Title: A qualitative study on the experiences of autologous haematopoietic stem cell transplant for Multiple Sclerosis

Authors: Laura Davenport[1], Dr Mathew McCauley[1], Dr Liam Smyth[2], Dr Audrey Reynolds[2,3], Dr Maria Gaughan[2], Prof. Niall Tubridy[2,3], Prof. Chris McGuigan[2,3], Dr Fiadhnait O'Keeffe[2,4]

---

[1] Trinity College Dublin, Ireland

[2] St Vincent's University Hospital Dublin, Ireland

[3] University College Dublin, Ireland

[4] University College Cork, Ireland

The corresponding author is Laura Davenport. Please contact via email at: ldavenpo@tcd.ie

Declarations

Our sincere thanks to the participants for giving their time to this research.

No funding was received for conducting this study.

The authors have no conflicts of interest to declare.

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

Abstract

Aim: Autologous haematopoietic stem cell transplant (HSCT) is an effective treatment for people with highly-active relapsing multiple sclerosis (MS), who are not adequately responding to disease-modifying therapies. To date, research has predominantly focused on disease-specific outcome measures. There is a lack of research exploring patient experiences of this complex treatment. The study aims to explore the experience of considering and receiving HSCT treatment for MS.

Methods: Semi-structured interviews were conducted online with 12 adults with MS who had undergone HSCT treatment. Interview topics covered the experience of deciding on the treatment, the HSCT process itself, and the patient-reported outcomes following HSCT. Interviews were audio-recorded and transcribed verbatim. A thematic analysis approach was employed.

Results: Three main themes were identified: (1) *Balancing hope and fear* explores the decision-making experience when considering HSCT as a treatment; (2) *Distinct emotional experience,* highlights the unique challenges faced on all stages of the treatment journey; and (3) *Adjusting to outcomes,* explores how participants make sense of the aftermath of the treatment, including managing the ongoing uncertainty of MS and complications arising from HSCT.

Discussion: HSCT is a complex treatment, both physically and psychologically for pwMS. A comprehensive and holistic care pathway is required to support people with MS at all stages of the treatment process, to ensure patient-centred planning and care.

Keywords: Multiple Sclerosis; haematopoietic stem cell transplant; qualitative; neuropsychological outcomes; patient experience

Introduction

Multiple Sclerosis (MS) is a chronic neurological condition of the central nervous system (CNS). Symptoms can significantly affect quality of life (QoL) and impact daily functioning to varying degrees, including employment, social functioning, and mobility (Barin et al., 2018). The unknown aetiology, high variability of symptoms, and unpredictable disease progression can be a significant source of distress for people with MS (pwMS) (Giovannetti et al., 2017).

Despite the availability of many disease-modifying treatments (DMT), some pwMS do not respond adequately, and others may have more aggressive presentations of MS (Bose et al., 2021). Autologous haematopoietic stem cell transplantation (HSCT) is treatment for MS first used in the 1990s (Fassas et al., 1997). It has been found to have high rates of effectiveness for people with relapsing MS with high levels of disease activity and resistance to the most efficacious diseases-modifying therapies (Sharrack et al., 2020). For this cohort, efficacy studies highlight high relapse-free and progression-free survival rates, although variability is noted across studies (Mariottini et al., 2023). There is some evidence of clinical stabilisation for progressive forms of MS following HSCT, however further trials are required to assess if the benefits of HSCT for these patients outweigh the associated risks of HSCT (Sharrack et al., 2020). Treatment-related mortality rates, reported to be around 4% before 2005, have recently decreased to below 1% due to improved safety of treatment regimes (Muraro et al., 2017).

Autologous HSCT is an intensive treatment process which involves extracting a patient's haematopoietic stem cells, administering high doses of chemotherapy to eradicate the immune system, and then reinfusing the stem cells to allow for recovery of haematopoiesis. This process induces long-term suppression of new focal inflammation, acting as an immunosuppressive therapy (Cencioni et al, 2022). Several barriers exist to the broad implementation of HSCT, including high resource requirements of transplant units, unfamiliarity of HSCT clinicians in MS care, unfamiliarity of neurologists with the transplant process, debates regarding funding of the procedure, and concerns of associated morbidity and mortality (Atkins & Freedman, 2017).

When deciding on this treatment, there are many considerations for patients and their healthcare team. These can include burden of disease, timing, and risk of complications, including increased risk of secondary autoimmunity and altered fertility (Bose et al., 2021). As HSCT treatment is currently unavailable in Ireland for pwMS, patients must travel abroad for the

treatment, which has cost, time, and social support implications. Patients who meet specific clinical criteria can be referred to the UK and can avail of public funding, or coverage via private insurance. Typical inclusion criteria for treatment under the UK National Health Service (NHS) are people with relapsing MS who: have had at least 2 relapses (or 1 with new lesions identified on MRI); have not responded to at least 2 DMTs; have an Expanded Disability Status Scale (EDSS) of 5.5 or less; are younger than 45; and have had MS for less than 10 years (NHS England, 2023). Those who do not meet the criteria for HSCT MS services in the UK sometimes seek HSCT treatment further afield, incurring a significant cost. Due to the differing clinical criteria, the phenotype of pwMS who can access HSCT in the UK is likely different to those individuals receiving HSCT overseas.

Research on HSCT in MS to date is predominantly focused on disease outcome measures, such as inflammatory activity observed on magnetic resonance imaging (Oliveira et al., 2021). There is limited research examining the impact of HSCT on patient-reported outcome measures such as fatigue, cognition, and mood (Davenport et al., 2024). Several studies have assessed patient-reported QoL pre and post HSCT, identifying significant improvements sustained at long-term follow-up (Giedraitiene et al., 2022; Burt et al., 2015). These studies utilise self-report instruments to assess QoL across physical, psychological, and social domains, providing important quantitative insights into the potential impact of HSCT on pwMS's QoL. Qualitative research may augment these findings, by offering further understanding of the factors impacting QoL, and the nuances and fluctuations of the patients' experience.

