Evaluating Factors That Influence How Older People in the UK and KSA Report Fear of Falling: A Cross-Sectional Study

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Abstract

Background

Falls are a major health problem for those 60 years and older, and fear of falling (FoF) is a critical psychological aspect of this issue. A widely used subjective scale that measures a person's level of concern towards falling is the Falls Efficacy Scale International (FES-I). The FES-I is commonly used in research, but several studies highlighted potential issues and biases associated with its use. This cross-sectional study aimed to investigate some of these issues by providing participants with four versions of the FES-I: the FES-I (or standard. FES-I), two modified instruction FES-Is (worst and best FES-I), and the Iconographic (ICON) FES-I.

Methods

A sample of community-dwelling older adults from two countries, the UK (n = 76) and the KSA (n = 100), participated in this cross-sectional study. Four different versions of the FES-I were used to assess changes in FoF. Additionally, the Hospital Anxiety and Depression Scale (HADS), the

Medical Outcomes Study Social Support Survey (MOS-SSS), a sociodemographic survey, a 6-month Fall History question, Timed up and Go test (TUG), and two bespoke Likert scales, were used to assess the potential factors that could influence FES-I scores and were treated as independent variables. Descriptive statistics, T-tests, analysis of variance (ANOVA), correlation and regression analysis were performed to examine the significance of the difference and the relationship between FES-I scores and independent variables.

Results

The standard FES-I and the ICON FES-I scores significantly differed from the worst and best FES-I ($P<0.05$). Perceived health status, anxiety and depression scores significantly correlated with standard FES-I when accounting for TUG and fall history. Mobility, fall history, and psychological factors collectively predicted the FES-I reporting tendencies (degree of deviation between the different versions of the FES-I).

Conclusions

The results confirmed that the participants' FES-I scores changed when clarity was added to the instructions and that other variables influenced FES-I scores. Although the FES-I is a valid and reliable scale, it needs refinement because its ambiguity dilutes what can be obtained through its use. More studies should examine how the FES-I is affected by interpersonal factors and focus on understanding it more comprehensively.

Keywords: Fear of Falling, Fall Efficacy Scale-International, FES-I, ICON FES-I, Cognitive Bias, Older adults.

Background

Falls are a major health problem for people 60 years and older and the second leading cause of unintentional death worldwide, according to the World Health Organisation [53]. FoF is a critical

psychological aspect of this issue. It has been shown to have a severe negative impact on various aspects of an older person's life and to increase their vulnerability to falls [24]. The importance of FoF among older adults has been well-documented and was identified as a predictor of future falls. Furthermore, FoF can lead to activity avoidance and subsequent deconditioning, which is alarming given its occurrence in 92% of individuals over 65 who have experienced falls and up to 65% of those who have not [1, 24]. This cycle of activity avoidance, FoF, and physical decline can contribute to an increased risk of falls and loss of independence [20, 24]. Addressing FoF is crucial in preventing falls and improving the quality of life for older adults [1].

For this reason, healthcare providers and researchers utilise objective and subjective assessments to comprehensively evaluate older individuals' clinical status in relation to risk of falls. One widely employed subjective measure is the FES-I. This scale gauges a person's level of concern about falling when performing 16 tasks on a scale from 1 (i.e., not concerned) to 4 (i.e., very concerned). The FES-I was developed after the original FES and is a notable improvement over its predecessor. This evolution is attributed to the incorporation of a second domain involving relatively demanding activities and the consideration of social aspects related to the FoF.

Similarly, the ICON FES-I is a more recent development of FES-I. It depicts FES-I tasks using sketches of a person performing each one. It also includes additional tasks and separates some of the tasks in the FES-I. This scale has two versions: an extended version with 30 items and a short version with 10 items. While the ICON FES-I is the newest version, the FES-I is still the one most widely used.

The FES-I's inclusivity spans a broad spectrum of individuals; however, its primary application is intended for cognitively able adults who understand its instructions [12]. Recognising the

fundamental principles of the FES-I is essential, especially given its official endorsement by the esteemed World's Fall Guideline Task Force, a coalition of nearly a hundred multidisciplinary experts from around the world [54]. This group strongly advocates for the global application of FES-I, underlining its significance. This very endorsement motivated this study's intention to examine the FES-I.

The FES-I is a multidimensional scale that allows for a broad evaluation of FoF when considering various activities and individuals' perceptions of their fall risk [48]. It has been translated into multiple languages and repeatedly assessed for reliability, consistency, and validity in different regions around the world, such as Sweden [33], Iran [15, 32, 42], Spain [37], Saudi Arabia [10], UK [34], Japan [41], China, [13], Thailand [23], and Czech Republic [30].

Most importantly, the FES-I has been completed by many older adults with various health conditions. This includes those with dystonia [46], osteoporosis [33], multiple sclerosis [15], Parkinson's Disease [31, 38], dementia [30], different neurological conditions [42, 19], post-orthopedic surgery [7], post-hip/pelvic fracture [9], healthy older people [11; 40], those with anxiety [18, 34, 48], sarcopenia [37], postmenopausal women [16], and adult day care users [21].

The studies mentioned above have typically compared the FES-I to objective measurements, testing mobility and balance, such as TUG [11, 19; 25], the perceived path width a person can walk [40], spatiotemporal gait parameters [41], stair ascent/descent cadence [19], Mini-BESTest [42], and the Berg balance test [38]. Others have correlated FES-I results with FoF, avoiding activities, and adverse effects on quality of life [1, 3, 17, 44, 47]. These studies aimed to assess the FES-I's accuracy, measure its ability to differentiate between fallers and non-fallers (prospectively

and retrospectively) or assess perceived fall risk against actual performance using objective measures.

Numerous researchers have highlighted concerns and biases associated with the FES-I [11, 33, 40, 42, 46, 30]. Firstly, discrepancies between FES-I scores and objective measures are often attributed to participants' self-perception issues, indicating potential overestimation of capabilities when low FES-I scores contrast with poor objective performance [11, 40, 42]. Secondly, studies using the FES-I acknowledge that undisclosed factors could impact the participants' scores [33, 46, 50]. Even personal factors like sociodemographic details can sway how participants view their perceived fall risk compared to their physical ability [35]. Although the FES-I maintains high reliability and validity, it does not fully encompass older individuals' fall-related concerns [2].

The FES-I measures fall efficacy, which is one's perceived capability to perform tasks without falling [3]. This is distinct from FoF, which is the continuous fear that limits activities of daily living [3]. However, studies often use these terms interchangeably [7, 15, 29, 46]. Yardley et al. [12] emphasised that although the FES-I is used to assess "concern about falling" rather than "fear of falling", this distinction is mainly due to how emotionally charged the word 'fear' is in contrast to 'concern'. Other studies stress the importance of differentiating between FoF and fall efficacy, associating "concern about falling" with balance or perceived ability rather than just fear [22, 11, 21]. Ellmers et al. [45] argued that fear itself has a dual nature. Fear combined with control fosters adaptation, such as taking precautions while going down the stairs. Yet, fear combined with a lack of control leads to anxiety, potentially causing maladaptive responses such as activity avoidance or increased risk of falling due to the belief that this outcome is inevitable.

Suppose these distinctions are difficult for researchers to track. In that case, it follows that they would be difficult for older adults to track as well, especially if they do not know whether to answer the FES-I according to how they feel (e.g., reasonable fear or anxiety masking as fear) or based on their actual performance and physical capabilities (e.g., balance/mobility/health concerns). To illustrate this complexity, envision posing the same question to two physically healthy older individuals, with good mobility, about their level of concern when walking in their neighbourhood. The first individual might envision routine daily walks with no complications, resulting in a lower FES-I score, meaning a low concern about falling. Meanwhile, the second individual may contemplate challenging scenarios, like walking at night or without their assistive device, thus resulting in an increased FES-I score despite their actual ability to perform the task.

