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[RESEARCH ARTCLE]

Occupational therapy practice for sleep disorders in children: a South African perspective

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ABSTRACT

Introduction: The restorative occupation of sleep has been related to appropriate development and occupational performance in a child's routine and functioning. Intervention for sleep disorders among children with neurodevelopmental disorders and chronic conditions is offered by a small number of occupational therapists, even though the link between body function deficits, the environment and participation in sleep is well understood and described in occupational therapy models and frameworks. This study aimed to describe knowledge and training of occupational therapists as well as current occupational therapy practice for sleep interventions for children.
Method: A cross-sectional electronic questionnaire based on the Occupational Therapy Health Literacy Skills for Pain and/or Sleep Disorder Survey was used to collect data from South African occupational therapists treating children.
Results: Only a third of the 114 respondents in the study provided intervention for sleep disorders for children. While most respondents were aware of non-standardised assessments and strategies that could be used for sleep interventions, these addressed person or body functioning rather than environmental modification and participation impacting sleep as an occupation. Lack of training was reported to be the greatest barrier to implementing sleep interventions with children.
Conclusion: The lack of knowledge about standardised assessments and occupation-based treatment for sleep disorders in children with neurodevelopmental disorders and chronic conditions amongst South African occupational therapists impacts the implementation of sleep interventions defined scope of practice of occupational therapists. This is consistent with international trends in this field of practice.

Implications for Practice
- Theory and knowledge concerning the occupational performance domain of sleep and sleep interventions should be included in undergraduate and postgraduate training.
- Awareness of and competence in the use of standardised assessment tools and treatment programmes to use in occupational therapy sleep intervention need to be increased
- Research specific to sleep in the various South African cultures and practices needs to provide reliable evidence to inform occupational therapy sleep intervention with children.

INTRODUCTION

According to the occupational therapy practice framework (OTPF) IV, individuals spend a third of their time in the occupation of sleep or rest. Sufficient quality sleep in children is directly related to development and occupational performance, making it a critical aspect of a child's routine and occupational functioning[1]. Inadequate participation in the occupation of sleep has been linked to poor cognitive performance and executive functioning[2]. Performance of physical, work and social activities can also be impacted by erratic

sleep routines[3]. Disrupted sleep is associated with maladaptive emotional and social behaviour, decreased learning ability, increased familial discord, and health deficits[4]. Prolonged sleep disruptions can evolve into sleep disorders if intervention is not provided, resulting in continuous disrupted sleep[5]. Childhood sleep disorders can also continue into adolescence and adulthood, and have been linked to substance abuse, aggression, and adult psychiatric disorders[6].

Between 40% and 70% of children with neurodevelopmental or chronic disorders such as autistic spectrum disorder, sensory processing disorder, inattention and hyperactivity, prematurity and prenatal substance exposure and intellectual disability suffer from sleep disorders[7]. Sleep intervention should be part of a holistic treatment plan for such children and is provided by a multidisciplinary team including sleep physiologists, sleep coaches and other health care professionals[8]. Occupational therapists form part of this team, since the link between body function deficits, the environment and participation in sleep, providing a basis for such intervention, is well described in the professional literature and research[9].

Occupational therapist's assessment of sleep in children may include using sleep questionnaires[10].Occupational therapy intervention includes implementing structured daily routines, promoting parents' and caregivers' awareness, providing information on sleep, sleep hygiene as well as changing habits and environmental adaptation[9,11]. There is strong evidence that the involvement of parents or caregivers in supporting sleep interventions decreases the development of sleep disorders[10]. This is supported by Gronski[12] who reported other evidence justifying occupational therapy for sleep disorders in children including infant massage and internet-delivered occupation-based training. Ho and Siu[13] documented evidence supporting the use of assistive devices and activities, lifestyle intervention as well as cognitive behavioural therapy for insomnia (CBTi) by occupational therapists to address sleep disorders in children. However, Ip[10] in her study suggests that many occupational therapists are not aware of evidence-based assessments or interventions to address sleep for children and do not provide treatment for occupational performance in sleep.

LITERATURE REVIEW

Sleep

Normal sleep is characterised by a cessation of activity with altered consciousness and awareness of external stimuli and its associated physiological changes[9] .The occupation of sleep is categorized as firstly preparing for and secondly participating in a state of reduced consciousness. The OTPF IV describes rest and sleep preparation as the habits and routines needed to prepare for participation in sleep, which are culturally and personally defined as an essential part of the occupation of sleep[14]. Sleep preparation also includes preparing a comfortable sleep environment and completing physical and mental preparatory activities which may include spiritual practices. Social partings commonly occur followed by sleep in a set pattern and of a planned duration[14].

Sleep hygiene, or the behaviours and habits carried out to promote good sleep, is an essential aspect of sleep preparation. This includes securing the place where sleep occurs, making sure the bedding is comfortably organised and maintaining a regular sleep-wake schedule. Other environmental issues related to sleep hygiene include making sure the location is conducive to sleep in terms of light and noise, avoiding stimulating drinks and food, the use of technology as well as boisterous play before going to bed[11]. Participation in sleep includes ensuring the onset of sleep, sustaining a sleep state without disruption to achieve adequate duration and quality of sleep[14].

Occupational therapy in sleep intervention

Since performance in occupations is impacted by sleep disruption it is important for occupational therapists to consider children's sleep to inform their practice and to optimise their performance capacity[9]. Literature suggests that in occupational therapy sleep be viewed through an occupation lens. In a systematic review of evidence for occupational therapy to address sleep disorders Ho and Siu[13] suggest using the Person Environment Occupation Performance (PEOP) model[15] (Figure 1, below) to inform the relationship of sleep to all areas of occupation and occupational therapy practice. The person in PEOP model relates to intrinsic body function, a concept supported by the International Classification of Functioning, Disability and Health (ICF)[16] as well as personal attributes such as age and culture. The influence of body functioning on sleep is addressed using interventions for impairments, pain management, positioning nd calming techniques depending on the sleep deficit or disorder with which the individual presents. Environmental modification, which is part of the environment in both the PEOP and ICF considers promoting contexts conducive to sleep, such as light exposure, noise, sense of safety and comfort and the use of assistive devices or equipment. These devices include weighted blankets, specific pillows and music which can significantly affect sleep latency, duration and quality[13].