Qualitative research into the experience of HSCT has been conducted with other patient cohorts. A qualitative study of HSCT for Crohn's disease portrays a complex decision-making process involving weighing up risks and benefits, managing hopes and expectations, and dealing with uncertainty (Cooper et al., 2017). An exploration of the HSCT experience for systemic sclerosis patients highlights the major physical and psychological impact of the treatment and a long recovery period (Spierings et al., 2020). To the researchers' knowledge there are only two published qualitative studies investigating MS patient experiences of HSCT to-date. A recently published study, conducted in Germany, investigated the experiences of pwMS who received HSCT in both German clinics and abroad, highlighting a difficult decision-making process, alongside practical challenges during preparation for transplantation (Volz et al., 2024). These findings also underscore the psychological and physical stress associated with the treatment, as well as a feeling of regaining control over MS. Tolf and

colleagues (2024) explored the experiences of pwMS who underwent HSCT in Sweden between 8 – 10 years ago using a content analysis approach. The psychological challenges of MS and HSCT were highlighted in this study, with HSCT viewed as a possibility of relief from the uncertainty of MS. The authors highlight the need for further qualitative research in this area with other cohorts of MS patients to support pwMS and their healthcare team when considering HSCT as a treatment.

The aim of this qualitative study was to explore the patient lived experience of undergoing HSCT for MS using a thematic analysis approach. This study's unique contribution to the literature includes a focus on an Irish MS patient cohort who are currently required to travel abroad to receive HSCT. This research has the potential to be impactful in understanding the experience of undergoing haematopoietic stem cell transplantation of adults with MS and patient-centred outcomes. We hope this will help clinicians better understand how to support patients throughout the process of engaging in haematopoietic stem cell transplantation.

Method

Ethical Approval

This research was undertaken as part of a doctoral thesis in Clinical Psychology. This single site research was carried out at a large urban university teaching hospital. Ethical approval was obtained from both the hospital and university.

Participants

Participants were recruited from a Neurology outpatient department between September 2022 and June 2023. Inclusion criteria were adults diagnosed with Multiple Sclerosis who had undergone HSCT treatment in the past ten years. Exclusion criteria were individuals with MS with advanced severe cognitive impairment that would make their engagement with the consent, information, and interview process difficult. A purposive sampling method was employed to ensure the majority of potential participants were invited to partake due to the low number of patients who had received HSCT. Potential participants were informed of the

research study during routine MS outpatient clinic appointments. Informed consent to participate was obtained from all participants.

Data Collection

Semi-structured interviews were used to collect data. Interviews lasted approximately 90 minutes and were conducted online by the lead researcher (LD) using Microsoft Office Teams. Open-ended questions were developed by LD and FOK to explore participants' experiences of HSCT, including participants' experience of MS prior to HSCT, experience of the treatment process itself, and experience of recovery post-HSCT. Questions were asked to elicit participant views on the decision-making process, their expectations of the treatment, and the short-term and long-term impact of the treatment. An opportunity was provided at the end of the interview to reflect and debrief.

Analysis

Interviews were audio-recorded with consent and transcribed verbatim by the interviewer. Data were analysed using the Braun and Clarke (2006, 2017, 2023) model of thematic analysis (TA), using a reflexive, inductive approach. Reflexive thematic analysis allowed the researchers to identify and make sense of collective meanings related to the experience of pwMS of the HSCT process (Proudfoot, 2022). The analysis process was supported with NVIVO analysis software (Lumivero, 2017). In line with the reflexive ethos of this approach, the researchers acknowledge facets of their backgrounds, assumptions, and values that may have impact on the various stages of the research process (Braun & Clarke, 2019).

Results

Interviews were conducted with 12 pwMS. Demographic and clinic data of participants are outlined in Table 1 and Table 2.

Table 1: Demographics of participants

Age (years)	$\bar{x}$ = 40; range = 28 - 48
Sex	9 female 3 male
MS subtype	9 RRMS 3 SPMS
Time since diagnosis (years)	$\bar{x}$ = 13; range = 8 - 20
Time since HSCT (years)	$\bar{x}$ = 3; range = 0.5 - 8
Number of DMTs pre-HSCT	$\bar{x}$ = 2.8; range = 0 - 5
EDSS pre-HSCT	$\bar{x}$ = 5.75; range = 2 - 7
EDSS at time of interview	$\bar{x}$ = 5.75; range = 2 – 7.5
Treatment location	8 UK 3 Russia 1 Mexico
Treatment funding	4 Self-funded/fundraised 7 Insurance/publicly funded

Table 2: Clinical data pre and post HSCT

Participant #	**No. of previous DMTs**	**EDSS pre-HSCT**	**EDSS at interview**	**MRI activity post-HSCT**	**DMT post-HSCT**
1	4	6	7.5	no	yes
2	5	6.5	7	no	no
3	4	7	7	no	no
4	2	6.5	6.5	no	no
5	2	6.5	6	no	no
6	3	6.5	7	no	no
8	4	6	6.5	no	yes
7	2	4.5	3.5	no	no
9	3	6	6.5	no	no
10	0	5.5	2	no	no
11	2	6	7.5	no	no
12	2	2	2	no	no

Three main themes were developed to capture participants' narratives of their HSCT experience. A description of the themes and subthemes follows, supported by sample participant quotes in Table 3. Together, the themes demonstrate how much variation exists among experiences of people undergoing HSCT for MS, and the psychological complexities of the process.

Table 3: Summary of themes and sample quotes

Theme	Subtheme	Sample Quotes
1. Balancing hope and fear	1A. Weighing up risks	1. OK, what if I do die and leave the boys behind and I won't be there for all the important stuff. That was scary. [P3] 2. But it's the point that, it could be taken away from me. Its different if you choose I'm not gonna have children to, ok you won't be able to have children the possibility - that that's difference, it's a completely different thing, you know? [P4] 3. But that's like, without it, I was, I was gone. I was a goner, really, I, I I wouldn't, I didn't, maybe I wouldn't be dead, but I wouldn't want to be alive, you know, with someone feeding me all that. [P5]
	1B. Managing expectations	4. For me it was, it was about halting disability progression, if I could, because already having a lot of mobility problems, I was going, 'yeah, if I can, if I can sort of stabilize myself that that would be huge just in terms of confidence about the future and things like that.' [P6] 5. On one hand I was very, very optimistic, but very practical, you know, hopefully what it will do is you know, slow it down. Hopefully it will slow it down or it will, you know, send it into remission. That'd be good enough for me. And then the other side, which is magical thinking, which was, you know, 'I'll be able to walk! And maybe I won't need a stick!' [P8]
	1C. Not just a number	6. [They*] didn't, I, I think [they] felt that it was a very severe treatment for somebody who wasn't, you know, whose life let's say wasn't at risk. I wasn't a cancer patient, it wasn't a life or death treatment. Although for me it felt almost like a life or death treatment. [P10] 7. We're not in a sense, just numbers or just the name, like we're people as well, you know [P4] 8. It would have been nice if they could have just have been a bit more open to even looking into it or

