Leveraging AI to characterize mental health experiences throughout the myasthenia gravis diagnosis journey

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Introduction

- Myasthenia gravis (MG) is the most common form of neuromuscular junction disease, estimated to affect between 36,000 and 60,000 individuals in the United States each year[1]
- Anxiety and depression reportedly affect approximately one-third of individuals living with MG[1]
- The negative impact of MG on health-related quality of life has been shown to increase with disease severity[2,3]
  - However, the factors associated with the increased prevalence of mental health issues in MG remain less clear
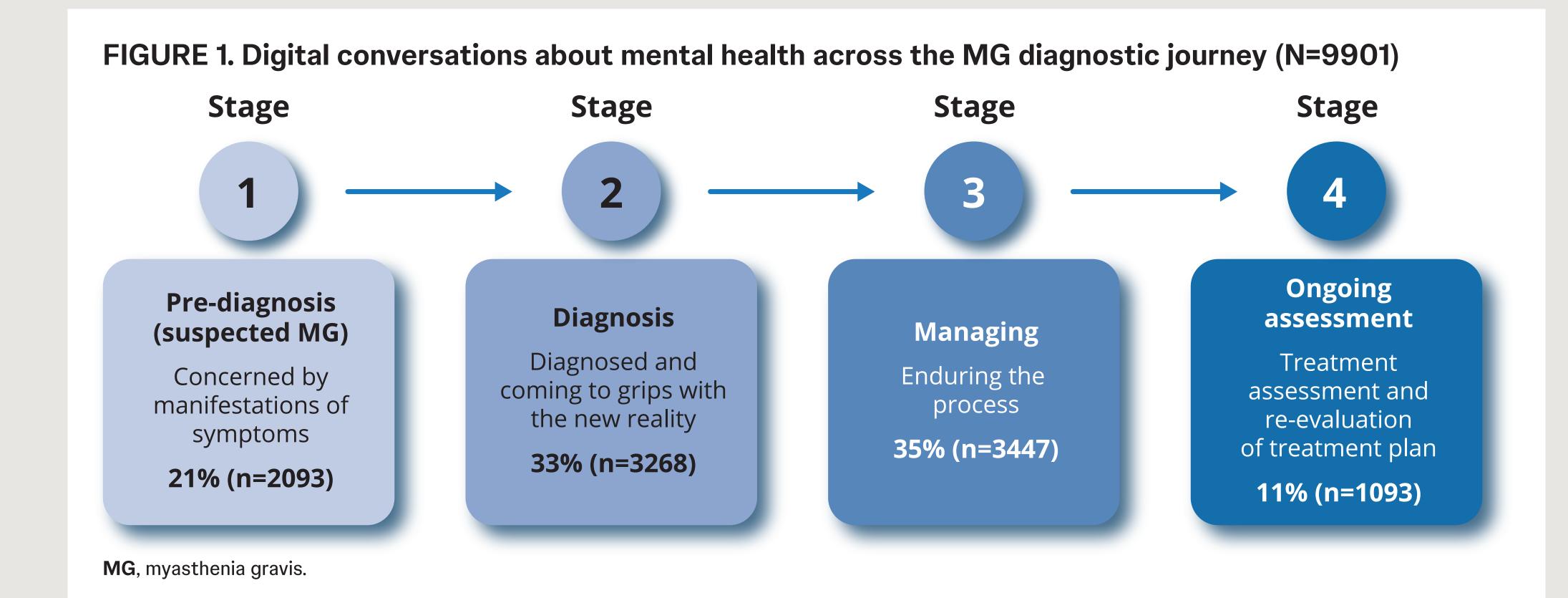
Objective

- To characterize mental health experiences of anxiety, fear, depression, and hopelessness among individuals affected by MG, and to identify potential triggers for these emotions throughout the stages of the MG diagnosis journey via analysis of MG public domain digital conversations using artificial intelligence (AI)