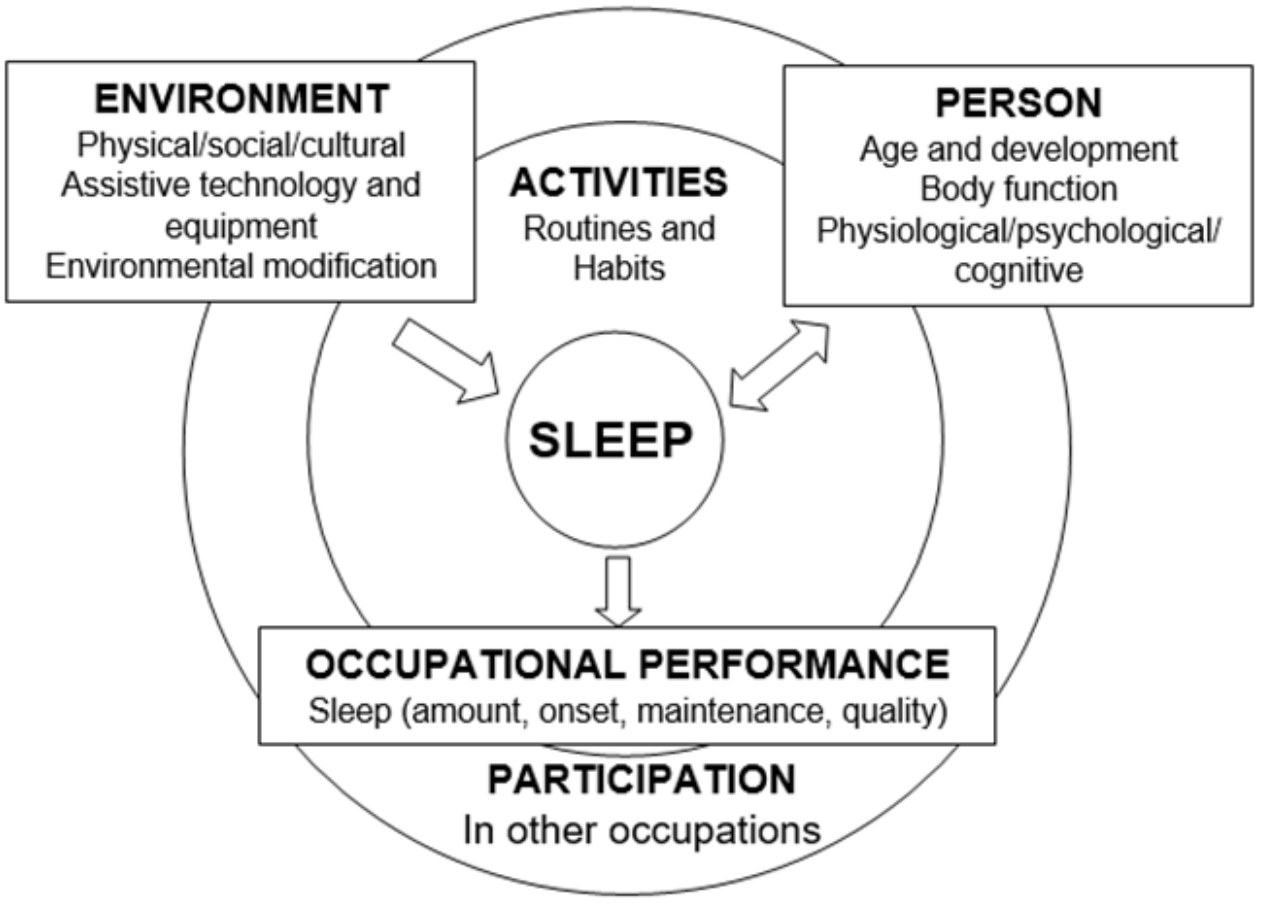

Figure 1: Adaptation of Person Environment Occupation Performance model[11] and the International Classification of Functioning, Disability and Health[16] for occupational therapy in management of sleep

Addressing the occupation and participation in sleep using the PEOP model includes monitoring the amount, onset, maintenance and quality of sleep, supported by the concept of activities optimising participation in sleep according to the ICF. Intervention for participation in the occupation of sleep may consist of restructuring daytime activity and routines as well as including winddown routines and sleep routines as suggested by Faulkner[9] and Leive and Morrison[17]. The timing and type of activities in which the individual participates prior to the occupation of sleep should result in improved sleep-related outcomes such as better regulated sleep, as well as improved physical, cognitive and psychological functioning[9].

Sleep Disorders in Children

Sleep participation is particularly important for children in terms of cerebral protein production, which regulates sleep processes and assists in synaptic connection formation, otherwise known as neuroplasticity[17]. It is widely accepted that synaptic connection formation maximises cognitive functioning which in turn influences communication, socio-emotional, physical, and social development[18]. Evidence from the literature points to the first three to five years of life being a pinnacle for neuroplasticity and a decrease in sleep during this period is likely to result in decreased cerebral protein production, ultimately leading to poor cognitive and motor memory[5,19]. Sleep-wake cycles occur during healthy sleep based on a circadian rhythm which regulates sleeping and waking[20]. Infants and young children sleep for much of the day and night, while children aged three to five, spend 11 to 12 hours asleep in a period of 24 hours. As the child matures, an overall decline in sleep duration occurs, with 10 to 11 hours in school-aged children[5].