* Gender of healthcare practitioners has been anonymised

	even more open into you know, acknowledging that you are a person who needs to, you know, do the best they can you know that's kind of, that's, that would be my main thing, just yeah, its just support like, you know?[P2] 9. I guess you kind of feel if you are going against medical advice and then you can't maybe feel comfortable going back to those same doctors afterwards, especially if it doesn't work or if something goes wrong or you know without feeling that kind of like, 'well, I warned you not to go', or you know that it wasn't advisable. [P10]
2. Distinct emotional experience	10. Your brain just protects your body, doesn't it? It's kind of it knows something bad's going on, but it's like, no, you don't need to know about that right now. [P9] 11. There was a picture of the three boys in a frame, that my mam gave me when I was going in and, every single time I looked at the frame and I thought to myself, this is so fucking embarrassing. But I'm doing this for you. [P3] 12. Strangely enough, once the treatment started, I stopped thinking about all the things that could happen, the dying and all that? I don't know why, looking back on it, but it never crossed my mind when I was getting the treatment done, probably because the doctors and the nurses were so optimistic about everything. [P3] 13. I would tell all the nurses or the doctors and nobody would do anything or say anything to me, I didn't know what was going on, and I kept pressing the button, just saying 'I'm in so much pain'. [P4] 14. I always used to break things down into, into, into small goals to get through them. So this is like, the challenge was OK, break it into a week, week, week and then a day a day a day. And then within that day was the challenge of just getting through. [P7] 15. After the treatment was, yeah, it's tough. You're kind of coming off a, nearly adrenaline, of going

		over and doing it and coming back, and that's - when you come back is when it's a hard slog really. [P11] 16. I knew that it would take a while. I knew that recovery would be slow. I was probably a little bit surprised by how slow it was, which I shouldn't have been? But I was kind of going, 'why am I not sort of hopping about already? This is, you know, how can I have not recovered?' [P6] 17. I was very anxious during that whole period because, you know, there were a couple of times where I was a little bit worried and thought, 'Oh my God, you know, what have I done? Have I traded in MS for something far more sinister? [P10]
3. Adjusting to outcomes	3A. Finding value	18. It really does feel like it's giving me back my life because I felt like my life was just dominated by MS for years. And now it's, that's just all in the back burner, like, do you know what I mean? There's so many more things to talk about now before I get to a point to talking about MS, that it's great. [P9] 19. I wish [the doctor] had a let me go when I first asked [them] because I was walking then. And I would still be walking now. [P3] 20. It's all, positive as in if I never did it, I wouldn't know where, what was gonna be the outcome, you know? Emm so no, I mean the, it, it's like I do it again if I needed, for the bigger cause for the bigger picture but emm yeah, its all, I suppose it's just, the procedure and the professionalism of the and the, emm the actual three weeks of being done? Yeah I mean that's, there's no negative thoughts, it's all kind of, it was for the best and all that. I suppose the only anger bit is in the, is the fact that it didn't work. [P7] 21. I've found it to be a great milestone in my life and it's given me great peace of mind and helped me to move on with my life actually and do other things that I never would have done before. [P11]

	3B. Navigating uncertainty	22. I'd find myself sometimes, just think and maybe overthinking something, going ‘God, you know, what way am I going to be in a year’s time?’ And then all of a sudden I’m just like ‘Ohh, live in the moment as best I can and plan for as best the future as I possibly can’. [P12] 23. But, like, I don't know whether having this procedure has actually had a benefit, if you know what I mean. So it's got worse, but if I hadn't got it done, would it have gotten much worse now, you know what I mean? [P7] 24. I think the physio aspect, cause I think if when I first came back and I just kind of kept going in that, then I think I'd be doing a lot better. But I think everything's left to you and your own devices. And when you're already feeling quite low or lethargic you're not really able to do, you're not you, you don't, it's not that you don't want to, but it's just difficult to motivate yourself. [P4] 25. It's absolutely terrifying to think that I've been through everything, MS stem cell transplant, kidney failure, all this bad stuff, but yet menopause is the toughest thing that I've had to face it, like, oh my goodness, like, I just totally lost myself. Like it was so scary. I was like, I don't recognize the person that I am at all in the slightest. [P9] 26. Where like I was going in and being like ‘would you test my, my hormone levels because I think I'm menopausal’. And it's, you know, they'll be like, ‘oh you're being ridiculous.’ And I'd explain the situation and they'd be like, ‘ohh no, you're far too young’. Like it's so frustrating. [P9] 27. I do think about it a lot, obviously. Like my friends, a lot of my friends there, emm you know, that got married, they’re having babies and the, you know, they’re all having the children and, and so that was really sad for me because I, I wanted children, do you know what I mean, I did. [P4]

1. Balancing hope and fear

This theme pertains to the challenge of decision-making with many unknown variables and considering potential futures with or without getting HSCT. It encompassed the struggle of participants to have their own voice heard in the decision-making process. This theme includes three subthemes: *Weighing up risks*, *Managing expectations,* and *Not just a number.*

1A. Weighing up risks

Participants discussed evaluating both the risks of getting, and not getting, HSCT. Apprehension and concern about the severity of the treatment process itself were mentioned by participants. Some participants considered the possibility of dying from treatment complications, highlighting the gravity of the decision[1]. A potential side effect of HSCT is infertility, and this posed a significant dilemma for some participants when evaluating what they were willing to risk for the treatment[2]. Participants discussed how they weighed up the risks of HSCT against the dread of MS progression and fears of a deteriorating QoL, considering that other treatments had not been effective. Some participants described HSCT as the *"last line of defence*" or the *"only option"*[3].

1B. Managing expectations

Participants reflected on the importance of having realistic expectations of treatment outcomes. All participants felt a strong sense of hope for halting progression of MS, a driving factor for deciding on HSCT as a treatment[4]. Participants emphasised the challenge of managing hopes for symptom improvement, which is not guaranteed, as often online stories showcased *"miracle"* results. Some participants described holding a glimmer of hope for the best possible outcome, while trying to maintain realistic expectations[5]. The importance of seeking balanced information to support managing expectations was emphasised during the interviews, including speaking to others who had undergone HSCT and obtaining information from professionals.

1C. Not just a number

Participants emphasised the impact of conversations with their healthcare team when considering HSCT. Although there was an understanding among participants that consultants

must be cautious when recommending HSCT, participants were appreciative when their consultant was open to exploring the option and provided support during the decision-making process. Conversely, many participants felt their own individual circumstances, values, and reasons for considering HSCT were disregarded, leaving them feeling unheard and dismissed[6].

