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Received: 8 May 2024 | Revised: 5 August 2024 | Accepted: 7 August 2024

DOI: 10.1002/alz.14226

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

RESEARCH ARTICLE

Psychological outcomes of dementia risk estimation in MCI patients: Results from the PreDADQoL project

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Abstract

INTRODUCTION: Understanding the impact of biomarker-based dementia risk estimation in people with mild cognitive impairment (MCI) and their care partners is critical for patient care.

METHODS: MCI patients and study partners were counseled on Alzheimer's disease (AD) biomarker and dementia risk was disclosed. Data on mood, quality of life (QoL), and satisfaction with life (SwL) were obtained 1 week and 3 months after disclosure.

RESULTS: Seventy-five dyads were enrolled, and two-thirds of the patients opted for biomarker testing. None of the participants experienced clinically relevant depression or anxiety after disclosure. All dyads reported moderate to high QoL and SwL throughout the study. Patients reported more subthreshold depressive symptoms 1 week and lower QoL and SwL 3 months after disclosure. In patients, depression (odds ratio [OR]: 0.76) and anxiety (OR: 0.81) were significant predictors for the decision against biomarker testing.

DISCUSSION: No major psychological harm is to be expected in MCI patients and care partners after dementia risk disclosure.

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Funding information
Federal Ministry of Education and Research; Ministry of Economy and Competitiveness; Network of European Funding for Neuroscience Research

TRIAL REGISTRATION: This study is registered in the German clinical trials register (Deutsches Register Klinischer Studien, DRKS): http://www.drks.de/DRKS00011155, DRKS registration number: DRKS00011155, date of registration: 18.08.2017.

KEYWORDS
Alzheimer's disease, anxiety, biomarker, close other, coping, counseling, dementia risk, depression, disclosure, mild cognitive impairment, quality of life, satisfaction with life

Highlights

- Patients with mild cognitive impairment (MCI) and study partners were counseled on Alzheimer's disease (AD) biomarker-based dementia risk estimation.
- About two-thirds of patients opted for biomarker testing and received their dementia risk based on their AD biomarker status.
- Patients who decided in favor or against CSF biomarker testing differed in psychological features.
- We did not observe major psychological harm after the dementia risk disclosure.
- Coping strategies were associated with better subsequent mood and well-being in all participants.

1 | BACKGROUND

Cerebrospinal fluid (CSF) and positron emission tomography (PET) biomarkers make it possible to identify individuals with Alzheimer's disease (AD) pathology and the estimation of risk for developing dementia in the prodromal stage of mild cognitive impairment (MCI). The application of biomarkers for prodromal AD diagnosis and associated recommendations for counseling and disclosure have been subject to several publications.[1–5] Biomarker-based detection of AD may lead to changes in clinical management,[6–8] but knowledge of one's own dementia risk may also have major implications for future life plans and psychological well-being. It is therefore of particular importance to refine the understanding of the impact of such information.

According to recent studies, disclosure of a positive amyloid PET result in people with MCI is not associated with clinically relevant depression and anxiety symptoms but may result in mixed emotional feelings and an increase in distress.[9–15] Outcomes beyond effects on depression, anxiety, and stress, such as quality of life (QoL), satisfaction with life (SwL), affective well-being, and coping strategies, however, have not been sufficiently studied.[16]

QoL is defined by the World Health Organization (WHO) as "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns"[17] and can therefore be understood as a multidimensional construct that incorporates physical, psychological, social, and environmental aspects. Awareness of cognitive decline, such as MCI diagnosis, may have a negative impact on QoL.[18–20] In contrast, the construct of SwL represents the global cognitive component of subjective well-being based on the conscious judgment of one's own life using a person's unique criteria.[21,22] The concept of affective well-being is defined as the balance of pleasure and displeasure with one's life.[23] While mental health (ie, depression or anxiety) and affective well-being are correlated, both are different constructs. In addition, the literature indicates a correlation between affective well-being and personality traits, particularly positive affect with extraversion and negative affect with neuroticism.[23,24]

Care partners, such as spouses, face challenges associated with the continuous cognitive decline of their partners and the expected increased burden of care in the long term. Therefore, their need for practical and emotional support must be better understood, and there is a growing effort to address the specific needs of care partners in the early stages of the caregiving trajectory.[25,26] The term anticipatory grief in care partners of MCI patients describes a process of experiencing the impending loss of the person they have once known with the progressive cognitive decline to the final dementia stage.[26] In care partners of MCI patients, a decrease in self-efficacy to cope with MCI has been described after receiving the amyloid PET results, irrespective of an (amyloid-) positive or negative outcome.[11] The authors discussed a potential feeling of unpreparedness in care partners regarding the progressive cognitive decline of amyloid-positive patients and uncertainty in care partners about the brain health status of amyloid-negative patients.[11] In this context, cognitive and behavioral coping strategies are of interest, which describe approaches to handle aversive situations, burdensome conditions, and stress.[27,28] On a patient level, various forms of coping strategies in the context of dementia risk assessment have been described. These include problem-focused techniques, such as internal and external memory aids, and actions of prevention, such as stress

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reduction, physical activities, cognitive stimulation, and other lifestyle modifications.[29–33]

The latest report from the PreDADQoL study ("Ethical and legal framework for predictive diagnosis of Alzheimer's dementia: Quality of life of individuals at risk and their close others") presents the effects of AD biomarker-based dementia risk estimation in people with MCI and their care partners concerning mental health, QoL, SwL, positive and negative affective well-being, and coping behavior in a prospective study design with quantitative outcome measures. In addition, results from qualitative interviews with patients and care partners are presented.

RESEARCH IN CONTEXT

1. **Systematic review**: We identified key studies on psychosocial outcomes of people with mild cognitive impairment (MCI) and care partners after biomarker-based Alzheimer's disease (AD) detection. Findings revealed that no major psychological harm is to be expected after biomarker disclosure. Outcomes beyond effects on mood and stress as well as the impact of dementia risk estimation on patients and care partners have not been sufficiently studied.
2. **Interpretation**: This study examined the effects of biomarker-based dementia risk estimation on psychosocial outcomes in people with MCI and their study partners. About two-thirds of the MCI patients opted for CSF biomarker testing after counseling on AD biomarkers. We found no evidence of major psychological harm after the individual dementia risk disclosure, but interviews showed that the diagnostic trajectory experienced was stressful and exhausting.
3. **Future directions**: Our findings suggest that dementia risk disclosure is safe, but patients and care partners might profit from psychosocial support.

2 | METHODS

2.1 | Participants and design

The PreDADQoL study is a prospective study with an explorative design and has been conducted in parallel in Spain (Barcelona) and Germany (Cologne) to provide empirical data on psychological outcome and QoL in subjects with MCI and their study partners in the context of AD biomarker-based dementia risk estimation. MCI patients and their study partners were enrolled at two memory clinics (Fundació ACE, Barcelona Alzheimer Treatment & Research Center [Barcelona, Spain] and Center for Memory Disorders, Department of Psychiatry and Psychotherapy, University Hospital of Cologne [Cologne, Germany]) between June 2018 and October 2020. Patients were eligible if they received the diagnosis of MCI according to the National Institute on Aging-Alzheimer's Association (NIA-AA)[34] after the clinical diagnostic work-up including neuropsychological testing (Consortium to Establish a Registry for Alzheimer's Disease, CERAD[35] and the Neuropsychological test battery Fundacio ACE, NBACE[36]), brain magnetic resonance imaging (MRI), and blood test for potentially reversible causes of cognitive decline. The screening process included assessments to control for severe depression,[37–39] severe anxiety,[40–42] and acute suicidality,[43] which were exclusion criteria. Furthermore, depressive and anxiety disorders identified at screening with the structured interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) Axis I Disorders were exclusion criteria.[44] The study partner had to be a close other (eg, spouse or child) and had to be in regular contact with the patient. Study partners had to be able to accompany the patient to all study visits and contribute to the study assessments. Further exclusion criteria for study partners were dementia or a Mini-Mental State Examination (MMSE) score of ≤26. This study was registered in the German clinical trials register (Deutsches Register Klinischer Studien DRKS: http://www.drks.de/DRKS00011155, DRKS registration no. DRKS00011155).

2.2 | Study procedure and interventions

After enrollment, MCI patients and study partners received a 1-h manual-guided counseling session by a trained neurologist (Barcelona) or psychiatrist (Cologne). Patients gave final notice of their decision for or against biomarker testing during the baseline visit, which took place 7 to 10 days after the counseling session. Those consenting to biomarker testing at baseline received an appointment for a CSF sample collection. About 2 weeks after the lumbar puncture, the individual biomarker results and dementia risk were communicated to the patients and study partners during a 1-h manual-guided disclosure session (Visit 0), again by a trained neurologist (Barcelona) or a psychiatrist (Cologne). The quantitative assessments took place at baseline, 1 week (Visit 1), and 3 months (Visit 2) after baseline in participants deciding against CSF sampling and after disclosure in participants deciding for CSF sampling. Patients who decided against CSF sampling underwent the same study visits as those with CSF sampling. CSF analyses were performed with Lumipulse G CLEIA and INNOTEST ELISA in Barcelona and EUROIMMUN ELISA in Cologne, the cutoffs were center-specific. In Cologne, additional qualitative interviews were conducted at baseline (7 to 10 days after the counseling session) and 3-month follow-up. The study flowchart is presented in Figure 1.

The protocols for counseling and disclosure were developed based on previously published protocols and recommendations, with special attention paid to the topic of informed decisions regarding predictive AD diagnostics.[1,3,4,45–49] The purpose of the counseling session was to establish basic knowledge and address misconceptions. A detailed description of the development and content of the protocols was previously published.[50] In summary, the counseling session contained general information about the diagnostic work-up and clinical symptoms in MCI and about Alzheimer's dementia, as well as a section about

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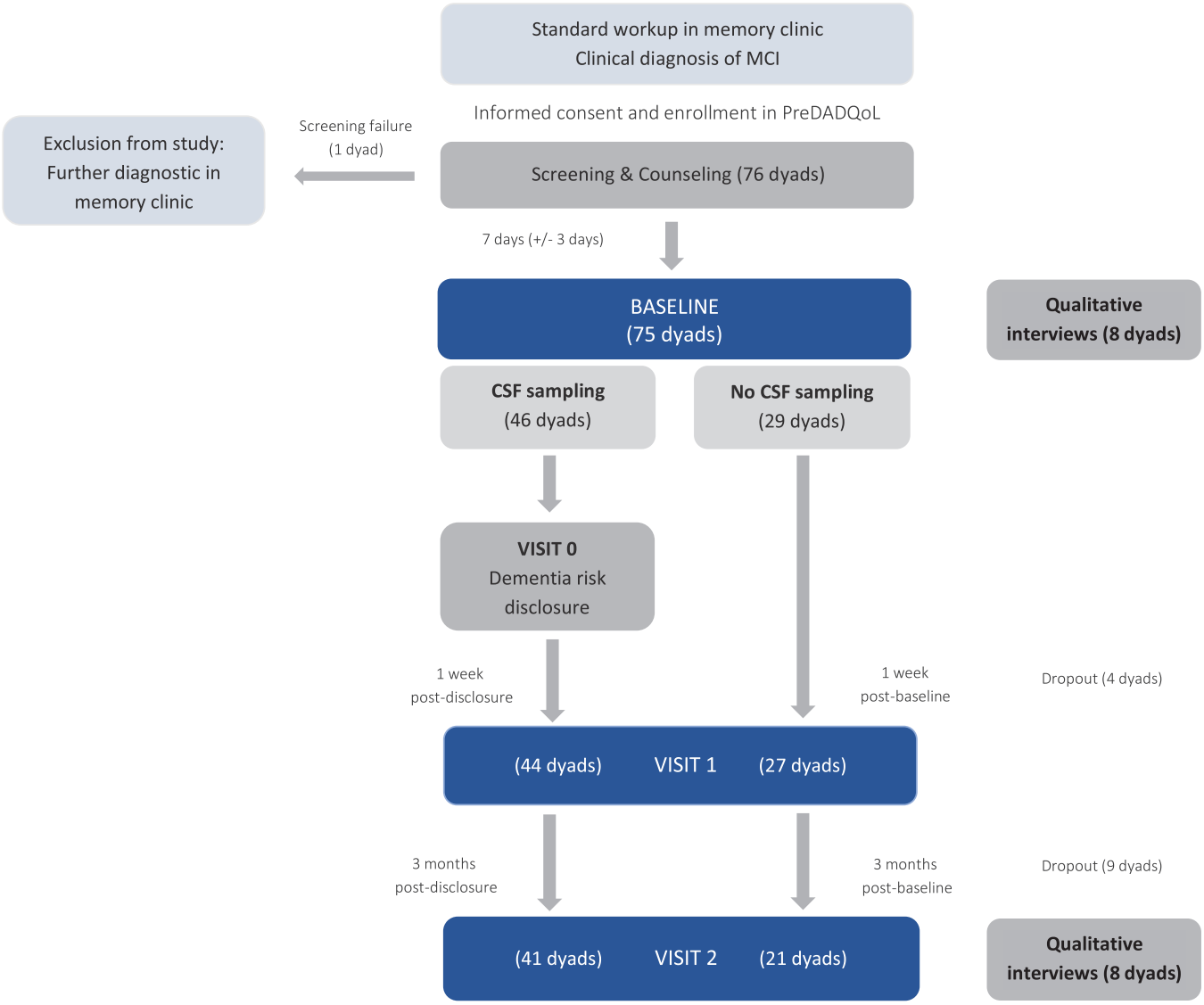


FIGURE 1 Study flow chart. CSF, cerebrospinal fluid; MCI, mild cognitive impairment.