Common sleep disorders include parasomnias (night terrors and sleepwalking) and dyssomnias (delayed-sleep and irregular sleep-wake patterns), which result in difficulty initiating or maintaining sleep[21]. Sleep disorders frequently identified in children are excessive opposition to structured sleep times or delays in sleep-onset, with an inability to return to sleep[22]. Other specific sleep disorders have been associated with various neurodevelopmental conditions such as poor emotional regulation, inability to effectively self-soothe and decreased understanding of social cues. Children with autistic spectrum disorders (ASD) may also present with sleep anxiety or a fear of going to sleep[23]. Attention deficit hyperactivity disorder (ADHD) has been associated with lower sleep efficiency, delayed sleep-onset, daytime sleepiness and nighttime wakening[7]. The correlation between severity of ADHD symptoms and risk of sleep disruption indicates that sleep problems in ADHD may be physiological[24]. Literature also indicates a strong link between sensory sensitivity and sleep disorders in children with sensory processing disorders in terms of sleep onset and frequent waking[25]. Specific sleep disorders are also reported in children with intellectual disability[7] as well as emotional issues related particularly to trauma[26]. For children with motor and neurodevelopment deficits such as cerebral palsy, pain and discomfort due to inadequate positioning has been associated with poor quality of sleep[27].

Childhood sleep disorders can also have serious implications for the health and well-being of the parents and/or caregivers. Increased anxiety, stress and depression have been reported amongst parent/s and caregivers of children with sleep disorders[3]. When a child's sleep pattern is disrupted, it has a direct implication for the parent/carer sleep patterns which is associated with mood dysfunctions and the quality of care received by the child[28].

Occupational therapy for sleep disorders in children

Assessment

Sleep disorders and their effects on occupational performance and activity participation through parent- and child-based questionnaires are assessed by occupational therapists[13]. Standardised questionnaires are valuable for the evaluation of potential sleep disorders. Spruyt and Gozal[29] report 183 assessment tools of sleep for children and adolescents, 57 of which have been psychometrically evaluated. Most assessment tools suggested for use in occupational therapy have been developed in high-income countries. However, the BEARS Paediatric Sleep Screening Tool (B=Bedtime Issues, E=Excessive Daytime Sleepiness, A=Night Awakenings, R=Regularity and Duration of Sleep, S=Snoring) for children aged 2 to 18 years[30] has been validated in a middle low-income country where children may not have their own bed to sleep in[31]. A parent report assessment tool, the Brief Infant Sleep Questionnaire (BISQ), specifically designed for the infant population group[32] up to the age of 29 months, has also been used in low middle-income countries. A parent report questionnaire for older children, recommended for use in occupational therapy[11], is the Children's Sleep Habits Questionnaire (CSHQ)[33] for children aged 2 to 10 years.

Intervention

Evidence to support occupational therapy treatment for sleep disorders in children in conjunction with caregivers includes family education, establishing predictable sleep routines, teaching and behavioural techniques[34]. Gronski et al.[12] also recommend addressing sensory disorders and modifying the sleep area. Outcomes include reduced crying, reduced time to fall asleep and less night waking. Significant change in sleep onset has been reported using infant massage[35], with decreased night waking after parent training and support using telerehabilitation[36] These techniques aim to encourage self-soothing, bedtime fading and gradual extinction of waking and lack of sleep routine[37].

Currently, studies conducted on sleep disorders within developing countries focus solely on adults while the prevalence of sleep disorders and the intervention for sleep disorders in children receiving occupational therapy in South Africa remains unknown. There is also limited evidence on sleep intervention training for occupational therapists in South Africa and the effectiveness of occupational therapy may be affected by undetected and untreated sleep disruption[23]. This study, aimed to describe knowledge of sleep interventions and current practice offered by South African occupational therapists for children on their caseload, as well as to determine the barriers and supports to providing sleep intervention and the extent of training in sleep intervention occupational therapists received.

METHODOLOGY

Study Design

A quantitative, descriptive, cross-sectional survey was conducted to determine which sleep interventions South African occupational therapists use for children with sleep disorders and what related training they have received.

Population and Sample

This study population included occupational therapists providing services to children, in both public and private health sectors within South Africa. A non-probability convenience sampling method was used where respondents chose to self-select to complete the questionnaire[38], sent to them in an all-member mailing from the Occupational Therapy Association of South Africa (OTASA), the South African Institute for Sensory Integration (SAISI) and the Rural Rehab South Africa (RuReSA) organisation. The number of occupational therapists practicing in South Africa in 2024 was 6427 with fewer than 2000 being members[38] of these three organisations. Some occupational therapists belong to more than one organisation. Although the full cohort of occupational therapy members of the three organisations were invited to participate in the study, the inclusion criteria were occupational therapists who currently work in paediatric practices or had worked in paediatric practices within the past two years. Based on previous surveys of paediatric occupational therapists in South Africa with an assumed 75% of occupational therapists practicing in paediatrics[39], between 105 to 110 responses

were required to allow for a representative sample size with a 5% margin of error at a confidence interval of 95% using Cochrane's formula[40].

Measurement Instrument

The Occupational Therapy Health Literacy Skills for Pain and/or Sleep Disorder Survey, developed by Brown et al.[23] was used in this study. This is a self-administered, cross-sectional survey with a response burden of 20 to 40 minutes. It was developed and used in Canada as part of a national study aimed at determining the interventions occupational therapists provide to children with sleep disorders and pain[23].. Permission was obtained from for the use in the current study. A demographic section applicable to the South African qualifications and locations and questions on training received on sleep interventions were included in a preliminary section to the questionnaire.

The Occupational Therapy Health Literacy Skills for Pain and/or Sleep Disorder survey was piloted by an advisory committee of six occupational therapy experts with more than ten years' experience in paediatrics[41] to confirm the content for the aim of the current study. They deemed the questionnaire appropriate for the South African context and the questionnaire was not changed except for removing the pain question considered irrelevant to the focus of the current study, with permission from Brown et al.[23].

Research Procedure

Once ethical clearance was obtained from the Human Research Ethics Committee at XXX (M181053), the survey was made available on the REDCap platform to approximately 3000 respondents for three months via a membership mailing from OTASA, SAISI and RuReSA. The occupational therapists were required to indicate informed consent on the survey link after reading the approved information sheet before completing the survey. Demographic data as well as data about training received in sleep interventions were collected and respondents completed the adapted Occupational Therapy Health Literacy Skills for Pain and/or Sleep Disorder questionnaire.