Anxiety and frustration were conveyed through participant stories when wondering whether their own unique disease profile would allow them to be eligible for HSCT. Participants stressed that criteria for eligibility should be more flexible due to the variance in MS presentations[7].

As HSCT is a complex treatment, great significance was placed on consultant attitude towards the treatment. Some participants felt disappointment and frustration at their consultants' emphasis on risk and resistance to considering HSCT as an option, particularly when participants had carried out their own research and reconciled themselves with the risks[8]. Participants going outside of the UK for treatment emphasised the importance of their consultant's *"blessing"*, for fear that if they did not approve, they would not receive the care they required upon returning[9].

2. A distinct emotional experience

This theme encompasses the range and intensity of emotions experienced by participants during the treatment process and recovery time. It spotlights how each person had an individual experience of the treatment, impacted by a range of physical and emotional factors.

A strong sense of vulnerability was conveyed by participants when discussing the treatment process itself. Many participants described the physical challenges of feeling unwell, low in energy, or in pain while in hospital. Medical complications, including serious infections, sepsis, and kidney failure, impacted the emotional experience of the treatment. Some participants described fear and overwhelm, while others described a detachment from the seriousness of their health complications[10]. Some participants recalled feeling a loss of control when they lost the ability to care for themselves due to the impact of the treatment while in hospital. Embarrassment was felt due to being unable to carry out self-care tasks such as toileting, which some did not expect[11].

Participants voiced their gratitude for the care and compassion of healthcare staff which supported them through the process. The positive attitude of staff towards the treatment seemed to boost the resilience and optimism of participants during treatment[12]. In contrast, some participants recalled feeling fear and anxiety when they perceived their needs weren't being listened to by staff. This led to an increase in the emotional distress associated with the treatment process[13].

Mental resilience during treatment was illustrated throughout all the interviews. For some, trying to maintain a positive mindset helped. Recalling their reasons for getting the treatment was also identified as helpful. For others, it was about getting through the treatment from moment to moment[14]. Not only is the HSCT treatment process lengthy and arduous, but participants also faced significant stressors arising from getting treatment abroad. This included significant wait times between making the decision and receiving the HSCT treatment, financial burden, managing travel logistics, and being away from their support system.

It was apparent across interviews that recovery post-HSCT was a unique journey in its own right, with emotional and physical complexities to navigate[15]. Having patience during recovery was a strong thread throughout participants' stories. Despite managing expectations, participants recalled the challenge of waiting for positive outcomes to become apparent, either through tangible symptom improvement, or stabilised level of disability[16]. A few participants found the recovery period to be straightforward and without complications, enabling a quicker return to normality. In contrast, medical complications arising from the HSCT treatment brought high levels of distress and uncertainty to some participants' recovery journey[17].

3. Adjusting to outcomes

This theme draws out the narrative of sense-making of the outcomes of HSCT, as the consequences of the treatment became apparent overtime. The subthemes under this heading are *Finding value* and *Navigating uncertainty.*

3A. Finding value

A strong narrative throughout the interviews was the absence of regret about receiving the

treatment, regardless of outcome. For many participants, since undergoing HSCT they have experienced no further disease progression, with some even gaining significant symptom improvements. These participants expressed the depth of their gratitude for the opportunity to receive this treatment, which enabled them to engage in life again[18].

For some participants, their disability continued to progress since the treatment, or they did not gain the symptomatic relief they had hoped for. Many participants regretted not getting HSCT sooner, as they wondered if this would have yielded more positive results[19]. For those with continued disability, although there was frustration that the treatment didn't work, they described feeling glad that they tried all options available to them and did not regret it[20]. Some participants noted a sense of acceptance of their MS and current level of disability following HSCT, bringing greater peace of mind. They described looking at new ways to live a valued life[21].

3B. Navigating uncertainty

Participants highlighted ongoing concerns pertinent to the outcomes of HSCT. Some participants discussed how the ever-present uncertainty of MS continues, despite positive HSCT results. Fears of future progression were still very much at the forefront of some participants' minds, a significant psychological burden[22]. Some participants expressed uncertainty in knowing whether the treatment worked, highlighting the complexity of evaluating the outcomes of an uncertain treatment for an unpredictable disease[23].

Although positive experiences of healthcare support for acute complications post-HSCT were described, a strong sense of disappointment in the lack of a care pathway during recovery was palpable from participants. A feeling of a sudden drop-off in care was described, placing the onus on the participants to navigate and organise their rehabilitation care needs. Services felt disjointed to participants. For example, many participants were not offered physiotherapy within the public service and were required to pay privately to access support for improving mobility. Others waited significant lengths of time on public waiting lists, which they felt hindered their recovery[24].

Ongoing complications arising from HSCT treatment included menopause and infertility,

presenting significant challenges to some participants. For those who experienced chemically induced menopause, they described coping with an altered sense of self as an additional burden to MS[25]. Furthermore, the reports of participants who entered menopause post-HCST highlighted a significant gap in the healthcare system regarding support and understanding of their experience[26].

The long-term effect of infertility was a reality for some participants. They described sadness and difficulty coming to terms with the fact that potential avenues regarding having children were no longer available to them, particularly if freezing eggs was not an option prior to treatment due to financial barriers[27].

Discussion

This study explored the lived experience of pwMS who underwent HSCT. Qualitative interviews were conducted with 12 adults with MS who received HSCT treatment outside of Ireland in the past eight years. Through reflexive thematic analysis three main themes were developed: *Balancing hope and fear*, *Distinct emotional experience*, and *Adjusting to outcomes.* These highlighted the HSCT process as a unique journey with significant emotional intensity for pwMS.

The theme *Balancing hope and fear* encapsulated the complicated decision-making process participants were faced with when considering HSCT. The subtheme *Weighing up risks* highlighted the view that the hope of halting progression was worth the risks of HSCT. This is consistent with other qualitative findings of pwMS's experience of HSCT (Tolf et al., 2024; Volz et al., 2024) and in research exploring HSCT for Crohn's disease (Cooper et al., 2017). The challenge of being realistic about treatment outcomes was explored in the subtheme *Managing expectations*. This is in line with qualitative studies of HSCT for systemic sclerosis patients (Spierings et al., 2020) and cancer patients (Carey et al., 2022). While the provision of clear accessible information for patients considering HSCT is important, the challenges of predicting outcomes post-HSCT should also be highlighted to patients.

The subtheme *Not just a number* emphasised the salience of participants' own individual context when considering HSCT. This is echoed in research by Eskyte et al. (2019), where

contextual factors of MS patients' lives were found to be equally, if not more, important as clinical measures and criteria when making treatment decisions. In some cases, participants did not meet clinical evidence-based criteria for treatment in the UK and as such were advised against this treatment by their neurologist. Consequently, participants may have perceived medical advice based on evidence-based criteria as unsupportive as it did not align with their preferences and values.

