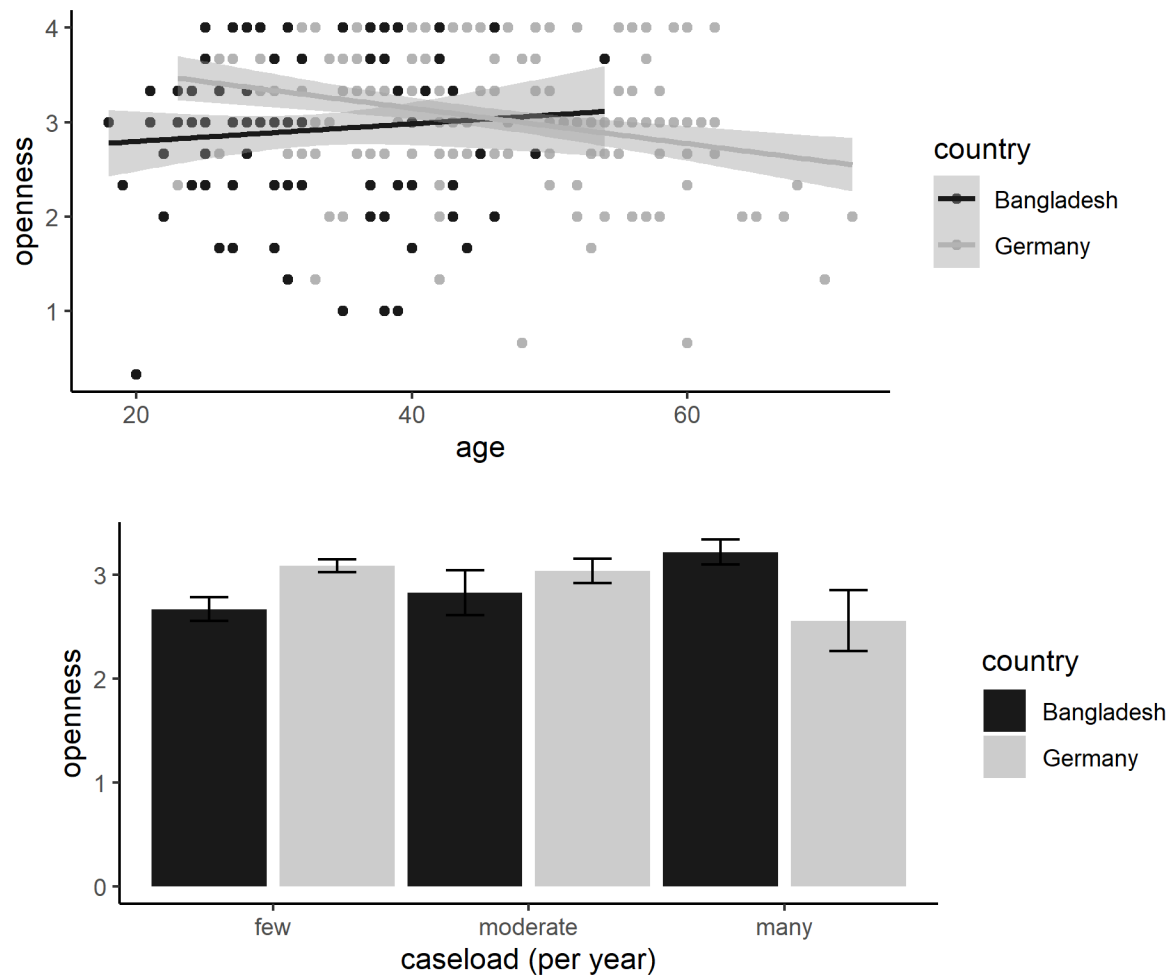
Figure A2 *Relation between respondent's gender (M=male, f=female) and caseload per year (categorized as few=1-10 patients, moderate = 10-100, and many = more than 100) and appeal subscale of the EBPAS-36 for Bangladesh and Germany. Note that gender and caseload per year were the only significant predictors of appeal.*
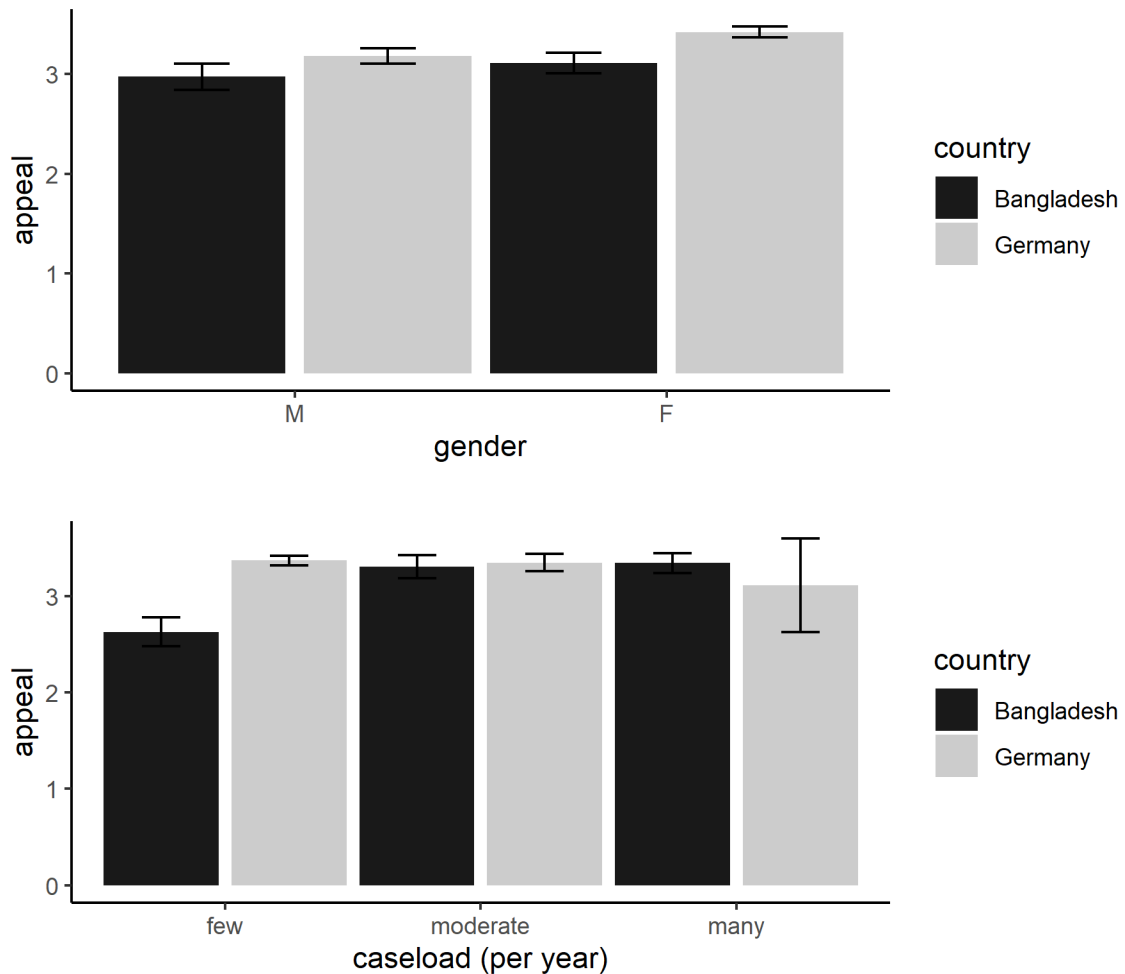
Figure A3 *Relation between caseload per year (categorized as few=1-10 patients, moderate = 10-100, and many = more than 100) and working in their own practice (0= no, 1 = yes) and the requirements subscale of the EBPAS-36 