Data analysis

Descriptive statistics were used to analyse the data (frequency counts and percentages)[42] according to whether nominal and ordinal data were collected based on the PEOP[15] and ICF[43] domains.

RESULTS

Demographics

Of the 118 surveys (8% response rate) completed, 95.76 % (n=114) of respondents met the inclusion criteria. All the respondents were female, and their years of experience ranged from five years to 40 years, with approximately a quarter of respondents (26,32%) having less than 5 years' experience (Table I, below)

Table I: The demographics of the respondents (N=114)

		n	%
Gender	Female	114	100.00
Years of experience	<5	30	26.32
	6-10	17	14.91
	11-15	20	17.54
	16-20	13	11.40
	21-25	13	11.40
	26-30	10	8.77
	31-35	5	4.39
	36-40	6	5.26
Level of qualification	Bachelor of Occupational Therapy	102	89.47
	Master of Occupational Therapy	9	7.89
	Doctor of Philosophy	3	2.63
Work Settings	Hospitals and clinics	20	11.98
	Private practices	87	52.10
	Schools	55	32.93
	Other (non-governmental organisation, Community health, a university, and a Medico-legal practice)	5	2.99

Some respondents worked in more than one setting, with the highest percentage (52,10%) working in private practices. Five also worked in other facilities, namely an NGO, a community health centre, a university, a medico-legal practice, and a sub-acute rehabilitation centre.

Almost a third (30,70%) of respondents studied at the University of the Witwatersrand and most lived in Gauteng (50,88%) and the Western Cape (22,81%). Slightly more than a third of the respondents in private practice, other and schools reported providing intervention for sleep, compared to 10% of respondents in hospitals and clinics. Although 35.09% (n=40) respondents reported providing sleep interventions, those in private practices and other were more likely to offer this type of intervention, with 40% of respondents treating sleep disorders. Fourteen percent of respondents reported they were the primary therapist, 16.10% of respondents provided consultation for sleep intervention, while 4.99% did not specify their role with sleep disorders.

Person

The profile of the children to whom most services were provided by the respondents within the paediatric field of practice, included children from birth to 12 years of age with four to six-year-olds being the age group most commonly treated.

The most common diagnostic groups of children on the respondents' caseloads associated with sleep disorders, included learning disabilities (21.23%), sensory integration dysfunction or difficulty (31.41%), and neurological disorders (36.72%). The conditions and disorders in each diagnostic group reported r represented more than 114, as respondents treat children with multiple conditions (Table II, below).

Table II: Conditions in the diagnostic groups for children treated by respondents (N=226)

Diagnostic group	Reported Conditions and disorders	n	%
Sensory processing disabilities	Sensory processing disorder	55	24.34
	Dyspraxia	11	4.87
	Sensory modulation disorder	5	2.21
Learning disabilities	Attention Deficit Hyperactive disorder	35	15.49
	Attention Deficit disorder	8	3.54
	Gross/Fine motor impairments	3	1.33
	Dyslexia	2	0.88
Neurological disorders	Autistic spectrum disorder	40	17.70
	Cerebral palsy	24	10.62
	Low or increased tone	3	1.33
	Developmental Coordination disorder	3	1.33
	Developmental disorder	2	0.88
	Epilepsy	2	0.88
	Tourette's syndrome	1	0.44
	Down syndrome	1	0.44
	Intellectual disability	1	0.44
	Sleep disorders	1	0.44
Musculoskeletal disorders	Traumatic brain injury	3	1.33
	Bone fractures/deformities	2	0.88
	Visual impairments	2	0.88
	Burns	2	0.88
	Hand injuries	1	0.44
Emotional or behavioural disorders	Anxiety	4	1.77
	Attachment disorder	2	0.88
	Trauma/PTSD	1	0.44
	Conduct disorder	1	0.44
Birth deficits:	Spina bifida	2	0.88
	Prematurity	2	0.88
	Foetal alcohol syndrome	1	0.44
	Birth asphyxia	1	0.44
	Encephalopathy	1	0.44
Illnesses:	Severe acute malnutrition	2	0.88
	HIV	1	0.44
	TB	1	0.44

The respondents reported a mean assumed prevalence of sleep disorders in the children they treated at 35,6% with a range from 0% to 100%.

Assessment

Most respondents relied highly on caregiver reporting on whether a sleep disorder was present (77.98%) during the assessment or on the referral information from another healthcare practitioner (9.17%). Informal assessment specific to sleep included exploration of aspects such as sensory behaviours, nightmares/terrors, and what calmed or soothed the child were reported by 15.78% of respondents. Very few (3.51%) respondents reported using standardised assessments for evaluation of body functioning to determine the effects on disordered sleep. The assessments that were used included the Child Sensory Profile 2[44], Sensory Integration and Praxis Test (SIPT)[45], and Tomatis Listening Test System[46].

Intervention

Only 40 respondents (35.08%) reported providing sleep intervention. However, over 90% respondents indicated that they were aware of at least one intervention that could be used to treat sleep disorders. These interventions included addressing body functioning such as sensory diet home programs (56.14%) or sensory integration principles and techniques (21.93%). Less than 7% of respondents considered the use of Masgutova Neurosensorimotor (MNRI®) body reflex integration therapy or sensory system tactile integration therapy[47] for sleep disorders in children, (Figure 2, below).