This subjective and qualitative nature of FES-I interpretation can cause difficulties when attempting to compare FES-I scores to objective measurements. The inherent ambiguity in how results are interpreted becomes apparent. The FES-I is especially susceptible to bias due to its acknowledged ambiguity, as indicated by the supplementary data from Yardley et al.'s study [12]. Although this inherent flexibility enables the researcher to capture a wide range of responses, it inadvertently exposes the FES-I to cognitive biases during its interpretation.

Cognitive biases stemming from personal experiences and predispositions play a significant role in information processing [39]. For instance, attentional bias, which is an example of cognitive bias, explains how stimuli (such as FES-I tasks like walking on a slippery surface, attending social events, or reaching overhead), when paired with anxiety, can impact decision processing, especially when that stimulus is perceived as threatening or emotionally arousing [39]. Reduced anxiety can lead to an underestimation of risk perception. In contrast, heightened anxiety might result in an overestimation, directing attention toward stimuli (i.e., a stimulus-driven attentional

system) rather than the task itself (i.e., a goal-directed attentional system), affecting anxious individuals' focus, balance and performance [6, 39].

As attentional bias influences how anxious individuals perceive their capabilities and concerns, it would stand to reason that someone frequently assisted during task performance would have a low FES-I score [34]. Similarly, a person who has previously fallen while performing a task might interpret related questions differently from someone who has not. This dynamic could significantly contribute to the variations observed in FES-I scores and the sometimes low to modest correlations between the FES-I and other objective evaluations [6, 27, 34].

Rationale for the study

The importance of adding clarity to a widely used and endorsed scale, such as the FES-I, would be knowing exactly what information is being obtained. Consider the following cases for example:

1) When individuals engage with the FES-I questionnaire, encountering tasks that they cannot perform or are irrelevant to their lives, they might be led to visualise simpler or more complex ways of completing them. This could be influenced by factors such as anxiety, depression, sociodemographic data, and cultural norms. For instance, cultural practices such as household chores being managed by servants in certain regions, like in the Kingdom of Saudi Arabia (KSA), can impact how individuals perceive certain tasks. The subsequent effect this would have on FES-I scores would go unknown.
2) The FES-I instructs individuals to respond based on typical task performance; however, this can be problematic when tasks are done in an alternating fashion. Older adults who alternate between assisted and independent methods of performing tasks may find this aspect challenging to navigate, leading to potential confusion in how to score certain tasks.

3) Since the FES-I has been recommended for use in fall prevention/management programs, this raises concerns about its applicability to patients. If someone progresses in their performance through such a program, they might paradoxically exhibit increased concern about task performance due to their newfound independence. This negative shift in FES-I score could mask actual performance improvements, leading healthcare providers to misinterpret the outcomes.
4) Considering the FES-I's utilisation in fall risk assessment, its effectiveness could be influenced by an individual's social support system, demographic traits, health status, anxiety, and depression levels. This prompts the question of whether the FES-I genuinely reflects subjective fall risk or whether personal dynamics and demographic traits primarily shape how the FES-I is interpreted and scored.

Understanding the inherent logic of the FES-I is pivotal, prompting the need to delve into these uncertainties by examining how heightened clarity affects FES-I scores. This was primarily done by placing four versions of the FES-I in one survey. The FES-I (also labelled standard or std. FES-I in this study) was the first of the FES-I versions given to participants in order to collect primary levels of concern towards falling. Subsequently, two FES-I versions with modified instructions were implemented. The first adaptation—the best-case scenario FES-I (best FES-I)—included more explicit instructions than the standard FES-I, mentioning that tasks are performed with available help and assistive devices. This iteration aimed to gauge whether concern levels would significantly change when participants felt supported and reassured. The second modified version—the worst-case scenario FES-I (worst FES-I)—specified that the tasks were done without help or assistive devices. This FES-I examined participants' concern levels when they could not rely on support or devices, potentially emphasising any balance and mobility concerns. The total

178 scores of the three FES-I were used in a percentage difference calculation to measure the degree
179 of deviation between each one. These calculated differences were labelled the reporting tendencies
180 (worst-to-std. FES-I reporting tendency, std.-to-best FES-I reporting tendency and worst-to-best
181 FES-I reporting tendency). Further elaborations can be found in the Methods section under the
182 Worst, Std., and Best FES-I subheading.

183 Moreover, an optional ICON FES-I was provided to assess whether images portraying task
184 performance would impact concern levels and, thus, yield scores different from the other versions
185 of the FES-I. This is relevant because this study's inclusion criteria allowed participants with mild
186 cognitive impairments [51] to participate.

187 Additionally, two tailored Likert scale surveys were integrated into the study design to
188 complement the utilisation of multiple FES-I iterations and delve into participants' thought
189 processes during scoring. The first survey was a custom-designed survey intended to help gauge
190 participants' degree of agreement or disagreement with statements about the impact of assistance
191 and fear in relation to FES-I task performance (Table 8). The second survey introduced a
192 performance-based FES-I scale to examine the level of independence associated with each task.
193 This provided the study with an understanding of how participants interpreted the FES-I and the
194 rationale behind their scoring decisions, particularly for tasks they could not or would not
195 undertake (Table 9). This information, combined with the std. FES-I scores, were then used to
196 create three interpretation groups (misinterpreters, interpreters and non-misinterpreters). More
197 details can be found in the Methods section, under the Bespoke FES-I Survey and the Performance
198 of Tasks in the FES-I subheadings.

Furthermore, a range of supplementary assessments were employed. These encompassed the TUG test (a mobility evaluation), a 6-month retrospective fall history question (frequency of falls), the MOS-SSS (a social support level scale), the HADS (an anxiety and depression level assessment), and a sociodemographic survey. These measures were employed to ascertain their correlation, potential as predictive indicators, and impacts on interpretation for the different FES-I scores and interpretation groups. The Methods section provides a comprehensive explanation for each of these measures.

Study Aims

Primary Aims

1. Analyse the effect of enhancing FES-I clarity by modifying its instructions on score variations across different FES-I iterations.
2. Examine the significance of the ICON FES-I in comparison to that of FES-I iterations.

Secondary Aims

3. Evaluate the relationship between the psychological factors (anxiety and depression), available social support, and sociodemographic attributes of the participants and their FES-I scores when accounting for their mobility and fall history.
4. Determine whether significant distinctions and associations exist between the independent variables and FES-I dependent variables.
5. Determine whether there are significant differences between the interpretation groups across the different FES-I scores and reporting tendencies.
6. Determine the predictive value of the independent variables concerning which interpretation groups the participants belong to.

7. Investigate the underlying rationales driving FES-I scores among older adults in the UK and the KSA.

Research Terminology

Reporting tendency: This is the measured deviation between the participants' worst, standard/ICON, and best FES-I scores using percentage difference calculation.

Interpretation groups: There were three groups of participants (i.e., misinterpreters, nonmisinterpreters, and interpreters). The participants were divided based on their interpretation of the FES-I (i.e., how they performed and scored each FES-I task).

Methods

Study Design

This cross-sectional study was conducted in Southwest England, UK, and Riyadh, KSA. This was done to capture a diverse sample of older adults and increase the study's heterogeneity, and not to compare the two groups. The study entailed collecting data from participants using a Google Forms Survey at a single point in time to evaluate the relationship between various factors and FES-I scoring. The researcher provided the validated English and Arabic questionnaires on a tablet/iPad. The questionnaires are listed and explained in detail under the Protocol subheading.

