Low socioeconomic status is associated with worse treatment outcomes in patients with Achilles tendinopathy

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► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/bjsports-2023-107633).

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Accepted 26 March 2024
Published Online First 3 April 2024

To cite: Visser TS, Brul S, Deng J, *et al*. *Br J Sports Med* 2024;**58**:579–585.

ABSTRACT

Objective To assess whether there is a difference in symptom severity at baseline and 24 weeks follow-up between conservatively managed patients with Achilles tendinopathy (AT) with low socioeconomic status (SES) compared with those with high SES.

Methods In this prospective cohort study, 200 patients with AT were included and treated according to current guidelines. We linked a neighbourhood SES indicator based on income, employment and education level and divided the patient population into quintiles, with Q1 being the highest SES and Q5 the lowest. Symptom severity at baseline and follow-up was assessed using the Victorian Institute of Sports Assessment-Achilles (VISA-A) score. Treatment adherence was not measured. We used a general linear model and the mean VISA-A scores at baseline and at 6, 12 and 24 weeks follow-up were compared between Q1 (n=45) and Q5 (n=39), while adjusting for age, sex, body mass index (BMI), Ankle Activity Score, symptom duration and baseline VISA-A score.

Results Patients had a median age of 51 years and median BMI of 25.4, 40% were female. 74%, 70% and 58% of the participants completed the VISA-A at 6, 12 and 24 weeks, respectively. VISA-A scores at baseline were similar for Q1 and Q5 (43.9 and 41.8, p=0.591). At 24 weeks, there was a mean (95% CI) difference of 11.2 (1.0 to 21.3, p=0.032) points in favour of Q1 on the VISA-A score.

Conclusion AT patients with low SES may have worse outcomes when treated using the current guidelines. The difference in VISA-A score at 24 weeks is larger than the minimal clinically important difference and might be clinically relevant, but comes with uncertainty due to the large dispersion in the data. Clinicians need to consider the impact of social inequality when developing and implementing treatment plans.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Low socioeconomic status leads to a higher incidence of and worse outcomes in various musculoskeletal diseases.

WHAT THIS STUDY ADDS

⇒ Patients with Achilles tendinopathy and low socioeconomic status might experience worse treatment outcomes at 24 weeks follow-up compared with patients with high socioeconomic status.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Healthcare providers should be mindful of the socioeconomic status of their patients while administering treatment. Future research should focus on this subgroup of tendinopathy patients with lower socioeconomic status to better understand the reasons behind the worse treatment response and explore whether treatment should potentially be tailored based on socioeconomic status.

INTRODUCTION

Achilles tendinopathy (AT) is characterised by localised pain in the Achilles tendon that results from mechanical loading.[1] AT occurs frequently and is often long standing with substantial impact on quality of life.[2–5] The role of psychosocial factors in tendinopathy is scarcely studied but believed to be important by experts.[6] Examples of socioeconomic factors include income, place of residence, age, sex, education and ethnicity. Individuals with lower socioeconomic status (SES) may face barriers to accessing healthcare, leading to limited support during rehabilitation.[7 8] Limited health literacy is also associated with low SES and results to misunderstanding of medical information and reduced adherence to medical instructions.[9]

The outcome of various diseases is associated with socioeconomic factors.[10–12] Low SES leads to a higher incidence, more severe symptoms before treatment initiation and worse outcomes in several musculoskeletal conditions[10 13 14] Understanding the influence of SES on treatment outcomes in AT is crucial, as it could lead to more effective, tailored interventions (eg, health literacy education and targeted support to improve access to healthcare). This could help bridge the health disparity gap in musculoskeletal care. It is unknown whether SES influences symptom severity and treatment effectiveness in patients with AT.

The primary objective of this study is to assess whether a disparity exists in the severity of symptoms at baseline between AT patients with low SES and those with high SES. The secondary aim is to investigate whether there is a difference in the effectiveness of standardised treatment after 24 weeks between AT patients with low and high SES.