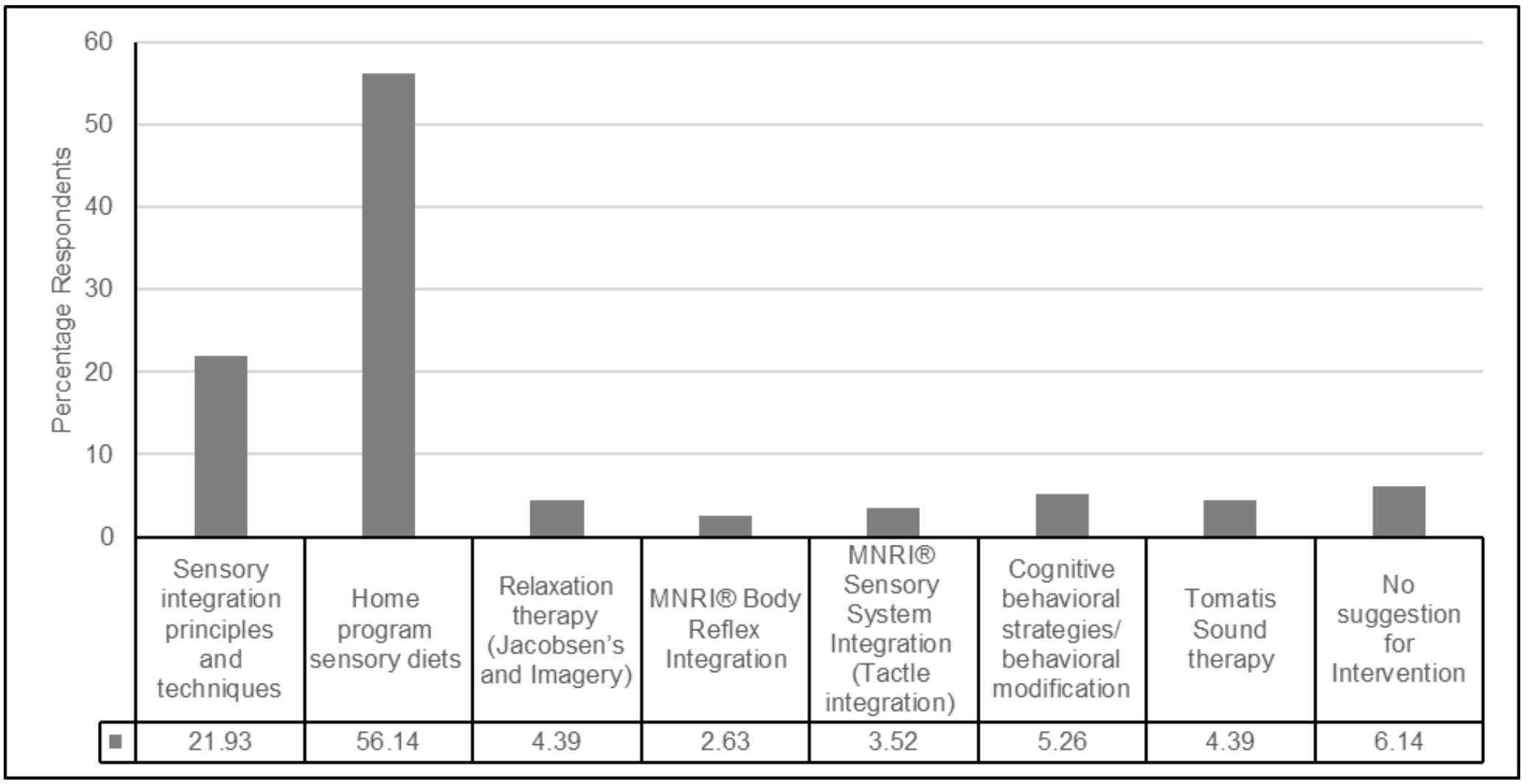

Figure 2: Intervention suggested to improve sleep for children with sleep disorders (N=114)

Environment

Assessment and Intervention

Informal assessment of the sleep environment via parent report was used by just under 16% of respondents with sensory integration principles used to propose adaptions to the sleeping environment. Almost a quarter (24.56%) of respondents reported using environment adaptations as part of their intervention for sleep disorders, but the specific environmental adaptations proposed were not specified.

Occupation and performance

Assessment

When assessing sleep as an occupation, 72.80% (n= 83) respondents indicated they would use the child's background information and occupational profile to focus on bedtime and sleep routine. Only a quarter of respondents were aware of non-standardised assessment methods and two thirds of respondents (66%) relied solely on background information from various role players in the child's life such as parents, teachers and multidisciplinary team members to identify sleep disorders.

Only four (3.36%) respondents indicated the need for an occupation-based assessment in identifying sleep disorders in children. These respondents reported utilising informal assessments to assess the occupation of sleep including questionnaires such as an in-house activities clock questionnaire, electronic media viewing routines, bedtime habits as well as the presentation and consequence of disturbed sleep. Observation and sleep screening assessments were also used by these respondents. However, most respondents indicated they could identify the red flags associated with a sleep disorder through observation. These red flags were reported to include sleepiness, lethargy, fatigue, dark rings under the child's eyes, mood disturbances, low energy and motivation, poor concentration during therapy with lack of focus and "switching off" in the therapy session. Yawning and the child falling asleep during intervention were also considered a red flag.

Intervention

Only four respondents reported using standardised interventions and cognitive behavioural therapy (CBTi) for insomnia[48]. Figure 3 (page 7) represents the other occupational therapy interventions provided to address the occupation of sleep in children with sleep disorders. Developmental interventions specific to the child's sleep level and individualised developmental sleep programs were provided by 16.67% and 11.40% of respondents respectively. Sleep handling techniques for caregivers to implement and family support were the interventions most commonly suggested by approximately a quarter of the respondents to address performance in sleep, while 9.65% provided sleep programs for caregivers and just over 5% indicated other interventions.