AD biomarkers, lumbar puncture, potential risks and benefits of CSF biomarker testing, and dementia risk estimation. The biomarker-based risk estimates for developing Alzheimer's dementia within 3 to 5 years after the MCI diagnosis were obtained from the meta-analysis by Vos et al.[51] Overall risk estimates for developing Alzheimer's dementia within 3 to 5 years based on the clinical MCI diagnosis only (without AD biomarker testing) were derived from the meta-analysis by Mitchell et al.[52,53] The CSF biomarker classification used was guided by the NIA-AA criteria from 2011, which was also the basis for the meta-analysis by Vos et al.[34,51,54] Amyloid (A) pathology was defined as abnormal CSF amyloid-ß1-42 concentration and neurodegeneration (N) was defined as abnormal CSF tau (total tau and/or phosphorylated tau) concentration.[34,54] During the counseling session, all patients and study partners were introduced to four different dementia risk scenarios according to the possible AD biomarker profiles: normal biomarker status (A^-N^-), fully abnormal biomarker status (A^+N^+, full AD profile with amyloid and tau pathology), partly abnormal biomarker status (A^+N^- or A^-N^+, corresponding to only amyloid pathology or only tau pathology), and unknown biomarker status (no AD biomarker testing when patients decided against it). We completed the session with a section about therapeutic and preventive measures at the stage of MCI with an emphasis on lifestyle modification as a secondary preventive action.[46,48] We encouraged MCI patients and their study partners to discuss the benefits and disadvantages of dementia risk estimation before deciding to undergo CSF biomarker sampling. In the disclosure session, patients who underwent CSF biomarker assessment received, together with their study partners, information on the individual biomarker results and the derived risk for Alzheimer's dementia, following the corresponding scenario introduced during the counseling session. In addition, the psychoeducational content of the counseling session was repeated.

To enhance participants' comprehension, we used plain language, avoided medical terminology where possible, and applied the teach-back method to strengthen the informed process.[55,56] Guided by a

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literature review on risk communication techniques, oral, written, and graphical (icon arrays, bars, and line charts) information, including take-home material, was developed with sensitivity to cognitive impairment and the challenges of providing probabilistic numerical risk information.[4,57–61]

2.3 | Outcomes

Assessments took place at baseline and at Visits 1 and 2 and included validated self-report questionnaires for the assessment of mental health (depression, anxiety, and suicidality), QoL, SwL, positive and negative affective well-being, and coping behavior. Due to the short interval of 7 to 10 days between the screening and baseline visit, the questionnaires on depression, anxiety, and suicidality were assessed at screening, but not repeated at baseline. All baseline assessments took place before the biomarker test result disclosure. The exact time points of all questionnaire assessments are listed in Table SA.1. Additional instruments were applied as described in the study protocol,[62] which will be reported in subsequent publications.

Symptoms of depression were assessed by the 15-item short form of the Geriatric Depression Scale (GDS), ranging from 0 to 15 points, with scores between ≥6 and ≤10 points indicating mild to moderate depressive symptoms and scores ≥11 points suggesting severe depressive symptoms.[37] In study partners younger than 50 years of age, the 21-item scale Becks Depression Inventory-II (BDI-II) was used.[38,39] The BDI-II score ranges from 0 to 63 points, with scores between ≥14 and ≤28 points referring to mild to moderate depressive symptoms and scores ≥29 points indicating severe depressive symptoms. Symptoms of anxiety were determined by the 20-item Geriatric Anxiety Inventory (GAI),[40] with a cut-off score of ≥11 points indicating clinically relevant anxiety symptoms. The 21-item scale Beck Anxiety Inventory (BAI) was used in study partners below <50 years, with scores between ≥16 and ≤25 points referring to moderate anxiety symptoms and scores ≥26 points indicating severe anxiety symptoms.[41,42] Suicidal ideation and suicidal behavior throughout a lifetime, within the last 12 months before screening, and in between visits were assessed with the Columbia-Suicide Severity Rating Scale (C-SSRS).[43] Suicidal ideation reaching a score of >4 and any suicidal behavior since enrollment in the study were defined as acute suicidality requiring treatment.

QoL was assessed by the short version of the WHO QoL assessment, the 26-item scale WHO QoL-Bref,[17] with higher scores referring to higher subjective QoL. The WHO QoL-Bref incorporates one initial item on the subjective judgment on general QoL and one item on the overall perception of one's health and continues with 24 items on four different domains: physical, psychological, social relationship, and environmental aspects. The total score was generated by the mean of the four domain scores with a possible range between 4 and 20, with higher scores reflecting higher subjective QoL.

SwL was measured with two different questionnaires. First, the Satisfaction with Life Scale (SWLS) was deployed,[21] a five-item scale measuring from 5 to 35, with higher scores indicating higher subjective SwL. The second questionnaire on SwL, the *Fragebogen zur Lebenszufriedenheit-Module* (FLZ-M) (Questionnaire on Life Satisfaction), consists of two 16-item modules, one for general life satisfaction and the second for satisfaction with health.[63] For each module, the respondent is asked to additionally rate the subjective importance of the given topic. Scoring for weighted life satisfaction ranges from −12 to +20 points per item (total score range for each module: −96 to +160), with higher scores indicating higher weighted life satisfaction.

The Positive and Negative Affect Schedule (PANAS) is a 20-item questionnaire evaluating affective well-being.[23,24] Mean scores of each scale range between 1 and 5 points, with higher scores representing either higher positive affect (PA) or higher negative affect (NA).

Coping strategies were assessed by the coping model of Brandtstädter and Renner, which so far has not yet been used in the context of MCI and the risk estimation of AD dementia.[28] It describes a two-process model of assimilative and accommodative processes. Assimilative coping describes the tendency to stick to goals and to persistently persevere with them even in the face of a high risk of failure, while the accommodative coping process is characterized by a flexible adaptation of one's own goals and life plans to a given situation and includes strategies such as cognitive reassessment of stressful situations. An adjusted version of the Tenacious Goal Pursuit /Flexible Goal Adjustment (TEN/FLEX) Scale was used.[28] In the current adjusted version of the questionnaire, the assimilative and accommodative coping strategies are ordered as opposite constructs on an unidimensional scale. The total score is derived from mean scores from each item and has a range between 1 and 5. Higher scores indicate higher accommodative coping and were defined to be equivalent to lower scores in assimilative coping.

2.4 | Qualitative interview conduct

Interviews of 30 to 60 min each in the form of episodic interviews[64] were collected at the baseline visit (7 to 10 days after the counseling session) and at Visit 2 (3 months after baseline in participants deciding against CSF sampling and 3 months after disclosure in participants deciding for CSF sampling). Every interviewee was interviewed twice during the study. The findings from the pilot study of PreDADQoL[62] indicated that a categorial and thematic saturation could be expected after the interviews with six to eight dyads, which represents a pragmatic approach of methodical literature in this field.[65,66] Patients and their corresponding study partners were interviewed separately. The interviews were conducted by three different interviewers, who had a professional background in the fields of medical humanities and social sciences. The main topic of the interview was risk estimation of Alzheimer's dementia to obtain insights into participants' attitudes and expectations. The interviewer guided the participants through their narrations of specific situations within their disease course and the diagnostic process in the memory clinic. The interviews were semi-structured, consisting of episodic parts (narratives on life events) and semantic parts, where questions about specific situations from the

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participants' everyday lives and their feelings after the dementia risk disclosure were asked.[64]

2.5 | Statistical analysis

All statistical analyses were performed with IBM SPSS Statistics 25.0 (IBM Corp., Armonk, NY, USA) for Windows. The significance level was set at $p < 0.05$ for two-sided hypothesis testing, and $p < 0.1$ was interpreted as a statistically non-significant trend. To analyze whether the disclosure of the individual biomarker status and dementia risk estimation was associated with the outcomes, the participants were divided into two groups, depending on the communicated dementia risk (Risk Groups 1 and 2). Risk Group 1 was defined as the low to medium dementia probability group and included patients who did not consent to biomarker testing and therefore received the information of an approximate 36% risk of conversion to dementia within the next 3 to 5 years based on clinical MCI diagnosis only[52,53] and patients who had a normal biomarker status (A^-N^-) with information of a 12% dementia risk within the next 3 to 5 years.[51] Risk Group 2 was defined as the high dementia probability group and consisted of patients who had one or two abnormal AD biomarkers and were informed about an approximate risk for future dementia of 47% (A^+N^- or A^-N^+) or 89% (A^+N^+)[51] within the next 3 to 5 years. The study partners of the MCI patients were grouped into the corresponding risk groups. For group comparisons, paired *t*-tests or chi-squared tests (respectively Fisher's exact test, as appropriate) were performed. For the *t*-tests, effect sizes (Cohen's *d*/Hedges' g) were added. To examine changes in dependent variables between the time points (screening, baseline, Visit 1, Visit 2), mixed repeated-measurement ANOVAs with fixed effects for group and time and their interaction were performed. The between-subject factors were (1) the grouping of patients and study partners, (2) grouping in Risk Groups 1 and 2, and (3) grouping according to the individual biomarker-based risk profile (normal biomarker status (A^-N^-), fully abnormal biomarker status (A^+N^+), partly abnormal biomarker status (A^+N^- or A^-N^+), or unknown biomarker status). Time was the within-subject factor. Covariates were age and sex. In case of significant effects, univariate ANOVAs with the covariates age and sex were performed to determine simple main effects of the between-subject factors in relation to dependent variables at each time point. Pairwise comparisons were done by Bonferroni-corrected post hoc tests. Coping behavior was assessed at baseline only, not as an outcome parameter. Mean scores and effect sizes were determined to examine differences in coping behavior at baseline between patients deciding for CSF biomarker testing versus patients deciding against CSF biomarker testing. A linear regression analysis was performed to analyze the relationship between the coping behavior as a predictor for the psychosocial outcomes at 3-month follow-up (GDS, GAI, WHO QoL-Bref, SWLS, FLZ-M, PANAS-PA, and PANAS-NA). All analyses were performed for the patients and the study partners separately.

In addition, binary logistic regression analyses were performed to examine whether the affective state at baseline (defined by the variables GDS, GAI, PANAS-PA, PANAS-NA, and the psychological subscale of the WHOQoL-Bref), predicted the decision for or decision against the CSF biomarker testing (decision against CSF biomarker testing = 0; decision for CSF biomarker testing = 1). The analyses included a simple binary logistic regression (Model I) and a multiple logistic regression (Model II) with the covariates age, sex, global cognition MMSE, study site, and family history of dementia. Bootstrapping with 1000 iterations as a non-parametric approach was used to provide standard errors and confidence intervals. The frequency of reported positive and negative affective well-being at baseline measured by the PANAS-PA and PANAS-NA in patients deciding against CSF biomarker testing versus patients deciding in favor of CSF biomarker testing and their corresponding study partners were compared by chi-squared test or Fisher's exact test, respectively.

2.6 | Qualitative interview data analysis

The interviews were recorded as audio files. The data were transcribed using the discourse and conversation analytic transcription system (*Gesprächsanalytisches Transkriptionssystem, GAT2 [Conversational Analytic Transcription System]*) to facilitate a thematic and interactional linguistic analysis,[67] which considers the content and linguistic expressions used. A linguistically grounded qualitative content analysis method[64,68] was selected because of its suitability for small sample sizes.[68] Following a discourse-structural examination of the transcribed data, responses to open questions about "feelings after the dementia risk disclosure or after the decision against CSF biomarker testing" and "expressions of affect and emotions" were extracted for further analysis. Selected passages were allocated to the two categories "retrospective reflection of immediate affective state after the dementia risk disclosure or after the decision against biomarker testing" and "emotional progress and coping with the affective state," considering grammatical, syntactical, and rhetorical language patterns. Thereafter, the respective utterances were categorized by hyperonymization, where semantically similar utterances were grouped under a common thematic expression.

3 | RESULTS

Fifty dyads were screened in Barcelona and 26 in Cologne. One dyad did not pass the screening process due to a too low MMSE score of the study partner. A total of 75 dyads completed baseline data collection and 62 dyads completed the 3-month follow-up visit. The study flow chart is presented in Figure 1. At the Cologne site, a total of eight dyads (eight MCI patients and eight corresponding study partners) opted for the qualitative interviews at baseline and 3-month follow-up (two interviews per study participant).

