Occupational therapists' perceptions of the relationship between gravitational insecurity, emotion regulation and functioning in adult mental health settings: an interpretative phenomenological analysis

Rebecca Matson, Edwina Rushe and Anne-Louise Humphreys
Department of Occupational Therapy, Faculty of Health and Life Sciences, University of Liverpool, Liverpool, UK

Abstract

Purpose – Gravitational insecurity (GI) is characterised by a significant fear of movement that is disproportionate to the level of threat and any deficiencies in postural control. It has been suggested to lead to increased anxiety and barriers within everyday activities. Limited insight is available into how this difficulty may present in adults, specifically those with mental health conditions. This study aims to consider occupational therapists' perceptions on how GI may alter emotional regulation and functioning in this population.

Design/methodology/approach – Six occupational therapists working with mental health clients were recruited using purposive sampling. Semi-structured interviews were completed and analysed using an interpretative phenomenological analysis approach.

Findings – Four main themes were identified: a real lack of understanding; making the connection; alterations in relationships; and supporting recovery. Occupational therapists suggested that GI can be evident in barriers within functional performance and increased emotional dysregulation, but that its presence could be missed or misinterpreted because of limited awareness among professionals and confounding factors such as medication.

Originality/value – Findings provide initial insight into occupational therapists' perceptions of GI in adults with mental health conditions. While much further research is needed, to the best of the authors' knowledge, this is the first study to explore GI in this way and may offer insights to support occupational therapists in developing their clinical reasoning in this area.

Keywords Sensory integration, Emotion regulation, Occupational therapy, Gravitational insecurity, Sensory processing

Paper type Research paper

Introduction

Sensory integration (SI) is the ability to perceive, regulate and respond to sensory input that supports a range of skills and behaviours, including learning, motor activity, affect regulation, self-concept, and social engagement (Bundy and Lane, 2020). Two key processes within SI are sensory modulation, which is the regulation and organisation of sensory input to inform an adaptive response, and sensory discrimination, which is the ability to identify and interpret qualities of sensory input such as temporal and spatial aspects (Bundy and Lane, 2020). Gravitational insecurity (GI) was initially related to difficulties with sensory modulation because of being perceived as a "basic and profound" fear response to movement that is disproportionate to any threat or deficiencies in postural control (Fisher and Bundy, 1989; Lane, 2020, p. 171). It is distinguished from two other vestibular-based difficulties: postural insecurity, which is considered more rational because of its relationship to reduced postural stability, and intolerance to movement, which, while it also features autonomic nervous system responses, occurs in response to rotary or angular movements, rather than the linear movements that are problematic in GI (Koomar, 1996; May-Benson and Koomar, 2007).

GI has been connected with central nervous system dysfunction, specifically vestibulo-cerebellar integration, rather than the peripheral nervous system dysfunction seen in vestibular disorders such as vertigo (May-Benson *et al.*, 2020a). GI's strong limbic system responses have been

The current issue and full text archive of this journal is available on Emerald Insight at: **https://www.emerald.com/insight/0791-8437.htm**

Irish Journal of Occupational Therapy
53/1 (2025) 33–40
Emerald Publishing Limited [ISSN 0791-8437]
[DOI 10.1108/IJOT-03-2024-0008]

Received 17 March 2024
Revised 6 August 2024
12 November 2024
23 February 2025
Accepted 6 March 2025

suggested to originate from poor modulation of vestibular input received from the otolith organs (Fisher and Bundy, 1989); however, more recent studies indicate a discriminative-postural basis to GI related to inadequate vestibular velocity storage (VVS) in the brainstem and cerebellar areas (Potegal, 2015; Potegal *et al.*, 2022). As VVS amplifies signals from the semi-circular canals to support movement perception, spatial orientation and balance, impairment results in the receipt of insufficient vestibular information, thereby hindering discrimination and behavioural responses. However, Potegal *et al.* (2022) suggest this is not at the exclusion of otolithic dysfunction but as an additional factor.

GI is thought to occur across the lifespan (May-Benson *et al.*, 2016b; May-Benson and Koomar, 2007) with a limited correlation between GI severity and age (May-Benson *et al.*, 2016b). Similar prevalence is indicated in males and females but with significantly higher severity reported by females (Levinson, 1989a; May-Benson *et al.*, 2016b). In a sample of 1392 adults, 16% reported a mild level of GI and 2% more severe GI (May-Benson *et al.*, 2016b). GI has been identified in 15% of adults with sensory processing disorder (SPD), with a strong correlation suggested between GI and motor skill difficulties (May-Benson *et al.*, 2016a, 2016b, 2020b). SPD is a term used in the literature to describe impairments in the process of SI that impact an individual's ability to function and engage with their environment (Miller, 2006). Connections have been drawn to a lesser extent between GI and visual-spatial processing; vestibular difficulties such as balance and dizziness; and impairments in tactile, visual and auditory processing (May-Benson *et al.*, 2020a). Many functional difficulties suggested to co-occur with GI, such as postural control and spatial orientation, rely on the integration of vestibular, proprioceptive and visual input (Koomar, 1996; Potegal *et al.*, 2022). These difficulties are thought to lead to potentially significant challenges with functional performance and emotion regulation (Ayres, 2005; Coelho and Balaban, 2015; May-Benson *et al.*, 2020b).