for Bangladesh and Germany. Note that caseload per year and working in one's own practice were the only significant predictors of requirements.*
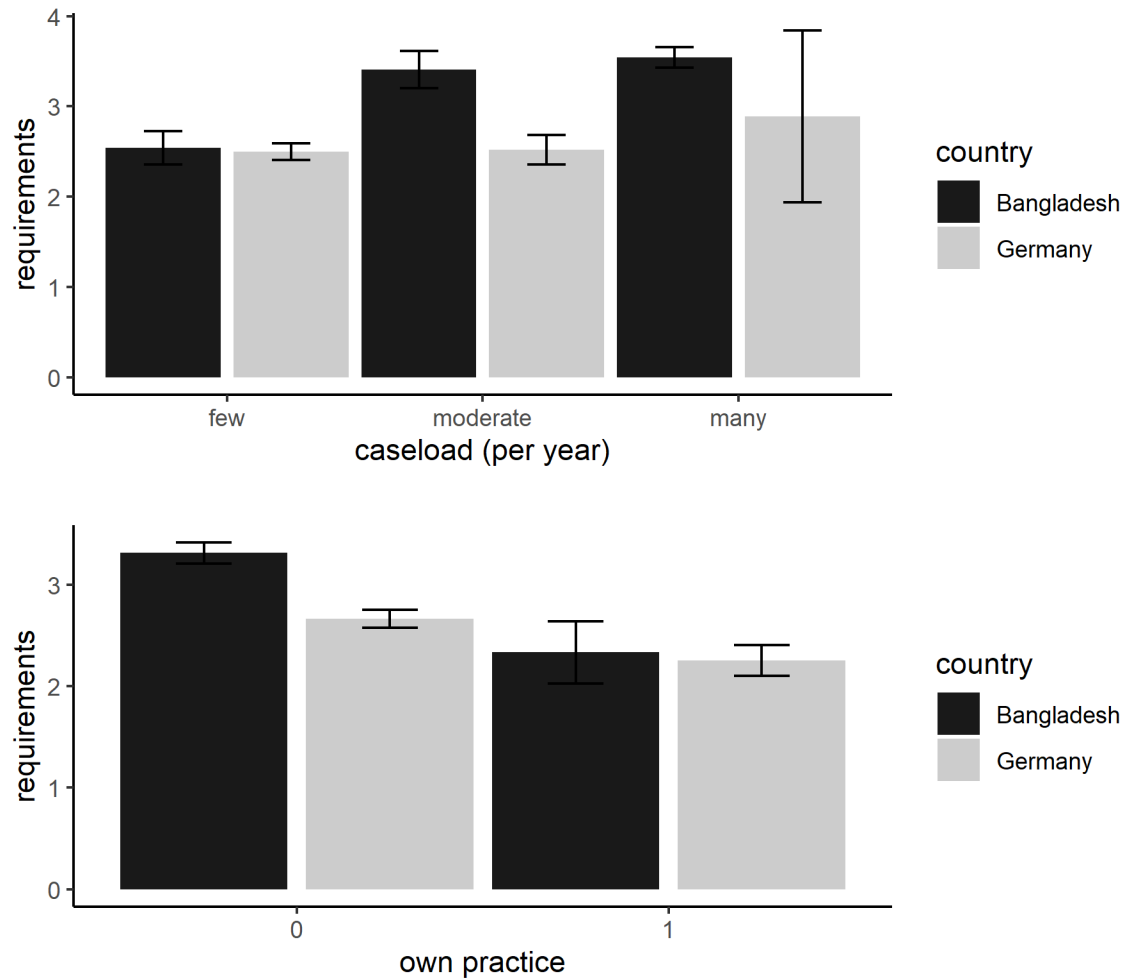
Figure A4 *Relation between age and the job security subscale of the EBPAS-36 for Bangladesh and Germany. Note that age was the only significant predictor of job security.*
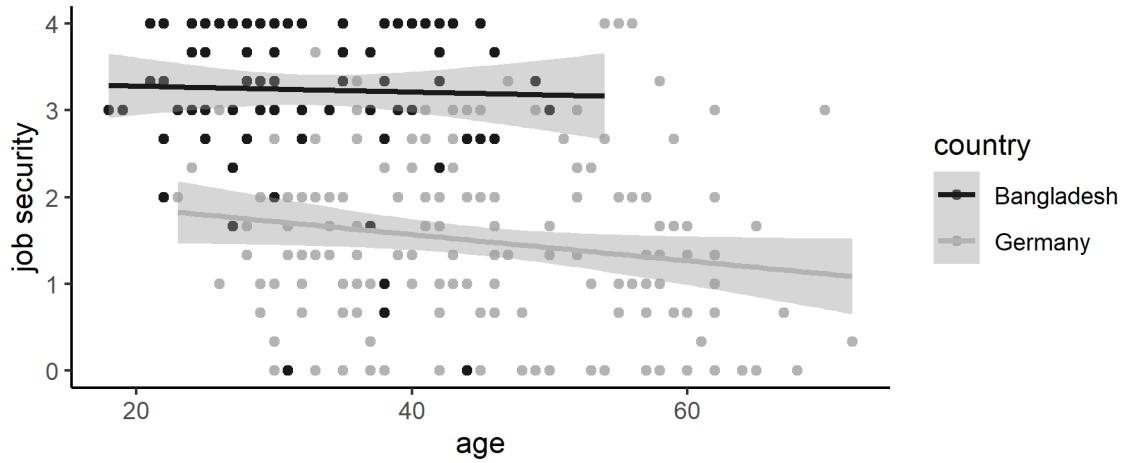
Figure A5 *Relation between appeal subscale and the number of different types of EBPs used by professionals in Bangladesh and Germany. Note that appeal subscale is the significant predictor of the number of EBPs used.*