METHODS

Study design

This prospective cohort study was conducted at the Department of Orthopedics and Sports Medicine, Erasmus MC University Medical Center (Rotterdam, the Netherlands). We adhered to the minimum

reporting standards for tendinopathy studies as determined by the international consensus statement[15] and the CHecklist for statistical Assessment of Medical Papers (CHAMP) statement for the design, analysis and reporting of cohort studies.[16]

Patient and public involvement

Prior to the start of the study, an electronic survey was performed, as part of the development of the Dutch multidisciplinary guideline on AT.[17] AT patients were asked about their treatment goals. Patients mainly described treatment goals to be return to (pain-free) participation in sports and (pain-free) participation in activities of daily living.[18] Based on these treatment goals established by the patients, we chose our outcome measures. As the Victorian Institute of Sports Assessment-Achilles (VISA-A) questionnaire evaluates pain during daily living and sports activities, and return to participation in sports, we selected the VISA-A score as primary outcome.[19] To complement this and address aspects not covered by VISA-A, we included an assessment of patient satisfaction, reflecting individual treatment needs and experiences, as a secondary outcome.

Equity, diversion and inclusion statement

Our study, conducted in a single high-income country, specifically investigated the effect of SES on the selected outcome measures. However, we acknowledge that we did not evaluate the effects of race/ethnicity and marginalised groups as we did not obtain these data. The author team includes both junior and senior researchers and both men and women.

Patients

All adult patients who visited the outpatient department of Orthopaedics and Sports medicine of the Erasmus MC University Medical Center with symptoms in the Achilles tendon region were eligible to participate. These patients were referred by general practitioners or medical specialists. As per Dutch healthcare regulations, the referral process is free for patients who have already met their own risk (also known as deductible); otherwise, they are responsible for costs up to €385 (this amount includes costs for treatment and follow-up by the sports physician). The Erasmus MC, situated in a below average SES area, attracts a broad spectrum of patients from across the country, encompassing both underserved and well-served populations. The inclusion period was between September 2018 and March 2023. Patients were included if (1) the clinical diagnosis of AT was established by the physician, (2) informed consent was provided and (3) the baseline digital questionnaire was completed.

Procedures

Patients who were referred by a healthcare provider (general practitioner or medical specialist) because of pain in the Achilles tendon region were asked to complete a digital questionnaire before their appointment at the outpatient department. This questionnaire was sent within 1 week before the appointment to patients using GemsTracker (GEneric Medical Survey Tracker), a software package designed for clinical research assuring secure distribution of questionnaires. This baseline questionnaire consisted of questions on demographics (age, sex, postal code), lifestyle, comorbidities, work, injury characteristics and (sports) activity. Sports activity was rated using the Ankle Activity Score (range 0–10) (AAS).[20] The VISA-A questionnaire was also completed. A single senior sports physician (R-JdV) performed complete history taking, physical examination and ultrasound examination on all patients. The scheduled duration of the consultation was 1 hour for all patients. Patients were specifically asked if their symptoms were associated with (sports) activities. Physical examination included the assessment of recognisable pain on palpation[21] and the presence/absence of localised tendon thickening. The clinical diagnosis was made based on physical examination and patient history. The physician established the clinical diagnosis of AT if (1) pain located in the Achilles tendon region in association with Achilles tendon-loading activities and (2) localised pain on Achilles tendon palpation that was consistent with their injury pain (eg, experienced during loading activities) were present. This could be with or without Achilles tendon thickening. The imaging findings were discussed with the patients. All included patients received treatment advice based on the best available evidence and standard practices for AT at the time of inclusion. This approach was aligned with the prevailing recommendations in existing (inter)national guidelines, which included education, load management and exercise therapy.[17 22 23] If patients already received (part of) this treatment advice, the sports physician aimed to optimise this cornerstone of treatment based on the context of the individual (eg, changes in the exercise therapy programme or education about the long-standing nature of tendinopathy and need for prolonged rehabilitation). All patients received a folder (see online supplemental files 3 and 4 for the folders 'insertional AT' and 'midportion AT') which provided an overview of education, load management advice and progression of exercise therapy. The patient could voluntarily consult a physiotherapist for guidance if he or she desired. If so, the physician also instructed that the folder was a guide of the treatment plan that could be used during the physiotherapy sessions. This is according to the Dutch multidisciplinary guideline.[17] Follow-up appointments were scheduled between 6 and 12 weeks as part of routine care and further follow-up appointments were made based on individual needs. The limited value of additional conservative treatments (eg, extracorporeal shockwave therapy (ESWT) or orthotic devices)[18] was discussed at the first appointment and considered during follow-up.

