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Abstract

Student well-being is an increasing area of concern within higher education and one of the biggest causes of attrition. This study sought to investigate the potential for sensory modulation strategies as an approach to support student well-being and engagement in studies through an action research project. Sixteen second-year occupational therapy students took part in a two-week trial of items designed to support sensory modulation, following which they were asked to complete an online survey evaluating the effectiveness of the item in relation to affect, regulation, attention, and activity. Eight students completed the survey containing a mix of Likert scale and free text responses. Results of the surveys were analyzed through descriptive statistical analysis of numerical data and quantitative content analysis of textual data informed by a pre-existing framework derived from a model of Sensory Integration. While preliminary in nature, the results of the survey suggested a positive impact on affect, specifically anxiety, overall regulation, and ability to engage in studies, suggesting a connection between these factors. An additional code was identified during the analysis of strategy mismatch to reflect barriers encountered relating to the extent of and longevity of use of the strategies. Further research on a larger scale is needed to more fully investigate the potential of this approach for facilitating increased student well-being.

Keywords

Well-being, sensory modulation, higher education

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ABSTRACT

Student well-being is an increasing area of concern within higher education and one of the biggest causes of attrition. This study sought to investigate the potential for sensory modulation strategies as an approach to support student well-being and engagement in studies through an action research project. Sixteen second-year occupational therapy students took part in a two-week trial of items designed to support sensory modulation, following which they were asked to complete an online survey evaluating the effectiveness of the item in relation to affect, regulation, attention, and activity. Eight students completed the survey containing a mix of Likert scale and free text responses. Results of the surveys were analyzed through descriptive statistical analysis of numerical data and quantitative content analysis of textual data informed by a pre-existing framework derived from a model of Sensory Integration. While preliminary in nature, the results of the survey suggested a positive impact on affect, specifically anxiety, overall regulation, and ability to engage in studies, suggesting a connection between these factors. An additional code was identified during the analysis of strategy mismatch to reflect barriers encountered relating to the extent of and longevity of use of the strategies. Further research on a larger scale is needed to more fully investigate the potential of this approach for facilitating increased student well-being.

Introduction

An update to the Health and Care Professions Council (HCPC) professional standards for occupational therapists that came into effect in the United Kingdom (UK) in 2023 included a practitioner duty to "develop and adopt clear strategies for physical and mental self-care and self-awareness" (HCPC, 2022), placing increased importance on identifying ways to support well-being for students in preparation for their transition to being a newly qualified practitioner. A lack of strategies to support personal well-being was found to cause increased fatigue and cynicism during completion of training and increased risk of burnout in the initial years following qualification (Lewis-Kipkulei et al., 2021; Morales-Rodriiguez et al., 2019). This is a timely consideration due to the impact of the COVID-19 pandemic on an already over-stretched healthcare sector leading to increased clinical pressures, higher rates of attrition from the workforce, and increased levels of burnout (Poon et al., 2022). Occupational therapy students increasingly have practice placements in highly pressured environments, and supporting them in identifying strategies to support self-regulation may buffer against the impact of these added demands and pressures.

Occupational therapy students are tasked during their training with developing both a knowledge of the theoretical basis of their profession alongside building practical skills to inform their practice. The additional demands of a healthcare course within higher education that requires students to balance academic study and clinical placement have been identified as a factor that contributes to them being at higher risk of mental health difficulties during their time at university (Hughes & Byrom, 2019). While these challenges to well-being are not isolated to occupational therapy students, the levels of anxiety and stress reported by this student group have increased in recent years with the most common stressors being identified as academic pressure and perceived time constraints (Haughey et al., 2017, Poleshuck et al., 2020).

The transition to adult learning in higher education requires independent self-regulation to engage successfully in learning and enable students to achieve their potential (Bandura, 2005). Bandura's theory of self-regulation views this skill from a "top-down" approach focusing on cognitive factors to support self-motivation, behavior control, affective regulation, and self-efficacy. However, when in too high or too low a state of arousal, such as when anxious or stressed, cognitive strategies become too difficult to initiate and are often ineffective due to an overactivation of the sympathetic nervous system (Collins, 2019). Accessing such strategies is dependent on the regulation of arousal levels to enable the ability to think clearly and engage with others (Porges, 2022).