GI has been suggested as particularly evident in heightened anxiety responses to activities where the feet are off the ground; the head is out of an upright position; or movement is required across variable or unstable surfaces, but in adults with mild GI, this may present as more of a hesitancy or avoidance of movement than the level of fear demonstrated by children (May-Benson and Koomar, 2007; Potegal *et al.*, 2022). Difficulties are thought to increase in activities with reduced visual and proprioceptive input, such as when the eyes are closed, movement occurs in backward space such as in hair-washing, or passive movement such as using an escalator (Lane, 2020; Potegal *et al.*, 2022). Driving and travelling on an airplane, where the visual input received in connection with movement can be disorienting, are also likely to be problematic (May-Benson *et al.*, 2020b).

Occupational therapists therefore identify GI through observations of movement, fear/anxiety responses and postural responses, as well as consideration of functioning through self-report assessments such as the Adult/Adolescent Sensory History (ASH) (May-Benson, 2015) (Potegal *et al.*, 2022). More objective assessments such as the GI-Assessment Revised are not yet readily available for use in the UK, and additional complexities suggested include the distress experienced by adults with severe GI in rotary testing and the increased likelihood of physical limitations that require non-standardised testing (May-Benson *et al.*, 2020b; Potegal *et al.*, 2022). As with broader SI intervention, the aim of GI intervention is to enhance participation (Parham and Cosbey, 2020). Existing studies on GI intervention advocate for gradually increasing vestibular input, progressing from linear to rotational input (Piller and Hageman, 2020; Potegal *et al.*, 2018), as well as deep-pressure and proprioceptive input (Piller and Hageman, 2020); however, neither study objectively evaluated the effectiveness, and both focus on children.

Although GI has not been explored in the mental health literature, impaired SI has been considered in a range of mental health conditions, including OCD, eating disorders, borderline personality disorder, affective disorders, and schizophrenia (van den Boogert *et al.*, 2022). The relationship between these conditions and impaired SI is thought to be bidirectional (van den Boogert *et al.*, 2022) and may contribute to difficulties with emotion regulation, social participation and occupational engagement, although the impact on functioning is yet to be fully explored (Andersson *et al.*, 2022; Bailliard and Whigham, 2017). Difficulties with emotion regulation, that is, the ability to control our emotions alongside changing situational demands, can impair functional performance in individuals with mental health conditions (Romero-Ayuso *et al.*, 2024); therefore, considering these two areas together is likely to be of relevance.

Anxiety is thought to be one of the most common co-morbid conditions with GI in adults and children (May-Benson *et al.*, 2020b). While it is a natural physiological response to stress, anxiety becomes maladaptive when it is disproportionate, prolonged and impacts functioning, all of which can be features of GI (Arroll and Kendrick, 2018; May-Benson *et al.*, 2016a; Potegal *et al.*, 2022). Studies suggest anxiety disorders co-occur with vestibular processing deficits in 94% of adults, with mild GI in 27%, and with severe GI in 12% (Levinson, 1989b; May-Benson *et al.*, 2016b). The parabrachial nuclei of the dorsolateral pons may help explain this link because of their key role in this link in the regulation of anxiety and the receipt of vestibular input (Potegal, 2015). However, it has been suggested that the impact of GI on areas such as functioning and anxiety is often misattributed to symptoms of a mental health difficulty or phobia (Ayres, 2005; Coelho and Balaban, 2015).

As GI has primarily been identified by occupational therapists with specialist training in SI (Potegal *et al.*, 2022), they are well-placed to provide insight into its relationship with emotion regulation and functioning. GI has been connected to several specific functional difficulties, making separate exploration of this SI difficulty of potential value, but the current evidence base consists of textbook chapters and anecdotal reports rather than research studies. This study aims to gain insight into occupational therapists' perceptions of the relationship between GI, emotion regulation and

functioning in adult mental health settings. A qualitative approach allows for a broader exploration of this connection to help inform future research directions and occupational therapy practice.

Methods

Interpretative phenomenological analysis (IPA) was used to support in-depth consideration of the lived experience and perceptions of occupational therapists working with individuals with GI because of its focus on how individuals make sense of their experience (Smith and Nizza, 2021). While IPA is, therefore, more commonly used for considering the direct experience of a phenomenon or condition, understanding of GI continues to develop, and therefore therapists are also engaged in this process of "sense-making". IPA has previously been used to explore clinician perceptions in various contexts, including obesity and understanding of suicidality (Hitch *et al.*, 2020; Janackovski *et al.*, 2021).