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At baseline, 39% of the patients and 67% of the study partners were female. Seventy-two percent of the accompanying study partners were spouses. Most participants were either retired or not employed. The mean age was 73.4 years (SD 6.5) in patients and 64.8 years (SD 12.0) in study partners. The mean MMSE score was 26.5 (SD 2.5) in patients and 29.1 (SD 1.0) in study partners. A family history of dementia was reported from 47% of the patients and 24% of the study partners. About 60% of the patients decided on CSF-based AD biomarker detection after counseling. Of these, 52.2% had an amyloid and tau pathology, 20% had either amyloid or tau pathology, and 28% had a normal AD biomarker profile. In total, 13 dyads (13 patients and 13 corresponding study partners) dropped out during the study. Reasons for drop-out were loss of contact, lack of interest, pandemic situation, and other health problems that hindered study participation. Detailed information on the sample is provided in Tables 1 and 2.

3.1 | Depression and anxiety

Mean scores on the depression and anxiety measure were below the threshold of clinical relevance for both patients and study partners, at all time points. At screening, the mean GDS score was 2.5 (SD 2.2) in patients and 2.0 (SD 2.4) in study partners, while at Visit 2 the mean GDS score was 2.6 (SD 2.3) in patients and 2.0 (SD 2.6) in study partners (Table SA2). Mean scores on the GAI measure at screening were 3.6 (SD 3.2) in patients and 3.7 (SD 4.1) in study partners, with insignificant increase at 3-month follow-up to 4.3 (SD 4.2) in patients and to 3.8 (SD 4.4) in study partners. Over time, no significant changes were observed in the mean GDS and GAI scores of both patients and study partners. However, a significant group difference was noted at Visit 1 with a higher mean GDS score of 2.9 (SD 3.0) in patients, compared to 1.8 (SD 2.5) in study partners (F_G-value = 4.094, $p = 0.045$). The comparison of Risk Groups 1 with 2 showed a non-significant trend effect for interaction between time and group in the GDS score for study partners, with study partners in Risk Group 2 scoring higher over time compared to study partners in Risk Group 1 (F_{GxT}-value = 3.029, $p = 0.053$). Concerning the GAI score, a significant main effect for group (Risk Group 1 vs Risk Group 2) was noted in patients (F_G-value = 5.156, $p = 0.027$) and a non-significant trend in study partners (F_G-value = 3.772, $p = 0.058$) (Figure 2 and Table SA.3). Univariate analyses of variance confirmed significantly higher mean GAI scores at Visit 1 in patients of Risk Group 1 compared to patients of Risk Group 2 (F_G-value = 4.208, $p = 0.045$). Conversely, higher mean scores at Visit 1 were observed in study partners of Risk Group 2 compared to study partners of Risk Group 1 (F_G-value = 5.782, $p = 0.020$).

3.2 | Suicidality

At screening, none of the participants reported acute suicidality; however, a total of eight patients and six study partners reported suicidal ideation during their lifetime, and two patients and four study partners reported suicidal behavior during their lifetime. At the 3-month follow-up, two patients and three non-related study partners reported the "wish to die" with no concomitant active intention of suicidal behavior. No clinically relevant depressive symptoms were present, and no psychiatric intervention was necessary in any case. The two patients reporting suicidal ideation at follow-up had decided against CSF biomarker testing. One female patient with a history of major depression disorder reported chronic suicidal ideas with no change since enrollment in the study and distanced herself from suicidal behavior. One male patient reported a pre-existing wish to die when symptom progression would occur and the dementia stage would be reached, with no change since enrollment in the study. He reported that, due to his experiences with dementia in the family, he would not want to reach the end stage of dementia. He had no specific suicide plans and distanced himself from suicidal behavior. One male study partner reported having the "wish to die" in the context of his aging process ("I have lived my life") without a specific plan and not related to the diagnostic work-up and biomarker disclosure of his spouse. One female study partner had a history of personality disorder with chronic suicidal ideation, which was not aggravated in the context of the study. Another male study partner, whose diseased wife had decided against CSF sampling, had a history of major depression disorder and reported weariness of life due to his severe somatic disease. Overall, we did not observe acute suicidality in association with AD biomarker assessment and dementia risk communication.

3.3 | Quality of life, life satisfaction, and affective well-being

The mean baseline score of the WHO QoL Bref was 15.0 (SD 1.7) in patients and 15.7 (SD 1.8) in study partners. SwL measured by the SWLS was 26.00 (SD 6.2) in patients and 26.7 (SD 6.7) in study partners at baseline. On the FLZ-M mean baseline scores for the general life satisfaction subscale of the FLZ-M were 70.1 (SD 33.2) in patients and 73.7 (SD 34.6) in study partners, while mean scores on the health-related satisfaction subscale of the FLZ-M were 62.1 (SD 38.0) in patients and 73.5 (SD 36.0) in study partners at baseline. Mean baseline scores on the PANAS-PA were 3.4 (SD 0.6) in patients and 3.6 (SD 0.7) in study partners, while mean baseline scores on the PANAS-NA were 2.2 (SD 0.7) in patients and 2.1 (SD 0.7) in study partners. The mixed repeated-measurement ANOVAs showed non-significant changes in the mean WHO QoL Bref, SwL scale, FLZ-M, and PANAS scores over time in both groups (Table 3). However, significant main effects for the group were observed with patients scoring lower compared to their study partners in the WHO QoL Bref, the FLZ-M, and the PANAS-PA and higher in the PANAS-NA. Univariate analysis of covariance confirmed lower mean scores in patients at baseline for the WHO QoL Bref (F_G-value = 6.045, $p = 0.015$), the WHO QoL Bref psychological subscale (F_G-value = 6.310, $p = 0.013$), and the WHO QoL Bref environmental subscale (F_G-value = 4.856, $p = 0.029$). At Visit 2 patients scored significantly lower than their study partners in the WHO QoL

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TABLE 1 Sample characteristics of MCI patients at baseline and 3-month follow-up (Visit 2).

	Baseline				3-month follow-up (Visit 2)			
	Patients, total ($n = 75$)	Patients with CSF sampling ($n = 46$)	Patients without CSF sampling ($n = 29$)	p-value[d]	Patients, total ($n = 62$)	Patients with CSF sampling ($n = 41$)	Patients without CSF sampling ($n = 21$)	p-value[d]
Study location, *n* (%)								
Cologne	25 (33.3)	12 (26.1)	13 (44.8)		24 (38.7)	12 (29.3)	12 (57.1)	
Barcelona	50 (66.7)	34 (73.9)	16 (55.2)		38 (61.3)	29 (70.7)	9 (42.9)	
Age, mean (SD) (range)	73.4 (6.5) (55 to 85)	72.8 (5.8) (57 to 84)	74.3 (7.6) (55 to 85)	0.328[b]	72.6 (6.6) (55 - to 84)	72.6 (5.9) (57 to 84)	72.5 (7.9) (55 to 81)	0.961[b]
Sex, *n* (%)								
Female	29 (38.7)	16 (34.8)	13 (44.8)	0.384[c]	26 (41.9)	16 (39)	10 (47.6)	0.516[c]
Male	46 (61.3)	30 (65.2)	16 (55.2)		36 (58.1)	25 (61)	11 (52.4)	
MMSE, mean (SD)	26.5 (2.5)	26.5 (2.6)	26.5 (2.3)	0.931[b]	26.5 (2.5)	26.5 (2.6)	26.7 (2.3)	0.769[b]
Years of education, mean (SD) (range)	11.5 (4.9) (5 to 19)	11.0 (5.0) (5 to 19)	12.3 (4.7) (6 to 19)	0.272[b]	11.4 (4.8) (5 to 19)	11.1 (5.0) (5 to 19)	12.0 (4.5) (6 to 19)	0.467[b]
Native speakers, *n* (%)								
Yes	62 (82.7)	38 (82.6)	24 (82.8)	>0.99[a]	52 (85.2)	34 (82.9)	18 (90)	0.704[a]
No	12 (16.0)	8 (17.4)	4 (13.8)		9 (14.8)	7 (17.1)	2 (10)	
Referral tomemory clinic, *n* (%)								
General practitioner	53 (70.7)	36 (78.3)	17 (58.6)	0.069[c]	43 (69.4)	32 (78.0)	11 (52.4)	0.038[c]
Neurologist	8 (10.7)	1 (2.2)	7 (24.1)	0.005[c]	8 (12.9)	1 (2.4)	7 (33.3)	0.001[a]
Own request	14 (18.7)	10 (21.7)	4 (13.8)	0.39[c]	14 (22.6)	10 (24.4)	4 (19)	0.755[a]
Other	6 (8.0)	1 (2.2)	5 (17.2)	0.029[a]	3 (4.8)	0	3 (14.3)	0.035[a]
Religion, *n* (%)								
None	24 (32.0)	19 (41.3)	5 (17.2)	0.037 [a]	19 (30.6)	16 (39)	3 (14.3)	0.048[a]
Catholic	44 (58.7)	25 (54.3)	19 (65.5)		38 (61.3)	23 (56.1)	15 (71.4)	
Protestant	2 (2.7)	0	2 (6.9)		2 (3.2)	0	2 (9.5)	
Other	5 (6.7)	2 (4.3)	3 (10.3)		3 (4.8)	2 (4.9)	1 (4.8)	
Job situation, *n* (%)								
Employed	10 (13.3)	6 (13.0)	4 (13.8)	>0.99 [a]	10 (16.1)	6 (14.6)	4 (19.0)	0.722[a]
Not employed	65 (86.7)	40 (87.0)	25 (86.2)		52 (83.9)	35 (85.4)	17 (81.0)	
Civil status, *n* (%)								
Single	0	0	0	0.34 [a]	0	0	0	0.144[a]
Married	61 (81.3)	36 (78.3)	25 (86.2)		50 (80.6)	31 (75.6)	19 (90.5)	
Divorced	6 (8)	5 (10.9)	1 (3.4)		5 (8.1)	5 (12.2)	0	
Widowed	7 (9.3)	5 (10.9)	2 (6.9)		6 (9.7)	5 (12.2)	1 (4.8)	
Other	1 (1.3)	0	1 (3.4)		1 (1.6)	0	1 (4.8)	
Living Situation, *n* (%)								
Two-person household	58 (77.3)	34 (73.9)	24 (82.8)	0.715 [a]	49 (79)	30 (73.2)	19 (90.5)	0.344[a]
Multiperson household	8 (10.7)	6 (13)	2 (6.9)		6 (9.7)	5 (12.2)	1 (4.8)	
Alone	9 (12.0)	6 (13)	3 (10.3)		7 (11.3)	6 (14.6)	1 (4.8)	

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TABLE 1 (Continued)

	Baseline				3-month follow-up (Visit 2)			
	Patients, total ($n = 75$)	Patients with CSF sampling ($n = 46$)	Patients without CSF sampling ($n = 29$)	p-value[d]	Patients, total ($n = 62$)	Patients with CSF sampling ($n = 41$)	Patients without CSF sampling ($n = 21$)	p-value[d]
Relationship with study partner, *n* (%)								
Spouse/partner	54 (72.0)	32 (69.6)	22 (75.9)	0.868 [a]	47 (75.8)	29 (70.7)	18 (85.7)	0.675[a]
Adult child	16 (21.3)	10 (21.7)	6 (20.7)		10 (16.1)	8 (19.5)	2 (9.5)	
Friend	3 (4.0)	2 (4.3)	1 (3.4)		3 (4.8)	2 (4.9)	1 (4.8)	
Other	2 (2.7)	2 (4.3)	0		2 (3.2)	2 (4.9)	0	
Legal precautions, *n* (%)								
Advance directive	17 (22.7)	10 (21.7)	7 (24.1)	0.809 [c]	15 (24.2)	9 (22)	6 (28.6)	0.565[c]
Healthcare proxy	21 (28.0)	14 (30.4)	7 (24.1)	0.554 [c]	19 (30.6)	13 (31.7)	6 (28.6)	0.8[c]
Legal guardian proxy	7 (9.3)	6 (13.0)	1 (3.4)	0.239 [a]	6 (9.7)	5 (12.2)	1 (5)	0.653[a]
Legal guardian	4 (5.3)	4 (8.7)	0	0.154 [a]	3 (4.8)	3 (7.3)	0	0.545[a]
Financial dependency of other individuals from participant, *n* (%)	10 (13.3)	8 (17.4)	2 (6.9)	0.299[a]	9 (14.5)	7 (17.1)	2 (9.5)	0.705[a]
Family history of AD, *n* (%)	35 (46.7)	20 (43.5)	15 (51.7)	0.486[c]	32 (51.6)	19 (46.3)	13 (61.9)	0.246[c]
CSF sample collection, *n* (%)								
No CSF	29 (38.7)	N/A	29 (100)		21 (33.9)	N/A	21 (100)	
CSF	46 (61.3)	46 (100)	N/A		41 (66.1)	41 (100)	N/A	
Amyloid and tau normal		13 (28.3)				10 (24.4)		
Amyloid or tau abnormal		9 (19.6)				8 (19.5)		
Amyloid and tau abnormal		24 (52.2)				23 (56.1)		

Abbreviations: AD, Alzheimer's disease; CSF, cerebrospinal fluid; MMSE, Mini-Mental State Examination; *n*, number; N/A, not applicable; SD, standard deviation.