The theme *Balancing hope and fear* illustrated the challenges pwMS are faced with when considering HSCT as a treatment. These findings support the research conducted by Volz and colleagues (2024), who identified that pwMS deal with many challenges during the decision-making process for HSCT, and advocate for standardised decision-making protocols, with the option of psychological support. Research shows that MS treatment decisions are rarely made independent to healthcare teams, and that pwMS's understanding of the treatment is mediated by their consultant's views (Eskyte et al., 2019). Some findings illustrate that pwMS rarely disagree with clinicians' treatment recommendations, underscoring the need for meaningful conversations about how treatment will impact their life and evaluate it in relation to their own social and personal values, rather than efficacy data alone (Manzano et al., 2020). As such, a shared decision making (SDM) model may benefit patients and healthcare providers when considering HSCT. This model enables informed decisions to be made collaboratively by clinicians and patients based on best available evidence and patients' values and preferences (Charles et al., 1997). SDM is becoming more prevalent in MS healthcare and has been associated with a number of positive outcomes including improved treatment adherence and higher patient satisfaction (Rieckmann et al., 2018; Ubbink et al. 2022).

The theme *Distinct emotional experience* captured the arduous nature of the treatment, with a keen sense of vulnerability and lack of control conveyed by participants. Similar findings from qualitative research with cancer patients highlighted specific emotional challenges of feeling trapped, fear, guilt, discouragement, and powerlessness during HSCT which interfered with motivation to actively engage in the recovery process (Amonoo et al., 2020). A pattern of high anxiety at the beginning of treatment, possibly reflecting a sense of uncertainty and threat, has been observed, while an increase in depression levels throughout the process or the long-term after HSCT is noted in the literature, possibly related to complications, increasing timeline, and ineffective coping (Baliousis, 2017; Kuba et al., 2017; Prieto et al., 2005).

Participants emphasised the important role healthcare staff played in fostering feelings of safety and care during the treatment, helping them through the challenging process. This echoes previous research that underscores compassionate care as one of patients' greatest healthcare needs (Sinclair et al., 2016). The current findings are in line with other qualitative research into HSCT for MS which highlighted the role healthcare staff can play in reducing psychological distress (Volz et al., 2024). Some participants tried to sustain a sense of hope, optimism, and gratitude throughout the treatment process, often encouraged and supported by staff. Previous research has highlighted the protective nature of such positive psychological constructs, finding that their presence is associated with improved QoL, along with other health outcomes among patient cohorts who receive HSCT for hematologic malignancies (Amonoo et al. 2019). Some participants noted that the reassurance of staff reduced their anxiety going into the process. The significance of such interactions is not to be underestimated, as negative perceptions of HSCT have been linked with increased distress (Baliousis, 2017). The theme *Distinct emotional experience* points to the need for services to actively target emotional distress of HSCT patients via compassionate healthcare staff interactions, psychosocial support, and appropriate referral pathways (Baliousis, 2017). In addition, evidence-based psychological interventions, such as mindfulness-based interventions, may be effective in reducing depression and anxiety post-HSCT, as demonstrated in a study of patients with haematological malignancies (Grossman et al., 2015).

The theme *Adjusting to outcomes* encapsulated how participants made sense of the varying outcomes post-HSCT. The subtheme *Finding value* reflected the fact that regardless of the treatment outcome, all participants were glad to have received HSCT. Some participants experienced increased acceptance of MS and current level of disability following HSCT. It has been found that pwMS with greater illness acceptance rated their QoL more highly, and that such psychological variables were more salient correlates of QoL compared to clinical factors (Wilski et al., 2019). More generally, research has shown that acceptance of illness is significantly positively correlated with self-acceptance, positive relations, personal growth, general well-being, sense of meaning, and family satisfaction (Szcześniak et al., 2020). The current study highlights that undergoing HSCT can provide participants with a sense of gladness that they availed of the treatment, potentially increasing levels of acceptance and improving quality of life.

Although hopeful, the recovery journey was fraught with uncertainty, with continuing emotional and physical challenges, as explored in the subtheme *Navigating uncertainty.* A recent review identified that greater perceived self-efficacy and ability to cope with MS are associated with lower anxiety levels in pwMS (Fahy & Maguire, 2022). This is particularly pertinent for pwMS undergoing HSCT. As such, healthcare providers are encouraged to support patients in optimizing their ability to coexist with uncertainty, through defining what is controllable regarding MS management, and how to respond adaptively to the uncontrollable (Alschuler & Beier, 2015). Psychological interventions targeting intolerance of uncertainty and acceptance should be considered for HSCT patient cohorts, as they have been demonstrated to decrease psychological distress and improve QoL within an MS population (O'Keeffe et al., 2024; Rahimi et al., 2023).

Participants in the current study felt disappointment in aftercare service provision, often feeling unsupported. Although rehabilitations pathways have been established for patients with haematological diseases where HSCT is routinely used (Giaccone et al., 2020), there is a dearth of evidence regarding rehabilitation following HSCT for MS. Consensus guidelines and recommendations were recently established which note that "rehabilitation should be considered at each stage of the pathway on an individualized basis via a proper MDT assessment" (Roberts et al., 2020). Utilising a biopsychosocial model, these guidelines recommend a holistic programme including physical, cognitive, psychological, and social aspects of care to optimise patient outcomes. The current study highlights the urgent unmet need of supporting rehabilitation for Irish patients with MS following HSCT.

Clinical Implications

The findings of this study have significant clinical implications for healthcare professionals supporting pwMS undergoing HSCT. The psychological and physical challenges experienced throughout all stages of the process highlight the imminent need for wrap-around service support tailored to individual needs, informed by consensus guidelines (Roberts et al., 2020). At all stages of the process, a collaborative patient-centred approach is recommended to ensure the patient's needs are heard and considered. It is vital that patients have a full understanding of HSCT when considering this treatment. Thorough pre-treatment counselling by expert physicians, whereby there is no financial incentive to advocate for or against HSCT, is crucial to support the patient's decision-making process. Such consultations should outline the

mechanism of actions of HSCT, the treatment process including recovery period, potential risks and outcomes, and comparison with other DMTs.