A purposive sample of six participants was identified to obtain sufficient data for analysis while retaining a small sample size as is desirable in IPA (Smith and Nizza, 2021). As IPA focuses on understanding the "convergence and divergence" of individual participant experience data, saturation is not the intention (Smith *et al.*, 2009). A sample of six was considered sufficient to achieve depth of understanding, without diluting the analysis and representation of individual perceptions. Participants were recruited using an online poster via social media sites and the mailing list of an SI education provider. Eligibility required participants working with adult mental health clients in the UK and sufficient training in SI to assess and identify GI verified through mapping to assessment and interpretation-focused modules with the two UK providers of post-graduate education. Participant demographics are available in Table 1 below. Written consent was obtained from all participants via an online consent form and confirmed verbally at the beginning of each interview. Ethical approval was obtained from the University of Liverpool, ILCAMS REC reference 11501.

Two researchers (RM & ER) completed and recorded semi-structured interviews via MS Teams. Transcription was completed by a university transcriber and then verified against the recordings by the lead researcher. Interviews lasted between 37 and 52 min following an interview schedule [Insert link to supplementary material – Interview schedule] informed by a literature review and the clinical experience of the lead researcher, an advanced practitioner in SI, working with individuals experiencing GI in mental health settings.

Data analysis

Data analysis was completed by the lead researcher following IPA guidelines, starting with repeated rereading of the transcripts to achieve sufficient familiarity with the data (Smith and Nizza, 2021). Early observations and reflections on the language used, the participant's context and reflexive comments made during the interview were noted by hand on the transcripts (Smith and Nizza, 2021). Each interview transcript was analysed individually by the lead researcher (removed for peer review) and personal experiential themes (PETs) were identified, bracketing ideas from previous transcripts to focus on the individual experience of each participant.

Shared concepts between cases were identified to inform the overall group experiential themes (GETs), developed through comparison and clustering of PETs to represent shared experiences. Sub-themes were identified within these GETs, reflecting the convergence and divergence of participant experience. Themes at each stage of analysis were checked against, and connected to, the specific words of participants to ensure they remained grounded in their perceptions. As researcher interpretation is a central part of the IPA process, no attempt was made to bracket this. Instead, their role as an analyst and influence on the data was acknowledged and recorded via an audit trail (Smith and Nizza, 2021). Member

Table 1. Participant demographics

Participant	Experience as an occupational therapist	Work setting	Sensory integration training completed	Conditions commonly seen within setting
Chloe	20+ years	Community mental health – adults	Level 3	Depression, schizophrenia, OCD, PTSD, anxiety
Emma	7 years	Private practice, children and adults	Level 2	Anxiety, depression, PTSD, ADHD
Sophie	18+ years	Inpatient secure mental health services – adults	Level 3	Borderline personality disorder, schizoaffective disorder, schizophrenia
Olivia	20+ years	Independent practitioner – commissioned services, adults	Level 4	Schizophrenia, autism, ADHD, bipolar
Orla	Not known	Short-stay inpatient services, adults	Level 3	Personality disorder, learning disability, autism
Alice	15+ years	Community mental health – adults	Level 3	Anxiety, depression, borderline personality disorder, bipolar disorder, ADHD, autism

Note(s): Key: Level 2 – sensory integration assessment. Level 3 – sensory integration intervention. Level 4 – advanced practice. PTSD = post-traumatic stress disorder; ADHD = attention deficit hyperactivity disorder; OCD = obsessive compulsive disorder
Source(s): Table created by the authors

checking was not used as it has been considered incongruent with IPA because of the interpretative nature of the process (Smith *et al.*, 2009).

Findings

Out of the six occupational therapists who took part in the study, two worked in an inpatient setting, three in a community setting, and one across both settings. Pseudonyms are used for all participants, and any identifiable details have been removed. Four group experiential themes were identified as outlined in Table 2.

1. A real lack of understanding

A real lack of understanding was identified to capture participant suggestions of limited understanding amongst clinicians, by the person themselves, or those around them. GI as a result could be missed with potentially connected behaviours and functional challenges misunderstood.

1a. Challenges that have never been picked up

Participants described how the presence of GI could be overlooked because of this limited understanding, as highlighted by Orla and Chloe. Orla relates this to an apparent independence assumed by those around an individual who lack awareness of "what that [GI] can look like", stating:

> I suppose it is perhaps you know that they are presenting as really independent, um, and again, um, that's not necessarily understood.

Chloe also relates this difficulty in understanding to the individual who could be frustrated by struggling to engage in certain activities but without understanding the reason why:

> A lot of it's masked by the fact that they're, they're, they're intelligent and they can get through academically but really struggle with why they aren't able to do, erm, other *t*. . ., other things.

Being unable to appreciate the cause or make sense of their experiences was one of the most significant factors for many of those described by participants.