[a]Fisher's exact test.

[b]*t* test for independent samples.

[c]Chi-squared test.

[d]Post hoc comparisons of demographic characteristics of patients deciding in favor of CSF biomarker testing and against CSF biomarker testing.

Bref psychological subscale (F_G-value = 4.378, $p = 0.039$), the general FLZ-M (F_G-value = 3.953, $p = 0.049$), the health-related FLZ-M (F_G-value = 3.988, $p = 0.048$), and the PANAS-PA (F_G-value = 9.733, $p = 0.002$) and higher on the PANAS-NA (F_G-value = 7.567, $p = 0.007$).

The impact of the dementia risk disclosure on QoL, SwL, and affective well-being was analyzed by comparing participants in Risk Groups 1 and 2. The mixed repeated-measurement ANOVAs showed a significant effect for interaction between time and group in the SWLS for study partners, with study partners in Risk Group 1 reporting a significant increase in SwL over time compared to study partners in Risk Group 2 (F_{GxT}-value = 4.491, $p = 0.038$). The Bonferroni-corrected pairwise comparison revealed that study partners of patients with one abnormal biomarker reported significantly higher positive affect than study partners of patients with two abnormal biomarkers ($p = 0.033$) and those that decided against biomarker testing ($p = 0.026$). Patients with a normal biomarker status had significantly lower scores on the WHO QoL Bref physical subscale than patients with two abnormal biomarkers ($p = 0.044$). Detailed comparisons of all other outcomes are presented in Figure 2 and Tables SA.3 to SA.5.

3.4 | Coping behavior

Mean scores on the TEN/FLEX scale showed more prominent accommodative coping behavior than assimilative coping behavior in patients (3.6, SD 0.6) and study partners (3.7, SD 0.6). Simple linear regression was used to test whether coping behavior at baseline significantly predicted outcomes of depression, anxiety, QoL, SwL, and affective well-being at the 3-month follow-up. In study partners, lower depressive symptoms at the 3-month follow-up were predicted by higher coping behavior at baseline ($b = -0.43$ [−0.93, −0.01], $t(62) = -2.04$, $p = 0.046$), while the effects showed borderline significance in patients ($b = -0.36$ [−0.75, −0.05], $t(62) = -2.00$, $p = 0.05$). Similar effects were found for the relationship with anxiety, with

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TABLE 2 Sample characteristics of study partners at baseline and 3-month follow-up (Visit 2).

	Baseline				3-month follow-up (Visit 2)			
	Study partners, total ($n = 75$)	Study partners of patients with CSF sampling ($n = 46$)	Study partners of patients without CSF sampling ($n = 29$)	p-value[d]	Study partners, total ($n = 62$)	Study partners of patients with CSF sampling ($n = 41$)	Study partners of patients without CSF sampling ($n = 21$)	p-value[d]
Study location								
Cologne	25 (33.3)	12 (26.1)	13 (44.8)		24 (38.7)	12 (29.3)	12 (57.1)	
Barcelona	50 (66.7)	34 (73.9)	16 (55.2)		38 (59.3)	29 (70.7)	9 (42.9)	
Age, mean (SD) (range)	64.8 (12.0) (41 to 85)	62.9 (11.8) (41 to 85)	67.7 (11.9) (42 to 84)	0.096[b]	65.5 (11.2) (42 to 85)	63.4 (11.6) (42 to 85)	69.5 (9.4) (42 to 84)	0.042[b]
Sex, *n* (%)								
Female	50 (66.7)	31 (67.4)	19 (65.5)	0.867[c]	40 (64.5)	27 (65.9)	13 (61.9)	0.758[c]
Male	25 (33.3)	15 (32.6)	10 (34.5)		22 (35.5)	14 (34.1)	8 (38.1)	
MMSE, mean (SD)	29.1 (1.0)	29 (0.9)	29 (1.0)	0.378[b]	29.1 (1.0)	29.05 (1.0)	29.19 (1.1)	0.603[b]
Years of education, mean (SD) (range)	12.9 (4.2) (6 to 19)	12.5 (4.2) (6 to 19)	13.4 (4.2) (6 to 19)	0.353[b]	13.0 (4.0) (6 to 19)	12.9 (4.2) (6 to 19)	13.3 (3.9) (6 to 19)	0.678[b]
Native speakers, *n* (%)								
Yes	66 (88.0)	41 (89.1)	25 (86.2)	0.727[a]	55 (88.7)	36 (87.8)	19 (90.5)	>0.99[a]
No	9 (12.0)	5 (10.9)	4 (13.8)		7 (11.3)	5 (12.2)	2 (9.5)	
Religion, *n* (%)								
None	0	0	0	0.507[a]	0	0	0	0.404[a]
Catholic	34 (45.3)	23 (50)	11 (37.9)		27 (43.5)	20 (48.8)	7 (33.3)	
Protestant	37 (49.3)	20 (43.5)	117 (58.6)		31 (50)	18 (43.9)	13 (61.9)	
Other	4 (5.4)	3 (6.5)	1 (3.4)		4 (6.5)	3 (7.3)	1 (4.8)	

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TABLE 2 (Continued)

	Baseline				3-month follow-up (Visit 2)			
	Study partners, total ($n = 75$)	Study partners of patients with CSF sampling ($n = 46$)	Study partners of patients without CSF sampling ($n = 29$)	p-value[d]	Study partners, total ($n = 62$)	Study partners of patients with CSF sampling ($n = 41$)	Study partners of patients without CSF sampling ($n = 21$)	p-value[d]
Job situation, *n* (%)								
Employed	23 (30.6)	15 (32.6)	8 (27.5)	0.646[c]	17 (27.4)	13 (31.7)	4 (19)	0.290[c]
Not employed	52 (69.3)	31 (67.4)	21 (72.4)		45 (72.6)	28 (68.3)	17 (81)	
Civil status, *n* (%)								
Single	4 (5.3)	3 (6.5)	1 (3.3)	0.298[a]	4 (6.5)	3 (7.3)	1 (4.8)	0.239[a]
Married	60 (80.0)	35 (76.1)	26 (86.6)		50 (80.6)	32 (78)	18 (85.7)	
Divorced	8 (10.7)	7 (15.2)	1 (3.3)		5 (8.1)	5 (12.2)	0	
Widowed	1 (1.3)	0	1 (3.3)		1 (1.6)	0	1 (4.8)	
Other	2 (2.7)	1 (2.2)	1 (3.3)		2 (3.2)	1 (2.4)	1 (4.8)	
Living Situation, *n* (%)								
Two-person household	56 (74.7)	23 (69.6)	24 (82.8)	0.352[a]	50 (80.6)	30 (73.2)	20 (95.2)	0.127[a]
Multiperson household	16 (21.3)	11 (23.9)	5 (17.2)		9 (14.5)	8 (19.5)	1 (4.8)	
Alone	3 (4.0)	3 (6.5)	0		3 (4.8)	3 (7.3)	0	
Financial dependency of other individuals from participant, *n* (%)	21 (28.0)	12 (26.1)	9 (31)	0.791[c]	17 (27.4)	11 (27.5)	6 (30.0)	0.839[c]
Family history of AD, *n* (%)	18 (24.0)	11 (23.9)	7 (24.1)	>0.99[c]	14 (22.6)	10 (24.4)	4 (19.0)	0.755[a]

Abbreviations: AD, Alzheimer's disease; CSF, cerebrospinal fluid; MMSE, Mini-Mental State Examination; *n*, number; SD, standard deviation.

[a]Fisher's exact test.

[b]*t* test for independent samples.

[c]Chi-squared test.

[d]Post hoc comparisons of demographic characteristics of study partners of patients deciding in favor of CSF biomarker testing and against CSF biomarker testing.

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TABLE 3 Outcome of depression, anxiety, QoL, SwL, and affective well-being over time for patients and study partners.

	Patients		Study Partners		
Outcome parameter	***n***	**Mean ± *SD***	***n***	**Mean ± *SD***	***F*-value, *p*-value**
GDS					
Screening	63	2.6 ± 2.2	54	1.8 ± 2.2	**F_G-value = 4.708, p = 0.032***
V1	63	2.9 ± 3.0	54	1.8 ± 2.5	F_T-value = 0.234, p = 0.789
V2	63	2.6 ± 2.3	54	2.0 ± 2.6	$F_{G\times T}$-value = 1.238, p = 0.292
GAI					
Screening	63	3.8 ± 3.3	52	3.5 ± 3.5	F_G-value = 2.967, p = 0.088
V1	63	4.5 ± 4.2	52	3.3 ± 4.0	F_T-value = 1.348, p = 0.261
V2	63	4.3 ± 4.2	52	3.6 ± 4.0	$F_{G\times T}$-value = 0.402, p = 0.651
WHO QoL Bref					**F_G-value = 5.354, p = 0.022***
Baseline	62	15.0 ± 1.6	60	15.8 ± 1.7	F_T-value = 0.967, p = 0.328
V2	62	15.1 ± 1.9	60	15.6 ± 1.7	$F_{G\times T}$-value = 2.495, p = 0.117
WHO QoL Bref physical					F_G-value = 2.345, p = 0.128
Baseline	62	15.1 ± 2.2	60	15.8 ± 2.5	F_T-value = 1.896, p = 0.171
V2	62	14.8 ± 2.2	60	15.5 ± 2.8	$F_{G\times T}$-value = 0.455, p = 0.501
WHO QoL Bref psychological					**F_G-value = 8.451, p = 0.004****
Baseline	62	14.5 ± 2.0	60	15.6 ± 2.2	F_T-value = 0.020, p = 0.886
V2	62	14.9 ± 2.1	60	15.6 ± 2.2	$F_{G\times T}$-value = 1.199, p = 0.276
WHO QoL Bref social					F_G-value = 0.762, p = 0.384
Baseline	62	14.7 ± 2.3	60	15.4 ± 1.9	F_T-value = 0.582, p = 0.447
V2	62	14.7 ± 2.5	60	14.9 ± 2.0	$F_{G\times T}$-value = 2.916, p = 0.090
WHO QoL Bref environmental					**F_G-value = 5.000, p = 0.027***
Baseline	62	15.8 ± 2.1	60	16.5 ± 2.0	F_T-value = 0.189, p = 0.665
V2	62	15.9 ± 2.1	60	16.4 ± 2.1	$F_{G\times T}$-value = 0.837, p = 0.362
SWLS					F_G-value = 2.311, p = 0.131
Baseline	62	25.8 ± 6.3	61	26.6 ± 6.9	F_T-value = 0.163, p = 0.687
V2	62	26.6 ± 5.9	61	27.1 ± 6.7	$F_{G\times T}$-value = 0.133, p = 0.716
FLZ-M general					**F_G-value = 5.167, p = 0.025***
Baseline	62	67.9 ± 33.2	61	73.1 ± 35.8	F_T-value = 1.375, p = 0.243
V2	62	66.0 ± 32.2	61	75.0 ± 34.5	$F_{G\times T}$-value = 0.009, p = 0.926
FLZ-M health					**F_G-value = 5.379, p = 0.022***
Baseline	61	59.0 ± 36.5	61	73.3 ± 36.2	F_T-value = 0.022, p = 0.881
V2	61	57.9 ± 40.2	61	73.0 ± 36.9	$F_{G\times T}$-value = 0.000, p = 0.996
PANAS PA					**F_G-value = 7.743, p = 0.006****
Baseline	62	3.3 ± 0.6	61	3.6 ± 0.7	F_T-value = 2.636, p = 0.107
V2	62	3.4 ± 0.6	61	3.7 ± 0.7	$F_{G\times T}$-value = 1.872, p = 0.174
PANAS NA					**F_G-value = 4.664, p = 0.033***
Baseline	62	2.2 ± 0.7	61	2.0 ± 0.7	F_T-value = 0.565, p = 0.454
V2	62	2.2 ± 0.6	61	2.0 ± 0.6	$F_{G\times T}$-value = 2.238, p = 0.137

Abbreviations: n, number; SD, standard deviation; V1, visit 1 (1-week follow-up); V2, visit 2 (3-month follow-up).
*$p < 0.05$
**$p < 0.01$