Sensory modulation approaches entail a different approach to self-regulation through utilizing a "bottom-up" approach. Sensory inputs provided by equipment, activities, or environments, are used to activate the parasympathetic nervous system, thereby regulating physiological responses to support self-regulation and well-being (Champagne et al., 2010; Miller et al., 2007; O'Sullivan & Fitzgibbon, 2018). These sensory inputs alter physiological arousal in the body and thereby "calm the mind and

facilitate adaptive self-management" (Hollands et al., 2015, p. 4). One of the main benefits of sensory modulation approaches is that they are low demand to learn and use and can be adapted to the environment and the individual thereby increasing accessibility (Keptner et al., 2021; Wallis et al., 2018).

Sensory modulation relates to both the ability to regulate our response to sensory input as well as the therapeutic use of sensory inputs to support regulation (Champagne, 2011). Bundy and Lane's model of sensory integrative dysfunction identified the process of sensory modulation as foundational to self-regulation and higher-level functions including attention, regulation, affect, and activity (Bundy & Lane, 2020), all of which are important to engage successfully in learning and therefore were chosen as factors to measure within this study. Bundy and Lane (2020) did not define these terms; therefore, it was necessary to identify equivalent factors, or more specific components, that were relatable to the majority of students to capture them within this study. These were defined by the lead researcher (RM) informed by their knowledge of the sensory integration evidence base and verified by a second member of the research team. For the purposes of the questionnaire used within this study, these terms were altered as follows: attention was changed to ability to concentrate; affect to a more specific affective factor of anxiety; regulation was extended to regulation of mood; and engagement in studies was identified as a specific example of an activity relevant to all students.

Poleshuck et al. (2020) highlighted the importance for occupational therapy students to develop strategies that support well-being. This is also in keeping with an increasing call for a focus on student well-being in higher education settings, with poor mental health and well-being being identified as one of the main causes of student attrition (Dodd et al., 2021; Higher Education Policy Institute [HEPI], 2021). Focusing on developing student knowledge of strategies that have both the potential to support their well-being and utility for clinical practice may be an effective way to support this, without increasing the time constraints and pressures reported by students.

This action research study aimed to consider how sensory modulation can be used to support higher education occupational therapy students. The project aims were to gain insight into:

- The potential of sensory modulation approaches for the well-being and engagement of occupational therapy students
- The impact of using items of sensory equipment on self-regulation in relation to factors such as attention, regulation, affect, and activity.

Literature Review

Sensory Processing as Foundational to Skill Development

Sensory modulation is a component of the theory of sensory integration first developed by Jean Ayres that considers the processes of both perception of and modulation of sensory input (Brown et al., 2019). Dunn (2001) described this ability to regulate response as dependent on the interaction between two key factors: an individual's

nervous system threshold for sensory input; and their response to that threshold in order to self-regulate. This ability to regulate, successfully process, and respond to sensations is foundational for a wide range of skills and abilities (Ayres, 1979).

This connection between threshold for sensory input and self-regulation was echoed by Bundy and Lane (2020) but with a focus on dysfunction which starts with poor sensory processing in the central nervous system. Their model, however, separated the sequential development of skills that have their basis in sensory perception, resulting in difficulties with motor skills and body awareness, and those related to sensory modulation, resulting in difficulties with arousal levels. Within their model, the process of sensory modulation is connected with challenges in relation to attention, regulation, affect, and activity (the areas of focus chosen for consideration within this study), and as a result, barriers to occupational engagement. Self-regulation and sensory integration have therefore been described as “interdependent and interrelated processes” suggesting that the provision of targeted sensory inputs can be used to support self-regulation and learning (Dahl-Reeves, 2001, p. 90).

Sensory Modulation and Higher Education

While overall there is minimal literature on the use of sensory modulation approaches with higher education students, there have been several studies considering the connection between sensory sensitivity and other areas likely to impact a student’s experience and well-being during their time at university. Students who displayed higher levels of sensitivity to sensory input have been found to show lower levels of resilience, increased depressive symptoms and stress, and a higher level of communication difficulties (Gearhart & Bodie, 2012; Hwang et al., 2021; Johnson & Irving, 2008; Yano et al., 2019).