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Chapter 5

General Discussion

5. General Discussion

The aims of the first part of this thesis were to find out whether there are differences in the effectiveness of interventions for children and adolescents with ASD between HIC and LMIC and which interventions can be considered evidence-based in LMIC (Study 1). The second study aimed to investigate mental health care professionals' and special teachers' attitudes towards EBP for children and adolescents with ASD in Bangladesh and to explore how providers' demographic factors are related to attitudes to and adoption of EBPs. This study also assessed potential barriers to the implementation and usage of EBPs. The third study aimed to look into cross-cultural differences in attitudes towards EBP, in the number and types of EBPs used, and in the relations between demographic variables, attitudes, and EBPs between mental health professionals providing treatment to children and adolescents with ASD in Bangladesh as a LMIC and Germany as a HIC.

This final chapter first summarizes and discusses the most important findings. After that, the strengths and limitations are discussed. Then the implications of these findings are presented, and the chapter ends with recommendations for future research.

5.1 Discussion of Findings

5.1.1 Evidence-based practices in HIC and LMIC

The first research question of the thesis was which types of treatments and interventions for children and adolescents with ASD can be considered evidence-based in LMIC?. A meta-review of systematic reviews was conducted. Thirty-five reviews that included research from LMIC and/or UMIC fulfilled the inclusion criteria. Thirty-one of these considered also research from HIC. Forty-six reviews, however, were excluded because they considered only studies from HIC. Although eleven of the reviews included research from HIC and LMIC, no review compared evidence from HIC and LMIC. Overall, there was rather little research from LMIC, which was partly of low quality. Based on studies considered in the reviews, no type of intervention could be considered evidence-based in LMIC according to the What Works Clearinghouse standards (version 4.1, https://ies.ed.gov/ncee/wwc/Resources/Resources for Reviewers), but parent-mediated interventions seemed promising. One likely reason for the lack of research is the limited amount of funding available, which is congruent with previous findings that LMIC are faced with financial constraints, absence of government initiatives, and inadequately trained healthcare professionals (Dababnah & Bulson, 2015; Saraceno et al., 2007; Saxena et al., 2007). Another possible explanation for the findings is that the awareness of the importance and knowledge about research methodologies is still moderate in some LMICs. A final reason might be that international publication fees are often prohibitively expensive, despite the price reductions for researchers from LMIC. This may reduce the international visibility of existing research.

5.1.2 Professionals' attitudes towards EBP and the usage of EBPs for children with ASD

The second set of research questions were "What are the attitudes towards EBP in Bangladesh? Are the attitudes towards EBP predicted by demographic variables?" while the third set was "Which EBPs do mental health professionals in Bangladesh use? Is the usage of EBPs predicted by attitudes?". The results of Study 2, a cross-sectional survey, indicated that many Bangladeshi mental health professionals and special teachers had positive attitudes towards evidence-based practice and the usage of evidence-based practices for children and adolescents with ASD. A majority was open to using EBPs and found them appealing. They would adopt an evidence-based practice if it was required by the supervisor, agency, or state and they would learn new EBPs to improve their job security. Such a favorable attitude is not unexpected, given the positive value assigned to EBP in academic training programs in Bangladesh. Interestingly, many respondents judged the external and the organizational contexts, i.e. their supervisors, organization, existing workflows and structures support the usage of EBPs. However, many professionals also reported some barriers to the implementation of EBPs e.g., no access to literature on EBPs. A substantial minority did not judge the national and local economic climate to be conducive to the implementation and usage of EBPs and they said that the present policies and legislative framework did not enable them to use EBPs. One possible reason may be a lack of awareness of respective governmental initiatives (see the Chapter 1.1.4 Barriers and facilitators to the implementation and usage of EBP and EBPs in the introduction for a summary). Previous studies from other LMICs indicated that an appropriate legislative framework, as well as supportive national and local policies can promote the implementation of EBPs (Adugna et al., 2020; Fontaine et al., 2010; Leonard et al., 2020).

Professionals with higher caseloads and professionals who are working in private clinical and special school settings were more open to EBPs, found them more appealing, judged that they allowed for a good fit of values and needs of patients and clinicians, and said that they would adopt an EBP when required. These findings are congruent with previous findings indicating that attitudes towards EBP depend on professionals' demographic characteristics, for example, private professionals reported a greater perceived fit of EBPs with the characteristics and needs of clients (Aarons et al., 2012). They were also inconsistent with findings by Rye et al. (2019), who found private practitioners to have a lower score on attitudes related to requirements. One potential explanation might be that surveyed professionals working in a private setting in Bangladesh are less independent than professionals working in private practice in HIC. The present study found no relation between caseload and perceived burden. This is inconsistent with previous findings from HIC, which indicate professionals with higher caseloads associated EBP with more burden (Aarons et al., 2012; Okamura et al., 2018). This may indicate that in Bangladesh the guidance and structure provided by EBPs are considered more helpful than the effort required. The present study found that work settings was to related to the perception of temporal demands and administrative

burden. This finding is consistent with Aarons et al. (2012). No relation between demographic characteristics and perceived barriers was found in the present study. This finding was somewhat surprising given the differences between settings in organization, funding, and patients cared for. One reason might be that there is also substantial heterogeneity within service settings when it comes to barriers.

Concerning the third set of research questions, a major finding was that the service setting and caseload per year were predictive for the usage of EBPs. Every type of intervention (except medication) was used by more professionals in special schools than in private and public clinical settings. It seems that special teachers seek out a multitude of interventions for children with ASD compared to other practitioners. Social skills training and cognitive behavioral interventions were the most commonly used practices in special schools and private clinical settings. Peer training programs where peers play an active role in helping children with autism to develop social skills were more likely used in special school settings than both in public and private settings. However, the type of treatment used most in all settings was parent-mediated interventions. This is congruent with previous findings that non-specialist mediated interventions are particularly important, as preschool-age children with ASD and other NDDs spend most of their waking hours at home with their caregivers (Parsons et al., 2017; Reichow et al., 2013). In the context of LMIC, utilizing parent-mediated interventions helps to ensure cost-efficiency and sustainability (Blake et al., 2017). Comprehensive behavioral interventions for high-cost and antipsychotic medication due to significant side effects were used least in the present study. It is important to note, however, that a considerable number of professionals did not use as many EBPs as they could. This might be due to limited resources, the overall underdeveloped health system, a lack of knowledge about ASD, and insufficient training, which are major barriers to the usage of EBPs in LMIC including Bangladesh (Bangladesh Bureau of Statistics, 2018; Dababnah & Bulson, 2015, Saraceno et al., 2007; Saxena et al., 2007).