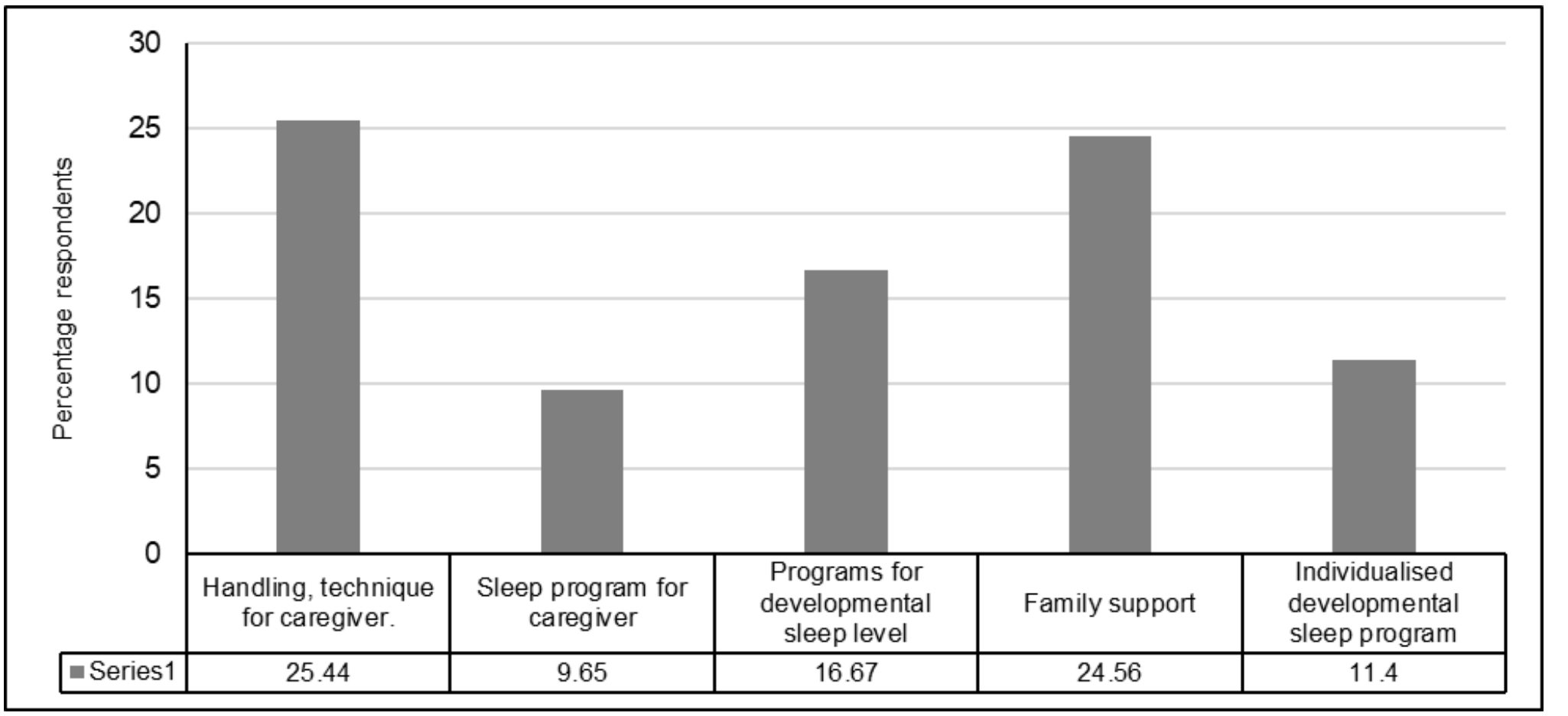

Figure 3: The types of occupational therapy provided to address the occupation of sleep for children with sleep disorders (N=114)

Of the 40 respondents who provided sleep intervention, most indicated spending more time educating the caregiver about the sleep techniques than the child, spending only 0-10% of their time providing sleep education to the child. When asked about effectiveness it was the respondents' perception that 91-100% of their sleep education to the child achieved positive results, whilst only 51-70% parents followed sleep education interventions. The effectiveness of sleep intervention would be determined by most respondents obtaining feedback from parents, with four indicating they would use a sleep logbook or observation of the child during intervention.

Perceived barriers and supports to implementing sleep interventions in occupational therapy

All 114 respondents identified barriers that they perceived to limit their ability to implement sleep interventions to children with sleep deficits/disorders. Sixty respondents (52.63%) highlighted insufficient knowledge and training or a lack of access to education as a barrier, so affecting their ability to offer effective intervention to children with sleep disorders. Nearly half (48.25%) of respondents reported a lack of appropriate sleep assessment tools and training in intervention strategies (45.61%) to be used with children with sleep disorders. Nearly a quarter (24.56%) of respondents included the child's physical or cognitive (dis)ability as a barrier to sleep interventions. Four respondents (3.51%) further reported poor carryover of home programs for sleep interventions as a barrier (Figure 4, below).