Johnson and Irving (2008) suggested this was of particular significance in view of the high amount of change students undergo when transitioning from secondary to higher education, such as living away from home, larger class sizes, and changes in daily routines and habits. All of these changes present additional sensory challenges due to an environment likely to contain higher levels of sensory stimulation and a lower level of predictability, both of which provide additional challenges for someone who is sensory sensitive. Sensory processing sensitivity has also been connected with an increased risk of burnout and compassion fatigue in healthcare professionals suggesting identifying ways to support sensory regulation is an important area of consideration for well-being (Perez-Chacon et al., 2021).

There has been one study to date that has considered the use of sensory modulation with higher education students. Keptner et al. (2021) evaluated the effectiveness of four specific strategies on test anxiety. This included two strategies identified as based upon sensory modulation, the use of a weighted lap pad and an adapted dive reflex, and two strategies they identified as more traditional approaches to anxiety management, progressive muscle relaxation and deep breathing techniques. While a statistically significant decrease in anxiety was noted with all four techniques, this reduction was

longer lasting following the use of the two sensory modulation techniques compared to the more traditional anxiety management approaches. This suggests a potentially more prolonged benefit with utilizing the sensory modulation approach for anxiety.

Sensory Modulation and Well-being

A significant correlation has been found between anxiety levels of adults and over-responsivity to sensory input, and between depressive symptoms and under-responsivity to sensory input (Engel-Yeger & Dunn, 2011; Engel-Yeger et al., 2018; Kinnealey et al., 2011). The difficulties regulating sensory input experienced have been identified as a potential factor in the development of affective disorders, but also as a possible consequence of heightened levels of anxiety or depression (Engel-Yeger & Dunn, 2011; Serafini et al., 2016). These sensory processing differences can limit an individual's social engagement, their well-being, and overall quality of life (Kinnealey et al., 2011).

The benefits of sensory modulation approaches for well-being have been evaluated to a greater extent with the general population, specifically within community mental health settings. Studies have shown the potential of the approach in relation to improved well-being including a reduction in anxiety levels, improved sleep, and supporting increased engagement in valued activities (Dempsey, 2016; Wallis et al., 2018; Williamson & Ennals, 2020). Of particular significance is the ability of the approach to facilitate self-regulation as well as the sense of agency provided that allows the person to develop a greater understanding of their sensory responses and the benefits of strategies rather than viewing the therapist as the "expert" (Dempsey, 2016; Williamson & Ennals, 2020).

Methodology

Within their first professional practice module in the second year of their program at a UK university, occupational therapy students were introduced to equipment that could be used to support sensory modulation. Students developed their understanding of the approach by first considering the benefits of sensory modulation for their arousal levels before then applying this knowledge to fictional case studies. This pilot study expanded on this through taking an action research approach in which students were able to opt-in to additional activities to further consider the potential benefit of sensory modulation strategies for their own well-being.

An action research approach was chosen as the most appropriate approach as the intention was for this project to inform further developments to practice within education (Norton, 2019), specifically to better support student well-being. By opting into the additional activities, students were able to complete a sensory screening tool, the Sensory Patterns Questionnaire (SPQ; Dunn, 2009), to understand more about their responses, and attended a drop-in session where they were supported by two members of staff in choosing a sensory item, based upon their personal preferences and responses to the available items, to take away and trial for a two-week period. The SPQ was chosen to facilitate increased self-understanding for participants who are part of a general rather than clinical population. Dunn provided this tool to facilitate awareness of the impact of sensation in everyday life, thereby enabling individuals to make

adjustments to meet their sensory needs (Dunn, 2009). Participants were able to self-score the questionnaire and had access to information explaining the different categories and responses. The questionnaires were not collected in or scored by the researchers as the focus of the study was on increased self-awareness and self-regulation, rather than therapist-led assessment and intervention. Co-creation in the development of sensory modulation strategies is suggested to play an important role in increasing potential effectiveness and continued development of strategies (Williamson & Ennals, 2020).

Participants were encouraged to trial using the item during activities such as lectures, independent work, or anxiety-provoking situations. Available items included massage balls, fidget tools such as tangle teasers, hand exercise balls, and aromatherapy putty. Items to be included were considered against a need to be affordable and easily replaceable for those with a limited budget; portable so they could be easily used in different situations and locations; and as subtle as possible to reduce the risk of participants feeling self-conscious when using the item. These were considered important factors in increasing the potential for ongoing use if a participant were to find the item beneficial.