Methods

- This research was conducted using a proprietary AI-powered methodology by Human Dot Plus (previously CulturIntel; Dallas, TX, USA)
- This AI-powered methodology utilized big data tools, natural language processing, and machine learning to mine and analyze English-language public domain online conversations between August 2022 and August 2023 that were related to a (self-reported) diagnosis of MG and mental health and/or emotions
- Online conversations were assessed to characterize the perspectives of individuals with MG in terms of what they think, feel, and experience during different stages of the MG diagnostic journey
  - These discussions were used to identify triggers for anxiety, fear, depression, and hopelessness, and to map these emotional experiences throughout the diagnostic journey of MG
  - Recommendations were developed by the Strategy Team at Human Dot Plus based on the insights revealed through the study
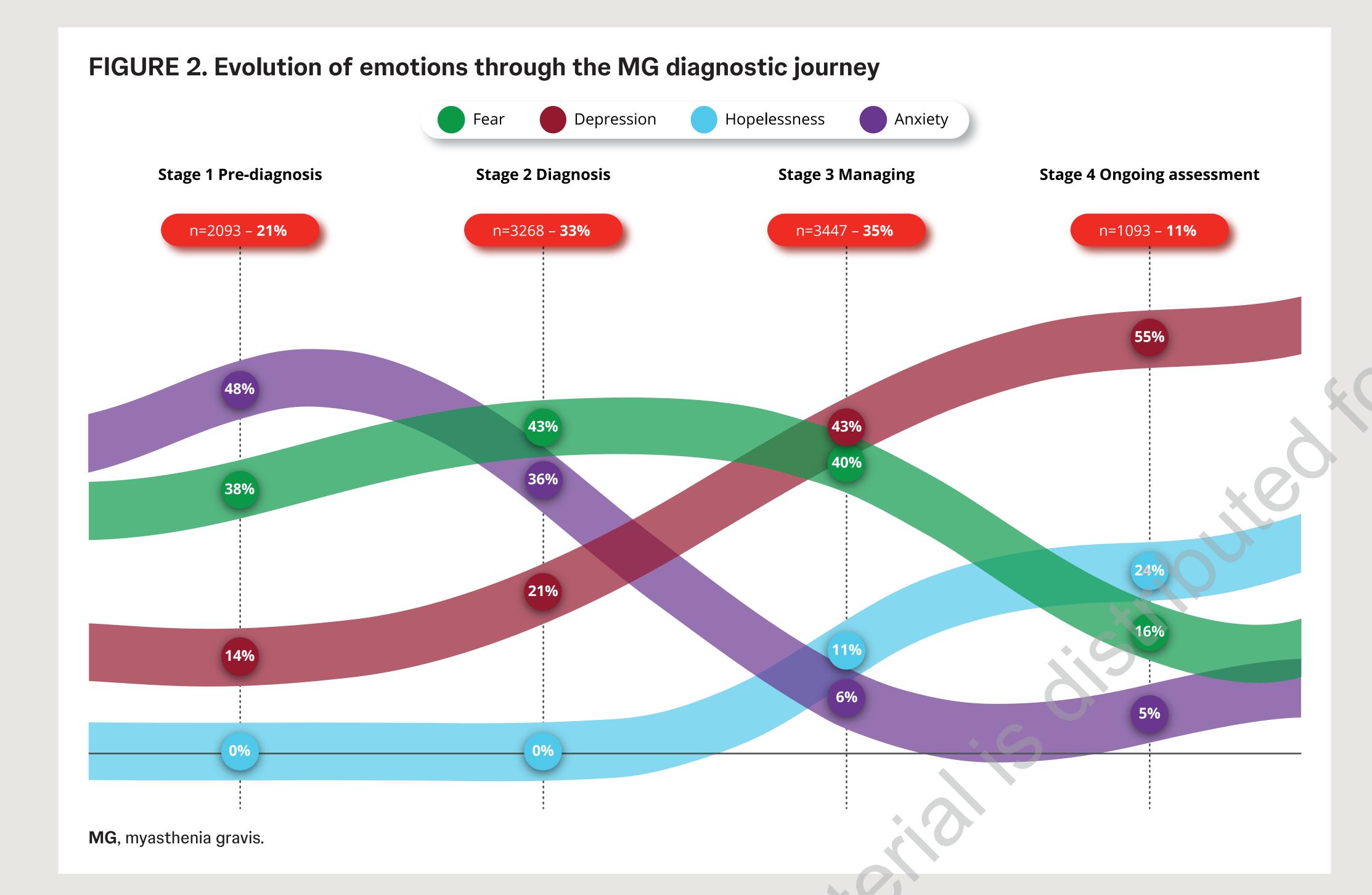
Results