The intensity of the HSCT experience underscores the importance of holistic support for all aspects of patients' wellbeing, including psychological support. We are not aware of any published psychological intervention specifically for pwMS undergoing HSCT to date, however, there is a growing evidence base for the effectiveness of psychological intervention in the management of MS symptoms such as mood and fatigue (O'Keeffe et al., 2024; Zarotti et al., 2023; Fiest et al., 2016). Furthermore, initial trials of psychological interventions with cancer patients who have undergone HSCT, including a phone-based intervention (Amonoo et al., 2021) and a self-help programme (Lawrence et al., 2023), reported some improvements in distress levels and QoL.

Clear recovery pathways must be established following HSCT. Crucially, the possibility of menopause and infertility should be discussed clearly beforehand, and patients at risk of these side effects must be linked in with appropriate services before undergoing the treatment. It must be acknowledged that all participants in the current study received treatment within a healthcare service outside of Ireland which poses challenges to continuity of care post-treatment. Some of these issues regarding post-HSCT healthcare support highlighted by participants would be addressed if a funded national HSCT service for Irish MS patients was established.

Strengths & Limitations

One strength of the present study was the qualitative approach, which allowed for an in-depth exploration of the experiences of pwMS who received HSCT treatment abroad. Most literature in this area has focused mainly on disease outcome measures rather than the patient perspective. Highlighting common themes from the participants' experiences will provide important insights for healthcare professionals supporting pwMS considering or undergoing HSCT.

There are some limitations to this research. Considering this was a single centre study, the generalisability of the results may be limited, particularly as travelling abroad for HSCT adds a layer of complexity to the experience of this study cohort. Participants included both pwMS who were referred by their neurologist to the established HSCT for MS pathway in the UK as they met clinical criteria, and those who sought their own treatment independent of their

neurologist's referral as they did not meet the criteria for the UK. Analysing these participants together may have impacted the results. However, as perspectives and experiences varied across all participants, it was deemed appropriate to conduct one thematic analysis for the group. A strength of the study is that the findings are representative of Irish MS patients who underwent HSCT as a whole. Another limitation to the research is that experiences of healthcare provision and attitudes towards HSCT may differ across treatment locations. Furthermore, participants who received HSCT more recently may have had a different experience due to recent developments in treatment pathways between Ireland and the UK. As accounts were retrospective with time periods up to seven years since treatment, recall bias may have been a factor. Furthermore, interviews captured participants' accounts of their experience at only one timepoint. A longitudinal approach may have unearthed further insights into the various stages of the process. Social desirability bias may also have been present for participants. Interviews were conducted online which was a strength in terms of accessibility for participants with MS (Synnot et al., 2014), however the possible impact on data quality cannot be ruled out in terms of non-verbal cues and rapport building.

Future research

Further research is required to understand the experience of HSCT for pwMS in greater depth to allow for the development of suitable and comprehensive services. Longitudinal studies are required to shed light on the changing needs and psychological challenges faced throughout the HSCT process, allowing for more tailored recommendations. Both quantitative and qualitative research should be undertaken to explore factors influencing the emotional experience of the process. This will help to inform the development of interventions to support the psychological wellbeing of patients. Investigation into patients' health behaviours post-HSCT and interactions with services is required to gain greater insights into support needs following treatment. Further research is required across primary and tertiary care services to explore healthcare professionals' knowledge of HSCT for MS, understanding of the patient experience, and care needs post-treatment, to inform the development of appropriate and supportive healthcare pathways. Future research with pwMS who decided against receiving HSCT may shed light on the decision-making process and factors that influence this decision.

Conclusion

The present study investigated the experiences of pwMS who underwent HSCT treatment by utilising qualitative methods. Three themes were identified which shed light on the complex psychological challenges faced by patients at all stages of the process. *Balancing hope and fear* highlighted the difficult decision-making process when considering HSCT. *Distinct emotional experience* discussed the emotional intensity experienced during both the treatment and recovery process, requiring resilience and fortitude from participants. *Adjusting to outcomes* illustrated how participants made sense of the impact of HSCT and tolerated the ongoing uncertainty. These findings underscored the critical importance of establishing robust healthcare pathways based on the biopsychosocial model to support pwMS who undergo HSCT.

References

Alschuler, K. N., & Beier, M. L. (2015). Intolerance of uncertainty: shaping an agenda for research on coping with multiple sclerosis. *International journal of MS care*, *17*(4), 153-158.

Amonoo, H. L., El-Jawahri, A., Celano, C. M., Brown, L. A., Harnedy, L. E., Longley, R. M., Onkeaka, H. K., Healy, B. C., Cutler, C. S., Pirl, W. F., Lee, S. J., & Huffman, J. C. (2021). A positive psychology intervention to promote health outcomes in hematopoietic stem cell transplantation: the PATH proof-of-concept trial. *Bone marrow transplantation*, *56*(9), 2276-2279.

Amonoo, H. L., Brown, L. A., Scheu, C. F., Harnedy, L. E., Pirl, W. F., El-Jawahri, A., & Huffman, J. C. (2020). Beyond depression, anxiety and post-traumatic stress disorder symptoms: qualitative study of negative emotional experiences in hematopoietic stem cell transplant patients. *European journal of cancer care*, *29*(5), e13263.

Amonoo, H. L., Barclay, M. E., El-Jawahri, A., Traeger, L. N., Lee, S. J., & Huffman, J. C. (2019). Positive psychological constructs and health outcomes in hematopoietic stem

cell transplantation patients: a systematic review. *Biology of Blood and Marrow Transplantation*, *25*(1), e5-e16.

Atkins, H. L., & Freedman, M. S. (2017). Five questions answered: a review of autologous hematopoietic stem cell transplantation for the treatment of multiple sclerosis. *Neurotherapeutics*, *14*(4), 888-893.

Baliousis, M. (2017). Perceptions of hematopoietic stem cell transplantation and coping predict emotional distress during the acute phase after transplantation. *Number 1/January 2017*, *44*(1), 96-107.

Barin, L., Salmen, A., Disanto, G., Babačić, H., Calabrese, P., Chan, A., ... & von Wyl, V. (2018). The disease burden of multiple sclerosis from the individual and population perspective: which symptoms matter most?. *Multiple sclerosis and related disorders, 25*, 112-121.

Beck, A. T. (2002). Cognitive models of depression. In R. L. Leahy & E. T. Dowd (Eds.), *Clinical advances in cognitive psychotherapy: Theory and Application* (pp. 29–61). Springer Publishing Company.

Bjartmar, C., Wujek, J. R., & Trapp, B. D. (2003). Axonal loss in the pathology of MS: consequences for understanding the progressive phase of the disease. Journal of the neurological sciences, 206(2), 165-171.