On returning the item, students were asked to complete a short questionnaire containing eight questions (see Table 1) that were a mixture of Likert scale and free text to capture the impact on their well-being while decreasing the risk of a reduced completion rate (Denscombe, 2017). The questionnaire intended to capture changes in relation to attention, regulation, affect, and activity, which based upon the connections made by Bundy and Lane (2020) could be hypothesised to improve, should the item facilitate sensory modulation. As identified within the introduction, alternative terms or wording were identified to use within the questionnaire to make them relatable to the students surveyed.

Table 1

Survey Questions

1. Item loaned [free text]
2. Using the sensory item helped me to concentrate [Likert scale]
3. Using the sensory item helped me manage my anxiety [Likert scale]
4. Using the sensory item helped me to regulate my mood [Likert scale]
5. Using the sensory item helped me to engage with my studies [Likert scale]
6. In what situations or activities did you find yourself using the sensory item? [free text]
7. How would you describe the personal benefits for you of using the item if any? [free text]
8. Is there anything else you would like to add? [free text]

As the sensory workshops were delivered by the lead researcher (RM), to minimize the risk of bias in reporting the questionnaire was distributed by the module lead and co-investigator (JL). A descriptive statistical analysis was completed of numerical data and a quantitative content analysis of textual data. Content analysis can be deductive and informed by the use of an existing framework or theory to inform the coding process and identification of categories (Bishop-Clark et al., 2012; Norton, 2019). The qualitative data therefore was coded in relation to the behavioural areas connected to sensory modulation by Bundy and Lane (2020) of attention, regulation, affect, and activity. To increase the validity of the analysis and facilitate triangulation, three researchers (RM, JL & JH) were involved in coding the data. Each response within the textual data was initially coded independently by two of those researchers prior to all three researchers meeting to agree on a consensus and establish the final coding through further analyst triangulation. This was guided by a codebook identifying broad criteria for each code, that further expanded the definitions developed by the lead researcher (see Table 2) to enable the recording of the frequency of units related to each of the identified codes. Survey research does not usually produce high levels of textual data; therefore, these methods were chosen to best support a cohesive consideration of both numerical and textual responses together that allow overall inferences to be drawn about the potential benefits of the approach (Norton, 2019).

Table 2

Codebook of Terms

Code	Behavioral Consequence of Sensory Modulation	Criteria/ Definition
1	Attention	Impact on concentration levels or ability to direct focus towards something, e.g. increased attention span, reduced distraction levels, and improved recall.
2	Regulation	Impact on arousal levels and overall self-regulation, e.g. sense of stability in arousal, altered fatigue levels/ energy levels, decrease in agitation, ability to regulate physiological response.
3	Affect	Impact on affective or emotional state, e.g. management of anxiety, stability in emotional state, altered feelings or mood.
4	Activity	Impact on the ability to sustain or initiate engagement in an activity, e.g. facilitating the ability to meaningfully engage, the suggestion of purposeful activity, reduction in overactivity, and engagement in study.

Ethical approval was obtained via a collective application through the University of Liverpool. All students were made aware that the additional session and equipment loan was optional and that not participating would not result in any penalty within their studies. Students who expressed an interest in attending were provided with a participant information sheet and asked to complete an online consent form. Consent forms and completed questionnaires were stored in line with university policies. Participants were advised of their right to withdraw up until the point of submission of the questionnaire as once submitted it would not be possible to identify their data. As this study considers factors such as anxiety for which students may need further support, they were provided with a debrief document with avenues of support including University student support services and an immediate access helpline service.

Results

Out of the sixteen students who took part in the project eight (50%) completed the questionnaire. All students were in their second year of the undergraduate occupational therapy program. Out of those returned, all eight participants completed all four Likert scale questions and the first three open text questions, “Item loaned”, “In what situations or activities did you find yourself using the sensory item?” and “How would you describe the personal benefits for you of using the item if any?” The only question with a reduced completion rate was the final question “Is there anything else you would like to add?”