1b. Difficulties with being certain

Identification of GI could be complicated by difficulty feeling confident in their reasoning. Both Sophie and Olivia described having to "unpick medication from it [GI]" with Olivia stating, "well I can't, can I?". Sophie refers to being "heavily reliant" on structured clinical observations to ascertain if difficulties observed in occupational tasks are "really coming from the vestibular system" and likely to be related to GI. However, she states that a lack of knowledge among other clinicians can lead to questioning her reasoning:

> If you're the only person with that knowledge and there's other professionals around with their sort of perceptions you can quickly swing between, oh you know, am I right.

Both Sophie and Alice connect these feelings of uncertainty to a need for increased published evidence, with Sophie stating this would "make my sort of perception a bit more, concrete". Alice echoes this sentiment, suggesting "it's so so limited in the research out there that actually it's, it's really quite difficult to know".

Table 2. Group experiential themes and sub-themes

Group experiential theme	Sub-themes
1. A real lack of understanding	1a. Challenges that have never been picked up
	1b. Difficulties with being certain
2. Making the connection	2a. Barriers in everyday activities
	2b. The fight flight freeze response
3. Alterations in relationships	3a. Disconnection from self
	3b. Disconnection from others
4. Supporting recovery	4a. Developing a sense of safety
	4b. Providing support to move forward

Source(s): Table created by the authors

2. Making the connection

Making the connection was chosen as a group experiential theme (GET) to capture the main factors that led to GI being identified. These included two main areas: barriers experienced by their clients in everyday activities and ANS responses.

2a. Barriers to everyday activities

All participants described GI as becoming apparent through barriers individuals experienced in doing what they wanted or needed to do. Individuals might alter their routines and interests to reduce the challenges in their everyday occupations. Both Alice and Sophie give examples of this resulting in complete avoidance of activities:

> She says I would like to be able to go and walk my dog. But she's worried about sort of tripping up over the lead and, and all that (Alice).

> They'd often avoid sort of like, country walks and things like that through forests [. . .] uneven ground (Sophie).

Attempts to avoid barriers or situations were described as resulting in withdrawal or isolation by all participants. Chloe describes how this could lead to "a sedentary kinda lifestyle as a consequence of feeling gravitationally insecure, and not feeling comfortable out and about".

A common functional difficulty described by five out of six participants was using stairs. Sophie reflects on how this could create a barrier to engaging in occupations:

> She requested to go swimming. So I took her to a local leisure centre and she absolutely freaked out at the thought of just entering the pool. So, sort of going down the steps and, yeah it was really, she, she basically froze.

Orla discusses how for one individual this difficulty extended to where "even just the simplest of things in sort of her stepping up to a curb, she became really anxious", making it challenging to access her local area without support from staff.

2b. The fight-flight freeze response

All participants reflected on the significant fear response to movement in GI and the perceived impact on arousal. Most participants described this as strong ANS responses seen as "fight or flight" in reaction to a movement challenge. Orla describes seeing this with one individual in the completion of everyday tasks that require backward head movements, such as hair washing:

> She'll go into that fight-flight response and you know, it can lead to her really sort of hitting out at people or her peers. Um, we'll see a lot of sort of pacing behaviours as well.

Emma describes more of a freeze response where an individual became immobilised in response to movement, "she was like, standing there and she was like, I cannot, I cannot, do it, like my, my feet, I, I cannot move". Oliva echoes these observations, reflecting on the ANS reactions seen presenting with initial high levels of distress followed by a "blunted" or "shut down" response, stating:

> They don't understand themselves, nobody else understands them, they're in a system that they can't change. What use is fight/flight to them at that, that point?

Chloe and Olivia discussed the potential for these responses to be delayed so that the heightened responsivity may only become apparent after the movement has stopped. Olivia reflects on an example of this:

> It [GI] was really severe for him, erm, and lots of kind of what we figured was kind of delayed responses [. . .] it turned out that he'd had movement experience maybe in the morning and he'd be sitting there in the afternoon and then suddenly the behaviour would erm present itself.

Chloe suggests these feelings of overwhelm can be evident for the "duration of a day", causing an individual to experience a persistent sickness or grogginess.

3. Alterations in relationships

Alterations in relationships were identified as a GET to capture participants' reflections on how GI was perceived to alter an individual's sense of connection or relationship with themselves and those around them.

3a. Disconnection from self

Olivia, Chloe and Emma all suggested individuals with GI experience difficulty trusting their bodies, resulting in not feeling stable, grounded and secure in their movements. Olivia states:

> You don't trust your body to stay upright [. . .] to me it seems much more than that, it seems to be a wellbeing impact that stems out of lack of connection to the ground.

This sense of insecurity could lead to an understandable heightened level of anxiety and emotional instability, as suggested by Chloe:

> If you don't know, what's going on with your body and you're not getting feedback about how you're moving and how you relate to gravity you're gonna be anxious (laugh) aren't you?