Boffa, G., Massacesi, L., Inglese, M., Mariottini, A., Capobianco, M., Moiola, L., & Mancardi, G. (2021). Long-term clinical outcomes of hematopoietic stem cell transplantation in multiple sclerosis. *Neurology*, *96*(8), e1215-e1226.

Bose, G., Thebault, S., Rush, C. A., Atkins, H. L., & Freedman, M. S. (2021). Autologous hematopoietic stem cell transplantation for multiple sclerosis: a current perspective. *Multiple Sclerosis Journal, 27*(2), 167-173.

Braun, V., & Clarke, V. (2023). Toward good practice in thematic analysis: Avoiding common problems and be (com) ing a knowing researcher. *International journal of transgender health*, *24*(1), 1-6.

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative research in sport, exercise and health*, *11*(4), 589-597.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Burt, R. K., Balabanov, R., Han, X., Sharrack, B., Morgan, A., Quigley, K., & Burman, J. (2015). Association of nonmyeloablative hematopoietic stem cell transplantation with neurological disability in patients with relapsing-remitting multiple sclerosis. *Jama, 313*(3), 275-284.

Clarke, V., & Braun, V. (2017). Thematic analysis. *The journal of positive psychology*, *12*(3), 297-298.

Carey, G., Wilson, N., Janssen, J., Chohan, A., Rog, D., & Roddam, H. (2022). “I'm walking into the unknown”: Qualitative insights into how emotions and lived experience related to multiple sclerosis diagnosis impact on decisions to pursue disease modifying treatment. *Multiple Sclerosis and Related Disorders*, *58*, 103464.

Cencioni, M. T., Genchi, A., Brittain, G., de Silva, T. I., Sharrack, B., Snowden, J. A., & Muraro, P. A. (2022). Immune reconstitution following autologous hematopoietic stem cell transplantation for multiple sclerosis: a review on behalf of the EBMT autoimmune diseases working party. Frontiers in immunology, 12, 813957.

Charles, C., Gafni, A., & Whelan, T. (1997). Shared decision-making in the medical encounter: what does it mean?(or it takes at least two to tango). *Social science & medicine*, *44*(5), 681-692.

Clarke, V., & Braun, V. (2017). Thematic analysis. *The journal of positive psychology*, *12*(3),

297-298.

Cooper, J., Blake, I., Lindsay, J. O., & Hawkey, C. J. (2017). Living with Crohn's disease: an exploratory cross-sectional qualitative study into decision-making and expectations in relation to autologous haematopoietic stem cell treatment (the DECIDES study). *BMJ open, 7*(9), e015201.

Davenport, L., McCauley, M., Breheny, E., Smyth, L., Gaughan, M., Tubridy, N., McGuigan, C., & O'Keeffe, F. (2024). Neuropsychological outcomes following HSCT in MS: A Systematic Review. *Multiple Sclerosis and Related Disorders*, 105702.

Eskyte, I., Manzano, A., Pepper, G., Pavitt, S., Ford, H., Bekker, H., ... & Potrata, B. (2019). Understanding treatment decisions from the perspective of people with relapsing remitting multiple sclerosis: a critical interpretive synthesis. *Multiple sclerosis and related disorders*, *27*, 370-377.

Fahy, A., & Maguire, R. (2022). Potentially modifiable associates of anxiety in people with multiple sclerosis: a systematic review. *Disability and Rehabilitation*, *44*(26), 8201-8212.

Fassas, A., Anagnostopoulos, A., Kazis, A., Kapinas, K., Sakellari, I., Kimiskidis, V., & Tsompanakou, A. (1997). Peripheral blood stem cell transplantation in the treatment of progressive multiple sclerosis: first results of a pilot study. *Bone marrow transplantation*, *20*(8), 631-638.

Fiest, K. M., Walker, J. R., Bernstein, C. N., Graff, L. A., Zarychanski, R., Abou-Setta, A. M., & Marrie, R. A. (2016). Systematic review and meta-analysis of interventions for depression and anxiety in persons with multiple sclerosis. *Multiple sclerosis and related disorders*, *5*, 12-26..

Giaccone, L., Felicetti, F., Butera, S., Faraci, D., Cerrano, M., Dionisi Vici, M., ... & Bruno, B. (2020). Optimal delivery of follow-up care after allogeneic hematopoietic stem-cell transplant: improving patient outcomes with a multidisciplinary approach. *Journal of blood medicine*, 141-162.

Giedraitiene, N., Gasciauskaite, G., & Kaubrys, G. (2022). Impact of autologous HSCT on the quality of life and fatigue in patients with relapsing multiple sclerosis. *Scientific reports, 12*(1), 15404.

Giovannetti, A. M., Brambilla, L., Torri Clerici, V., Antozzi, C., Mantegazza, R., Černiauskaitė, M., & Confalonieri, P. (2017). Difficulties in adjustment to multiple sclerosis: vulnerability and unpredictability of illness in the foreground. *Disability and rehabilitation*, *39*(9), 897-903.

Grossman, P., Zwahlen, D., Halter, J. P., Passweg, J. R., Steiner, C., & Kiss, A. (2015). A mindfulness-based program for improving quality of life among hematopoietic stem cell transplantation survivors: feasibility and preliminary findings. *Supportive Care in Cancer*, *23*, 1105-1112.

Kuba, K., Esser, P., Mehnert, A., Johansen, C., Schwinn, A., Schirmer, L., & Scherwath, A. (2017). Depression and anxiety following hematopoietic stem cell transplantation: a prospective population-based study in Germany. *Bone Marrow Transplantation*, *52*(12), 1651-1657.

Lawrence, R. J., Lee, S. J., Katona, L. J., De Bono, S., Norton, P. J., & Avery, S. (2023). A Self-Help Manual for Psychological Distress and Quality of Life During a Haemopoietic Stem-Cell Transplant: An Effectiveness and Acceptability Pilot. *Journal of Clinical Psychology in Medical Settings*, *30*(4), 846-855.

Lowden, D., Lee, V., & Ritchie, J. A. (2014). Redefining self: patients' decision making about treatment for multiple sclerosis. *Journal of Neuroscience Nursing*, *46*(4), E14-E24.

Lumivero. (2017). *NVivo* (Version 12). www.lumivero.com.

Manzano, A., Eskytė, I., Ford, H. L., Bekker, H. L., Potrata, B., Chataway, J., ... & Pavitt, S.

H. (2020). Impact of communication on first treatment decisions in people with relapsing-remitting multiple sclerosis. *Patient Education and Counseling*, *103*(12), 2540-2547.