- In total, 9901 digital conversations about emotional and mental health issues were identified among patients with a self-reported diagnosis of MG
- Conversations were categorized into four stages along the diagnostic journey: (1) suspicion of disease (pre-diagnosis); (2) at diagnosis; (3) managing MG; and (4) ongoing assessment (**Figure 1**)
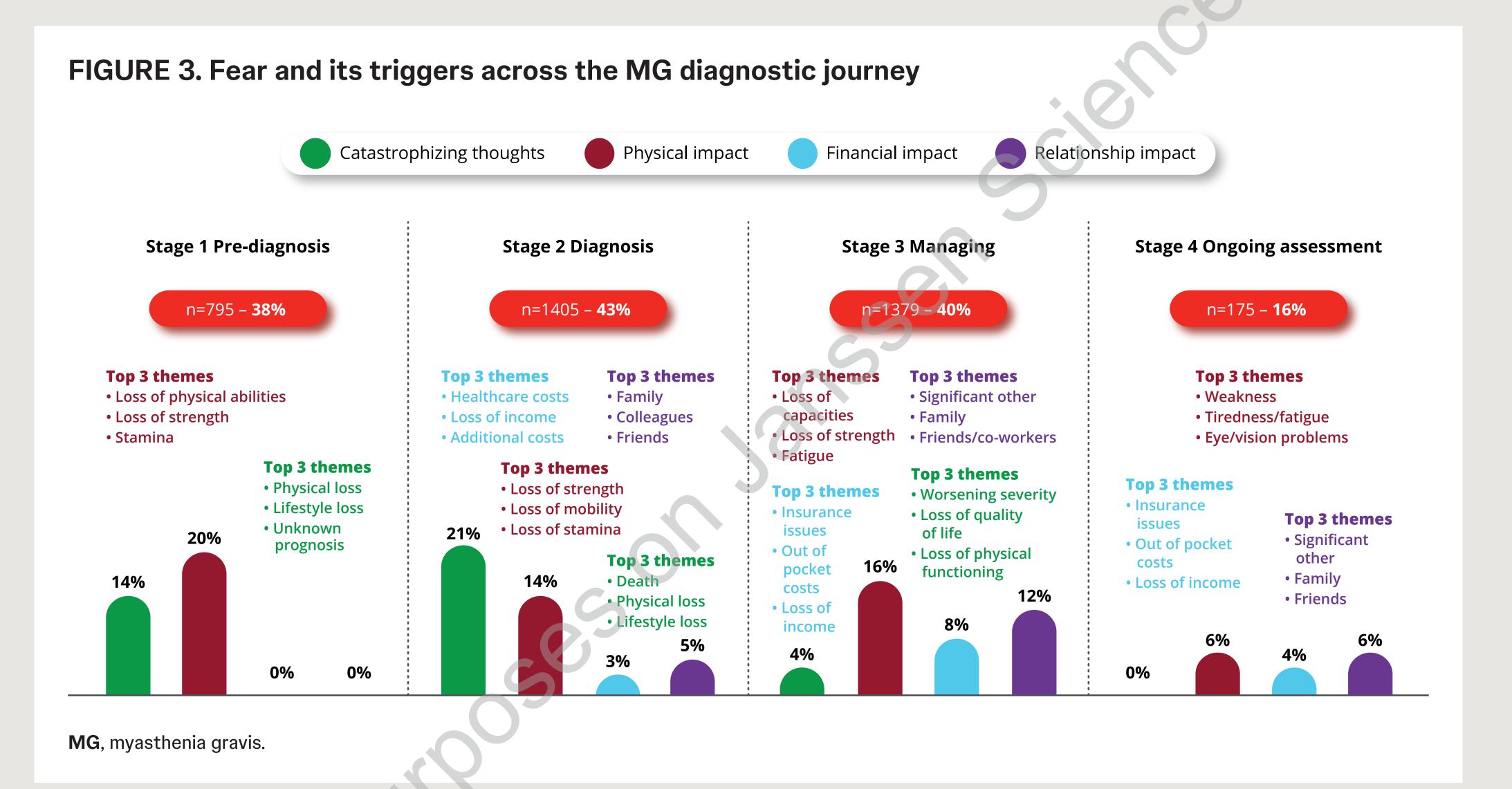
FIGURE 1. Digital conversations about mental health across the MG diagnostic journey (N=9901)