5.1.3 Professionals' attitudes toward EBP, EBPs used and their relationship differ between Germany and Bangladesh

The fourth set of research questions of the thesis was "Do attitudes toward EBP, EBPs used and their relationship differ between Germany and Bangladesh?". To address these questions, the same cross-sectional survey was conducted in Germany and results were compared to the results from Bangladesh. To better align the samples, only responses from professionals working in a clinical setting and providing treatments to children and adolescents with ASD were considered. This study is the first comparative study, which investigated the attitudes of mental health professionals in a LMIC and HIC. The EPBAS-36 used in the survey was validated in US and Norwegian samples and recently in a German sample (Rye et al., 2017; Szota et al., 2021). Good psychometric properties were reported for these HIC. Results from LMIC are missing. An important part of the current study, therefore, was to examine measurement invariance for the nine

subscales of the EBPAS which were used. Measurement invariance (partial scalar invariance) could only be established for four of the nine subscales of EBPAS-36 across countries. One potential reason might be that the constructs measured by the other scales had a different meaning or structure in the two countries and/or specific questions were understood differently (cf. Putnick & Bornstein, 2016). A comparative analysis of the four remaining subscales showed that professionals in both countries were open to using EBPs, but German clinicians were more likely to use EBPs when they appealed to them. One reason might be that licensed German professionals, especially when they work in their own practice, are rather free to use new treatments when there is evidence for them. The findings conform to those of James et al. (2019), who reported similar findings with respect to appeal. On the other hand, Bangladeshi professionals claimed to be more likely to adopt an EBP when required and to be more willing to learn EBPs to improve job security. One possible reason for this finding is that Bangladesh practitioners may welcome new requirements, which provide guidance and could simplify their daily work, while German professionals are rarely required to use a specific type of treatment. Concerning job security, Bangladesh where practitioners were younger, less experienced, had a broader variety of theoretical backgrounds, and worked less often in their own practice than the German professionals. This may explain, why enhancing job security by learning EBPs is more important for the Bangladeshi processionals.

Study 3 also found that German professionals reported a higher number of different EBPs used than Bangladeshi professionals. Most of the EBPs (e.g. behavioral interventions, cognitive behavioral interventions, language training, social skill training, and parent-mediated interventions as well) were more likely to be used by mental health professionals in Germany than in Bangladesh. This is line with several other studies on LMIC (Dababnah & Bulson, 2015; Saraecno et al., 2007; Saxena et al., 2007). A large gap exists between evidence and practice in LMIC due to financial constraints, training, limited resources, and maybe unwillingness to use certain EBPs as evidence for them comes mostly from HIC (NPDC 2017a; 2017b; Parsons et al., 2017; Reichow et al., 2013; Steinbrenner et al., 2020; Ratliff-Blake & Therrien, 2021; Pervin et al., 2022). The meta review of Study 1 of this dissertation found that treatments for children and adolescents with ASD, which are considered evidence-based in HIC, are still rarely investigated in LMIC and cannot be considered evidence-based in these countries (Pervin et al., 2022). Study 2 of this dissertation found that a broader variety of EBPs was used in special school settings than in clinical settings in Bangladesh (Pervin & Hagmayer, 2022). At present, it is unclear why this was the case. In Studies 2 and 3, we found that parent-mediated interventions were used frequently in Bangladesh and even more in Germany. This practice is supported by previous findings which show that parent-mediated interventions were effective with good evidence especially for preschoolers in HIC (Parsons et al., 2017; Reichow et al., 2013; Ratliff-Blake & Therrien, 2021; see also Steinbrenner et al., 2020). The evidence is still insufficient for LMIC as Study 1 showed. The infrequent usage of comprehensive behavioral interventions in both countries found in Study

3 might be due to the high cost of comprehensive treatment programs. Concerning medical treatments, only a minority of participants were eligible to use antipsychotic medications (e.g., Aripiprazole, Risperidone) in both countries. Therefore, respective results might underestimate their actual usage.

The relation of demographic characteristics and attitudes as well as potential differences in these relations between countries were also investigated. An interesting and rather unexpected finding was the differential effect of caseload on attitudes. In Bangladesh, a high number of patients treated per year was associated with more positive attitudes towards EBP e.g., a higher appeal of EBP, more openness, and more willingness to follow requirements, while this was not the case in Germany. This difference between countries was significant for appeal. Previous findings were that higher caseload was associated with more negative attitudes toward EBP in HIC and UMIC (Aarons, 2004; Aarons et al., 2012; Magidson et al., 2018; Rye et al., 2019). We also found that age was negatively related to openness, but there seems to be a difference between the two countries. The relation tended to be positive in Bangladesh, but negative in Germany. This difference, however, was not significant. One possible explanation may be explained by cohort effects related to changes in psychotherapy training, with EBPs becoming more important and more familiar to clinicians (Aarons, et al., 2012; Gray et al., 2007; Institute for Quality and Efficiency in Health Care, 2016; James et al., 2019; Rye, et al., 2019; Szota et al., 2021; van Sonsbeck et al., 2015). The comparably negative attitudes of younger practitioners in Bangladesh are consistent with findings of Cockcroft et al. (2011), who reported that practitioners under 40 years of age in Bangladesh reported more work-related difficulties, which may result in less openness to further types of treatment, however, some studies from LMIC and UMIC reported no age effects (Busse et al., 2021; Chetwin, 2018; Hall et al., 2021; Sico, 2019; Vasudevan et al., 2020). Regarding gender differences, females reported a significantly higher appeal of EBP in both countries. This finding is consistent with many previous studies (Aarons & Sawitzky, 2006; Aarons et al., 2010; Aarons et al., 2012; Rye, et al., 2019; Szota et al., 2021; van Sonsbeek et al., 2015), although a few reported no gender differences (Gray, et al., 2007; Melas et al., 2012). Practitioners working in their own practice reported significantly more negative attitudes towards requirements in both countries, which is in line with a previous study (Rye, et al., 2019) that reported clinicians working in private practice to be less willing to adopt an EBP when required. A possible explanation might be that clinicians working in their own practice prefer to be more independent and decide on their own on treatments for their patients.

Study 3 also found that only the intuitive appeal of EBPs was a significant positive predictor of the number of different treatments used in Bangladesh and Germany. This finding is consistent with previous findings that a lack of appealing features hinders the implementation and usage of EBPs (Aarons et al., 2009; Jensen-Doss et al., 2009; Reding et al., 2014).

5.2 Strengths and Limitations

A strength of the current thesis is that several different methodologies were used across the three studies. Study 1 used a meta-review (i.e., a systematic review of reviews) and a review. Study 2 and 3 used a cross-sectional survey in Bangladesh and Germany. Study 3 was also a comparative study and tested for measurement invariance. A range of statistical methods were used including general linear models, multi-level models, and multi-group confirmatory factor analyses.

A strength of the meta-review in Study 1 was that provides a comprehensive overview of the effectiveness of different types of treatments for children and adolescents with ASD in HIC and in LMIC. While respective overviews existed for HIC (e.g. Odom, et al., 2014) and South Asia (Dabanah, et al., 2018), no review existed that aimed for a comparison between HIC and LMIC. Moreover, no review existed that evaluated the studies from LMIC for quality and evidence across studies in a systematic way. Study 1 filled this gap in the literature

A strength of Study 2 was the high response rate of eligible professionals and a sufficient power for conducting the statistical analyses. Moreover, it is the first study that investigated professionals' attitudes and usage of EBPs in Bangladesh. The dissemination and implementation of EBPs for children with ASD is a relatively new field in Bangladesh. Therefore, the results are relevant for ongoing efforts to improve the uptake of EBPs and the services provided to children and adolescents with ASD in Bangladesh.

A major strength of Study 3 was that it was the first study in which attitudes and the usage of EBPs were directly compared between Germany as a HIC and Bangladesh as a LMIC. As described above, comparisons were based on an analysis of measurement invariance across countries. The use of multi-level modeling allowed me to analyze whether relations between demographic variables, attitudes, and the variety of EBPs used differed between countries.