Participants

A total of 176 community-dwelling older adults aged 60 and up were included in the study. The study participants were recruited from May 2023 to July 2023. The participants were chosen using convenience and snowball sampling methods. The Saudi participants were recruited from the outpatient facility at the Sultan bin Abdulaziz Humanitarian City Hospital in Riyadh, KSA, making up 57% of the study's sample population. The British participants were recruited from independent

living facilities, public areas, and retirement homes in Southwest England (i.e., Exeter-Teignmouth-Dawlish) and accounted for 43% of the sample population in the study. See Figure 1 for the participants' flow chart.

The inclusion criteria for the study were as follows:

- People 60 years and older
- Those who can functionally walk outdoors (regardless of whether they need assistive devices or assistance when walking).
- Those who can provide informed consent.

The exclusion criteria for the study were as follows:

- Those who were unable to walk outdoors or complete TUG.
- Participants with cognitive impairments that would hinder their ability to provide informed consent or complete the assessments. This was assessed through conversation and the mini-Cog test (scores < 3 were not eligible) for the British participants and through confirmation of intact cognitive function from the assigned occupational therapist for the Saudi participants.

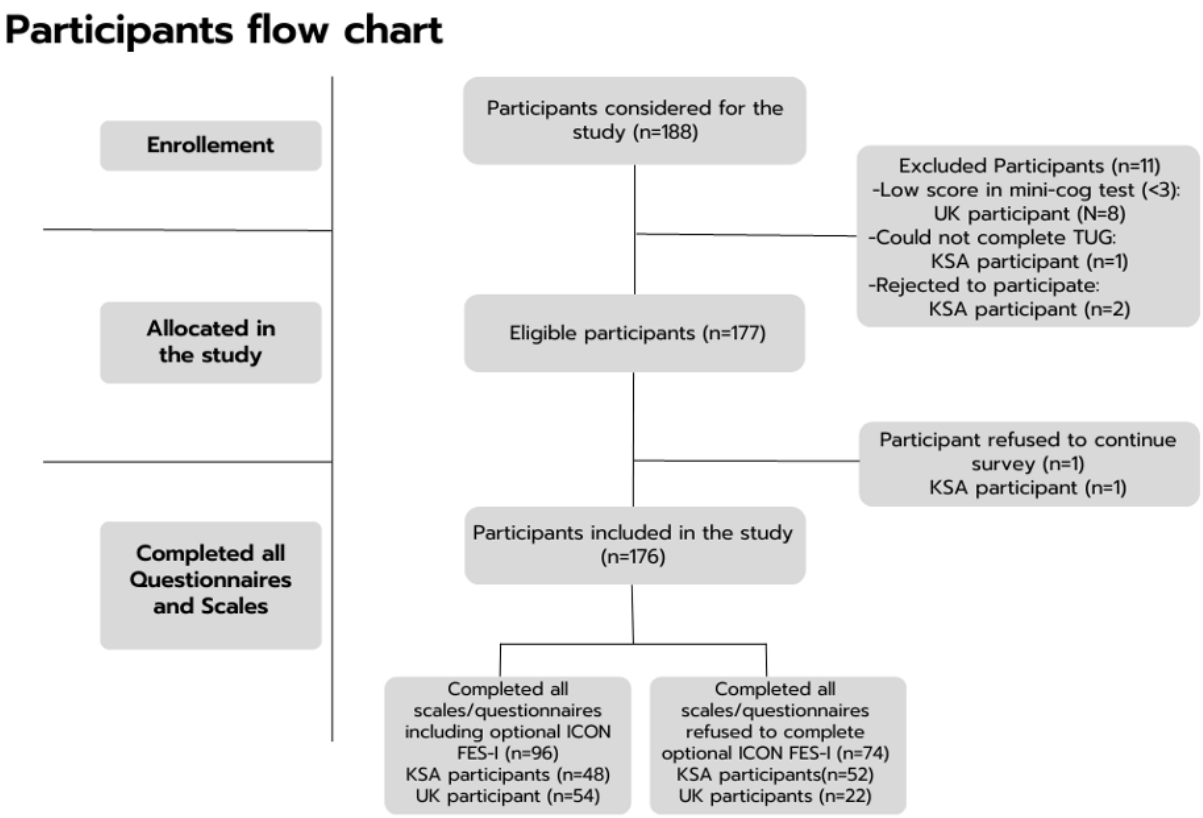

Figure 1: Participant flow chart depicting the enrollment and final inclusion in the study.

Protocol

This study examined whether providing additional clarity to the FES-I scale instructions would lead to differences in participants' scoring and quantified the magnitude of those differences. These three versions of the FES-I would assess if participants' initial FES-I responses were shaped by envisioning tasks being completed in a more negative or positive context than what is assumed. Additionally, the ICON FES-I, designed to assess whether images enhance older adults' FES-I reporting, was compared to the other three versions to gauge its degree of difference. Furthermore, variables, including social support levels, anxiety and depression scores, sociodemographic data, and TUG scores, have been assessed to explore their relationships with the FES-I iterations and the reporting tendencies.

The Google Form survey used in this study included all the following questionnaires and scales.

TUG

The TUG test was used to measure the participants' fall risk objectively, and it noted whether they used an assistive device or needed assistance during the test. The TUG test is timed, with the participant beginning the test seated, then walking three meters, turning around, and returning to the chair to sit. The TUG test was found to have high reliability and validity [49]. TUG was classified into three categories: Category 1 (i.e., low risk of fall, score ≤ 10 seconds), Category 2 (i.e., moderate risk of fall, ≤ 20), and Category 3 (i.e., high risk of fall, score > 20).

Sociodemographic Survey

A comprehensive survey was given to participants to collect the range under which their age, gender, highest education level, perceived health status, presence of disability/health conditions, 6-month fall history, and other relevant sociodemographic characteristics, falls under. The ranges or categories for each of these variables is shown in Table 2.

Standard, Best, and Worst FES-I

The standard FES-I was the third item presented to the participants after the TUG test and the sociodemographic survey. The FES-I's second and third versions, with modified instructions, followed. The modified instructions for each were:

A. Best FES-I: "Please restate your concern about falling if you performed these tasks under the BEST circumstances (i.e., you are feeling your best, and as much assistance AND assistive devices as you need are available)."

B. Worst FES-I: “Please restate your concern about falling if you performed these tasks under the WORST circumstances (i.e., you are feeling at your worst, tasks are done alone, and no assistance OR assistive devices are available).”

Bespoke FES-I Survey

A customised Likert scale survey was created to investigate the reasoning behind participants’ FES-I responses. The first question is a yes/no question about whether the participant requires assistance with any of the tasks listed in the FES-I. This was followed by questions that assessed the participants’ level of agreement with various statements pertaining to how they answered the standard FES-I. See Table 8.

ICON FES-I

The fourth optional version of the FES-I employed in this study was the ICON FES-I. This assessment tool has demonstrated robust internal consistency and test–retest reliability [2]. Although the ICON FES-I exists in two validated forms, this study did not use either. Instead, concentrating solely on the ICON FES-I tasks that aligned with those featured in the standard FES-I. The participants’ cumulative score obtained from the ICON FES-I was compared to those from the FES-I's standard, best, and worst iterations.

Of the 21 tasks in the ICON FES-I used in this study, the total score was calculated by first computing the average of the component tasks that had been segmented. For instance, the std. FES-I task 'Bathing and Showering' was separated within the ICON FES-I into two distinct tasks—the bathing task and the showering task. Similarly, the task 'Reaching for something above your head or on the Ground' was subdivided into four discrete questions within the ICON FES-I: 'Standing to reach for something', 'Standing to reach for something on a chair', 'Standing to reach

for something on a ladder', and 'Bending down to get something'. The cumulative sum of these averaged scores yielded the overall ICON FES-I score.