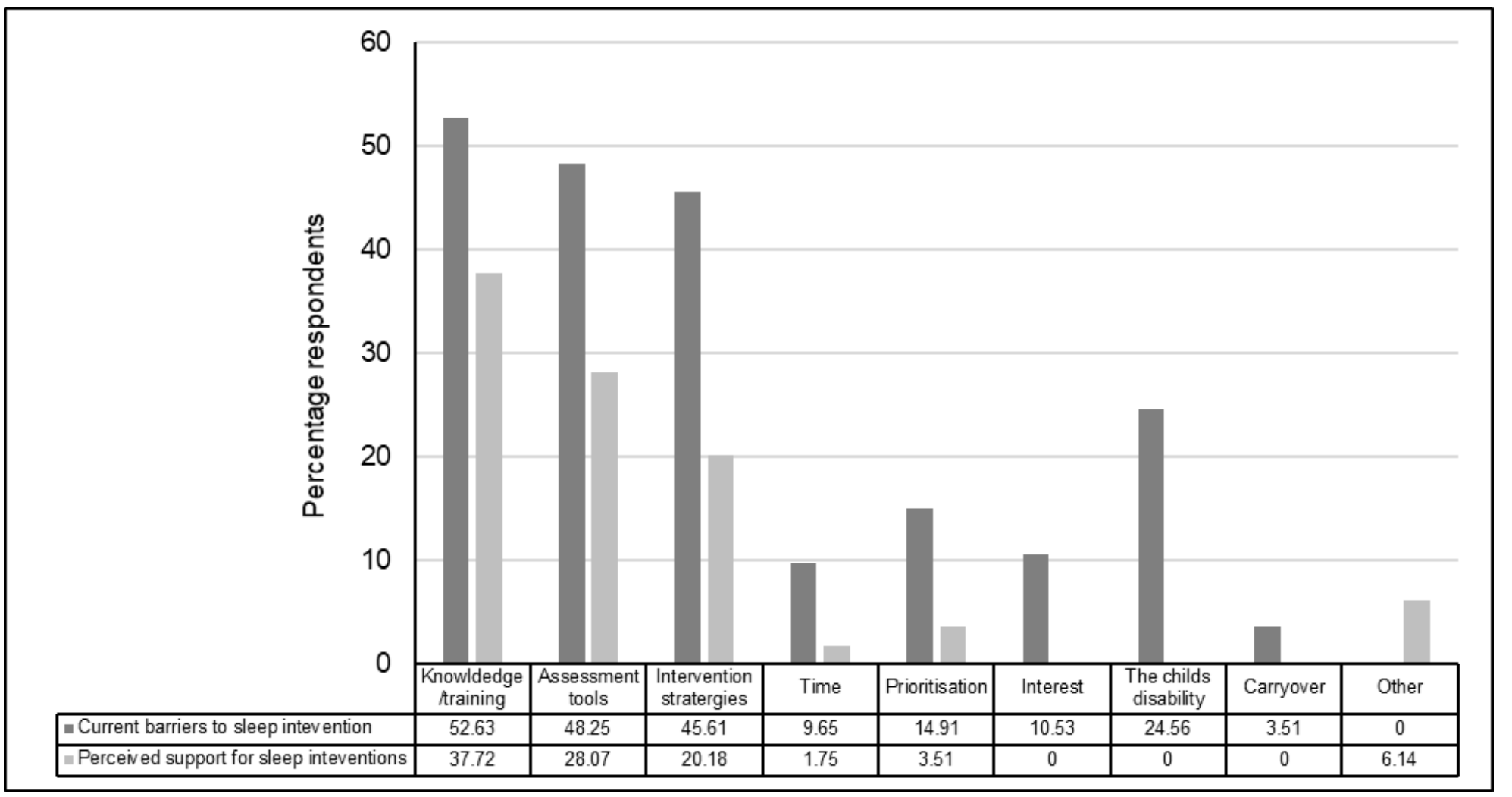

Figure 4: The barriers and supports to providing occupational therapy sleep intervention to children (N=114)

Support that would assist the delivery of more effective occupational therapy sleep interventions for children with sleep disorders was highlighted by respondents. The support required included more education on sleep and sleep intervention (37.72%) and the use of standardised assessment tools (28.07%) and intervention techniques (20.18%). Respondents reported on other strategies that would assist sleep-related outcomes within occupational therapy as monitoring medication and a need for better awareness of the impact of sleep disorders on a child's function and learning.

The training received by occupational therapists regarding sleep interventions with children

Of the 114 respondents, only 8.77% (n=10) stated that they recalled receiving undergraduate training on sleep interventions. This included self-study material on sleep and rest; information on sleep as an occupational performance area; the importance of sleep and possible interventions; sleep hygiene; routines; neurology; factors influencing sleep, sleep as part of a balanced lifestyle; as well as lectures on the benefits of good quality sleep. Only 1,75% (n=2) of respondents had received postgraduate training on sleep interventions. This training included a lecture on sleep intervention principles within the book 'Sleep Sense'[49] and lectures concerning sensory diets and the effects of medication, routinization as well as cell phone applications on sleep.

DISCUSSION

Only a third of the respondents in the current study provided sleep intervention even though they perceived approximately a third of the children in their caseloads had sleep dysfunction. This correlates with studies[10,23,50] indicate that occupational therapists underestimate the importance of sleep and the effect of disrupted sleep on the occupational performance of the children they treat. This correlates with previous research that indicate that occupational therapists underestimate the role of sleep and only a third of the respondents in the current study provided sleep intervention. This was the case even though they perceived approximately a third of the children in their caseloads had sleep dysfunction. Literature indicates a prevalence of sleep disorders in children with chronic health conditions and neurodevelopmental disorders higher[51] than the 20% for the general paediatric population[23] with some studies indicating 36% as a conservative estimate of sleep disorders in this population [7,16,52,53]. This may be related to the difficulty in clearly identifying these types of problems. Children and caregivers may have little insight into the effect of sleep disorders on daytime functioning and the family may have adapted to a child's disordered sleep[54].

Results mostly reflect information from occupational therapists in the private sector or in schools[55]. Some respondents explained that in the school setting occupational therapists focused mainly on the education domain of occupational performance. However, Ip[10] indicates that a positive impact on performance in education has been associated with also addressing sleep disorders and reducing dysregulation in daytime activity level. It is suggested that school-based occupational therapists and those who treat children with chronic health conditions and neurodevelopmental disorders could be involved in multidisciplinary sleep-related intervention. The very limited intervention for sleep provided by only 10% of respondents in hospitals and clinics may be related to the more acute nature of conditions treated in these settings. It is also possible in a low middle income country like South Africa that the sheer number of other overt impairments associated with the burden of disease may overshadow the need to address a sleep disorder[55].

The intervention of sleep disorders in children in the current study was considered in relation to the person, environment as well as the occupation of sleep as indicated by both the PEOP[13] and ICF[16], indicating the appropriateness and specific contribution of sleep intervention within occupational therapy[13].

Person

Sleep disorders were described as associated with specific diagnostic categories of health conditions in the respondents' caseloads. These included learning disabilities, sensory integration dysfunctions or difficulties, neurological disorders and developmental delay which are consistent with those described in a similar Canadian study[23]. Literature on sleep disorders for children indicates that sleep intervention in occupational therapy may need to consider specific body functioning for conditions such as ADHD[56], ASD[10], sensory integration disorder[57] and cerebral palsy[16]. Respondents were aware of the presentation of the bidirectional relationship between sleep disorders and disabilities of the children they treat [24,53,58]. Most respondents could identify possible assessments and intervention for addressing body functions that impact sleep. The three standardised assessments (Child Sensory Profile 2[44], SIPT[45], and Tomatis Listening Test System[46]) listed were not sleep-specific but rather addressed sensory integration and processing difficulties.