Stage 1 — Pre-diagnosis (suspected MG): Concerned by manifestations of symptoms — 21% (n=2093)
Stage 2 — Diagnosis: Diagnosed and coming to grips with the new reality — 33% (n=3268)
Stage 3 — Managing: Enduring the process — 35% (n=3447)
Stage 4 — Ongoing assessment: Treatment assessment and re-evaluation of treatment plan — 11% (n=1093)

MG, myasthenia gravis.

Emotions

- Posts reporting self-described fear and anxiety decreased during the latter stages of the diagnostic journey, while depressive feelings and hopelessness were identified more commonly during these stages (**Figure 2**)
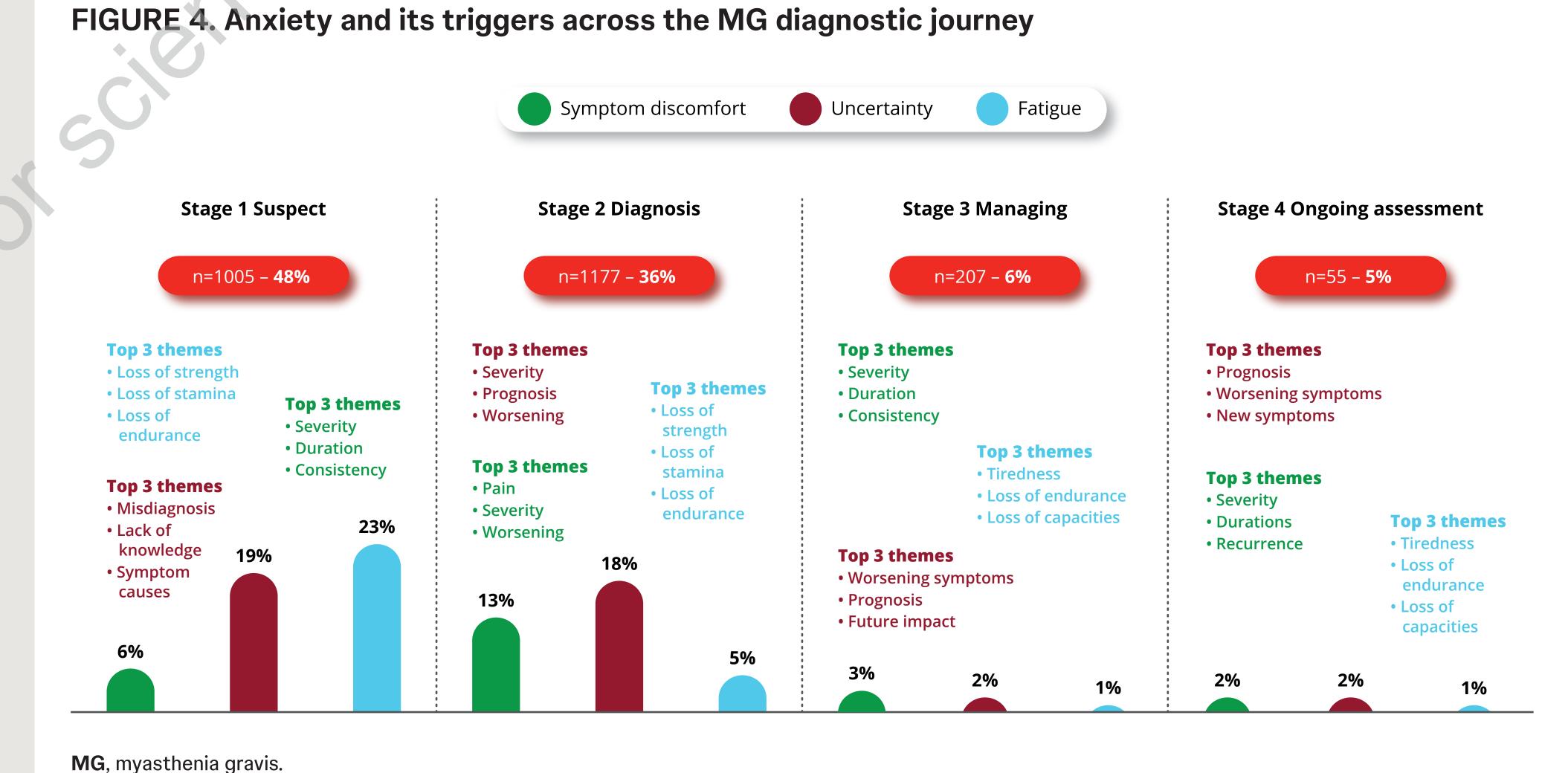
FIGURE 2. Evolution of emotions through the MG diagnostic journey
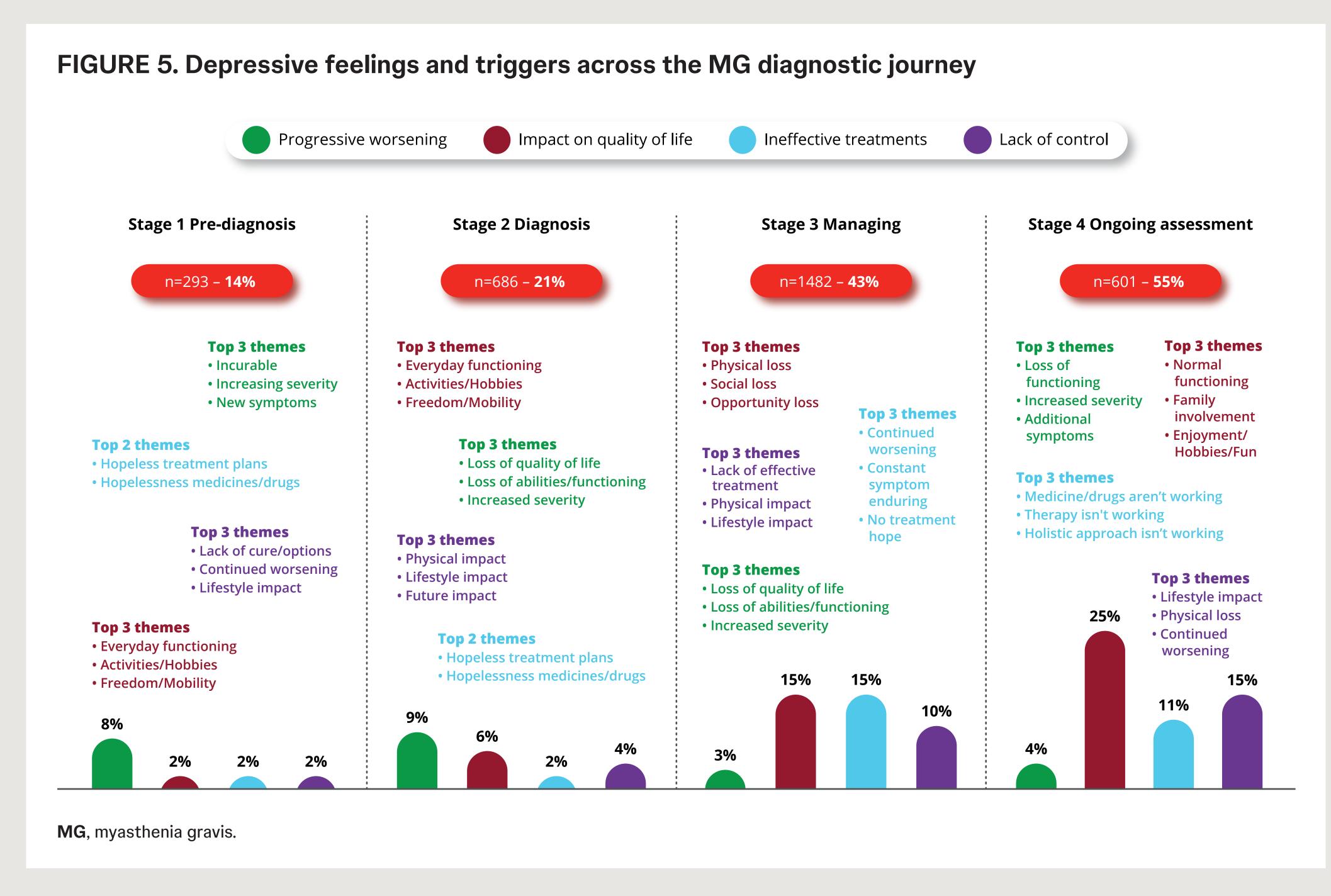