Socioeconomic status

We linked a neighbourhood SES indicator based on area information, which is in line with previous studies in this field.[24–26] The indicator was linked using patients' four-digit postal code. SES scores are calculated per postal code area by the Dutch Central Bureau for Statistics,[27] based on household income, educational level and employment status. The most recent socioeconomic data, published in 2019, were used.[27] We divided the SES scores into quintiles, based on the rank of the scores. Quintile 5 (Q5) was the quintile with the lowest SES (most deprived) and quintile 1 (Q1) was the quintile with the highest SES (least deprived, eg, high income, high educational level and high employment rate). The Q1 and Q5 groups were used for the analyses, which has been shown to be a customary method for evaluating inequality.[28] This approach follows guidelines by the WHO, highlighting the importance of focusing on the most extreme SES contrasts to effectively reveal significant effects on health outcomes and ensure findings are easily interpretable.[29]

Outcome measures

At 6, 12 and 24 weeks patients were asked to complete a follow-up questionnaire including the VISA-A questionnaire and treatment satisfaction.

The primary outcome measure was the score on the VISA-A questionnaire at 24 weeks. This questionnaire evaluates pain

scores and activity level and ranges from 0 to 100 (with lower scores corresponding with more pain and decreased activity).[19] The VISA-A is considered to be a reliable and responsive measure of symptom severity in people with AT.[30]

The secondary outcome measure of the study was the level of satisfaction with the treatment effect as reported by the patients. Treatment satisfaction was assessed using a 4-point Likert scale, which consisted of the following categories: excellent, good, moderate and poor.[31] In this study, we dichotomised the satisfaction score, as done previously.[31] Patients who rated their treatment satisfaction as excellent or good were considered to be satisfied, while those who rated it as moderate or poor were deemed unsatisfied.

The number of additional treatments (eg, ESWT or orthotic devices) was also recorded. Treatment adherence to the exercise therapy and guidance of a physiotherapist were not registered in this study.

Statistical analysis

The dataset of included subjects was examined using scatterplots to identify any outliers or disparities. Missing data were recorded and the reasons behind missing data were carefully evaluated. For the primary outcome measure, there were 26%, 30% and 42% of missing data at 6, 12 and 24 weeks, respectively. As a substantial proportion (>10%)[32] of the primary outcome measure was missing (at 24 weeks follow-up), we performed the Little missing completely at random (MCAR) test.[33] The missingness of these data was found to be plausible for MCAR) according to the non-significant (p=0.242) Little MCAR test. We performed a complete-case analysis (CCA) using pairwise deletion for both the primary and secondary outcome measures. We compared the VISA-A scores between Q1 and Q5 at baseline, 6, 12 and 24 weeks using a general linear model while adjusting for the following predefined set of variables that we also used in a similar prospective study: age, sex, body mass index (BMI), AAS and duration of symptoms.[34] We did not detect any significant collinearity among the variables (online supplemental file 5). Additionally, we adjusted for baseline VISA-A score as it significantly (p<0.001 in univariate analysis) influenced the VISA-A scores at 6, 12 and 24 weeks follow-up. For the secondary outcome measure (patient satisfaction), we used a modified Poisson regression analysis adjusting for the same set of variables. These methods ensured unbiased analyses.[35–38]

When it is plausible that data are MCAR, conducting a CCA does not introduce bias since the incomplete datasets can be considered representative of the entire dataset.[35 38 39] However, it is important to note that a CCA may lead to increased standard errors due to the reduced sample size resulting from missing data.[39] Additionally, as a substantial (>40%) amount of data is missing for the outcome measures, the results obtained from the analysis should be interpreted as hypothesis-generating rather than definitive.[39] To explore the robustness of our findings, a sensitivity analysis was performed using a (generalised) linear mixed-effects model for the primary and secondary outcome measures separately. IBM SPSS Statistics (V.28.0.1.0) were used for the CCA and the sensitivity analysis was conducted using R software, V.4.2.1. Used packages included 'nlme', 'GLMMadaptive' and 'emmeans'. Residuals were checked for all models.