Emma describes a sense of immobilisation and frustration for one individual unable to hop as part of a sensory assessment:

> She got really upset, she you know I can't, my body won't let me do this, this is, and yeah I, I really saw how, you know how much power, it almost has on her.

As a result, there could be an overall sense of mistrust and disconnect from their own body.

3b. Disconnection from others

Altering their lifestyles to manage or accommodate for the difficulties caused by GI, could result in isolation from others. Alice described a young man who withdrew from activities involving leaving the house:

> He wasn't obviously able to see his friends, he was spending a lot of time at home, erm, and there's kind of a lot of them (laugh) in the house as well so for him, he hasn't got that ability to, to escape.

Participants also described the experience of becoming cut off because of fears of judgement or a belief that others would not want to spend time with them. This could impact relationships with peers and supporting staff. Orla describes how for one individual this led to anticipation of negative responses:

> She's then sort of questioning actually. You know staff, because I've acted in this way because of her gravitational insecurity staff now don't like me or I've acted in a bad way.

This sense of feeling judged for their difficulties was apparent for several individuals described, leading to strained relationships. For others, this judgement could be more explicit:

> Health professionals have said to her in the past, erm, you know, like, stop being lazy [. . .] going for a swim and going for a walk will make you feel better [. . .] And she's like, it's not, it's not that easy (Emma).

4. Supporting recovery

Supporting recovery was identified as a GET to capture discussions that arose relating to how participants would enable someone with GI in their recovery.

4a. Developing a sense of safety

All participants automatically began to discuss how they might begin working with someone identified as having GI to instil a sense of safety or grounding. Participants described a "bottom-up" approach in contrast to traditional "top-down" cognitive interventions. Chloe and Emma reflect on how identifying GI as an underlying factor in an individual's dysregulation informed a new approach to working with the person.

> So you're building it you know gradually for them so that their, their, their vestibular system's able to, process that in a way, to and interpret it that actually ok, I can deal with this, this is ok, this is safe (Chloe).

> Like that iceberg I spoke about, she almost needs to, to, hit those and sort those foundations out first before she can then, move up (Emma).

This then informed intervention focused on helping the person trust their own body and responses as a starting point before beginning to actively challenge the GI, and the related anxiety experienced. Chloe and Sophie describe this as including developing the ability to regulate their response to vestibular input.

4b. Providing support to move forward

Participants suggested identifying GI, and an intervention focused on this could be the missing piece that allowed an individual to progress further and move on to more independent living. Emma discussed the apparent relief for an individual provided with the explanation of GI:

> She kept saying, oh, its, its gone, she said she, she's almost had like this layer over her eyes all the time, and this, this headache that she didn't really realise was there.

Being provided with an answer for their difficulties with movement was experienced as a relief that someone understood and validated their experiences. Alice described this as "a lightbulb moment" where an individual would realise "it's not necessarily, you know, not what maybe everyone else, saying it is". This could immediately begin to reduce the frustration experienced by individuals with GI.

For individuals within in-patient environments, GI was perceived as limiting progress in building up activities outside of the unit and establishing a more independent routine. Orla states:

> Not only does it hinder their ability to engage but I suppose you know it hinders their recovery as well.

Sophie describes how individuals could appear "more poorly than they are because they're not participating" and reflects on one woman who had spent approximately 20 years in hospital settings, but following identification of GI and commencing intervention, changed to "quite swiftly moving for, community discharge".

Identifying GI requires access to a practitioner with specialist training, which would not be available in all settings. Once identified, however, being able to formulate how GI affects them and identify strategies to support that individual could guide future services:

> It's so important to identify it [gravitational insecurity], whilst they're in services because then that report will kind of, yeah, that highlighted need would hopefully stay with them (Sophie).

It was suggested that this could reduce misconceptions of responses and provide greater understanding for that person and the clinicians who may work with them. Olivia states that this new understanding of an individual's presenting needs allowed her to consider "that person's real experience from a neurological level" as a key part of their occupational formulation.

Discussion

This is the first study to use a qualitative approach to gain the perspectives of occupational therapists working with adults with mental health difficulties who experience GI. GI has primarily been explored using quantitative or experimental methods, with most studies focusing on children. The findings of this study begin to develop an understanding of clinicians' perceptions of how GI may present in adults with mental health conditions and the potential connection of this to their emotion regulation and functioning. Four GETs were identified through the analysis: a real lack of understanding, making the connection, alterations in relationships and supporting recovery.

The idea that GI could be misunderstood within the mental health population is not new (Ayres, 2005; Coelho and Balaban, 2015), but this study begins to expand on potential reasons why and how this might affect the person. GI has limited acknowledgement beyond occupational therapy, and identification requires specialist training in SI (Potegal *et al.*, 2022). Even with relevant training and assessment tools such as the Adult/Adolescent Sensory History (ASH) (May-Benson, 2015), participants could lack confidence in their hypothesis because of factors such as medications that increase symptoms of dizziness by disrupting vestibular signals (Bareis *et al.*, 2022), resulting in a similar presentation to that connected with GI (May-Benson and Koomar, 2007; Potegal *et al.*, 2022). Another factor suggested was being the "only person with that knowledge" (Sophie) in a particular setting, which left them more uncertain in their reasoning. Peer support from others who share the same knowledge has been identified as an important factor in developing clinical expertise and confidence when practicing SI (Bird and Rihtman, 2024).