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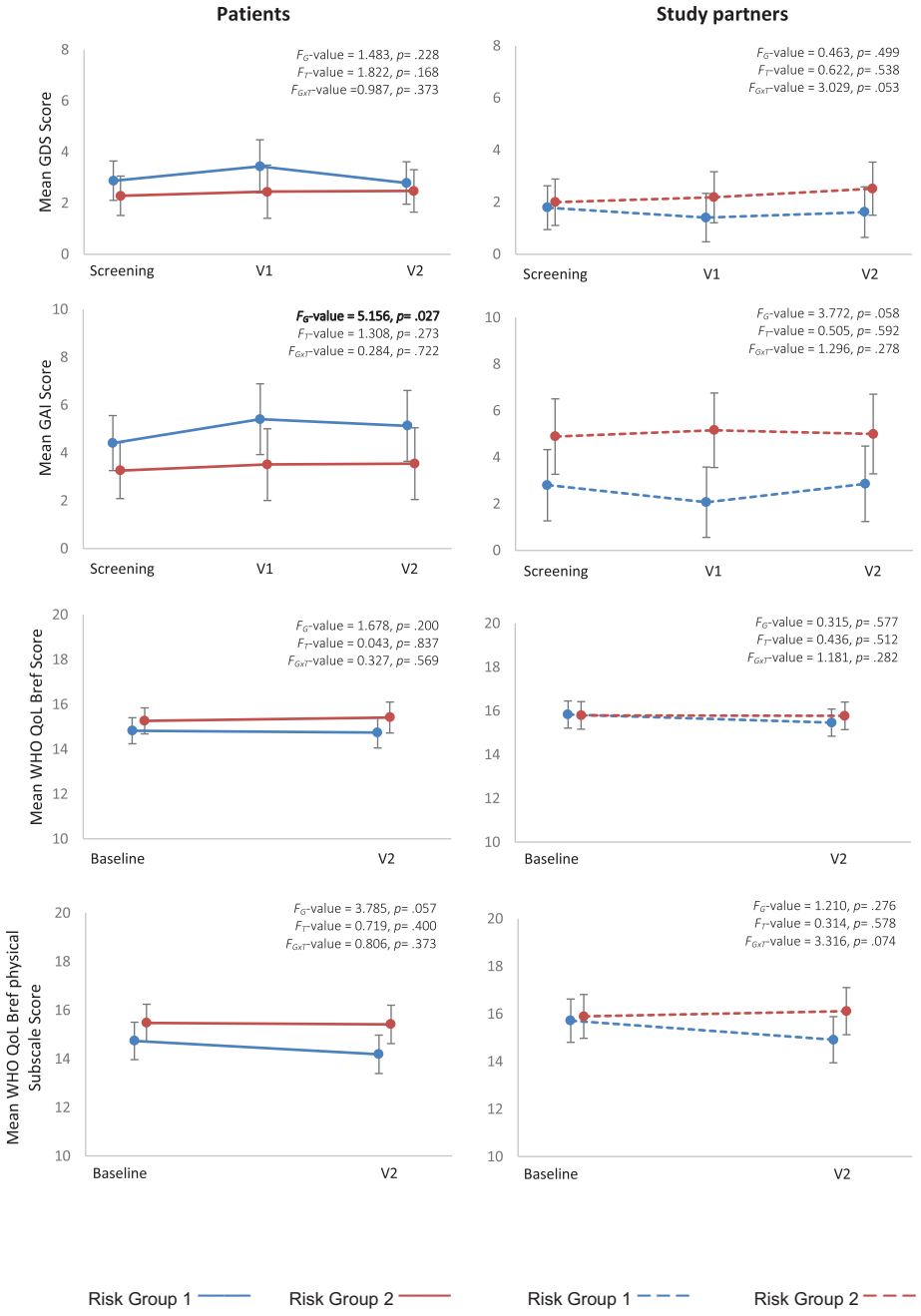


FIGURE 2 Outcomes over time in patients and study partners according to communicated dementia risk. Outcomes on depression, anxiety, QoL, SwL, and affective well-being over time according to communicated dementia risk, adjusted for age and gender. Error bars show 95% CI. V1, Visit 1 (1-week follow-up); V2, Visit 2 (3-month follow-up). Risk Group 1: low to medium dementia risk group, with patients who did not consent to CSF biomarker testing and patients with normal biomarker status with their corresponding study partners. Risk Group 2: high dementia risk group, with patients having an abnormal biomarker status with their corresponding study partners.
[correction added on October 4, 2024, after first online publication on October 1, 2024: Figure 2 has been updated.]

a significant effect for study partners (b = −0.52 [−0.93, −0.15], $t(61) = -2.55$, $p = 0.013$) and no significant effect in patients ($b = -0.31$ [−0.77, 0.16], $t(62)$ = −1.60, p = 0.115). For study partners, accommodative coping was a significant predictor for higher health-related FLZ-M (b = 24.75 [9.09, 40.12], $t(60)$ = 3.52, p = 0.002). For patients higher accommodative coping behavior was a significant predictor for positive affective well-being (b = 0.37 [0.12, 0.69], $t(60)$ = 3.15, p = 0.003), while in study partners higher scores in coping behavior predicted lower scores in the dimension of negative affect (b = −0.32 [−0.62, −0.03], $t(60) = -2.45$, $p = 0.017$). No significant effect of coping behavior with the other outcomes was observed. Detailed findings are presented in Tables SA.6 and SA.7.

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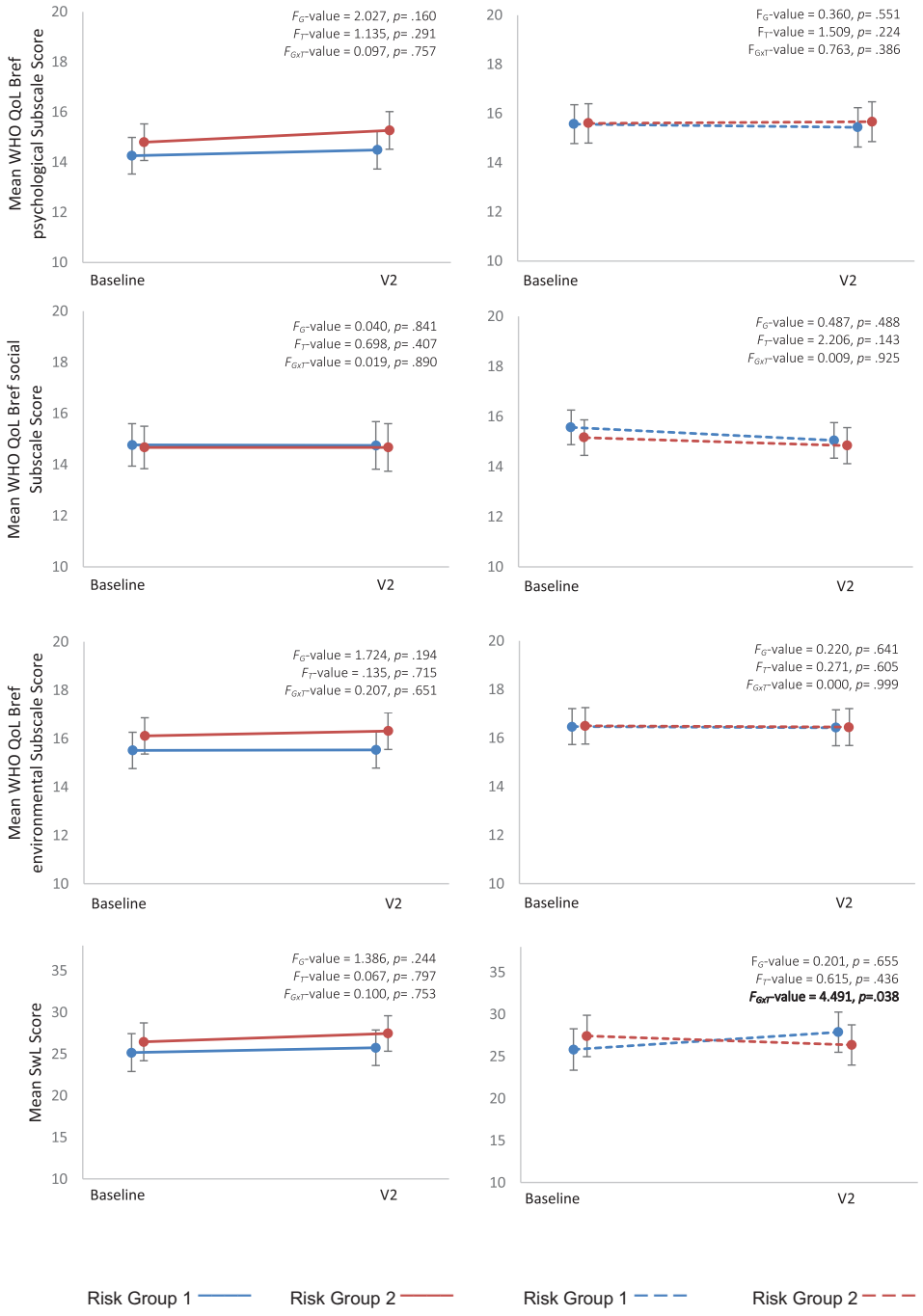


FIGURE 2 Continued

3.5 | Predictors for decision in favor or against AD biomarker testing

The results of the logistic regression analysis for the association of affective state as a predictor of the decision against CSF biomarker testing versus the decision for CSF biomarker testing in MCI patients are presented in Table 4. They show that of all tested associations, depression symptoms in MCI patients at screening, measured by the GDS, significantly predicted the decision against CSF biomarker testing (OR 0.76 [−0.61, −0.05], p = 0.019), which remained significant after including the covariates to the analysis. Similar results were found for anxiety symptoms in MCI patients at screening (Model I: OR 0.84 [−0.38, 0.01], p = 0.041; Model II: OR 0.81 [−0.51, 0.03], p = 0.036). The multiple logistic regression analysis (Model II) revealed a trend for the PANAS-NA as a non-significant predictor for the decision against CSF biomarker testing in MCI patients. Coping behavior at baseline did not differ significantly between patients deciding to undergo CSF biomarker testing and patients deciding against CSF biomarker testing (t(38.04) = 1.23, p = 0.23, d = −0.33 [−0.82–0.16]). The frequencies of positive and negative affective well-being assessed by the PANAS

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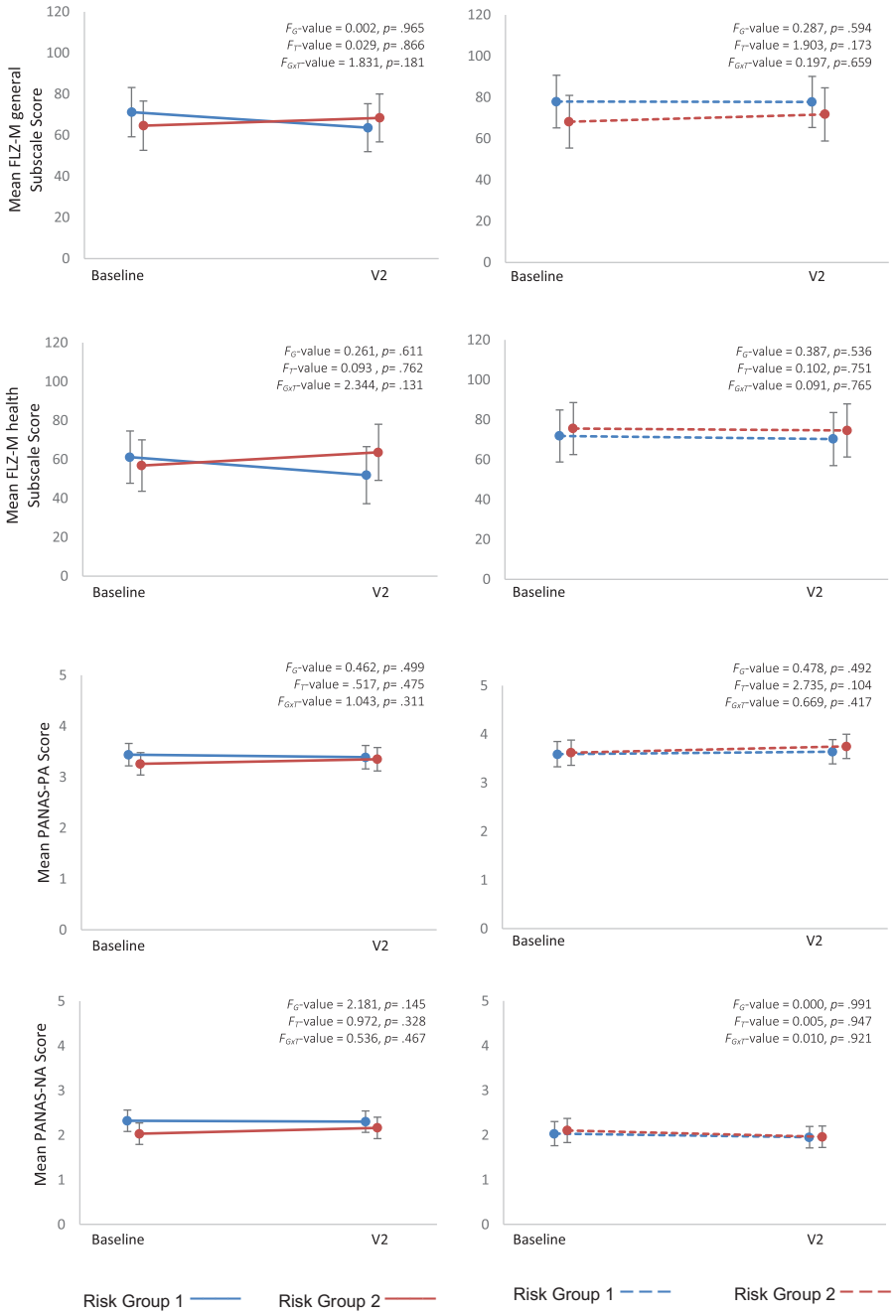


FIGURE 2 Continued

at baseline (before dementia risk disclosure) for patients and study partners are shown in Figure 3A,B. Patients deciding for biomarker assessment were significantly more proud (p = 0.038) and attentive (p = 0.049) than patients deciding against, while the latter group was significantly more scared (p = 0.045).