The current thesis also had its own inherent limitations and the result of the studies should be viewed in light of these weaknesses. Limitations of each study were already discussed in detail in the respective manuscripts. Therefore, only the most important aspects are highlighted here.

The major limitation concerning Study 1, was that only systematic reviews that were published between 2011 and the end of 2021 in English and considered research from HIC and LMIC and/or UMIC were taken into account. In addition, only three electronic databases (PsycINFO, PubMed, and Cochrane Database of Systematic Reviews) were searched. Unsystematic reviews and summaries of research studies that were not in English or were published in journals not included in these data bases were not taken into account. Therefore, some research from LMIC, especially LMIC in which English is not the language to publish local

studies, might have been overlooked. For example, almost no studies from Latin America were included in the reviews, which might be due to studies being published in Spanish or Portuguese.

One major limitation of Study 2 and 3 are their cross-sectional design. In consequence, the results only show associations but not cause and effect relations between attitudes and the usage of EBPs (Levin, 2006). Future research will have to use a longitudinal design to show whether changes in attitude lead to changes in usage or experimental designs, in which specific attitudes are manipulated through respective interventions. Longitudinal designs may also help to clarify the role of some demographic factors, for example training, experience, or age.

The purposeful sampling used in Study 2 and Study 3 is also a limitation. Potentially eligible participants, taken from publicly available databases, were contacted directly and invited to participate. This sampling process did not ensure that the samples were representative for Bangladesh and Germany. In Bangladesh participants came only from the area of Dhaka, where specialized services for children with ASD are available, but not from the underserviced countryside. In Germany, rather few participants had a medical background in psychiatry. Response rates between Bangladesh and Germany were also rather different. While in Bangladesh a majority of contacted persons participated, only a minority responded in Germany. This was probably due to participants being contacted and visited in person in Bangladesh, but invited to respond to an online or postal survey in Germany. Because of the non-representative samples, the generalizability of the findings is limited in both countries.

The major limitation of Study 3 was that measurement invariance could only be established for four subscales of the EBPAS. Thus, not all relevant aspects of attitudes towards EBP could be compared across countries. More efforts will be needed to revise the Bangla and German version of the EBPAS for future comparative research. is that we had to translate the English version of the EBPAS-36 (Rye et al., 2017) into the local language as no translations were available when the surveys were conducted. In study 2, it has not been validated in the context of Bangladesh. However, in Study 3, we could establish measurement invariance across countries only four subscales of the EBPAS-36, not for all subscales of the EBPAS-36.

Another limitation of Study 3 was the limited sample size, which did not allow to make comparisons between different groups of professionals in the two countries (e.g., psychologists, or psychiatrists). A sample size calculation was performed for Study 2 and yielded a target sample size of N=157. This number was reached in Bangladesh and Germany. In Study 3, however, we focused only on professionals working in a clinical setting in order to make the samples more comparable, which resulted in an overall sample size slightly below 300 including 101 Bangladeshi professionals. Note that this sample size was sufficient to establish small to medium effects between countries with high statistical power.

5.3 Implications for Practice and Research

The work described in the present thesis highlights the need for more research and mutually agreed methodological standards for research on the effectiveness of different types of treatment and interventions for children and adolescents with ASD. When planning implementation initiatives, differences in findings for HIC and LMIC need to be compared and considered systematically. The research on paraprofessionals e.g. nurses, teaching assistants, and social workers (Mrachko & Kaczmarek, 2017), which also provide interventions to children with ASD, might be interesting in LMIC. The research on the adaptation of treatments from HIC to the specific contexts of LMIC may also provide important insights to promote the implementation of EBPs.

The Government of Bangladesh developed the National Strategic Plan for Neuro-Developmental Disorders 2016-2021 aiming to spread the use of EBPs and to ensure the quality of life for children with ASD. The findings of Study 2 in the current thesis may be helpful for the realization of the Bangladesh government's plan. The findings in this study imply the need to obtain knowledge the organizational factors (e.g., support by supervisors, available resources, processes, and systems) and attitudes of the affected professionals before the implementation of new EBPs starts. Therefore, healthcare providing institutions should be aware of the barriers and facilitators professionals experience within their organization and develop effective plans to overcome them. The rather low number of participants who receive ongoing training, the government and non-governmental organizations should develop certifying training programs, research programs, and treatment dissemination strategies for mental health care service providers. Increased awareness about EBPs and address concerns related to EBPs use is recommended. Several studies, including Study 1 and 2, found that parent-mediated interventions are promising in the context of LMIC but not as widespread in use as they could be. More needs to be known about the financial, geographic, and/or cultural barriers that impede their usage.

There are many differences between Bangladesh and Germany with respect to cultural activities, language, funding of healthcare, treatment facilities for individuals with mental health problems, training facilities for professionals, knowledge, and awareness about ASD. Study 3 showed that there are also differences in attitudes towards EBP, the usage of EBPs, and their relation. The high willingness of Bangladeshi professionals to adopt an EBP when required points out that mandatory guidelines could be successful in Bangladesh. In Germany, by contrast, it might better to avoid requirements and to spend more effort to make EBPs appealing to practitioners. The appeal of EBPs could be increased by providing respective trainings, which may also help to prevent misunderstanding of the concept of evidence-based practice (cf. Evidence-Based Medicine Working Group, 1992; Spies, 2019; Szota et al., 2021). Positive feedback by colleagues using

EBPs may also be helpful to increase the appeal. Future studies will have to show, which of these strategies work the best in different countries.

Comparative research on mental health treatments and the professionals that provide them is still scarce. The findings of Study 3 indicate that there are interesting and relevant differences to be found that have differential implications for practice. Instruments, for which cross-cultural measurement invariance has been established, are a requirement for respective research. In addition, finding samples that can be compared in meaningful way is a challenge. Study 3 focused on professionals that work with a specific group of patients in a specific setting. Other studies may focus on professionals with a specific education and training.

5.4 Concluding remarks

Despite an increasing amount of research on how to successfully implement EBPs for children and adolescents with ASD in HIC, progress in implementing EBPs has been slow in LMIC including Bangladesh due to country-specific factors that play a role in the process. The present thesis points out a number of factors that may help to explain why progress has been slow. Future research should further explore factors relevant to the success or failure of the dissemination and implementation of EBPs, explore the relation of attitudes, actual behaviors, and behavioral change. Future studies will have to explore which implementation strategies work best in LMIC. These might be different from HIC.

We recommend that future studies examine country-specific differences within and between professionals' attitudes to generate a more comprehensive understanding of the critical issue of professionals' attitudes by applying a mixed-method design. We also recommended mental healthcare providers, clinicians, and other caregivers to look into this thesis and maybe even the findings of individual studies cited here for more details to support the more widespread implementation of EBPs in the specialty of children and adolescents with ASD. This information along with their personal experience may allow them to engage in evidence-based practice when delivering treatments to children and adolescents with ASD.