An additional important note, the ICON FES-I was missing three tasks in the English Google Form survey used with the British participants (walking on a slippery slope, walking on uneven pavement, and going to a social event). Therefore, *only* for the analysis that compared the British participants' ICON FES-I scores to the other three FES-I scores, were those three tasks omitted in the other FES-I versions as well. New scores were tabulated to accurately compare the difference between them.

Performance of tasks in the FES-I

The performance-based FES-I mirrors the standard FES-I format, featuring a four-point Likert scale and the same set of 16 tasks, seen in Table 9. However, it diverges by assessing participants' level of independence rather than concern. Participants can select from four options: 1. Independent, 2. Can complete the task with assistance/assistive device; 3. This task is irrelevant to me (or I would not perform it), or 4. I cannot perform this task. This scale was employed to categorise participants into three distinct FES-I interpretation groups: interpreters, nonmisinterpreters, and misinterpreters.

The misinterpreter group comprised of individuals who rated their performance level as 3 (i.e., 'this task is not relevant to me') or 4, (i.e., 'I cannot perform this task') in a specific FES-I task, yet also assigned that same task a score of 1 or 2 (i.e., 'not at all concerned' or 'somewhat concerned,' respectively) in the standard FES-I. Participants were categorised as misinterpreters when this pattern occurred for at least two tasks ($\geq$ 2 tasks).

Conversely, the nonmisinterpreters group included participants who rated a task at the same performance level as the misinterpreters (i.e., a score of 3 or 4) while also scoring that task as a 3 or 4 (i.e., fairly concerned or very concerned, respectively) on the standard FES-I. This non-misinterpretation pattern was used to assign participants to the nonmisinterpreters group when it was observed in at least one task or when the participant had more nonmisinterpreted tasks than misinterpreted ones.

The interpreter group encompasses participants who selected performance level 1 (i.e., independent) or 2 (i.e., can complete the task with assistance/assistive device) regardless of std. FES-I score. Participants with an equal number of misinterpretations and nonmisinterpretations were also placed in this group. Further details are available in Table 1.

Table 1: Criteria developed in the study outlining how participant distribution into each interpretation group was decided.

Criteria for Interpreters groups:	**Performance level chosen:**	**FES-I scores chosen:**	**Number of tasks needed to qualify for the group:**	**Number of Participants in the group**
Misinterpreters	Not Relevant or Cannot Perform	1 (Not at all concerned) or 2 (Somewhat concerned)	2	69 (39.2%)
Non-Misinterpreters	Not Relevant or Cannot Perform	3 (Fairly concerned) or 4 (Very concerned)	1 <u>*Or*</u> >Misinterpretations	40 (22.7%)
Interpreters	Independent or Need assistance/assistive device. <u>*Or*</u> Had an equal number of misinterpretations to nonmisinterpretations	Any score (1-4)	1	67 (38.07%)

HADS

Anxiety and depression were tested using the HADS, a valid and reliable instrument in both English and Arabic [8, 14]. The scale contains 14 questions split into two subscales targeting anxiety and depression (HADS-A and HADS-D, respectively). The total score for each was calculated and used to create four categories based on the level of anxiety and depression [5]. The categories were as follows: Category 1 (normal level, score 0–7), Category 2 (mild level, score 8–10), Category 3 (moderate level, score 11–15), and Category 4 (severe level, score > 15).

MOS-SSS

Social support level was measured using the MOS-SSS, which has high validity and internal consistency in English and Arabic [26, 52]. The total score for social support was calculated and used to create three social support categories: Category 1 (low social support level, score < 50), Category 2 (moderate social support level, score 50–75), and Category 3 (high social support level, score >75).

Ethical Approval

The present cross-sectional study titled "Evaluating Factors That Influence How Older People in the UK and KSA Report Fear of Falling: A Cross-Sectional Study" has received ethical approval from the relevant ethics committees of the respective institutions involved in the research. Ethical approval for this study was obtained from the University of Exeter Foundation (reference number: 1217953) in the UK. In Riyadh, Saudi Arabia, ethical approval was obtained from the Institutional Review Board of Sultan Bin Abdulaziz Humanitarian City (reference number: H-01-R-090).

The study was conducted according to the ethical principles outlined in the Declaration of Helsinki and the guidelines provided by the University of Exeter. It also complied with the ICH-GCP

Guidelines and all applicable national and institutional regulations and guidelines that govern clinical practice in Saudi Arabia.

Data Analysis

This study comprehensively analysed the data to explore factors influencing FES-I reporting among older individuals. Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 28.0 (IBM Corp., Armonk, NY, USA).

A central focus was on quantifying differences in FES-I scores to analyse the participants' reporting tendencies. These reporting tendencies could have been determined by either calculating the mean FES-I scores using absolute difference (e.g., worst FES-I - standard FES-I) or percentage difference {((e.g., worst FES-I – standard FES-I))/standard FES-I) x100}. Although both methods are effective, the percent difference calculation was used due to its ability to provide a relative assessment of disparity in relation to the original scores. This contextualises the difference by showing its significance relative to the initial value, offering a clear understanding of its importance. Opting for percent difference over absolute difference, when comparing quantities of similar scales and magnitudes, ensured a comprehensive and standardised evaluation of disparity would follow. This approach enhances the assessment of relative significance in relation to FES-I's original scores, particularly for assessing the degree of deviation between the scores [4; 28].

The reporting tendency percentage difference calculations were:

1) *Worst-to-std. FES-I reporting tendency:* {((Worst FES-I score - Std. FES-I score)/Std. FES-I score) x100}. This is the percentage difference between the worst FES-I score and the std. FES-I score in relation to the std. FES-I score.

2) *Std.-to-best FES-I reporting tendency:* {((Std. FES-I score - Best FES-I score)/Best FES-I score) x100}. This is the percentage difference between the std. FES-I score and the best FES-I score in relation to the best FES-I score.
3) *Worst-to-best FES-I reporting tendency:* {((Worst FES-I score - Best FES-I score)/Best FES-I score) x100}. This is the percentage difference between the worst FES-I score and the best FES-I score in relation to the best FES-I score.

The three ICON FES-I reporting tendencies were calculated similarly, with the ICON FES-I replacing the std. FES-I. However, this calculation was done separately for the British and Saudi participants' scores due to the aforementioned error in the British ICON FES-I.

The study analysed the quantitative variables using chi-square tests, t-tests, one-way repeated-measures ANOVA, and correlation analysis (Bonferroni correction and Tukey-Kramer test). These methods involved delving into the significant differences between the variables, disparities in FES-I scores, and the degree of deviation in reporting tendencies. Inferential statistics, encompassing regression and correlation analysis, were employed to explore the relationships between the variables. Regression analysis was utilised to identify the factors that impact FES-I scores and reporting, while correlation test results revealed the associations between dependent and independent variables, highlighting potential patterns. Greenhouse–Geisser correction was applied in cases where the sphericity assumption was violated. The Welch Statistic was employed when the homogeneity assumption (i.e., Levene's test) was violated. The assumption of normality remained unaffected. When correlation analysis was necessary, Spearman correlation was used instead of Pearson correlation because the included variables were categorical and continuous. For partial correlation, dummy variables for the categorical variables were used.