RESULTS

A total of 240 participants were potentially eligible for the study. We excluded 29 (12%) participants because they did not meet the criteria for the clinical diagnosis of AT and 11 (5%) participants were excluded as they did not provide informed consent. 200 participants fully completed the baseline questionnaire and were included in the study. For the primary outcome measure, 148 (74%), 139 (70%) and 116 (58%) participants completed the questionnaire at 6, 12 and 24 weeks, respectively. In Q1 and Q5, respectively, 64% and 67% of the participants completed the questionnaire at 24 weeks.

Table 1 Descriptive statistics of participants

	Participants' characteristics (n=200)
Population demographics	
Age, median (IQR), (years)	51 (40–57)
Sex (male/female)	121 (61)/79 (39)
Height, mean (SD), (cm)	179.2 (9.3)
BMI, median (IQR), (kg/m^2)	25.4 (23.5–28.8)
Tendinopathy descriptors	
AT (unilateral/bilateral)	132 (66)/68 (34)
Symptom duration, median (IQR), (weeks)	94 (39–213)
VISA-A score at baseline (0–100), mean (SD)	45.3 (18.7)
Pain location (midportion/insertion)	106 (53)/94 (47)
General health and comorbidities	
Sports participation (yes/no)	183 (92)/17 (8)
AAS score (0–10), median (IQR)	4 (4–7)
Sport adaptation (none/reduced/stopped)	32 (16)/42 (21)/126 (63)
Prior history of tendinopathy (yes/no)	92 (46)/108 (54)
Medication use (yes/no)	70 (35)/130 (65)
Comorbidities* (yes/no)	54 (27)/146 (73)

Data are presented as No. (%) unless otherwise specified. Sports adaptation: patients who reported no change in sports activities, a reduction in sports activities or stopped performing sports activities.
*Comorbidities included diabetes, hypercholesterolaemia, hypertension, heart/vessel diseases, uveitis, (inflammatory) bowel disease, rheumatism, thyroid disease and psoriasis.
AAS, Ankle Activity Score; AT, Achilles tendinopathy; BMI, body mass index; VISA-A, Victorian Institute of Sport Assessment Achilles.

The included participants had a median age of 51 years, were mainly male (60.5%), had a median symptom duration of 94 weeks and were active in sports before their injury in the majority of the cases (91%). The collected participants' characteristics are depicted in table 1 for the overall population. Adjunct conservative therapies were performed during follow-up in 33 participants (17%), including ESWT (7%), orthotic devices (5%) and prolotherapy (2%). 10 patients with high SES (Q1) received adjunct therapies compared with 6 patients with low SES (Q5). This difference was not statistically significant (p=0.497).

Symptom severity at baseline and SES

Data were completed for both VISA-A and baseline SES scores (Q1-Q5). Quintile 1 contained the largest proportion of AT patients (22.5%) and in all quintiles a larger proportion was male (table 2). Table 2 shows the participant characteristics per quintile, which did not demonstrate statistically significant differences between the quintiles. VISA-A scores at baseline were similar for Q1 and Q5 (43.9 and 41.8, p=0.59) (see table 3).

Baseline SES and change in symptom severity during 24 weeks treatment

The effect of baseline SES scores on change in symptom severity (measured with VISA-A and patient satisfaction) is depicted in tables 3 and 4 (CCA). At baseline, 6 weeks and 12 weeks, there were no statistically significant differences in VISA-A score