Four of the questions were based on a five-point Likert scale (5-strongly agree, 1-strongly disagree) and focused on areas in connection with the behavioral areas of Bundy and Lane’s (2020) model: attention (ability to concentrate); regulation (regulation of mood); affect (anxiety) and activity (engagement with studies). The overall benefits, as well as the overall strength of each factor, can perhaps be best considered in the context of the free text responses that followed to better support analysis of the factors within this.

The open-text questions were coded according to the identified areas, except the initial question which only required a brief response as to which item was loaned. Four of the respondents had loaned a tangle teaser, three the scented putty, and one a hand exercise ball. Quantitative content analysis allowed for the identification of the frequency of each factor within the open-text responses. The open-text responses were too short to consider a qualitative form of analysis to provide further understanding of individual experience, but examples in relation to each code have been provided to support the discussion. Table 2 outlines the number of occurrences and percentage of units relating to each code as well as how many participant transcripts contained units relating to each code. During the coding process it became apparent not all units corresponded to the codes within the codebook and an additional code of strategy mismatch was agreed by the researchers to reflect these units.

Figure 1

Student Responses to the Likert Scale Questions from the Survey

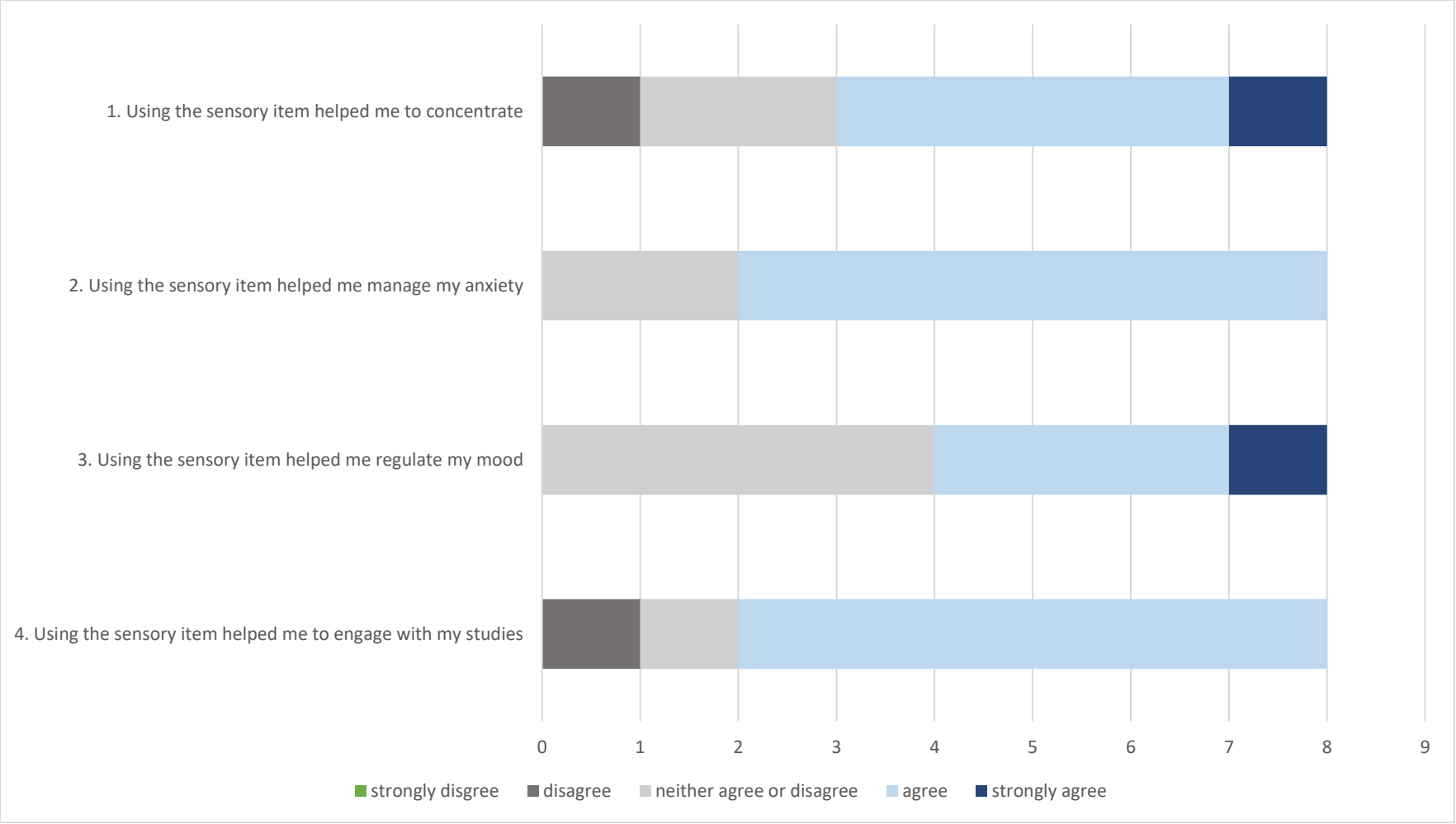

Table 2

Coding of Free Text Responses

Code	Occurrences	Percentage	No. participants
Attention	5	9%	4
Regulation	16	29%	6
Affect	12	21%	6
Activity	15	27%	6
Strategy mismatch	8	14%	4

Attention

While 63% of participants (n = 5) identified the sensory items as helping them to concentrate only 9% of units in the open text responses related to this code and it only appeared in 50% of the questionnaires making this the least common code within the transcripts. This suggests concentration was one of the less significant benefits of the items identified by the students. However, the physicality of the strategies appeared to be of benefit in focusing attention with participant 6 stating the item “gave me something to do with my hands while concentrating.” Where the item did support increased attention or concentration there was a suggestion of the items providing a sense of grounding to help remain present in the activity and engage for longer periods. Participant 8 stated one of the main benefits of the item was to “keep me from getting distracted.”

Regulation

Only 50% (n = 4) identified that using the sensory item supported them in regulating their mood in the Likert scale responses but this was the most evident code in the content analysis accounting for 29% of units and appearing in the transcripts for 75% of participants. Participant responses suggested the items supported a bodily regulation that thereby facilitated a more regulated state overall, with one participant stating “it was beneficial to have something to squeeze and press to distract from the situation” (Participant 2).