MG, myasthenia gravis.

Emotional triggers

- Triggers identified for fear included catastrophizing thoughts as well as physical, financial, and relationship impacts (**Figure 3**)
  - In the early stages of the MG diagnostic journey, physical loss and lifestyle loss were among the top themes of fear triggers
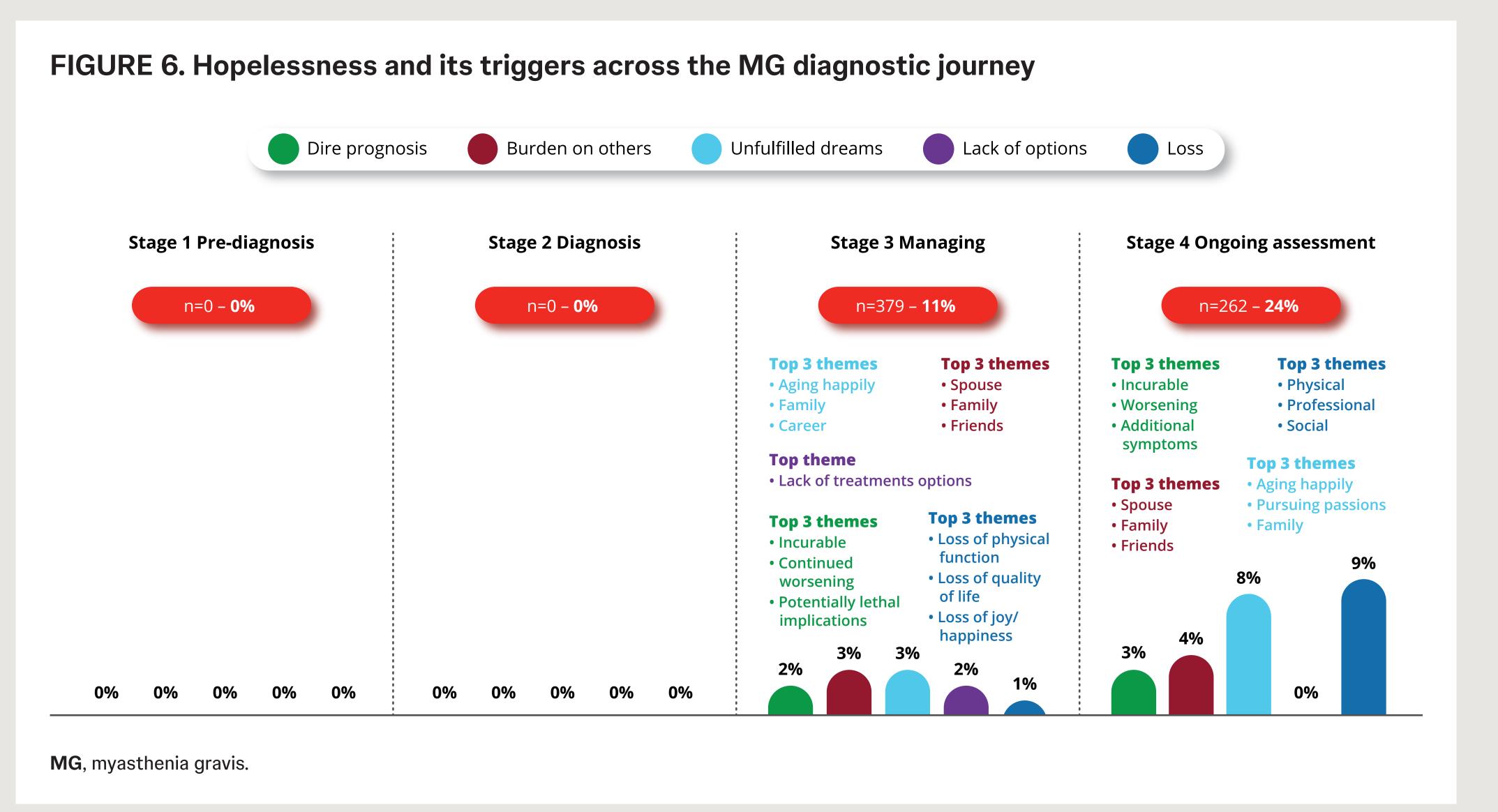
FIGURE 3. Fear and its triggers across the MG diagnostic journey