3.6 | Interviews at 3-month follow-up

The interviews at 3-month follow-up of eight MCI patients and eight corresponding study partners served as the content analysis. Of the eight MCI patients, four individuals had undergone CSF biomarker testing, while the other four had decided against it. Three of the MCI patients who had opted for CSF sampling had a full AD profile (A^+N^+) and one patient had an isolated tau pathology (A^-N^+). Details on the participants of the interviews are presented in Table 5.

From an analytical point of view, a thematic saturation of the main categories was achieved after eight interviews with the MCI patients and eight interviews with their corresponding study partners,[66] which were also observed within the pilot study.[62] First, the participants described retrospectively their thoughts and feelings immediately after the counseling and the risk disclosure session or after the patients' decision against CSF biomarker testing, respectively. Subsequently, they described their thoughts and feelings during the

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TABLE 4 Psychological predictors for decision in favor or against CSF biomarker testing in patients.

Predictors	Model I Odds ratio (95% CI), *p*	Model II Odds ratio (95% CI), *p*
GDS	**0.76 (−0.61, −0.05), .019***	**0.76 (−0.68, 0.01), .036***
GAI	**0.84 (−0.38, 0.01), .041***	**0.81 (−0.51, 0.03), .036***
PANAS-PA	1.72 (−0.26, 1.72), .223	1.0 (−1.22, 1.53), .995
PANAS-NA	0.72 (−1.17, 0.46), .342	0.5 (−1.97, 0.15), .088
WHO QoL Bref psych.	1.1 (−0.18, 0.38), .475	1.07 (−0.28, 0.44), .635

Abbreviations: GDS, Geriatric Depression Scale; PANAS, Positive and Negative Affect Schedule.
Model I: Logistic regression model.
Model II: Multiple logistic regression model with covariates age, gender, MMSE, study site, and family history of dementia.
Higher GDS and GAI scores were associated with the decision against CSF biomarker testing in patients.
*$p < 0.05$

TABLE 5 Qualitative interview data after dementia risk disclosure or decision against CSF biomarker testing.

	Immediate affective state (after dementia risk disclosure or decision against biomarker testing)	Affective state at 3-month follow-up (after dementia risk disclosure or decision against biomarker testing)
Patients with CSF sampling ($n = 4$) 75-year-old male (A^+N^+) 71-year-old male (A^+N^+) 76-year-old female (A^+N^+) 68-year-old male (A^-N^+)	Repressing thoughts/feelings Pessimistic Desperate Hopeless Reluctant Devastated Relieved	Repressing thoughts/feelings Helpless Meaningless Stressed due to interaction with spouse/family about test result/diagnosis Adjustment/coping Reflecting about identity Struggling (with biomarker test result) Relieved
Study partners of patients with CSF sampling ($n = 4$) 73-year-old female Female (age n/a) 59-year-old female 66-year-old female	Devastated Dramatic Helpless Feeling derailed Burdened Overwhelmed Ruminant Ambivalent Uncertain	Sadness Hopelessness Adjustment/coping Anticipated worse Positive appraisal of (risk-)knowledge (in terms of an adjusting approach to handle situation) Uncertain
Patients without CSF sampling ($n = 4$) 80-year-old male 77-year-old male 80-year-old female 75-year-old female	Repressing thoughts/feelings No feelings toward decision (not to perform CSF sample collection) Uncomfortable Overwhelming	Irritated (due to symptoms) Feelings of strain and fatigue in everyday life (Over-)burdened Anxious (of what others might think) Regretful/ambivalent (not having done biomarker testing) Fear of pain (due to lumbar puncture) External motivation for biomarker testing (for the sake of others/family) Being at ease with oneself Feeling good (with the new decision)
Study partners of patients without CSF sampling ($n = 4$) 77-year-old female 69-year-old female 84-year-old male 75-year-old male	Repressing thoughts/feelings Overburdened Under pressure Stressed due to interaction of family members about biomarker testing/diagnosis	Regretful/ambivalent (not having done biomarker testing) Stressed due to interaction with family members about biomarker testing/diagnosis Fear of stigma Informed

Note: Summarized interview excerpts according to the linguistic content analysis.
Abbreviations: A^-N^+, amyloid within normal limits and tau pathology; A^+N^+, amyloid and tau pathology; CSF, cerebrospinal fluid; *n*, number; n/a, not assessed.

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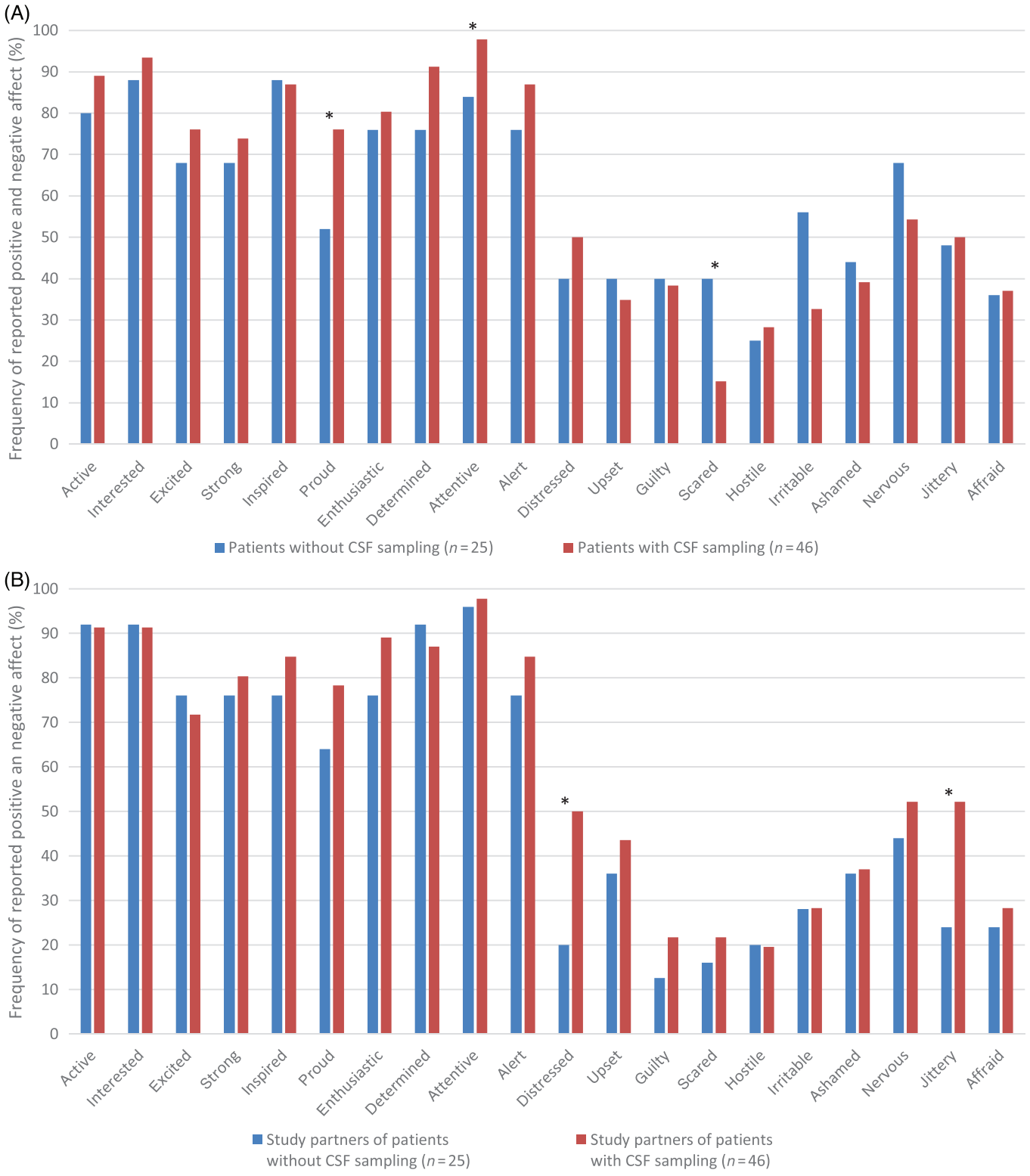


FIGURE 3 (A) Frequency of reported affective well-being at baseline (before dementia risk disclosure), measured by the PANAS in patients deciding against CSF biomarker testing versus patients deciding in favor of CSF biomarker testing. The charts depict each single item of the positive and negative affect scale. Chi-squared test or Fisher's exact test: $^*p < 0.05$. (B) Frequency of reported affective well-being at baseline (before dementia risk disclosure), measured by the PANAS in study partners of patients deciding against CSF biomarker testing versus study partners of patients deciding in favor of CSF biomarker testing. The charts depict each single item of the positive and negative affect scale. Chi-squared test or Fisher's exact test: $^*p < 0.05$.

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interview. The qualitative analysis revealed an increasing amount of distress directly after the clinical MCI diagnosis (counseling session) and the risk disclosure sessions in both patients and study partners. Imminent feelings of sadness, desperation, pessimism, reluctance, and burden, but also repressing feelings and thoughts about the procedures and diagnosis, were reported (Table 5). Patients and study partners also reported distress they perceived over the subsequent weeks. In addition, patients who decided against CSF biomarker testing and their corresponding study partners reported feelings of ambivalence and regret at follow-up over not having taken the test. Stressful interactions among family members with regard to the diagnosis and biomarker testing were reported by the patients and the study partners. Of note, external motivation for biomarker testing, such as undergoing the CSF sampling in favor of someone else (eg, spouse, children) was also mentioned. While study participants retrospectively reported feelings of sadness, stress, and uncertainties immediately after the risk disclosure or the decision against CSF biomarker testing, the expressed feelings during the follow-up interview partly included a more conscious approach to handling the diagnosis, which may indicate the beginning of an acceptance process 3 months after the dementia risk disclosure or after the patients' decision against CSF biomarker testing, respectively.

4 | DISCUSSION

This is the first study to investigate the effects of a standardized AD biomarker test result and dementia risk disclosure on people with MCI and their study partners, addressing a broad concept of psychosocial health. The results of this study confirm general psychological safety when dementia risk disclosure is embedded in an extended manual-guided counseling and disclosure process with health care professionals.

We found that MCI patients and study partners stayed well below the cut-off points for clinically relevant depressive and anxiety symptoms at the time of disclosure and 3 months after the communication of the individual dementia risk. Still, at 1 week after disclosure, patients reported significantly more depressive symptoms than study partners. As expected, anxiety levels were significantly higher in study partners in the high dementia probability group compared to those in the low to medium dementia probability group. Counterintuitively, anxiety levels 1 week after disclosure were significantly higher in patients with low to medium dementia risk than in those with high dementia risk. This result was unexpected and cannot be fully explained. As the results are non-confirmatory and the sample size is small, this effect should be examined in a larger cohort.

Overall, all study participants reported moderate to high QoL, SwL, and affective well-being throughout the study period. However, at the 3-month follow-up, patients reported a significantly lower psychological QoL, SwL, and affective well-being compared to their study partners. As expected, study partners in the low to medium dementia risk group reported significantly higher SwL over time compared to those in the high dementia risk group.

About two-thirds of the MCI patients opted for CSF sampling after an intensive counseling session, which reflects the real-world experience in our memory clinics. This is important because patients may decide against CSF sampling, even when extended counseling is offered and it is covered by health insurance.

We observed that patients who decided in favor or against biomarker testing differed in psychological features, in that higher initial depression and anxiety scores predicted the decision against biomarker assessment. We further determined that coping strategies correlated with subsequent affective state and well-being in patients and their study partners. A moderating effect of accommodative coping on the interaction between stressors and psychological well-being in the sense of a "buffer effect" is described in the literature.[69] Our study population also showed more accommodative than assimilative coping behavior. According to the two-process model by Brandtstädter, intra-individual changes in coping style with increasing age occur, in the sense of a decrease in assimilative tendencies and an increase in accommodative tendencies.[28] Emotionally, confronting a potential progressive neurodegenerative disease without an option for cure is burdensome. Comprehensive adjustments and coping strategies are required to manage the disclosure of the presence of AD pathology and high dementia risk.

A nationwide cohort study of 147,595 adults in the United States analyzed clinical data regarding suicidal attempts after clinical MCI and dementia diagnosis, without AD biomarker testing. A total of 138 patients with MCI (0.7%) and 400 patients with dementia (0.6%) attempted suicide during follow-up, compared with 253 patients in the comparison group without MCI or dementia diagnosis (0.4%).[70] The risk of death by suicide was not elevated. We did not observe acute suicidality with new MCI diagnosis and biomarker-based dementia risk communication. As such, our findings confirm previous reports in this field.[9–13,16,71] A randomized controlled trial of amyloid PET disclosure in MCI confirmed no major psychological harm; however, higher levels of distress in participants after disclosure of amyloid-positive PET scans were noted[11]. Similar results were found in a study on amyloid PET disclosure in people with MCI and mild dementia and in a study on disclosure of apolipoprotein E (APOE) genotypes and communicating dementia risk to people with MCI.[9,71] Interviews with MCI patients after disclosure of amyloid PET scans revealed mixed feelings,[10,12,14,25,72] which mirrored our qualitative findings. We found a range of negative feelings, with some participants reporting stressful interactions about the decision for or against biomarker testing and the test results in their family environment. A feeling of regret or missing out on the chance to undergo biomarker testing had been reported by participants deciding against it. In some patients and study partners, an adaptation process was observed in the course of the study with relief and a positive appraisal of the knowledge.