There was an apparent connection between engagement in a physical action and a more regulated state of arousal. A number of other responses simply described the item as reducing their overall stress levels or allowing them to feel more at ease. Participant 7 simply reported the item “Worked well at helping me calm down.”

Affect

Impact on affect, specifically the management of anxiety levels, was a significant area overall in both the Likert scale and textual responses. Seventy-five percent of participants (n = 6) responded agree or strongly agree to the item “using the sensory item helped me manage my anxiety” and units relating to this code appeared in six out of eight of the participant transcripts. Participants described the item as helping to divert their attention away from their thoughts or feelings:

> "If I felt socially anxious it helped me focus my attention on the feeling of the putty and the smell" (Participant 7)
>
> "At first I thought of using it while in lecture or while studying but it was more beneficial to distract me from overthinking and have a break from mind" (Participant 5)

For participant 7 there was a clear indication of the sensory properties of the item enabling this through the tactile and olfactory input it provided. The items provided a tangible cue to refocus and gain a sense of relief from negative emotions.

Activity

A high number of the participants connected the item with increased engagement in activity with 75% (n = 6) suggesting this facilitated greater engagement in their studies and the unit activity also being identified in the free text responses for 75% of participants. Increased engagement in activity accounted for 27% of the units in the content analysis with participants referring to a range of activities primarily connected with the study including reading articles, listening to or watching lectures, completing formative exams, and independent study. This tended to be during activities that demanded more prolonged attention such as participant 1 identifying "I used the dough when reading long articles" or while engaged in more passive activities such as "when watching tv" (Participant 4).

Strategy Mismatch

Following completion of the content analysis, there were eight units that all researchers agreed did not fit with any of the pre-identified codes. Upon reviewing these units, an apparent "mismatch" of the strategy either to that person's preferences or comfort level in using the strategy created barriers in on-going use. Two participants described the scented putty as leaving a "greasy" feel on their hands creating an unpleasant tactile sensation. For other participants, the initial novelty or interest of the item reduced with participant 5 describing how they "got bored and started using it less for the rest of the weeks". For participant 6, it was the more visual aspects of the item identifying that the color meant that it "stood out making me feel less confident using it," thereby reducing the places she would use the item and limiting the potential effectiveness of the strategy.