GI was described by all participants as becoming apparent through impaired functioning and reduced occupational and social engagement, challenges also frequently linked to various mental health conditions, warranting caution in connecting them solely to GI (Lipskaya-Velikovsky *et al.*, 2024). However, several difficulties described in this study, such as descending stairs or walking on uneven ground, align with existing literature and assessments such as the ASH, which identify these as key indicators of GI in the wider population (Ayres, 2005; May-Benson *et al.*, 2020a). Another key indicator suggested was strong ANS reactions to movement, suggestive of a fight, flight, freeze response, echoing the description of GI as a "primal fear response" (Koomar, 1996) disproportionate to the level of threat experienced (Fisher and Bundy, 1989; May-Benson *et al.*, 2020b). However, a new suggestion from this study is that these responses may be delayed, only becoming apparent after the movement experience has ended. This pattern potentially aligns with descriptions of sensory responsivity in schizophrenia, where impaired sensory gating is thought to cause limited initial registration of sensory input, followed by a heightened response once the stimulus is perceived (Brown *et al.*, 2020; Van den Boogert *et al.*, 2022). In contrast, affective disorders have been associated with more immediate aversive reactions to sensory input (Lipskaya-Velikovsky *et al.*, 2024), which may be why delayed responses were only noted by two participants (Chloe and Olivia), both of whom work with individuals with psychotic conditions. This factor may warrant further exploration to support understanding of the presentation of GI in mental health.

Awareness and understanding of GI was a commonly expressed concern in this study and an important consideration for practice (May-Benson *et al.*, 2020a; Potegal *et al.*, 2022). Participants echoed Ayres' (2005) sentiment that clinicians could misinterpret the avoidance of tasks seen in GI as a symptom of personality or behavioural difficulties. Limited understanding was suggested to impact an individual's relationships with others and lead to reduced social engagement. While this area is less apparent in the existing GI literature, social withdrawal has been suggested as a self-management strategy for heightened sensory responsivity (Ben-Avi *et al.*, 2012). This study added the idea of reduced self-understanding for those experiencing GI leading to frustration and a sense of mistrust in their bodies that prevented them from doing what they needed to do. Providing the explanation of GI and developing self-awareness, as well as that of those around them, was suggested to be key in moving forward. This centrality of increasing understanding for the person themselves and those around them as a key part of intervention resonates with findings of a previous study considering young people with mental health difficulties and their families (Williamson and Ennals, 2020). Other aspects of intervention, while not discussed by all participants, mirrored the focus on regulating the response to vestibular input suggested by both Piller and Hageman (2020) and Potegal *et al.* (2018).

Limitations

This study considered a small sample size, and all participants were working in the UK, which, while sufficient for an IPA study, limits the transferability of the findings. A potential confounding factor with the chosen client group is the impact of factors such as having to "unpick medication from it" (Olivia) or higher baseline levels of anxiety adding complexity to the identification of GI; therefore, the findings of this study must be considered cautiously and as reflective of participant

observations and interpretations. While the perceptions of these therapists are valuable, and perhaps necessary to obtain first, because of limited understanding of GI, they are not likely to provide as rich an insight as the experiences of those with GI. Also, no trial of the interview schedule was completed before use, which could have impacted the depth and reliability of the findings.

Conclusion

This study considered the perceptions of occupational therapists relating to the presentation of GI in adults with mental health conditions. GI was suggested to primarily be evident in the avoidance of specific functional challenges and activities as well as in ANS responses. These factors were proposed to lead to increased emotional dysregulation, withdrawal and reduced social and occupational engagement. Identification of GI could be complicated, because of therapist confidence and confounding factors such as medication. This study provides initial insight into the observations of occupational therapists working with adults with mental health conditions concerning how GI may be evident through its perceived impact on emotion regulation and functional performance. There is a need for much further research in this area, but gaining insight into the experiences of the individuals themselves who experience GI may be of value in developing understanding.

Acknowledgment

Recruitment for this study was supported by the Sensory Integration Education Research Support Grant (non-financial support).

Funding: This study received a grant from the University of Liverpool, Institute of Population Health research support budget.

Ethical statement: Ethical approval was received through ILCAMS-REC, University of Liverpool ref no: 11501.

Authors' declaration of authorship contribution: The study proposal was developed by RM and reviewed by ER. Data collection was completed by RM & ER. Data analysis and preparation of the manuscript was completed by RM. The manuscript was reviewed by all authors prior to submission to the journal.

Conflict of interest: The authors have no conflict of interest to declare.