The categorisation of variables as independent or dependent is rooted in the study's research design. Dependent variables were the outcomes under scrutiny that the study aimed to measure based on changes in the independent variables. In this study, the FES-I scores, reporting tendencies, and interpretation groups were the focal points (i.e., dependent variables) under investigation in connection with factors such as psychological, sociodemographic, and mobility variables. The independent variables were potential influencers or explanations for variations in the dependent variables. The independent variables were:

1. Psychological factors (e.g., anxiety and depression)
2. Level of available social support
3. Sociodemographic characteristics (e.g., age, education level, ethnicity, health status, and disability/health condition)
4. Mobility and fall history (TUG and 6-month fall history)

The analytical framework involved probing into how these independent variables might impact the dependent variables. By scrutinising these variable relationships, the study attempted to unveil the intricate interplay of factors that contribute to fall-related concerns among older adults, thus fostering a holistic comprehension of the phenomenon.

Results

The following section will present the primary outcomes derived from the statistical analysis of the study's data.

Table 2 contains the descriptive analysis results of the sociodemographic survey. The majority of the participants in the study were: 1. women (76.7%), 2. retired (71.6%), 3. completed secondary education (34.1%), 4. owned their home/flat (86.4%), 5. lived with their partner and/or children

(63.6%), and 6. reported having good health (36.9%). Concerning the fall category, 59.1% of the participants reported having no falls in the previous six months, while 30.7% reported falling a couple of times (i.e., 1–2).

Table 2: Descriptive analysis of the study population.

Particulars	Frequency	Percent
Age		
60-64	33	18.8
65-69	34	19.3
70-74	27	15.3
75-79	19	10.8
80-84	20	11.4
85-89	26	14.8
90-94	14	8.0
95-99	3	1.7
Ethnicity		
Saudi	100	56.8
British	75	42.6
American	1	0.6
Gender		
Female	135	76.7
Male	41	23.3
Highest education Level		
Did not complete or attend school	35	19.9
Secondary School or High school graduate or GED	60	34.1
Some college/AA degree/Technical school training	29	16.5
College graduate (BA or BS)	38	21.6
Postgraduate degree (MD, PhD, JD)	14	8.0
Health status		
Poor	5	2.8
Fair	28	15.9
Good	65	36.9
Very Good	57	32.4
Excellent	21	11.9
Disability		
No	126	71.6
Yes	50	28.4
6 month Fall History		
No	104	59.1
Yes, a couple of times (1-2 times)	54	30.7
Yes, a few times (5 or less)	12	6.8
Yes, multiple times (more than 5 times)	6	3.4
Total	176	100.0

Aim 1: Analyse the Effect of Enhancing FES-I Clarity by Modifying its Instructions on Score Variations Across Different FES-I Iterations

The mean values of the three FES-I scores were significantly different, as shown in Figure 2. The mean score decreased from the worst FES-I (37.88) to the standard FES-I (32.44) and further

decreased in the best FES-I (24.68). Which showed that clear instructions did affect scoring. A pairwise comparison report confirmed the difference between the worst and std. FES-I (5.44, $P < 0.05$), the std. and the best FES-I (7.76, $P < 0.05$) and the best and worst FES-I scores (13.2, $P < 0.05$), were all statistically significant. The results of a one-way repeated-measures ANOVA also revealed a significant difference between the overall three FES-I scores ($F = 220.88$, $P < 0.001$).

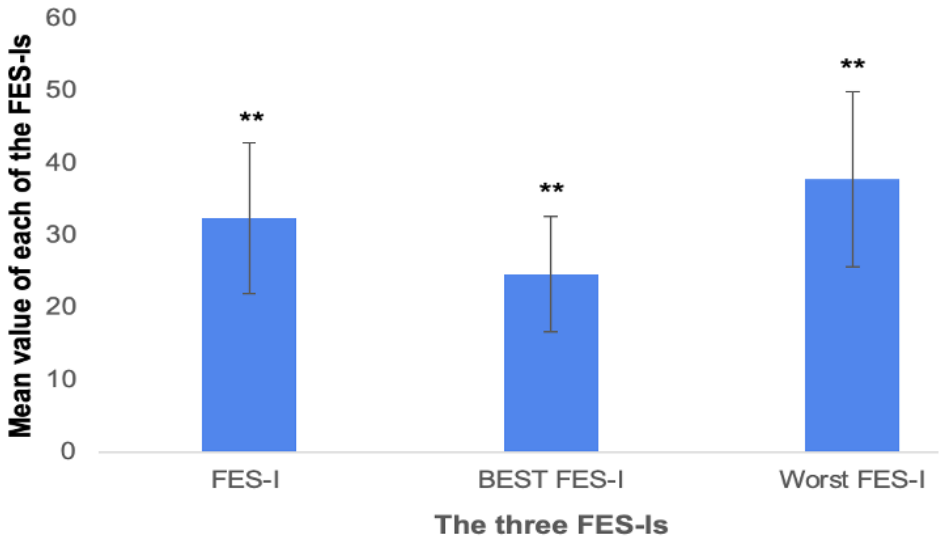

*Figure 2: Bar chart showing the mean values of each of the three FES-Is. * Difference in means is significant at the 0.05 level. ** Difference in means is significant at the 0.01 level.*

Figure 3 shows the difference in means between the three reporting tendencies using one-way repeated ANOVA. It identified a significant difference between all three reporting tendencies ($F = 68.52$, $P< 0.001$).

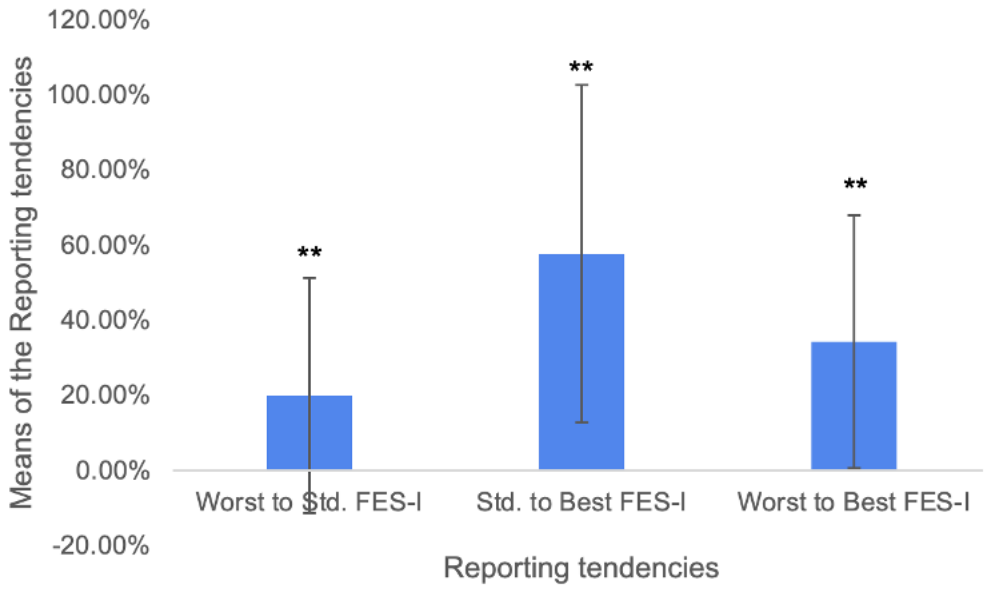

*Figure 3: Bar chart showing the mean values of each of the three reporting tendencies of the FES-Is. * Difference in means is significant at the 0.05 level. ** Difference in means is significant at the 0.01 level.*

448

449 Figures 4, 5 and 9 illustrate that the standard FES-I score has a strong, significant positive
450 correlation with the best FES-I, worst FES-I, and the std.-to-best FES-I reporting tendency. There
451 is also a significant correlation between the best FES-I and the worst FES-I, shown in Figure 6.
452 Figure 8 shows that the standard FES-I has a significant inverse correlation with worst-to-std. FES-
453 I.