Our qualitative findings showed that the diagnostic pathway of MCI patients and their study partners was experienced as stressful and exhausting, irrespective of the communicated dementia risk. The insights gained in this way allow us to understand the issues that preoccupy patients and care partners, which is important for addressing the specific needs of this target group during counseling. One aspect

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that should be particularly emphasized is that patients might undergo predictive testing in favor of someone else, which is a critical ethical challenge when empowering patients to make autonomous informed decisions.[73,74] Our findings highlight the need for psychosocial support for MCI patients and their care partners during and after the diagnostic process. Overall, the psychological reactions observed are in the expected range given the severity of the diagnosis, which is comparable to other severe diagnoses, as in oncology, where psychosocial care and psycho-oncological support are part of the standard care.[75,76]

Even though we did not investigate a control group, our findings underline the importance of a comprehensive and standardized approach where (1) patients and care partners are counseled on dementia risk estimation and (2) the biomarker profile and individual dementia risk are disclosed. While questionnaires for depression and anxiety are adequate tools for screening for clinically relevant disorders to identify individuals, who may be at higher risk of psychiatric worsening during the predictive AD diagnostics, they are not sufficiently sensitive to capture individual negative thoughts related to the MCI diagnosis and dementia risk disclosure.

One limitation of the study is the lack of a control group receiving biomarker assessment without extended and standardized counseling and disclosure procedures, which would reflect a more real-world clinical situation, where due to time constraints the counseling and disclosure processes are much shorter and no hand-out material is presented. In our protocol, extended information was provided and several approaches to improve understanding were offered. However, this is not standard clinical practice. It may therefore be the case that the psychological impact might be different if less information and counseling are provided. Of note, the memory clinic in Barcelona is run by neurologists, while in Cologne it is run by psychiatrists. As the counseling and disclosure sessions were manual-guided and the clinicians received training beforehand, we aimed to reduce any potential impact on the assessments. A further limitation is the restriction of biomarker assessment to CSF, requiring a lumbar puncture. If amyloid PET had been an option, more patients might have opted for biomarker testing.

Another limitation of the study is the missing recruitment goal of 100 dyads due to slower-than-expected recruitment in Cologne and partially also due to the pandemic. Furthermore, as all participants were recruited in the memory clinics, a high motivation for study participation was essential for completing the study. Also, participants with current depression or anxiety disorder were excluded from study participation, which may result in a non-representative sample, as individuals with such conditions may also be confronted with the topic of AD biomarker assessment. This potential bias might have led to a study population of psychologically healthy study participants, also reflected by high QoL and SwL, which have higher than average resilience. Due to the short follow-up period of 3 months, there might be changes in the outcomes beyond that period that were not captured. Finally, the analyses were not corrected for multiple testing, making the results exploratory and not confirmatory in nature.

In summary, our study indicates no major psychological harm concerning dementia risk disclosure in MCI patients and their study partners. However, our results also indicate that, despite the absence of major psychological side effects, a follow-up is advised with the possibility of offering support following the diagnosis and disclosure procedure to enhance disease acceptance and support self-management capacities. The novelty in our study is the extended assessment of the psychological effects of disclosure of future biomarker-based dementia risk. Of note, this study was done before the potential availability of disease-modifying treatments (DMTs). With the advent of DMTs, the demand for biomarker testing will increase as an accurate diagnosis of early symptomatic AD is the basis for treatment. These developments also extend the requirements for counseling and biomarker status disclosure as not only diagnostics but also informed treatment decision processes need to be developed.

Communication of numerical risk information remains a challenge for everyone involved and may increase feelings of uncertainty in an already uncertain prognostic and therapeutic situation. This highlights the need for training of health care professionals and the promotion of patient education. Physicians and multiprofessional expert institutions play an important role not only in diagnosis and therapy but also in psychological guidance and support in the context of a timely diagnosis.

ACKNOWLEDGMENTS

We owe our thanks to the patients and care partners for participating in this study. We would also like to thank our colleagues from the memory clinics Fundació ACE, Barcelona Alzheimer Treatment & Research Center (Barcelona, Spain), and the Center for Memory Disorders, Department of Psychiatry and Psychotherapy, University Hospital of Cologne (Cologne, Germany). This work was supported by the Federal Ministry of Education and Research (BMBF) and the Ministry of Economy and Competitiveness (MINECO) as part of the Network of European Funding for Neuroscience Research—ERA-NET NEURON ("Ethical and Legal Framework for Predictive Diagnosis of Alzheimer's Dementia: Quality of Life of Individuals at Risk and their Close Others" (PreDADQoL); funding no.: 01GP1624). This joint project was conducted under the leadership of the Cologne Center for Ethics, Rights, Economics, and Social Sciences of Health (ceres). The sponsor had no influence on study initiation, conducting, and reporting. Ayda Rostamzadeh was supported by the Koeln Fortune Program/Faculty of Medicine, University of Cologne.

Open access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST STATEMENT

Ayda Rostamzadeh has received fees for presentations from Eisai. Franziska Maier has received fees from Ely Lilly and Johnson & Johnson. Mercè Boada has received fees from Grifols, Araclon Biotech, Roche, Biogen, Lilly, Merck, Zambon, Novo-Nordisk, Roche, Biogen, Grifols, Nutricia, Araclon Biotech, Servier, and Novo-Nordisk. Frank Jessen has received fees for advice or presentations from AC Immune, Biogen, Cogthera, Eisai, Eli Lilly, Grifols, Janssen, Novo Nordisk, and Roche. Franziska Kalthegener, Carolin Schwegler, Vanessa Romotzky, Silvia Gil-Navarro, Maitée Rosende-Roca, Gemma Ortega, Pilar Canabate, Mariola Moreno, Philip Zeyen, Ann-Katrin Schild, Dix Meiberth, Lena Sannemann, Lara Bohr, Björn Schmitz-Luhn, and Christiane

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Woopen have nothing to disclose. Author disclosures are available in the supporting information.

CONSENT STATEMENT

Written informed consent was obtained from all study participants before participating in the study and the consent process was documented. Study participants were informed of all potential risks and could withdraw from the study at any time for any reason. Details on the study rationale, study design, and protocols were previously described.[62] The PreDADQoL study was approved by the local Institutional Ethical Committee of the Medical Faculty of the University of Cologne and the University Hospital of Cologne, and the Hospital's Clinic Ethical Committee in Barcelona.

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REFERENCES

1. Herukka S-K, Simonsen AH, Andreasen N, et al. Recommendations for CSF AD biomarkers in the diagnostic evaluation of MCI. *Alzheimers Dement*. 2016;0:387-403. doi:10.1016/j.jalz.2016.09.009
2. Johnson KA, Minoshima S, Bohnen NI, et al. Update on appropriate use criteria for amyloid PET imaging: dementia experts, mild cognitive impairment, and education. *Alzheimers Dement*. 2013;9:e106-e109. doi:10.1016/j.jalz.2013.06.001
3. Shaw LM, Arias J, Blennow K, et al. Appropriate use criteria for lumbar puncture and cerebrospinal fluid testing in the diagnosis of Alzheimer's disease. *Alzheimers Dement*. 2018;14(11):1505-1521. doi:10.1016/j.jalz.2018.07.220
4. Lingler JH, Butters MA, Gentry AL, et al. Development of a standardized approach to disclosing amyloid imaging research results in mild cognitive impairment. *J Alzheimers Dement*. 2016;52:17-24. doi:10.3233/JAD-150985
5. DGN e. V. & DGPPN e. V. S3-Leitlinie Demenzen. Version XX. 2023. Available from: https://register.awmf.org/de/leitlinien/detail/038-013
6. Cognat E, Troussière A-C, Wallon D, et al. Clinical impact of cerebrospinal fluid biomarkers in mild cognitive impairment diagnosis. *Alzheimers Dement*. 2017;13:P336-P337. doi:10.1016/j.jalz.2017.06.060
7. Rabinovici GD, Gatsonis C, Apgar C, et al. Association of amyloid positron emission tomography with subsequent change in clinical management among Medicare beneficiaries with mild cognitive impairment or dementia. *JAMA*. 2019;321(13):1286-1294. doi:10.1001/jama.2019.2000
8. De Wilde A, Van Der Flier WM, Pelkmans W, et al. Association of amyloid positron emission tomography with changes in diagnosis and patient treatment in an unselected memory clinic cohort: the ABIDE project. *JAMA Neurol*. 2018;75(9):1062-1070. doi:10.1001/jamaneurol.2018.1346
9. Taswell C, Donohue CL, Mastwyk M, et al. Safety of disclosing amyloid imaging results to MCI and AD patients. *Am J Geriatr Psychiatry*. 2017;25(3):S129. doi:10.1016/j.jagp.2017.01.147
10. Vanderschaeghe G, Schaeverbeke J, Bruffaerts R, Vandenberghe R, Dierickx K. Amnestic MCI patients' experiences after disclosure of their amyloid PET result in a research context. *Alzheimers Res Ther*. 2017;9(1):92. doi:10.1186/s13195-017-0321-3
11. Lingler JH, Sereika SM, Butters MA, et al. A randomized controlled trial of amyloid positron emission tomography results disclosure in mild cognitive impairment. *Alzheimers Dement*. 2020;16:1-8. doi:10.1002/alz.12129
12. Grill JD, Cox CG, Kremen S, et al. Patient and caregiver reactions to clinical amyloid imaging. *Alzheimers Dement*. 2017;13:924-932. doi:10.1016/j.jalz.2017.01.001
13. Couch E, Ashford MT, Zhang W, Prina M. Psychosocial and behavioral outcomes for persons with cognitive impairment and caregivers following amyloid-β PET scan disclosure: a systematic review. *Alzheimer Dis Assoc Disord*. 2023;37:246. doi:10.1097/WAD.0000000000000569
14. Kim JE, Tamres LK, Orbell SL, et al. "And does that necessarily mean absolutely Alzheimer's?" An analysis of questions raised following amyloid PET results disclosure. *Am J Geriatr Psychiatry*. 2024;32:45-54. doi:10.1016/j.jagp.2023.08.005
15. Shepherd-Banigan ME, Ford CB, Smith VA, et al. Amyloid-β PET scan results disclosure and care-partner emotional well-being over time. *J Alzheimers Dis*. 2022;90:775. doi:10.3233/JAD-220611
16. De Wilde A, Van Buchem MM, Otten RHJ, et al. Disclosure of amyloid positron emission tomography results to individuals without dementia: a systematic review. *Alzheimers Res Ther*. 2018;10(1):72. doi:10.1186/s13195-018-0398-3
17. WHOQOL Group, Harper A, Power M, et al. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychol Med*. 1998;28(3):551-558. doi:10.1017/S0033291798006667
18. Stites SD, Karlawish J, Harkins K, Rubright JD, Wolk D. Awareness of mild cognitive impairment and mild Alzheimer's disease dementia diagnoses associated with lower self-ratings of quality of life in older adults. *J Gerontol A Biol Sci Med Sci*. 2017;72(6):974-985. doi:10.1093/geronb/gbx100
19. Pusswald G, Tropper E, Kryspin-Exner I, et al. Health-related quality of life in patients with subjective cognitive decline and mild cognitive impairment and its relation to activities of daily living. *J Alzheimers Dis*. 2015;47(2):479-486. doi:10.3233/JAD-150284
20. dos Santos SB, Rocha GP, Fernandez LL, de Padua AC, Reppold CT. Association of lower spiritual well-being, social support, self-esteem, subjective well-being, optimism and hope scores with mild cognitive impairment and mild dementia. *Front Psychol*. 2018;9:371. doi:10.3389/FPSYG.2018.00371/BIBTEX
21. Diener E, Emmons R, Larsen R, Griffin S. Satisfaction with life scale. *J Pers Assess*. 1985;49:71-76. doi:10.1111/j.1758-0854.2010.01035.x
22. Pavot W, Diener E. Review of the satisfaction with life scale. In: Diener E, ed. *Assessing Well-Being*. Vol 39. Social Indicators research Series, Springer, Dordrecht; 2009:101-117. doi:10.1007/978-90-481-2354-4_5
23. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol*. 1988;54:1063-1070.
24. Breyer B, Bluemke M. Deutsche version der positive and negative affect schedule PANAS (GESIS panel). *Zusammenstellung Wissenschaftlicher Items Und Skalen(ZIS). ZIS-GESIS Leipniz Institute for Social Sciences*. 2016. doi:10.6102/zis242
25. Couch E, Emmanuelle B, Gadbois EA, DePasquale N, Zhang W, Wetle T. "I know that my role is going to change": a mixed-methods study of the relationship between amyloid-β PET scan results and caregiver burden. *Aging Clin Exp Res*. 2023;35:387-397. doi:10.1007/s40520-022-02314-6
26. Garand L, Lingler JH, Deardorf KE, et al. Anticipatory grief in new family caregivers of persons with mild cognitive impairment and dementia. *Alzheimer Dis Assoc Disord*. 2012;26:159. doi:10.1097/WAD.0B013E31822F9051
27. Kemper TD, Lazarus RS. Emotion and adaptation. *Contemp Sociol*. 1992;21:522. doi:10.2307/2075902
28. Brandtstädter J, Renner G. Tenacious goal pursuit and flexible goal adjustment: explication and age-related analysis of assimilative and accommodative strategies of coping. *Psychol Aging*. 1990;5:58-67. doi:10.1037//0882-7974.5.1.58