References

Andersson, H., Sutton, D., Bejerholm, U. and Argentzell, E. (2022), "Experiences of sensory input in daily occupations for people with serious mental illness", *Scandinavian Journal of Occupational Therapy*, Vol. 28 No. 6, pp. 446-456, doi: 10.1080/11038128.2020.1778784.

Arroll, B. and Kendrick, T. (2018), "Anxiety", in Gask, L., Kendrick, T., Peveler, R. and Chew-Graham, C.A. (Eds), *Primary Care Mental Health*, 2nd ed., pp. 125-137.

Ayres, A.J. (2005), *Sensory Integration and the Child*, (25th anniversary ed.) Western Psychological Services, Los Angeles.

Bailliard, A.L. and Whigham, S.C. (2017), "Linking neuroscience, function, and intervention: a scoping review of sensory processing and mental illness", *American Journal of Occupational Therapy*, Vol. 71 No. 5, pp. 1-18, doi: 10.5014/ajot.2017.024497.

Bareis, N., Olfson, M., Wall, M. and Stroup, T.S. (2022), "Variation in psychotropic medication prescription for adults with schizophrenia in the United States", *Psychiatric Services*, Vol. 73 No. 5, pp. 492-500, doi: 10.1176/appi.ps.202000932.

Ben-Avi, N., Almagor, M. and Engel-Yeger, B. (2012), "Sensory processing difficulties and interpersonal relationships in adults: an exploratory study", *Psychology*, Vol. 03 No. 1, pp. 70-77, doi: 10.4236/psych.2012.31012.

Bird, D.E. and Rihtman, T. (2024), "Research knowledge translation in sensory integration-based therapy: exploring subjectivity of clinical expertise", *Canadian Journal of Occupational Therapy*, Vol. 91 No. 3, p. 00084174231223875.

Brown, C., Karim, R. and Steuter, M. (2020), "Retrospective analysis of studies examining sensory processing preferences in people with a psychiatric condition", *The American Journal of Occupational Therapy*, Vol. 74 No. 4, pp. 1-11, doi: 10.5014/ajot.2020.038463.

Bundy, A.C. and Lane, S.J. (2020), "Sensory integration: A. Jean Ayres' theory revisited", in Bundy, A.C. and Lane, S. J. (Eds.) *Sensory Integration: theory and Practice*, 3rd ed. F.A. Davis, Philadelphia, pp. 2-20.

Coelho, C.M. and Balaban, C.D. (2015), "Visuo-vestibular contributions to anxiety and fear", *Neuroscience & Biobehavioral Reviews*, Vol. 48, pp. 148-159, doi: 10.1016/j.neubiorev.2014.10.023.

Fisher, A.G. and Bundy, A.C (1989), "Vestibular stimulation in the treatment of postural and related disorders", Payton, O.D. *et al.* (Eds.), *Manual of Physical Therapy Techniques*, Guilford Press, pp. 71.-107.

Hitch, D., Pazsa, F. and Qvist, A. (2020), "Clinical leadership and management perceptions of inpatients with obesity: an interpretative phenomenological analysis", *International Journal of Environmental Research and Public Health*, Vol. 17 No. 21, pp. 1-13, doi: 10.3390/ijerph17218123.

Janackovski, A., Deane, F.P. and Hains, A. (2021), "Psychotherapy and youth suicide prevention: an interpretative phenomenological analysis of specialist clinicians' experiences", *Clinical Psychology & Psychotherapy*, Vol. 28 No. 4, pp. 828-843, doi: 10.1002/cpp.2536.

Koomar, J. (1996), "Vestibular dysfunction is associated with anxiety rather than behavioral inhibition or shyness", unpublished manuscript, ProQuest Dissertations Publishing, Boston University, available at: www.proquest.com/dissertations-theses/vestibular-dysfunction-is-associated-with-anxiety/docview/304242818/se-2 (accessed 28 June 2024).

Lane, S.J. (2020), "Sensory modulation functions and disorders", in Bundy, A.C. and Lane, S.J. (Eds), *Sensory Integration: theory and Practice*, 3rd ed. F.A. Davis, Philadelphia, pp. 151-180.

Levinson, H.N. (1989a), "A cerebellar-vestibular explanation for fears/phobias: hypothesis and study", *Perceptual and Motor Skills*, Vol. 68 No. 1, pp. 67-84.

Levinson, H.N. (1989b), "The cerebellar-vestibular predisposition to anxiety disorders", *Perceptual and Motor Skills*, Vol. 68 No. 1, pp. 323-338.

Lipskaya-Velikovsky, L., Hershkovitz, A., Bukai, M. and Bar-Shalita, T. (2024), "Recent onset mental illness severity: pilot study on the role of cognition, sensory modulation, and daily life participation", *Frontiers in Psychiatry*, Vol. 15, p. 1413635, doi: 10.3389/fpsyt.2024.1413635.