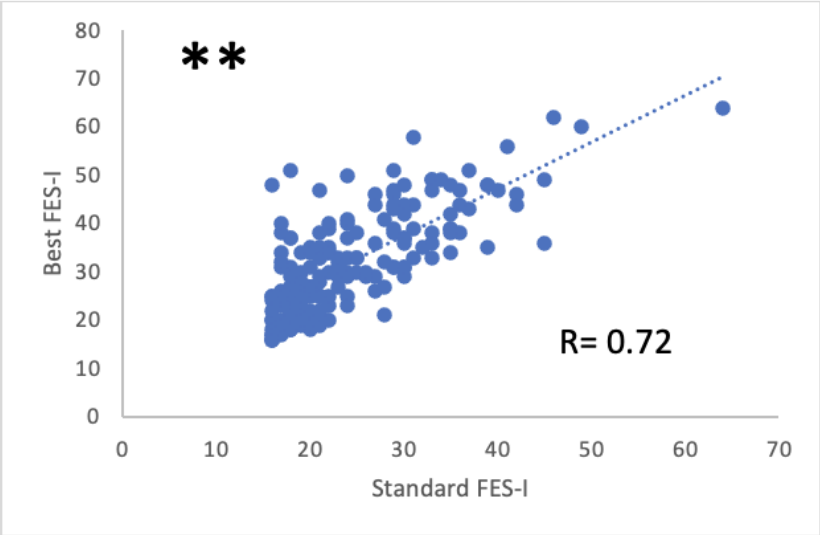

Figure 4: Scatter plot of the correlation between the Standard FES-I and Best FES-I. The R-value represents the correlation coefficient.. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

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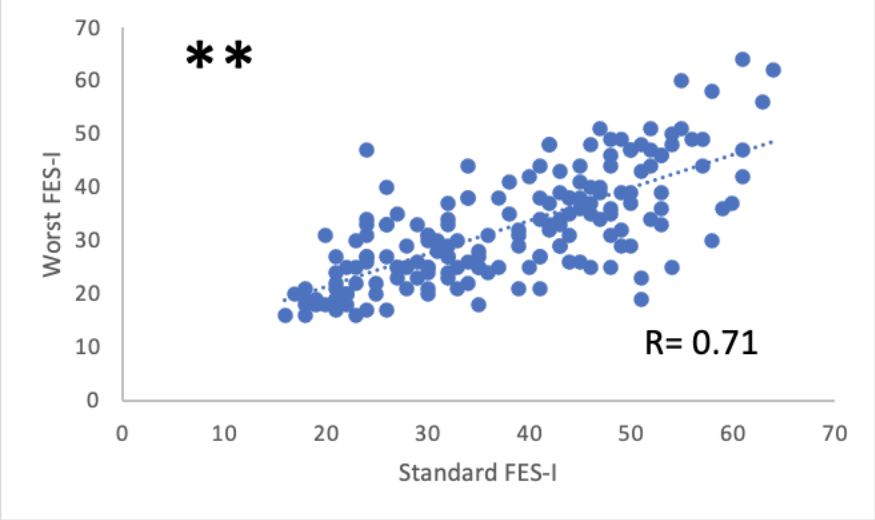

*Figure 5: Scatter plot of the correlation between the Standard FES-I and Worst FES-I. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

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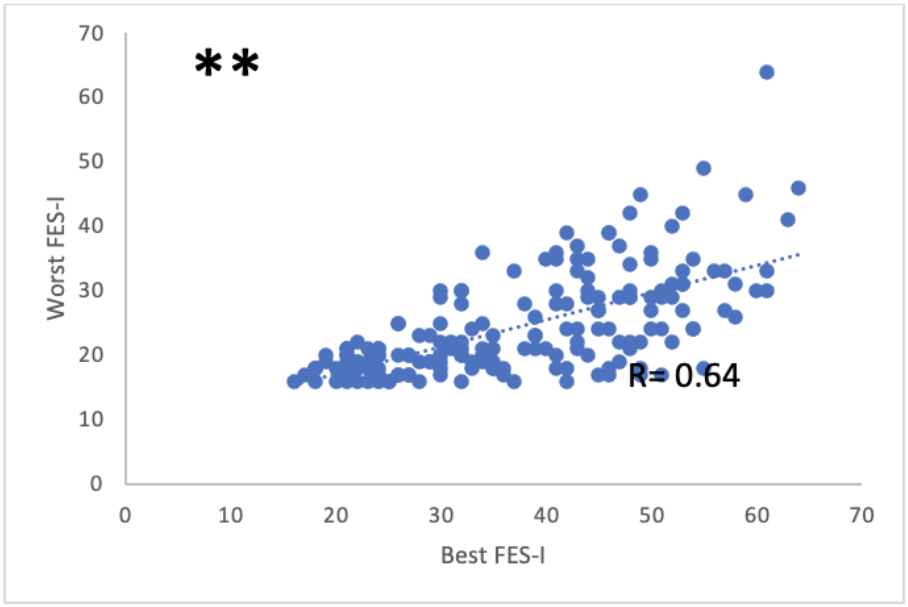

Figure 6: Scatter plot of the correlation between the Worst FES-I and Best FES-I.

**. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

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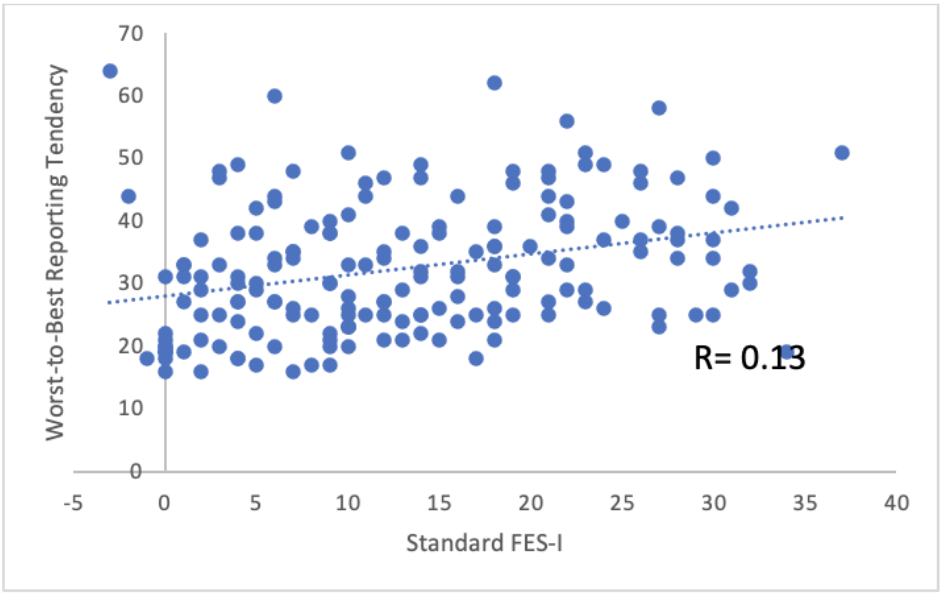

*Figure 7: Scatter plot of the correlation between the Standard FES-I and Worst-to-Best FES-I reporting tendency FES-I. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