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Appendices

Evidence-Based Practice Attitude Scale-36 (EBPAS-36; Nine Subscales)

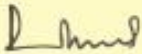| English version	Bangla version	German version
Openness		
I like to use new types of therapy/interventions to help my clients.	আমি আমার ক্লায়েন্টদের সাহায্য করার জন্য নতুন ধরনের থেরাপি / হস্তক্ষেপ ব্যবহার করতে চাই	Ich nutze gerne neue Behandlungsverfahren um meinen Patienten zu helfen.
I am willing to try new types of therapy/interventions even if I have to follow a treatment manual.	আমার যদি চিকিৎসা ম্যানুয়াল অনুসরণ করার সুযোগ থাকে তবে নতুন ধরনের থেরাপি / হস্তক্ষেপ ব্যবহার করতে ইচ্ছুক	Ich bin bereit, neue Behandlungsverfahren auszuprobieren, auch wenn ich ein Manual verfolgen muss.
I am willing to use new and different types of therapy/interventions developed by researchers.	আমি গবেষকরা তৈরী করেছেন এমন নতুন ও বিভিন্ন ধরনের থেরাপি / হস্তক্ষেপগুলি ব্যবহার করতে ইচ্ছুক	Ich bin bereit, neue und andere Behandlungsverfahren auszuprobieren, die Forscher entwickelt haben.
Divergence		
Research-based treatments/interventions are not clinically useful	গবেষণা ভিত্তিক চিকিৎসা / হস্তক্ষেপগুলো চিকিৎসাগতভাবে ব্যবহৃত নয়	Auf Forschung basierende Behandlungsverfahren sind in der klinischen Praxis nicht nützlich
Clinical experience is more important than using manualized therapy/treatment	ম্যানুয়াল থেরাপি / চিকিৎসা ব্যবহার করার চেয়ে চিকিৎসার অভিজ্ঞতা বেশী গুরুত্বপূর্ণ	Erfahrung ist wichtiger als der Gebrauch von manualisierten Behandlungsverfahren
I would not use manualized therapy/interventions	আমি ম্যানুয়ালাইজড থেরাপি / হস্তক্ষেপ ব্যবহার করব না	Ich würde keine manualisierten Behandlungsverfahren nutzen
Balance		
A positive outcome in therapy is an art more than a science	থেরাপির ইতিবাচক দিক হচ্ছে এটি একটি শিল্প যা বিজ্ঞান থেকে উন্নত	Ein positives Ergebnis in der Behandlung ist eher Kunst als Wissenschaft
Therapy is both an art and a science	থেরাপি একই সাথে একটি শিল্প এবং একটি বিজ্ঞান	Eine Behandlung ist sowohl Kunst als auch Wissenschaft
My overall competence as a therapist is more important than a particular approach	একজন চিকিৎসক হিসাবে আমার সামগ্রিক দক্ষতা একটি নির্দিষ্ট পদ্ধতির চেয়ে অধিকতর গুরুত্বপূর্ণ	Meine Kompetenz ist wichtiger als eine spezifische Behandlungsmethode
Burden		
I don't have time to learn anything new	আমার নতুন কিছু শেখার সময় নেই	Ich habe nicht die Zeit, Neues zu lernen
I can't meet my other obligations	আমি আমার অন্যান্য বাধ্যবাধকতা পূরণ করতে পারছি না	Ich kann meinen anderen Verpflichtungen nicht nachkommen, wenn ich diese nutze
I don't know how to fit evidence-based practice into my administrative work	আমি জানি না কিভাবে আমার প্রশাসনিক কাজের সাথে প্রমাণ-ভিত্তিক অনুশীলন যুক্ত করা যায়	Ich weiß nicht, wie ich evidenzbasierte Verfahren in meine Tätigkeit integrieren kann
Job-security		
Learning an evidence-based practice will help me keep my job	প্রমাণ-ভিত্তিক অনুশীলন সম্পর্কে শিক্ষা আমাকে আমার কাজ ধরে রাখতে সাহায্য করবে	Das Aneignen eines evidenzbasierten Verfahrens hilft mir, meinen Arbeitsplatz zu sichern

| English version	Bangla version	German version
Learning an evidence-based practice will help me get a new job	প্রমাণ ভিত্তিক অনুশীলন সম্পর্কে শিক্ষা আমাকে একটি নতুন কাজ পেতে সাহায্য করবে	Das Aneignen eines evidenzbasierten Verfahrens hilft mir, einen neuen Job zu finden
Learning an evidence-based practice will make it easier to find work	প্রমাণ-ভিত্তিক অনুশীলন সম্পর্কে শিক্ষা কাজটি সহজ করে তুলবে	Das Aneignen eines evidenzbasierten Verfahrens erleichtert es, Arbeit zu finden
Limitations		
Evidence-based practice is not useful for clients with multiple problems	প্রমাণ-ভিত্তিক অনুশীলন একাধিক সমস্যায় আক্রান্ত ক্লায়েন্টদের জন্য উপযোগী নয়	Evidenzbasierte Praxis ist nicht hilfreich für Patienten mit multiplen Störungen
Evidence-based practice is not individualized treatment	প্রমাণ-ভিত্তিক অনুশীলন স্বতন্ত্র চিকিৎসা নয়	Evidenzbasierte Praxis ist keine individualisierte Behandlung
Evidence-based practice is not narrowly focused	প্রমাণ ভিত্তিক অনুশীলন সংকীর্ণভাবে উপস্থাপন করা হয় না	Evidenzbasierte Praxis ist nicht eng umgrenzt
If you received training in a therapy or intervention that was new to you, how likely would you adopt it if	যদি আপনি কোন নতুন থেরাপি বা হস্তক্ষেপের প্রশিক্ষণ পান তবে তা আপনি কিভাবে পেয়েছেন তা নিচের প্রশ্নগুলির মাধ্যমে প্রকাশ করুন	Für die folgenden Fragen nehmen Sie bitte an, dass Sie ein Training für ein manualisiertes, evidenzbasiertes Behandlungsverfahren erhalten, das Ihnen noch nicht vertraut ist
Appeal		
it "made sense" to you?	এটা আপনার কাছে "অর্থপূর্ণ"?	es Ihnen sinnvoll erscheint?
it was being used by colleagues who were happy with it?	যেসব সহকর্মী এটার প্রতি খুশি ছিল তাঁদের দ্বারা এটা ব্যবহৃত?	es von Kolleg*innen genutzt wird, die damit zufrieden waren?
you felt you had enough training to use it correctly?	আপনি কি অনুভব করেন যে সঠিকভাবে এটি ব্যবহার করার জন্য আপনার যথেষ্ট প্রশিক্ষণ ছিল?	Sie das Gefühl haben, Sie wurden ausreichend geschult, um es adäquat anzuwenden?
Fit		
you knew it was right for your clients?	আপনি জানেন কি এটা আপনার ক্লায়েন্টদের জন্য সঠিক ছিল?	Sie wüssten, dass die Behandlung das Richtige für Ihre Patient*innen wäre?
you had a say in how you would use the evidence-based practice?	আপনি কিভাবে বললেন যে আপনি প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করবেন?	Sie mitbestimmen dürften, wie Sie das evidenzbasierte Verfahren anwenden?
it fit with your clinical approach?	এটা কি আপনার ক্লিনিকাল পদ্ধতির সঙ্গে মানানসই?	es Ihrer üblichen Herangehensweise entsprechen würde?
Requirements		
it was required by your supervisor?	এটা আপনার সুপারভাইজার দ্বারা অনুমোদিত ছিল?	Ihr/e Vorgesetzte/r es verlangen würde?
it was required by your agency/organization?	এটা আপনার সংস্থা / প্রতিষ্ঠানের দ্বারা অনুমোদিত ছিল?	es an Ihrem Arbeitsplatz verlangt würde?
it was required by your state?	এটা আপনার রাষ্ট্র দ্বারা অনুমোদিত ছিল?	wenn es in Ihrem Bundesland vorgesehen wäre?