Discussion

This study aimed to consider the potential benefits of sensory modulation strategies for the well-being and engagement of occupational therapy students. This was considered in view of the key areas identified by Bundy and Lane (2020) as connected with sensory modulation which includes attention, regulation, affect, and activity. Overall, there was a good level of connection between the results identified through the Likert scale questions and the open-text responses. However, what became apparent in the analysis was difficulty in distinctly separating the factors into the pre-assigned codes, suggesting these are not fully independent concepts and perhaps cannot be best considered in this way.

While items within the free text responses were allocated to different codes, a number were interconnected and due to the brevity of the responses in general, there was a limited context to clarify the intended or implicit meaning to the participants. Content analysis allows for the breaking down of qualitative data into chunks as small as individual words which supported this separation out into codes (Bishop-Clark et al., 2012); however, there was a clear sense among the researchers that many of these smaller units were interdependent. For example, a strategy identified as supporting the management of anxiety or affect was described as enabling greater engagement in activity as a result. However, this would correspond with Bundy and Lane's (2020) model which suggested occupational engagement is the final level or outcome that results from sensory processing and the connected skills.

An apparent theme within the open-text responses was a bodily element in relation to all the codes and that it was often the physicality of the strategies that made the sensory items effective. A number of participants described the item as giving them something to do with their hands and helping to stop automatic behaviors such as fidgeting or picking at nails. These behaviors are likely to be a result of autonomic nervous system dysregulation which results in the subconscious seeking of regulatory sensory inputs; in this case, movement or tactile input (Christensen et al., 2020). The sensory item provided an alternative to meet this need and remain regulated and engaged thereby increasing the ability to engage in a task or activity. These findings are in keeping with the theory of sensory modulation as a "bottom-up" approach that facilitates increased regulation of arousal levels through first altering physiological processes (Hollands et al., 2015; Miller et al., 2001).

In connection with this, the areas with the greatest support between the descriptive statistical analysis and the content analysis were regulation, affect, and activity with attention being less prominent. However, these connections must be viewed cautiously due to the small number of participants and responses and therefore are only suggestive of potential benefits. As participants were reflecting on item use primarily in the context of study-related activities, it is of interest that while a high number identified the item as supporting them in engaging with their studies, the suggestion of impact on concentration or attention was much less present in both the quantitative and textual data. This suggests that perhaps the greatest barrier to maintaining engagement in studies perceived by these students is the ability to regulate their arousal and mood. When in a stress state or high arousal, people are less able to engage in cognitively demanding activities, such as study, and tend to experience a shift into fight, flight, or freeze states (Bear et al., 2020). This is where approaches such as sensory modulation that activate our parasympathetic nervous system tend to have a greater effect by altering the physiological response to stress and countering the escalation in arousal (Champagne, 2010; Wallis et al., 2018). Using the sensory items likely facilitated a return to a more regulated state where students were able to engage in focused activity as part of their studies.

Codes for the quantitative content analysis were pre-determined. However, on analysis it was necessary to add an additional code of “strategy mismatch" to reflect barriers evident in relation to the use of the sensory items. This project took place over a relatively short time scale to fit within time in university for the students and to correspond with teaching within a professional practice module. Students selected a sensory item on loan in an informal workshop and were able to access online resources to support their awareness of their sensory preferences and the use of such items to manage arousal levels. These resources included the SPQ, an overview of sensory processing patterns, and educational videos and articles in relation to sensory modulation and well-being; however, students may or may not have made use of these prior to the session. This could have led to students selecting an item that while it held initial appeal or benefit was not based on any formal analysis of sensory responses or focused education in relation to their use. While overall the participants identified the item loaned as being beneficial, this perhaps limited the effectiveness of the approach as well as the longevity of strategy use.

Sensory modulation approaches have been found to be most effective when individualised and matched to a person’s sensory processing patterns (Champagne, 2020; Matson et al., 2021; O’Sullivan & Fitzgibbon, 2018). While students had control over the item they chose, this was limited to the four available types of item and selected during a relatively brief session. This perhaps did not allow time to fully consider both the sensory qualities of the item they found helpful and the qualities or aspects that could deter longer term use. A particular example of this appeared to be the scented putty which attracted participants initially due to the aromas and the tactile input the item provided but with longer use, left a greasy feel on their hands and lost some of its initial pliability.