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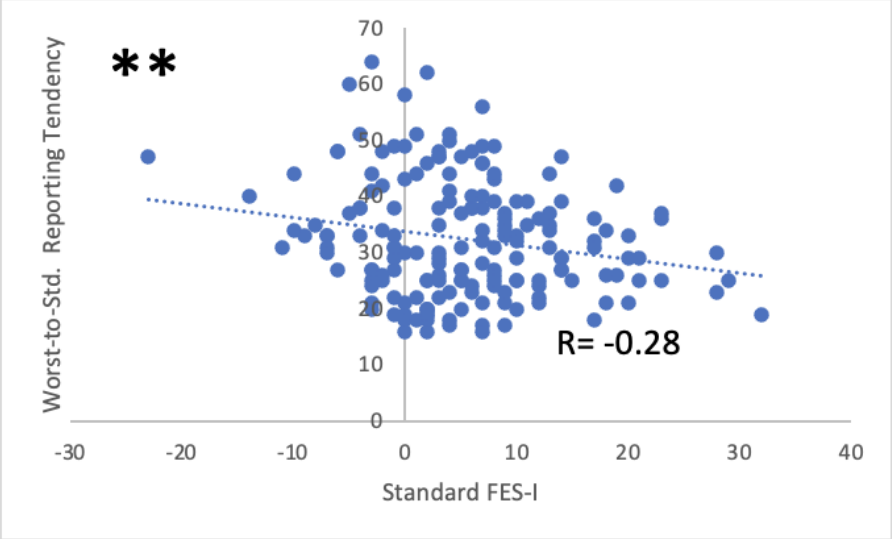

*Figure 8: Scatter plot of the correlation between the Standard FES-I and Worst-to-Std. FES-I reporting tendency FES-I. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

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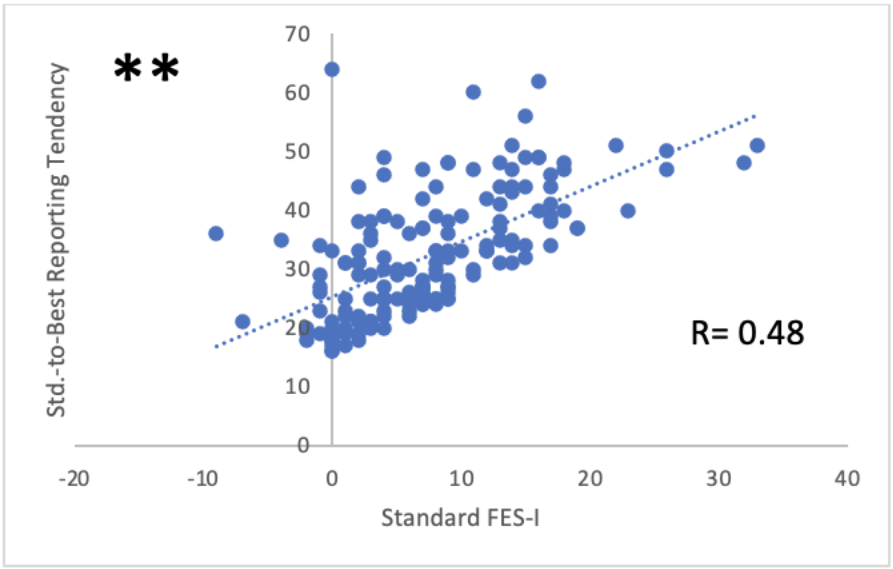

*Figure 9: Scatter plot of the correlation between the Standard FES-I and Std.-to-Best FES-I reporting tendency FES-I. *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).*

459

Aim 2: Examine the Significance of the ICON FES-I Compared to that of the FES-I Iterations

Moving on to the ICON FES-I, the difference in means between it and the three iterations of the FES-I, is shown in Figures 10 and 11. The mean value for the British participants' ICON FES-I (21.97) was relatively similar to the mean of the standard FES-I (20.66). However, compared to the worst FES-I score (27.388), it is noticeably lower, and to the best FES-I score (17.055), it is significantly higher. This is comparable to the Saudi participants for whom the mean values of the ICON FES-I (31.07) and the standard FES-I (32.04) were also quite close. The worst FES-I (36.94) and best FES-I (22.96) follow the same pattern of being higher and lower than the ICON FES-I, respectively.

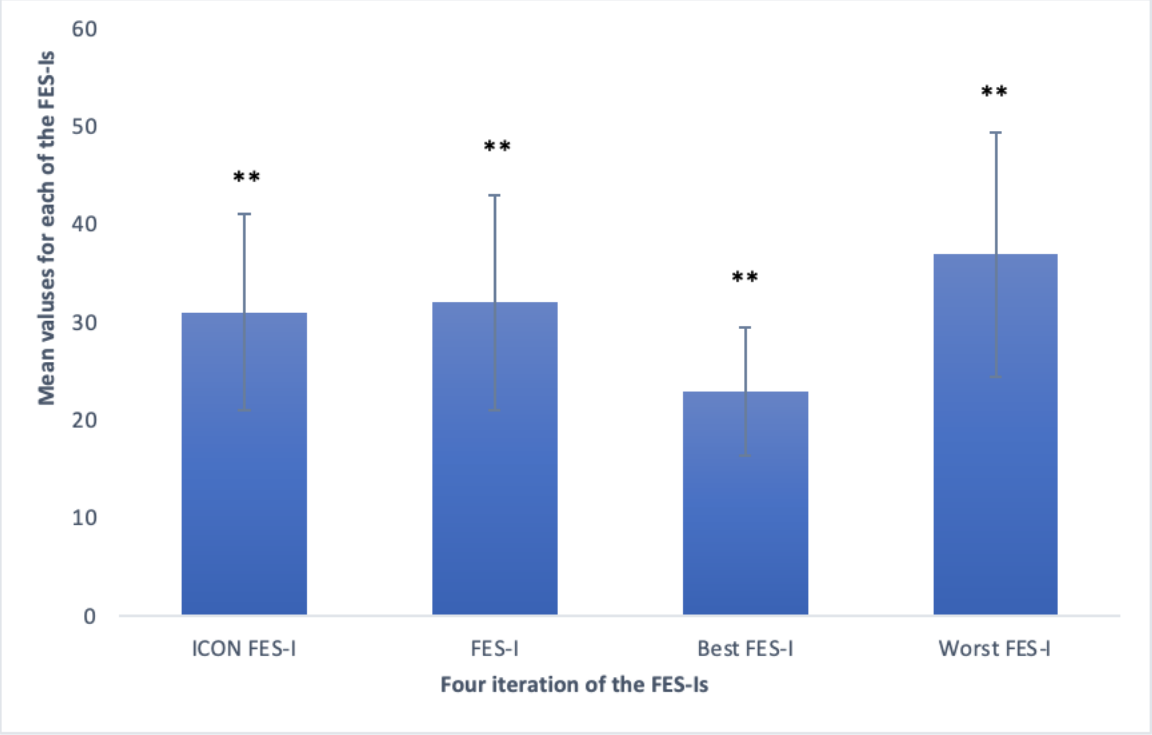

*Figure 10: Bar chart showing the mean values of the four FES-Is (British participants). * Difference in means is significant at the 0.05 level. ** Difference in means is significant at the 0.01 level.*