MG, myasthenia gravis.

- Anxiety triggers mainly included symptom discomfort, uncertainty, and fatigue (**Figure 4**)
  - Symptom worsening was among the top three themes for anxiety triggers across all stages of the diagnostic journey

FIGURE 4. Anxiety and its triggers across the MG diagnostic journey

MG, myasthenia gravis.

- Depressive feelings were mainly triggered by ineffective treatments, progressive worsening, the impact of MG on quality of life, and lack of control (**Figure 5**)
- Feelings of hopelessness only occurred in later stages of the MG diagnostic journey, triggered by dire prognosis, burden on others, unfulfilled dreams, lack of options, and loss (**Figure 6**)

FIGURE 5. Depressive feelings and triggers across the MG diagnostic journey

MG, myasthenia gravis.

FIGURE 6. Hopelessness and its triggers across the MG diagnostic journey

MG, myasthenia gravis.

Conclusions

- ✓ This digital conversation study identified decreasing mentions of self-described fear and anxiety and increasing references to depressive feelings and hopelessness as individuals progressed through the MG journey beyond diagnosis
- ✓ These AI-leveraged insights highlight the importance of establishing effective holistic treatment plans early to support patients at all stages of the MG diagnostic journey

Disclosures

RG has served on advisory boards for Argenx, UCB, Janssen, Roche, and speakers' bureaus for Argenx, Alexion, and UCB. **RDR, ZC, JP, SR, NC, KG,** and **KH** are employees of Janssen Scientific Affairs, LLC, a Johnson & Johnson company, Titusville, NJ, USA. **CB** is employed by Human Dot Plus, TX, USA, which derives profits from interactions with pharmaceutical sponsors. **AELA** serves on a speaker's bureau for Alexion Pharmaceuticals and as a consultant for Janssen Pharmaceuticals. **NS** reports having no conflicts to disclose.

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