15525279, 2024, 11, Downloaded from https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.14226 by Bibl. der Universitat zu Koln, Wiley Online Library on [15/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

29. Chao MD, Scott Roberts J, Marteau TM, et al. Health behavior changes after genetic risk assessment for Alzheimer disease: the REVEAL study. *Alzheimer Dis Assoc Disord*. 2008;100:130-134. doi:10.1016/j.pestbp.2011.02.012.Investigations
30. Largent EA, Harkins K, Van Dyck CH, Hachey S, Sankar P, Karlawish J. Cognitively unimpaired adults' reactions to disclosure of amyloid PET scan results. *PLoS One*. 2020;15(2):e0229137. doi:10.1371/journal.pone.0229137
31. Roberts JS, Cupples LA, Relkin NR, Whitehouse PJ, Green RC. Genetic risk assessment for adult children of people with Alzheimer's disease: the risk evaluation and education for Alzheimer's disease (REVEAL) study. *J Geriatr Psychiatry Neurol*. 2005;18:250-255. doi:10.1177/0891988705281883
32. Banningh LJW, Vernooij-Dassen M, Rikkert MO, Teunisse JP. Mild cognitive impairment: coping with an uncertain label. *Int J Geriatr Psychiatry*. 2008;23:148-154. doi:10.1002/gps.1855
33. McIlvane JM, Popa MA, Robinson B, Houseweart K, Haley WE. Perceptions of illness, coping, and well-being in persons with mild cognitive impairment and their care partners. *Alzheimer Dis Assoc Disord*. 2008;22:284-292. doi:10.1097/WAD.0B013E318169D714
34. Albert MS, DeKosky ST, Dickson D, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on. *Alzheimer's Dis*. 2011;7:270-279. doi:10.1016/j.jalz.2011.03.008.The
35. Morris J, Heyman A, Mohs R, et al. The consortium to establish a registry for Alzheimer's disease (CERAD-NP). Part 1. Clinical and neuropsychological assessment of Alzheimer's disease. *Neurology*. 1989;39:1159-1165.
36. Alegret M, Espinosa A, Valero S, et al. Cut-off scores of a brief neuropsychological battery (NBACE) for Spanish individual adults older than 44 years old. *PLoS One*. 2013;8:e76436. doi:10.1371/journal.pone.0076436
37. Sheikh JI, Yesavage JA. Geriatric depression scale (GDS) recent evidence and development of a shorter version. *Clin Gerontol*. 1986;5:165-1673. doi:10.1300/J018v05n01_09
38. Kühner C, Bürger C, Keller F, Hautzinger M. Reliability and validity of the Revised Beck Depression Inventory (BDI-II). Results from German samples. *Nervenarzt*. 2007;78:651-656. doi:10.1007/S00115-006-2098-7
39. Beck AT, Steer RA, Brown G. Beck Depression Inventory–II. APA PsycTests. 1996. doi:10.1037/t00742-000
40. Pachana NA, Byrne GJ, Siddle H, Koloski N, Harley E, Arnold E. Development and validation of the geriatric anxiety inventory. *Int Psychogeriatr*. 2007;19:103. doi:10.1017/S1041610206003504
41. Markgraf J, Ehlers A. *BAI—Beck-Angst-Inventar | Testzentrale*. Pearson; 2007.
42. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol*. 1988;56:893-897. doi:10.1037/0022-006X.56.6.893
43. Posner K, Brown GK, Stanley B, et al. The Columbia-suicide severity rating scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. *Am J Psychiatry*. 2011;168:1266-1277. doi:10.1176/appi.ajp.2011.10111704
44. First MB, Spitzer RL, Gibbon M, Williams JBW. *Structured Clinical Interview for DSM-IV Axis I Disorders*. Biometrics Research Department, New York State Psychiatric Institute; 1999.
45. Albert MS, DeKosky ST, Dickson D, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimers Dement*. 2011;7:270-279. doi:10.1016/j.jalz.2011.03.008
46. Deuschl G, Maier W, et al. S3-Leitlinie Demenzen. In *Deutsche Gesellschaft für Neurologie, Hrsg. Leitlinien für Diagnostik und Therapie der Neurologie*. 2016. doi:10.1007/s00115-010-2999-3
47. Grill JD, Apostolova LG, Bullain S, et al. Communicating mild cognitive impairment diagnoses with and without amyloid imaging. *Alzheimers Res Ther*. 2017;9:35. doi:10.1186/S13195-017-0261-Y
48. Livingston G, Sommerlad A, Orgeta V, et al. Dementia prevention, intervention, and care. *Lancet North Am Ed*. 2017;390:2673-2734. doi:10.1016/S0140-6736(17)31363-6
49. Visser PJ, Wolf H, Frisoni G, Gertz H-J. Disclosure of Alzheimer's disease biomarker status in subjects with mild cognitive impairment. *Biomark Med*. 2012;6:365-368. doi:10.2217/bmm.12.58
50. Schwegler C, Schmitz-Luhn B, Romotzky V, et al. Predementia counseling. *GeroPsych*. 2023;36(4):203-214. doi:10.1024/1662-9647/A000313
51. Vos SJB, Verhey F, Frölich L, et al. Prevalence and prognosis of Alzheimer's disease at the mild cognitive impairment stage. *Brain*. 2015;138:1327-1338. doi:10.1093/brain/awv029
52. Mitchell AJ, Shiri-Feshki M. Rate of progression of mild cognitive impairment to dementia—meta-analysis of 41 robust inception cohort studies. *Acta Psychiatr Scand*. 2009;119:252-265. doi:10.1111/j.1600-0447.2008.01326.x
53. Mitchell AJ, Shiri-Feshki M. Temporal trends in the long term risk of progression of mild cognitive impairment: a pooled analysis. *J Neurol Neurosurg Psychiatry*. 2008;79:1386-1391. doi:10.1136/jnnp.2007.142679
54. Jack CR, Knopman DS, Jagust WJ, et al. Tracking pathophysiological processes in Alzheimer's disease: an updated hypothetical model of dynamic biomarkers. *Lancet Neurol*. 2013;12:207-216. doi:10.1016/S1474-4422(12)70291-0
55. Genske A. Gesundheit und Selbstbestimmung. *Voraussetzungenu nd Folgen der Einwilligungs(un)fähigkeit von Patienten*. Vol 23. Springer; 2020. doi:10.1007/978-3-662-61140-1
56. Mejia AM, Smith GE, Wicklund M, Armstrong MJ. Shared decision making in mild cognitive impairment. *Neurol Clin Pract*. 2019;9:160. doi:10.1212/CPJ.0000000000000576
57. Garcia-Retamero R, Cokely ET. Designing visual aids that promote risk literacy: a systematic review of health research and evidence-based design heuristics. *Hum Factors*. 2017;59:582-627. doi:10.1177/0018720817690634
58. Garcia-Retamero R, Galesic M. *Transparent Communication of Health Risks: Overcoming Cultural Differences*. Springer; 2013. doi:10.1007/9781461443582
59. Lipkus IM. Numeric, verbal, and visual formats of conveying health risks: suggested best practices and future recommendations. *Med Decis Making*. 2007;27(5):696-713. doi:10.1177/0272989X07307271
60. Gigerenzer G, Gaissmaier W, Kurz-Milcke E, Schwartz LM, Woloshin S. Helping doctors and patients make sense of health statistics. *Psychol Sci Public Interest*. 2007;8(2):53-96. doi:10.1111/j.1539-6053.2008.00033.x
61. Fagerlin A, Ubel PA, Smith DM, Zikmund-Fisher BJ. Making numbers matter: present and future research in risk communication. *Am J Health Behav*. 2007;31(Suppl 1):47-56. doi:10.5555/AJHB.2007.31.SUPP.S47
62. Rostamzadeh A, Schwegler C, Gil-Navarro S, et al. Biomarker-based risk prediction of Alzheimer's disease dementia in mild cognitive impairment: psychosocial, ethical, and legal aspects. *J Alzheimers Dis*. 2021;80:601-617. doi:10.3233/JAD-200484
63. Henrich G, Herschbach P. Questions on life satisfaction (FLZM)—a short questionnaire for assessing subjective quality of life. *Eur J Psychol Assess*. 2000;16(3):150-159. doi:10.1027//1015-5759.16.3.150
64. Flick U. Das Episodische Interview. In: Oelerich G, Otto HU, eds. *Empirische Forschung und Soziale Arbeit. VS Verlag für Sozialwissenschaften*. 2011. doi:10.1007/978-3-531-92708-4_17
65. Creswell J, Creswell JW. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. 2nd ed. Sage; 2007.

15525279, 2024, 11, Downloaded from https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.14226 by Bibl. der Universitat zu Koln, Wiley Online Library on [15/11/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

66. Vasileiou K, Barnett J, Thorpe S, Young T. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Med Res Method*. 2018;18(1):148. doi:10.1186/s12874-018-0594-7
67. Selting M, Auer P, Barth-Weingarten D, et al. A system for transcribing talk-in-interaction: GAT 2 translated and adapted for English by Elizabeth Couper-Kuhlen and Dagmar Barth-Weingart. Gesprächsforschung - Online Zeitschrift zur verbalen Interaktion. 2011;12:1-51.
68. Deppermann A. *Gespräche analysieren. Eine Einführung*. 4th ed. Springer; 2008.
69. Bailly N, Joulain M, Hervé C, Alaphilippe D. Coping with negative life events in old age: the role of tenacious goal pursuit and flexible goal adjustment. *Aging Ment Health*. 2012;16:431-437. doi:10.1080/13607863.2011.630374
70. Günak MM, Barnes DE, Yaffe K, Li Y, Byers AL. Risk of suicide attempt in patients with recent diagnosis of mild cognitive impairment or dementia. *JAMA Psychiatry*. 2021;78:659-666. doi:10.1001/JAMAPSYCHIATRY.2021.0150
71. Christensen KD, Karlawish J, Roberts JS, et al. Disclosing genetic risk for Alzheimer's dementia to individuals with mild cognitive impairment. *Alzheimers Dement*. 2020;6:e12002. doi:10.1002/trc2.12002
72. Bélanger E, D'Silva J, Carroll MS, et al. Reactions to amyloid PET scan results and levels of anxious and depressive symptoms: CARE IDEAS study. *Gerontologist*. 2023;63:71. doi:10.1093/GERONT/GNAC051
73. Smedinga M, Tromp K, Schermer MHN, Richard E. Ethical arguments concerning the use of Alzheimer's disease biomarkers in individuals with no or mild cognitive impairment: a systematic review and framework for discussion. *J Alzheimers Dis*. 2018;66:1309-1322. doi:10.3233/JAD-180638
74. Vanderschaeghe G, Dierickx K, Vandenberghe R. Review of the ethical issues of a biomarker-based diagnoses in the early stage of Alzheimer's disease. *J Bioeth Inq*. 2018;15(2):219-230. doi:10.1007/s11673-018-9844-y
75. Holland JC, Andersen B, Breitbart WS, et al. Distress management: clinical practice guidelines in oncology. *J Natl Compr Canc Netw*. 2013;11(2):190-209. doi:10.6004/jnccn.2013.0027
76. Holland JC, American Cancer Society Award lecture. Psychological care of patients: psycho-oncology's contribution. *J Clin Oncol*. 2003;21:253s-265s. doi:10.1200/JCO.2003.09.133
77. Janhsen A, Golla H, Romotzky V, Woopen C. Spiritualität im höheren Lebensalter als dynamische Alter(n)saufgabe [Spirituality in old age as dynamic aging task]. *Z Gerontol Geriatr*. 2019;52(4):359-364. doi:10.1007/s00391-018-1391-y
78. Wimo A, Wetterholm AL, Mastey V, et al. *Evaluation of the resource utilization and caregiver time in Anti-dementia drug trials - a quantitative battery*. In: Wimo A, Jonsson B, Karlsson G, Winblad B (Eds.), The Health Economis of Dementia, John Wiley & Sons, London. 1998; pp. 465499

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How to cite this article: Rostamzadeh A, Kalthegener F, Schwegler C, et al. Psychological outcomes of dementia risk estimation in MCI patients: Results from the PreDADQoL project. *Alzheimer's Dement*. 2024;20:7635–7656. https://doi.org/10.1002/alz.14226

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