Mariottini, A., De Matteis, E., Cencioni, M. T., & Muraro, P. A. (2023). Haematopoietic Stem Cell Transplantation for the Treatment of Multiple Sclerosis: Recent Advances. *Current Neurology and Neuroscience Reports*, *23*(9), 507-520.

Muraro, P. A., Martin, R., Mancardi, G. L., Nicholas, R., Sormani, M. P., & Saccardi, R. (2017). Autologous haematopoietic stem cell transplantation for treatment of multiple sclerosis. *Nature Reviews Neurology*, *13*(7), 391-405.

NHS England. (2023). *Treatment Algorithm for Multiple Sclerosis Disease-Modifying Therapies, NHS England Reference: 170079ALG*. https://www.england.nhs.uk/wp-content/uploads/2024/03/treatment-algorithm-for-multiple-sclerosis-disease-modifying-therapies-july-23.pdf.

O'Keeffe, F., Cogley, C., McManus, C., Davenport, L., O'Connor, S., Tubridy, N., Gaughan, M., McGuigan., C, & Bramham, J. (2024). Neuropsychology Intervention for Managing Invisible Symptoms of MS (NIMIS-MS) Group: A pilot effectiveness and acceptability study. *Multiple Sclerosis and Related Disorders*, 105719.

Oliveira, M. C., Elias, J. B., Moraes, D. A. D., Simões, B. P., Rodrigues, M., Ribeiro, A. A. F., & Hamerschlak, N. (2021). A review of hematopoietic stem cell transplantation for autoimmune diseases: multiple sclerosis, systemic sclerosis and Crohn's disease. Position paper of the Brazilian Society of Bone Marrow Transplantation. *Hematology, Transfusion and Cell Therapy, 43*, 65-86.

Prieto, J. M., Atala, J., Blanch, J., Carreras, E., Rovira, M., Cirera, E., & Gasto, C. (2005). Patient-rated emotional and physical functioning among hematologic cancer patients during hospitalization for stem-cell transplantation. *Bone marrow transplantation*, *35*(3), 307-314.

Proudfoot, K. (2022). Inductive/Deductive hybrid thematic analysis in mixed methods research. *Journal of Mixed Methods Resea*rch, 15586898221126816. https://doi.org/10.1177/15586898221126816

Rahimi, H., Pirmoradi, M., Lavasani, F. F., & Farahani, H. (2023). The effectiveness of group intervention focused on intolerance of uncertainty on psychological distress and quality of life in multiple sclerosis patients. *Journal of Education and Health Promotion*, *12*(1), 29.

Rieckmann, P., Centonze, D., Elovaara, I., Giovannoni, G., Havrdová, E., Kesselring, J., & Ben-Amor, A. F. (2018). Unmet needs, burden of treatment, and patient engagement in multiple sclerosis: a combined perspective from the MS in the 21st century steering group. *Multiple sclerosis and related disorders*, *19*, 153-160.

Roberts, F., Hobbs, H., Jessop, H., Bozzolini, C., Burman, J., Greco, R., & Snowden, J. A. (2020). Rehabilitation before and after autologous haematopoietic stem cell transplantation (AHSCT) for patients with multiple sclerosis (MS): consensus guidelines and recommendations for best clinical practice on behalf of the Autoimmune Diseases Working Party, Nurses Group, and Patient Advocacy Committee of the European Society for Blood and Marrow Transplantation (EBMT). *Frontiers in Neurology*, *11*, 556141.

Sharrack, B., Saccardi, R., Alexander, T., et al. (2020). Autologous haematopoietic stem cell transplantation and other cellular therapy in multiple sclerosis and immune-mediated neurological diseases: updated guidelines and recommendations from the EBMT Autoimmune Diseases Working Party (ADWP) and the Joint Accreditation Committee of EBMT and ISCT (JACIE). *Bone marrow transplantation*, *55*(2), 283-306.

Sinclair, S., Norris, J. M., McConnell, S. J., Chochinov, H. M., Hack, T. F., Hagen, N. A., McClement, S., & Bouchal, S. R. (2016). Compassion: a scoping review of the

healthcare literature. BMC palliative care, 15, 1-16.

Spierings, J., de Bresser, C. J., van Rhijn-Brouwer, F. C., Pieterse, A., Vonk, M. C., Voskuyl, A. E., & Kars, M. C. (2020). From "being at war" to "getting back on your feet": A qualitative study on experiences of patients with systemic sclerosis treated with hematopoietic stem cell transplantation. *Journal of Scleroderma and Related Disorders*, *5*(3), 202-209.

Synnot, A., Hill, S., Summers, M., & Taylor, M. (2014). Comparing face-to-face and online qualitative research with people with multiple sclerosis. *Qualitative health research*, *24*(3), 431-438.

Szcześniak, M., Świątek, A. H., Cieślak, M., & Świdurska, D. (2020). Disease acceptance and eudemonic well-being among adults with physical disabilities: the mediator effect of meaning in life. *Frontiers in Psychology*, *11*, 525560.

Terry, G., & Hayfield, N. (2020). Reflexive thematic analysis. *Handbook of qualitative research in education* (pp. 430-441). Edward Elgar Publishing. https://doi.org/10.4337/9781788977159.00049

Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). Thematic analysis. *The Sage Handbook of Qualitative Research in Psychology*, 17-37. https://doi.org/10.4135/9781526405555.n2

Tolf, A., Gauffin, H., Burman, J., Landtblom, A. M., & Flensner, G. (2024). Experiences of being treated with autologous haematopoietic stem cell transplantation for aggressive multiple sclerosis: A qualitative interview study. *Plos one*, *19*(2), e0297573.

Ubbink, D. T., Damman, O. C., & de Jong, B. A. (2022). Shared decision-making in patients with multiple sclerosis. *Frontiers in Neurology*, *13*, 1063904.

Volz, T., Sippel, A., Fischbach, F., Richter, J., Willison, A. G., Häußler, V., & Heesen, C. (2024). "A second birthday"? Experiences of persons with multiple sclerosis treated

with autologous hematopoietic stem cell transplantation—a qualitative interview study. *Frontiers in Neurology*, *15*, 1384551.

Wilski, M., Gabryelski, J., Brola, W., & Tomasz, T. (2019). Health-related quality of life in multiple sclerosis: Links to acceptance, coping strategies and disease severity. *Disability and health journal*, *12*(4), 608-614.

Zarotti, N., Eccles, F., Broyd, A., Longinotti, C., Mobley, A., & Simpson, J. (2023). Third wave cognitive behavioural therapies for people with multiple sclerosis: a scoping review. *Disability and Rehabilitation*, *45*(10), 1720-1735.