Barriers and Facilitators Scale

English version	Bangla version	German version
The current policy and legislative framework in Bangladesh enables me to use EBPs	বাংলাদেশে বর্তমান নীতি ও আইনী কাঠামো আমাকে প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করতে সহায়তা করে	Die aktuelle Politik und Gesetzgebung ermöglichen die Anwendung von EBPs
My organization's goals and objectives support the usage of EBPs	আমার প্রতিষ্ঠানের লক্ষ্য ও উদ্দেশ্য প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করার সমর্থন দেয়	Die Ziele meiner Organisation unterstützen die Anwendung von EBPs
The economic climate nationally and locally is conducive to implement and use EBPs	অর্থনৈতিক জলবায়ু জাতীয় এবং স্থানীয়ভাবে প্রমাণ-ভিত্তিক অনুশীলন বাস্তবায়ন ও ব্যবহার করার জন্য সহায়ক	Das wirtschaftliche Klima auf nationaler und lokaler Ebene ist für die Implementierung und Anwendung von EBPs förderlich
I have access to literature on EBPs (e.g. clinical or academic journals)	আমার প্রমাণ-ভিত্তিক অনুশীলনের উপর সাহিত্যের সহজলভ্যতা আছে (উদাঃ ক্লিনিকাল বা একাডেমিক জার্নাল)	Ich habe Zugang zu Literatur über EBPs (z.B. klinische oder akademische Zeitschriften)
I have been informed early on the usage of EBPs at my organization	আমার প্রতিষ্ঠান আমাকে প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করার বিষয়ে প্রাথমিকভাবে তথ্য প্রদান করেছে	Ich werde frühzeitig über die Anwendung neuer EBPs an meinem Arbeitsplatz informiert
I have been involved in the implementation of EBPs	আমি প্রমাণ-ভিত্তিক অনুশীলনগুলো বাস্তবায়নের সাথে সম্পৃক্ত	Ich werde an der Implementierung von EBPs beteiligt
Key stakeholders at my organization have been informed early on EBPs	আমার প্রতিষ্ঠানের মূল অংশীদারদের প্রমাণ-ভিত্তিক অনুশীলন সম্পর্কে আগে থেকেই অবগত করা হয়েছে	Interessensvertreter*innen in der Organisation werden frühzeitig über Neuerungen informiert
Key stakeholders have been involved in the implementation of EBPs	মূল অংশীদাররা প্রমাণ-ভিত্তিক অনুশীলন বাস্তবায়নের সাথে সম্পৃক্ত	Interessenvertreter*innen werden an der Implementierung von EBP beteiligt
The necessary resources (e.g. funding, adequate staff with appropriate skills, training and ongoing support) for using EBPs are available where I work	আমি যেখানে কাজ করি সেখানে পর্যাপ্ত প্রয়োজনীয় সম্পদ প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করার জন্য আছে (উদাঃ অর্থায়ন, উপযুক্ত দক্ষতা সম্পন্ন কর্মী, প্রশিক্ষণ এবং চলমান সমর্থন)	Die notwendigen Ressourcen (z.B. Finanzierung, adäquat geschulte Mitarbeiter mit entsprechenden Fertigkeiten, Schulungen) für den Einsatz von EBP sind an meinem Arbeitsplatz verfügbar
The existing workflows and structure within my organization supports me in using evidence-based practices	আমার প্রতিষ্ঠানের বিদ্যমান কর্মপ্রবাহ এবং কাঠামো প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করতে আমাকে সমর্থন করে।	Der bestehende Arbeitsablauf und die Strukturen an meinem Arbeitsplatz sprechen für die Anwendung von EBPs
My supervisors promote the usage of EBPs	আমার সুপারভাইজার আমাকে প্রমাণ-ভিত্তিক অনুশীলন ব্যবহার করতে উৎসাহ দেন।	Die Vorgesetzten unterstützen die Anwendung von EBPs
Ongoing training on EBPs is provided to me	প্রমাণ-ভিত্তিক অনুশীলনের উপর চলমান প্রশিক্ষণ দিয়ে আমাকে প্রশিক্ষিত করা হয়।	Fortlaufende Schulungen in EBPs werden angeboten
I get feedback and support on how to improve my usage of EBPs	আমি কিভাবে প্রমাণ-ভিত্তিক অনুশীলনের ব্যবহার বৃদ্ধি করতে পারি, সে বিষয়ে নিয়মিত প্রতিক্রিয়া এবং সহায়তা পাই।	Ich erhalte Feedback und Unterstützung, um die Anwendung von EBPs zu verbessern

Ethical Approval Letter from BMRC, Bangladesh

বাংলাদেশ চিকিৎসা গবেষণা পরিষদ
Bangladesh Medical Research Council

BMRC

Ref: BMRC/NREC/2019-2022/386   Date: 03/12/2019

National Research Ethics Committee

Registration Number: 239 28 07 2019

Principal Investigator:
Mst. Maleka Pervin
PhD Student in Cognitive and Decision Sciences
Institute of Psychology
University of Goettingen, Germany and
Associate Professor, Department of Psychology
University of Dhaka

Title of the Project:
"Mental Health Professionals' Attitude towards Evidence Based Practices for Children with Autism Spectrum Disorders"

Duration of Project: 1.5 Years

Budget: BDT- 1,15,000/-
In words: One Lac Fifteen Thousand Taka Only.

Subject: Ethical Clearance

With reference to your application on the above subject, this is to inform you that above mentioned Research Title has been registered and approved by the National Research Ethics Committee (NREC).

(Dr. Mahmood-uz-jahan)
Director

BMRC Bhaban, Mohakhali, Dhaka-1212, Bangladesh.
Phone: +88 02 9848396, PABX : +88 02 9849311, Fax : +88 02 9848820, E-mail: info@bmrchd.org, Web: www.bmrchd.org

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THE ETHICAL GUIDELINES TO BE FOLLOWED
BY THE PRINCIPAL / CO-INVESTIGATORS

- ☐ The rights and welfare of individual volunteers are adequately protected.

- ☐ The methods to secure informed consent are fully appropriate and adequately safeguard the rights of the subjects (in the case of minors, consent is obtained from parents or guardians).