Table 2 Participants' characteristics of the patients in each quintile

	Number of patients	Sex (M/F)	Age, median (IQR), (years)	AAS score, median (IQR)	BMI (kg/m^2), median (IQR)	Symptom duration, median (IQR) (weeks)
Quintile 1 (highest SES score)	45 (22.5)	28 (62)/17(38)	50.0 (43.5–56.5)	4.0 (4.0–5.5)	25.5 (24.0–27.7)	126 (60–356)
Quintile 2	37 (18.5)	20 (54)/17 (46)	53.0 (49.0–59.5)	4.0 (4.0–5.0)	25.4 (23.0–28.9)	77 (43–206)
Quintile 3	38 (19.0)	26 (68)/12 (32)	45.5 (35.8–53.3)	5.0 (4.0–8.0)	25.2 (23.6–29.3)	104 (33–299)
Quintile 4	41 (20.5)	24 (59)/17(41)	51.0 (34.5–56.0)	5.0 (4.0–8.0)	25.4 (22.8–28.1)	66 (37–154)
Quintile 5 (lowest SES score)	39 (19.5)	23 (59)/16 (41)	52.0 (32.0–59.0)	5.0 (4.0–7.0)	26.0 (23.8–30.0)	68 (27–208)

Data are presented as No. (%) unless otherwise specified.
AAS, Ankle Activity Score; BMI, body mass index; F, female; M, male; SES, socioeconomic status.

between Q1 and Q5. At 24 weeks, there was a mean (95% CI) difference of 11.2 (1.0 to 21.3, p=0.03) points on the VISA-A score in favour of Q1 (table 3 and figure 1). Online supplemental file 1 shows the dispersion of the VISA-A scores for the overall population and the individual and mean VISA-A scores over time for Q1 and Q5.

There was no significant difference in treatment satisfaction between Q1 and Q5 at any of the follow-up time points (table 4).

The results of the sensitivity analyses for the comparison of VISA-A scores between Q1 and Q5 are displayed in online supplemental file 2. Mean (SE) VISA-A scores at baseline were similar for Q1 and Q5 (43.3 (2.6) and 43.6 (2.8)). At 24 weeks, there was a mean (SE) difference of 7.4 (5.3) points on the VISA-A in favour of Q1, but this difference was not statistically significant (p=0.17) (online supplemental file 2, table 1). The sensitivity analyses yielded similar results to the primary analysis for the comparison of treatment satisfaction (online supplemental file 2, table 2).

DISCUSSION

To our knowledge, this is the first study to examine the effect of SES in patients with tendinopathy. We found that AT patients with low SES have worse outcomes at 24 weeks follow-up when treated according to the current guidelines. Patients with low SES reported a mean VISA-A score that was 7–11 points lower at 24 weeks compared with patients with high SES. While this difference aligns with or exceeds the minimal clinically important difference of 7 points,[40 41] indicating potential clinical relevance, it is important to note that sensitivity analyses of the VISA-A scores only suggest a trend and did not demonstrate statistically significant differences between groups at all time periods, possibly due to the large dispersion of data. This highlights the need for cautious interpretation of these findings.

Comparison of current findings with the literature

The impact of SES on patients with AT has not been described before, but the relationship between SES and other musculoskeletal diseases has been studied more extensively. Previous research shows a strong association between low SES and worse treatment outcomes in individuals with other musculoskeletal conditions such as rheumatoid arthritis and osteoarthritis.[42 43] These studies align with the outcomes of this study, which revealed an association between low SES and increased pain and disability after 24 weeks of treatment in individuals with AT as measured with the VISA-A questionnaire.

Clinical implications

This study has demonstrated that AT patients belonging to low SES may experience inferior treatment outcomes compared with AT patients with higher SES when treated according to current guidelines. This observation has important clinical implications that require careful consideration by healthcare providers. Specifically, healthcare providers should be mindful of the SES of their patients while administering treatment.

A potential reason for the lower treatment effect in people with lower SES is a lack of understanding of their condition and suggested treatment and trust in their physician,[44] which may be addressed through improved patient education. Patient education has emerged as an important factor for improving treatment outcomes in general,[45 46] and also plays a crucial role in improving treatment outcomes through knowledge gain in AT patients.[47] Patients belonging to lower SES groups may possess limited health literacy, which could impede their understanding of treatment recommendations and hinder their ability to adhere to the prescribed treatment plan.[9 48] Recognising this, healthcare providers must take a proactive approach in providing comprehensive education and support to AT patients with lower SES. By ensuring that these patients possess a clear understanding of their treatment plan and the necessary steps required to achieve the best possible outcome, healthcare providers can empower them to actively participate in their own care.