May-Benson, T. (2015), *Adult Adolescent Sensory History*, Spiral Foundation, Newton, MA.

May-Benson, T. and Koomar, J.A. (2007), "Identifying gravitational insecurity in children: a pilot study", *The American Journal of Occupational Therapy*, Vol. 61 No. 2, pp. 142-147, doi: 10.5014/ajot.61.2.142.

May-Benson, T., de Mello Gentil, J.L. and Teasdale, A. (2016a), "Gravitational insecurity in children with sensory integration and processing problems", *The American Journal of Occupational Therapy*, Vol. 70 No. 4_Supplement_1, doi: 10.5014/ajot.2016.70S1-PO2007.

May-Benson, T., Faria, W. and Teasdale, A. (2016b), "Incidence and patterns of gravitational insecurity in adults and adolescents", *The American Journal of Occupational Therapy*, Vol. 70 No. 4_Supplement_1, doi: 10.5014/ajot.2016.70S1-PO6099.

May-Benson, T.A., de Mello Gentil, J.L. and Teasdale, A. (2020a), "Characteristics and prevalence of gravitational insecurity in children with sensory processing dysfunction", *Research in Developmental Disabilities*, Vol. 101, p. 103640, doi: 10.1016/j.ridd.2020.103640.

May-Benson, T., Ruzzano, L. and Teasdale, A. (2020b), "Performance of typical adults with and without self-reported fearfulness to movement on the gravitational insecurity assessment-revised", *American Journal of Occupational Therapy*, Vol. 74 No. supplement 1, doi: 10.5014/ajot.2020.74S1-PO3805.

Miller, L.J. (2006), *Sensational Kids: Hope and Help for Children With Sensory Processing Disorders*, Putnam Press, New York, NY.

Parham, L.D. and Cosbey, J. (2020), "Sensory integration in everyday life", in Bundy, A.C. and Lane, S.J. (Eds), *Sensory Integration: theory and Practice*, 3rd ed. F.A. Davis, Philadelphia, pp. 21-39.

Piller, A. and Hageman, S. (2020), "Sensory interventions used in the treatment of gravitational insecurity (GI)", *American Journal of Occupational Therapy*, Vol. 74 No. 4_Supplement_1, doi: 10.5014/ajot.2020.74S1-PO8802.

Potegal, M. (2015), "Is gravitational insecurity a unicorn?", *Physical Medicine and Rehabilitation International*, Vol. 2 No. 10, p. 1071.

Potegal, M., Pfaff, W.O. and Kroker, E. (2018), "Gravitational insecurity in children: a survey of occupational therapists' observations", *Indian Journal of Physiotherapy & Occupational Therapy*, Vol. 12 No. 2, pp. 3-37.

Potegal, M., May-Benson, T.A., Oxborough, S., Hall, A. and McKnight, S. (2022), "Reduced gain and shortened time constant of vestibular velocity storage as a source of balance and movement sensitivities in gravitational insecurity", *Occupational Therapy International*, Vol. 2022, doi: 10.1155/2022/5240907.

Romero-Ayuso, D.M., Toledano-González, A., Pinilla-Cerezo, M., Sanchez-Rodriguez, O., Garcia-Arenas, J.J., Trivino-Juarez, J.M. and Ortiz-Rubio, A. (2024), "Occupational balance and emotional regulation in people with and without serious mental illness", *Canadian Journal of Occupational Therapy*, Vol. 91 No. 1, pp. 100-109, doi: 10.1177/00084174231178440.

Smith, J.A., Flowers, P. and Larkin, M. (2009), *Interpretative Phenomenological Analysis: Theory, Method and Research*, Sage Publications, London.

Smith, J.A. and Nizza, I.E. (2021), *Essentials of Interpretative Phenomenological Analysis*, Sage Publications.

Van den Boogert, F., Klein, K., Spaan, P., Sizoo, B., Bouman, Y.H.A., Hoogendijk, W.J.G. and Roza, S.J. (2022), "Sensory processing difficulties in psychiatric disorders: a meta-analysis", *Journal of Psychiatric Research*, Vol. 151, pp. 173-180, doi: 10.1016/j.jpsychires.2022.04.020.

Williamson, P. and Ennals, P. (2020), "Making sense of it together: youth & families co-create sensory modulation assessment and intervention in community mental health settings to optimise daily life", *Australian Occupational Therapy Journal*, Vol. 67 No. 5, pp. 458-469, doi: 10.1111/1440-1630.12681.

Further reading

Larkin, M. and Thompson, A. (2012), "Interpretative phenomenological analysis", in Thompson, A. & Harper, D. (Eds), *Qualitative Research Methods in Mental Health and Psychotherapy: A Guide for Students and Practitioners*, John Wiley & Sons, pp. 99-116, doi: 10.1002/9781119973249.

Supplementary material

The supplementary material for this article can be found online.

Corresponding author

Rebecca Matson can be contacted at: rebecca.matson@liverpool.ac.uk