- ☐ The Investigator(s) assume the responsibility of notifying the National Research Ethics Committee (NREC) if there is any change in the protocol involving a risk to the individual volunteers.

- ☐ To report immediately to the NREC if any evidence of unexpected or severe adverse effect is noted on subjects under the study.

- ☐ Principal Investigator will facilitate supervision of the project by the BMRC authority time to time.

- ☐ This approval is subject to Principal Investigator's reading and accepting the BMRC ethical principles and guidelines currently in operation.

- ☐ You are requested to submit a report to the BMRC half yearly and after completion of the research work.

Checked by: ~~Fahmida~~

Ethical Approval Letter from Georg-Elias-Müller Institute for Psychology, University of Göttingen, Germany

Georg-August-Universität Göttingen

Fakultät für Biologie und Psychologie

Georg-Elias-Müller-Institut für Psychologie
Geschäftsführender Direktor

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Tel.: +49(0)551/39-33765
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https://www.psych.uni-goettingen.de/
de/experimental/people/uwe-mattler

The Director

Bangladesh Medical Research Council

Mohakhali, Dhaka-1212, Bangladesh

19. Juni 2019

We are happy to confirm that Mst. Pervin's research project "Mental Health Professionals' Attitude towards Evidence Based Practices for Children with Autism Spectrum Disorders" has been approved by the Georg-Elias-Mueller-Institute for Psychology. The project will be supervised by Professor Dr. Hagmayer, who will also provide the required funding.

Kind regards,

Prof. Dr. U. Mattler (Director)

Curriculum Vitae

Mst. Maleka Pervin
Associate Professor,
Department of Psychology,
University of Dhaka, Dhaka, Bangladesh.

Address	17/G, South Fuller Road, Dhaka University of Residential Area, Dhaka-1000, Bangladesh
Email	mpervin@uni-goettingen.de
	malekapervin@du.ac.bd
Website	https://www.psych.uni-goettingen.de/de/cognition/team/pervin
	https://www.du.ac.bd/body/faculty_details/PSY/1677

EDUCATION

Since 2018	**PhD student in the Program: "Psychology"** Georg-August-University Göttingen, Germany Thesis Supervisor: Prof. Dr. York Hagmayer
2014 - 2016	**Master of Philosophy in Special Needs Education** Grade 'A' (Excellent)-Master Thesis University of Oslo, Norway.
2004 - 2005	**Master of Science in Psychology (with First Class)** University of Dhaka Dhaka, Bangladesh
1998-2002	**Bachelor of Science in Psychology (with First Class)** University of Dhaka Dhaka, Bangladesh

AWARDS & SCHOLARSHIPS/GRANTS

2018 - 2022	**Bangabandhu Fellowship of Ministry of Science &Technology** The Government of Bangladesh, Bangladesh For pursuing PhD at Georg-August-University Göttingen, Germany
2014 - 2016	**Norwegian Government Scholarship** For pursuing two years M.Phil Program University of Oslo, Norway.
May 2018 – June 2018	**The program IP@Leibniz – a scholarship program** Funded by **DAAD** and **BMBF** for research stay Institute for Special Needs Education University of Hannover, Germany.
September 20-21, 2017	**Travel Grant in recognition of the presented paper's quality** at the 4th Annual BAGSS Conference The Bamberg Graduate School of Social Sciences University of Bamberg, Germany

PUBLICATIONS (*from PhD projects*)

1. **Pervin, M.,** Ahmed, H. U., & Hagmayer, Y. (2022). Effectiveness of interventions for children and adolescents with autism spectrum disorder in high-income vs. lower middle-income countries: An overview of systematic reviews and research papers from LMIC. *Frontiers in psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.834783

2. **Pervin, M.,** & Hagmayer, Y. (2022). Attitudes Towards Evidence-Based Practice of Professionals Working with Children and Adolescents with Autism Spectrum Disorder in Bangladesh. *Administration and Policy in Mental Health and Mental Health Services Research, 49*(5), 861-880. https://doi.org/10.1007/s10488-022-01205-2

3. **Pervin, M.,** Hansmann, N. M., & Hagmayer, Y. Attitudes towards evidence-based practice and usage of evidence-based practices for children and adolescents with autism spectrum disorder: A comparison of mental health professionals in Bangladesh and Germany. *Journal of Autism and Developmental Disorders.* (Under Review)

TEACHING EXPERIENCE (*During my PhD*)

Winter Term 2021/2022	Extracurricular course on *Mental Health Care in Lower Middle Income Countries*
Winter Term 2020/2021 & Summer Term 2021	Supervision of a Master Thesis by Nina Marie Hansmann (Research area: ASD and EBPs in German contexts).
Summer Term 2022	Supervision of a Bachelor Thesis by Lea Magdalena Boros.

CONFERENCES

July 2019	**41st International School Psychology Association (ISPA) Conference,** University of Basel, Switzerland *Talk:* "Effective Teaching Strategies for children with Autism Spectrum Disorder"
May 2019	**Annual meeting of Collaborative Research Project on Clinical Decision making** Radboud University Nijmegen, Netherlands *Talk:* "Mental Health Professionals' Attitudes towards Evidence-Based Practices for Children with Autism Spectrum Disorders"
October 2017	**International Symposium on Autism** MONASH University, Malaysia
September 2017	**4th Annual BAGSS Conference *on "Challenges for Diverse Societies".*** University of Bamberg, Germany *Talk:* "Attitudes Towards Inclusion of Pupils with Autism Spectrum Disorder (ASD): A Survey of Regular Primary School Teachers in Bangladesh"

PROFESSIONAL EXPERIENCES

May 2018 - onwards	**Associate Professor of Psychology** Department of Psychology University of Dhaka, Dhaka, Bangladesh.
May 2011 - May 2018	**Assistant Professor of Psychology** Department of Psychology University of Dhaka, Dhaka, Bangladesh.
November 2006 - May 2011	**Lecturer of Psychology** Department of Psychology University of Dhaka, Dhaka, Bangladesh.
June 2011 - August 2014	**Part-time faculty of Psychology** Department of Linguistics, University of Dhaka, Bangladesh
November 2017 - August 2018	**Part-time faculty of Neurodevelopmental Disorders** Department of Communication Disorders, University of Dhaka, Bangladesh
August 2018 - September 2018	**Part-time faculty of Psychology** Armed Forces Medical Institute, Dhaka, Bangladesh
October 2005 - October 2006	**Teaching Assistant of Psychology** Department of Social Sciences East West University, Dhaka, Bangladesh

RESEARCH AREAS

- Autism Spectrum Disorder (ASD)
- Evidence-Based Practice (EBP) & Evidence-Based Practices (EBPs)
- Attitudes
- Clinical Decision Making

SKILLS

Language   Bengali (Native), English (Fluent), German (Basic)

Software   R, SPSS

Interests   Listening to music, Cooking

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May 2018 - onwards	**Associate Professor of Psychology** Department of Psychology University of Dhaka, Dhaka, Bangladesh.
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