In addition, it is crucial to recognise that individuals from lower SES groups often face multiple barriers in accessing healthcare services, such as access to physiotherapy or consultations

Table 3 Differences in VISA-A score between Q1 and Q5 at each time point (adjusted for sex, BMI, age, symptom duration and AAS)

	Group		Difference		95% CI for difference	
	Q1	Q5	Mean difference (±SE)	P value	Lower bound	Upper bound
Baseline (n=45/39)	43.9 (20.9)	41.8 (17.9)	2.1±3.9	0.59	−5.6	9.8
6 weeks* (n=35/29)	49.2 (18.8)	43.7 (18.7)	5.5±4.6	0.24	−3.7	14.8
12 weeks* (n=32/28)	50.7 (19.5)	54.5 (20.1)	−3.8±5.1	0.45	−14.0	6.3
24 weeks* (n=29/26)	66.4 (18.9)	55.2 (18.9)	11.2±5.0†	0.03	1.0	21.3

Values are displayed as mean (SD). P values were Bonferroni corrected.
*Also adjusted for baseline VISA-A score.
†This difference exceeds the minimal clinically important difference of 7 points at 24 weeks.[40]
AAS, Ankle Activity Score; BMI, body mass index; VISA-A, Victorian Institute of Sports Assessment-Achilles.

Table 4 Percentage satisfied with treatment results and the difference in treatment satisfaction between Q1 and Q5 at each time point*

	Group			
	Q1	Q5	RR (95% CI)	P value
6 weeks	58.3% (21/36)	63.3% (19/30)	0.94 (0.64 to 1.37)	0.75
12 weeks	56.3% (18/32)	53.6% (15/28)	1.07 (0.65 to 1.73)	0.80
24 weeks	77.4% (24/31)	69.2% (18/26)	1.10 (0.80 to 1.51)	0.56

The estimated difference is reported using risk ratio (RR). The RRs were derived using modified Poisson regression analysis.
*Adjusted for sex, BMI, age, symptom duration and AAS.
AAS, Ankle Activity Score; BMI, body mass index.

with medical specialists.[8 49] Transportation to appointments and the inability to take time off work due to employment constraints are other potential barriers to healthcare access for these populations. Next to this, financial constraints and lack of insurance coverage can hinder their ability to seek and afford the recommended treatment.[7 8 49] Variations in physical activity engagement and adherence to exercise therapy could also affect AT recovery. Notably, in our study, the disparity between high and low SES groups primarily emerged between 12 and 24 weeks. This timing may reflect the challenges lower SES groups face in accessing continued physiotherapy support due to potential increased costs associated with prolonged rehabilitation. Consequently, healthcare providers may need to offer additional support to assist patients with lower SES in accessing affordable healthcare resources.

Strengths and limitations

This study has several strengths as we adhered to the CHAMP statement for analysis and reporting of the results and, to our knowledge, we performed the largest cohort study in AT patients. Nonetheless, this study has certain limitations that must be acknowledged. There was a substantial proportion of missing outcome data during the follow-up period. This issue arises due to the observational and longitudinal design of the study, in which the follow-up questionnaires were integrated into routine care. While we did not identify between-group differences in responders versus non-responders, the large proportion of missing outcome data warrants caution when interpreting the results. Additionally, the potential for unmeasured confounding must be considered as a limitation. While we adjusted for several known confounders, including age, sex, BMI, AAS, duration of symptoms and baseline VISA-A score, there may be other unmeasured variables that could influence the outcomes. The nature of observational studies inherently limits our ability to control for all possible confounding factors. Thus, although the findings are statistically significant and clinically relevant, they should be interpreted as hypothesis-generating rather than definitive.[39] To provide a more comprehensive understanding of the results, we conducted a sensitivity analysis to explore the robustness of the findings. The sensitivity analysis revealed a clinically relevant difference, yet did not demonstrate statistical significance. One possible explanation for this discrepancy could be the substantial dispersion observed in the VISA-A scores (online supplemental file 1). The wide range of scores suggests considerable variability among the AT patients, which could impact the statistical significance of the findings. We did not observe any difference in treatment satisfaction between patients with low and high SES which may question the robustness of the findings of the VISA-A questionnaire. Recent studies have highlighted some shortcomings of the VISA-A, particularly concerning its content validity.[50–52] It is also unknown whether reduced health literacy influences the ability to complete the VISA-A, as shown in other PROMs used in musculoskeletal care.[53] This is especially relevant in our study design. However, the VISA-A continues to demonstrate sufficient reliability and responsiveness.[30 51] Next to this, the VISA-A has been cross-culturally adapted in numerous languages (including the Dutch version of the current study).[54] At the time of the study, the VISA-A was the best available outcome measure as more recently developed questionnaires (eg, VISA-A sedentary or TENDINopathy Severity Assesment-Achilles) were not yet available.[50 55] We feel that the use of the VISA-A in our study is justified and that our study's findings and conclusions remain valid, but they should be considered along with the criticism on the psychometric properties of the VISA-A.