Limitations

It is important to consider the impact of non-response bias on the results as 50% of participants did not complete the survey and therefore their experience was not captured in the data. A 50% response rate is a relatively high response rate for surveys completed in higher education (Higher Education Academy, 2016). “Survey fatigue” can often be a factor in reducing response rates for student participants and average response rates tend to be around 25% for surveys completed by this group. However, a recent analytic literature review by Hendra and Hill (2019) suggested this has less of an impact than is often estimated with no significant difference in levels of nonresponse bias being found in connection with response rates. The potential impact of overall response bias on the results must be considered such as that those who responded may have done so due to experiencing more positive effects from using the item. While the surveys were anonymous, responses could also have been influenced by social desirability bias and a wish to provide responses that would be favorable to the study investigators as lecturers on their program of study.

The overall brevity of many of the free text responses also had an impact as this often led to them being more difficult to code and a conclusion had to be made at times upon a few isolated words, however, the nature of content analysis does allow for this (Bishop-Clark et al., 2012) and the independent coding of each transcript by two coders helped minimize the impact of personal bias. Caution is also required in any application of the results as while support for each of the codes ranged between 50% of participants (regulation) and 75% of participants (affect and activity) this relates to small numbers overall, four to six participants.

While having a pre-existing framework for coding supported a relevant focus, there were also challenges to this as with more limited data it was difficult to distinguish between the codes of regulation and affect in particular. Where this was the case, the researchers referred to the code book and reviewed consistency of coding with other participant responses of the same nature or wording. Another important limitation to consider in relation to this study is that only a small range of items were available for loan and therefore this may have limited the potential for participants to select an item that met their own sensory needs most effectively. Future studies should broaden the range of strategies trialed to maximize potential benefits and allow these to be more fully evaluated.

Implications for Occupational Therapy Education

Occupational therapy students face increased demands due to the nature of their training and a need to balance academics and practice placements, which is thought to place them at increased risk of poor well-being (Poleshuck et al., 2020). There is therefore a significant need to identify ways to support well-being amongst this student group alongside continued engagement.

The Student Academic Experience Survey (HEPI, 2022) found that 34% of students considering leaving studies attributed this to their mental health, suggesting a need for increased focus on developing strategies that facilitate an ability to regulate arousal within the education environment. With an increasing prevalence of mental health needs among the higher education population as a whole, further ways to facilitate this are highly important to investigate. As with any activity or approach, efficacy is dependent on initial engagement from students as part of the process and barriers to this need careful consideration. This study required attendance of an additional drop-in outside of the curriculum which may have deterred additional students from opting in. As time demands have been identified as a primary challenge to well-being (Morales-Rodriguez et al., 2019; Poleshuck et al., 2020), integration of sessions focused on strategies to support personal well-being within existing timetabled sessions may increase the potential for student engagement and support increased prioritization of self-care as part of their professional development.

The results of this study, while preliminary, suggest that sensory modulation approaches may have the potential to facilitate increased coping strategies and improved self-regulation similar to the findings of Keptner et al. (2021). However, due to the small number of respondents to the survey (n = 8) support for each of the codes

considered must be viewed with caution, and further research is needed to evaluate these potential benefits. Utilizing strategies that can also be transferred to their practice as therapists also supports the development of therapeutic use of self through a greater understanding of how these strategies may be effective for others. These strategies need to be carefully individualized which increases the time intensity of this approach; however, this initial investment of time in supporting students to best understand their sensory responses and identify strategies connected to these needs and that are also appropriate in view of factors, such as age, gender, and culture, is likely to increase the longevity of application as well as use to support engagement in a greater range of activities.

Conclusion

Supporting student well-being is an increasingly important factor in ensuring the successful completion of studies and for healthcare students in preparing them for clinical practice once qualified. Sensory modulation approaches have the potential to be an effective and accessible approach that meets this need while also supporting the development of knowledge and skills for practice. This pilot study attempted to review the potential of the approach in maintaining well-being and facilitating engagement with studies. While very much preliminary, the results do suggest a potentially positive impact in these areas. Further research is needed on a larger scale and with increased education for participants in relation to sensory processing patterns to support greater personalization of strategies to maximize the efficacy of the approach.

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