The current study revealed that only four occupational therapy respondents who provide intervention for sleep specifically address body functioning related to sleep amongst the children they treat. Thus, disordered sleep is not sufficiently considered in occupational therapy paediatric practice, indicating a very low priority of sleep intervention when setting therapy goals in relation to other personal or body function outcomes. The effect of sleep on body functions such as pain, involuntary movements, muscle tone and sensory functioning is viewed as a secondary problem in the child's assessment[59]. Nearly 80% of respondents, however, indicated they would suggest sensory integration principles or home programmes with sensory diets to address sleep disorders. The sensory diet approach is supported by Spira[57] who found a significant association between sleep disorders such as sleep onset delay, sleep anxiety, night waking, parasomnias, sleep disordered breathing, daytime sleepiness and overall sleep problems, and sensitivities identified in all components identified on the Short Sensory Profile[60]. This preference for sensory interventions by South African occupational therapists differed from a Canadian study where only 28% of Canadian cohort of occupational therapists used sensory-based interventions to address sleep disorders in children, with 37% preferring a behavioural approach[32]. This was suggested by only 5% of respondents in the current study.

Environment

Literature indicates that adaptation or environmental modification is effective in improving sleep latency, duration and quality[11]. Although a quarter of respondents in the survey reported the use of adaptation and environmental modification, specific details were not reported.

Occupation and Performance

The results of this survey indicate a lack of awareness of standardised assessment tools to explore the occupation of sleep in children, which is consistent with the results of an international survey[23] where only 5% of occupational therapists used standardised assessments for this purpose. As indicated in the survey, our respondents relied on informal assessments such as information from the parents and other sources in history taking for background information. They placed a greater reliance on parent report since most of the children on the respondents' caseload were between the ages of four and six years. The parents were considered a more reliable information source. However; this may have resulted in many children with sleep disorders being overlooked since parents do not have clear measurable indicators to recognise a sleep disorder. The reliability of parental reporting without the use of a standardised parent report questionnaire or interview is likely to be suboptimal for assessment purposes[61,62]. Although only four respondents reported using informal observation to determine sleep disorder in the current study, all the respondents, as in a Canadian study[23] , reported being able to identify the red flags indicating sleep disruption in the children.

While 50% of respondents indicated awareness regarding the use of occupation-based intervention to address sleep disorders in children, the interventions they were aware of mostly included caregiver and family involvement. Developmental sleep programs or interventions specific to the child's sleep deficits were suggested by between 11% and 16% of respondents in preference to body functioning interventions. For addressing sleep as an occupation, the role of the occupational therapists as an educator about sleep programs was emphasised, with respondents spending more time on sleep education with the caregivers. Four respondents in the current study reported poor carryover of sleep interventions with caregivers compared to programs used directly with the children. In an international study, occupational therapists reported similar results when educating caregivers, which they reported to be just over 50% effective[23].

However, even though interventions with children were reported to be more effective, respondents reported spending only 10% of therapy time on sleep intervention and programs to improve sleep with the children themselves. These individualised programs included regulation of activities, routines and habits associated with preparations for sleep[9]. These findings are supported by Leive and Morrison[17] who reported significant improvement in bedtime resistance, sleep onset, sleep duration and night wakings using the *Programa de Acompañamiento al Sueño en la Infancia desde Terapia Ocupacional (PASITO) p*rogram to support child sleep.

Parent feedback was the main source of feedback on the effectiveness of participation in sleep identified by the majority of respondents, with only four therapists using informal sleep logs and structured observation to confirm change in outcomes related to the amount, onset, maintenance and quality of sleep. These results reflect those reported in a Canadian study even though the use of standardised sleep assessments has been shown to be more valid and sensitive to incremental changes in maladaptive sleep behaviours and habits[23]. The results of the current study support the gap between the evidence-based and clinical practice as identified by Brown et al.[23]

Barriers and perceived support for sleep intervention in children

The greatest barrier to addressing sleep in occupational therapy was a lack of education and knowledge identified by over 50% of respondents in the current study and 80% of respondents in an international study[23]. In both studies between 7% and 17% of respondents indicated they were not aware of sleep interventions within the occupational therapy role. The lack of awareness of specific assessment tools and intervention techniques were also considered barriers even though information and evidence for both have been published. This confirms the limited knowledge about sleep intervention in occupational therapy. Of the respondents in the current study, 80.7% believed they received no training related to the occupational performance area of sleep and/or sleep interventions for children confirming the lack of prioritisation of this component of occupation when compared to others such as activities of daily living, work and play. Respondents supported the inclusion of sleep interventions for children in occupational therapy undergraduate training, but suggested that occupational therapists could use accessible online postgraduate or continuous professional development programs on the topic provided through organisations such as OTASA, to advance knowledge of standardised sleep interventions, both assessments and intervention.

Limitations

The limitations included limited access to the population of occupational therapists in South Africa with only those registered on OTASA, RuReSA and SAISI being sampled. Due to the closed nature of most of the questions, respondents did not have the opportunity to provide other information about the topic through comments.

CONCLUSION

The results of this study indicate limited provision of assessment and intervention of sleep for children by South African occupational therapists providing services to children.

Although most respondents could suggest intervention suited to addressing sleep disorders, these focused on body function rather than performance in the occupation of sleep. Knowledge of standardised assessments and intervention programs to address sleep participation was limited and the lack of training and knowledge of occupational therapists was seen as the greatest barrier in effectively fulfilling their role in sleep intervention in children. This study indicates that many occupational therapists in South Africa are not aware of the evidence-base for intervention in disordered sleep in children with neuro-developmental and other chronic health conditions.

Author Contributions

Denise Franzsen conceptualised the article and assisted with data analysis and interpretation. Alicia Myburgh and Olindah Silaule conceptualised the research, Alicia Myburgh collected the data and Olindah Silaule supervised the project. All listed authors contributed to and approved the final manuscript.

Conflicts of Interest

Authors had no conflict of interests to declare.

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