Another limitation is that we did not obtain data on treatment adherence and guidance of physiotherapists during treatment. This hinders a comprehensive understanding of the factors influencing the outcomes of patients with low SES and impedes a thorough analysis of the barriers they may face in receiving appropriate care.

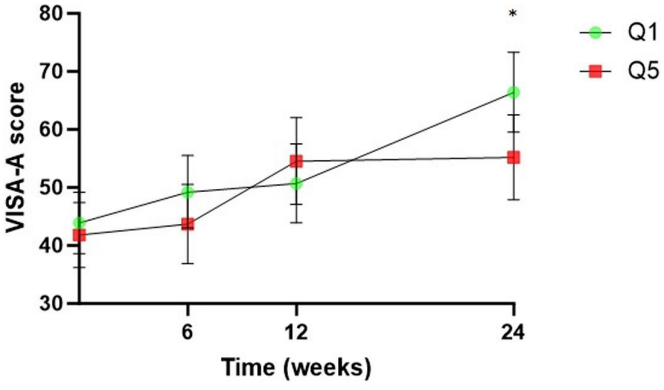

Figure 1 The difference in VISA-A between Q1 and Q5 at each time point (adjusted for sex, body mass index, age, symptom duration, Ankle Activity Score and baseline VISA-A score). Values are displayed as mean±95% CI. *Indicates statistically significant difference (p=0.03) exceeding the minimal clinically important difference. We applied the Bonferroni adjustment to adjust for multiple comparisons. VISA-A, Victorian Institute of Sports Assessment-Achilles.

Future research

The findings stress the need for future research to further examine the underlying mechanisms responsible for worse treatment outcomes among tendinopathy patients belonging to lower SES groups. Such qualitative investigations could identify barriers and facilitators, which in turn could inform specific interventions and strategies that can address these disparities and enhance treatment outcomes for all patients, irrespective of their SES status.

CONCLUSION

Low SES may be associated with worse patient-reported outcomes in patients with AT who are treated according to the current guidelines. This highlights the need for clinicians to consider the impact of social inequality when developing and implementing treatment plans and to explore tailored approaches that address the unique challenges faced by patients' subgroups. Future qualitative research should focus on this subgroup of patients with

lower SES to better understand the reasons behind the lower treatment response, which can facilitate personalised treatment.

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Acknowledgements We are grateful for the help and advice of S Baart (Department of Biostatistics, Erasmus MC University Medical Centre, Rotterdam, The Netherlands) in the statistical evaluation of the data.

Contributors TSV, JB and R-JdV were involved in the design of the study. TSV is responsible for the overall content as guarantor. EvE designed the questionnaire. SB performed data acquisition. TSV, SB and JD performed data analysis. All authors contributed to the interpretation of the data and drafted the manuscript. All authors gave their final approval to this version of the manuscript and agree to be accountable for all aspects of this work.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and the local Medical Ethics Committee (Southwest-Holland, the Netherlands) approved the study protocol (MEC-2021-0033). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

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