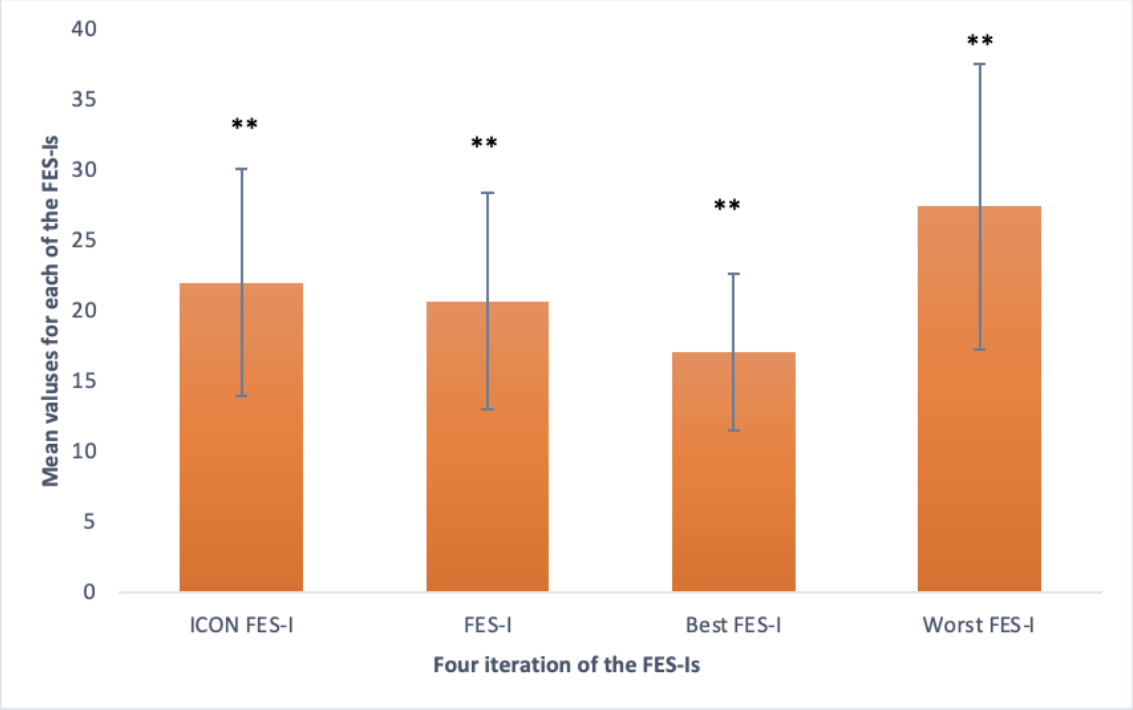

*Figure 11: Bar chart showing the mean values of the four FES-Is (Saudi participants). * Difference in means is significant at the 0.05 level. ** Difference in means is significant at the 0.01 level.*

Paired sample t-tests assessed the differences between the standard, best, and worst FES-I scores and the ICON FES-I score. Unsurprisingly, the difference in the mean value between the std. FES-I and ICON FES-I for both the British and Saudi participants were insignificant (-1.31, $P > 0.05$) and (0.973, $P > 0.05$), respectively.

For the Saudi participants, the mean difference was highly significant between the ICON FES-I, worst FES-I (5.86, $P < 0.001$), and best FES-I (-8.11, $P < 0.001$). Similarly, for the British participants, the mean difference was also highly significant between the ICON FES-I and best FES-I (-4.92, $P < 0.001$), and worst FES-I (5.41, $P < 0.001$). The one-way repeated-measures ANOVA results revealed a significant difference between the four FES-I scores ($F = 29.50$, $P < 0.001$). This was repeated twice for the ICON FES-Ireporting tendencies, once for the Saudi

participants and once for the British participants. The British and Saudi ICON FES-I reporting tendencies were calculated and then analysed using the one-way repeated measures ANOVA. They were both highly significant ($F = 16.39$, $P > 0.001$) and ($F = 15.28$, $P > 0.001$), respectively. This can be seen in Figures 12 and 13.

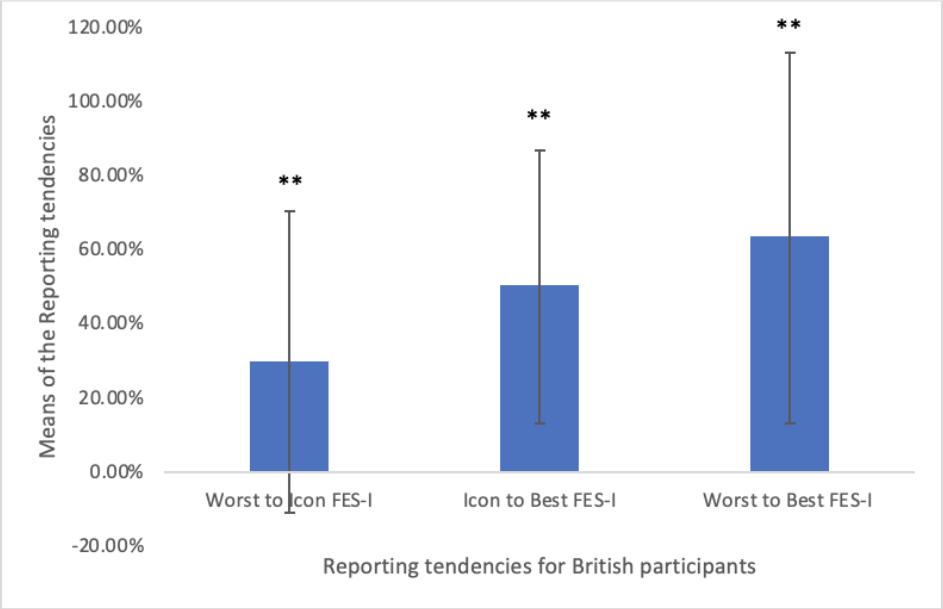

*Figure 12: Bar chart showing the mean values of the three reporting tendencies FES-Is (British participants). *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

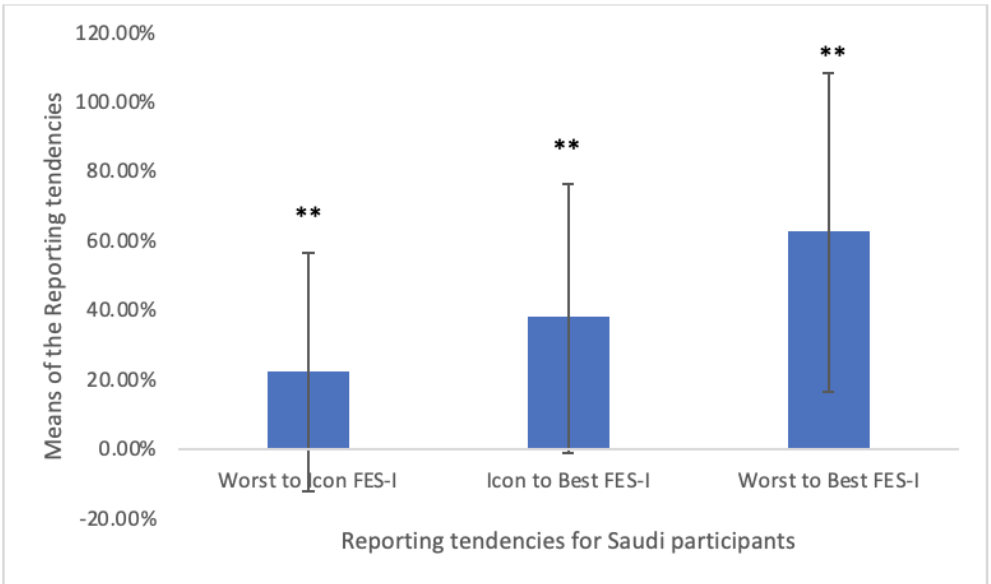

*Figure 13: Bar chart showing the mean values of the three reporting tendencies FES-Is (Saudi participants). *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

Aim 3: Evaluate the Relationships Between the Psychological Factors, Available Support, Sociodemographic Attributes and FES-I Scores While Accounting for Mobility and Fall History

To achieve this aim, a partial correlation analysis was done to describe the relationship between variables while controlling for TUG score and 6-month fall history categories.

*Table 3: Partial correlation of independent variables and the three FES-Is while controlling for TUG and Fall History. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).*

		Partial Correlation		
Control Variables		Standard FES-I scores	Best FES-I scores	Worst FES-I scores
TUG score **6 month Fall History category 1 (No falls)** **6 month Fall History category 2 (1-2 falls)** **6-month Fall History category 3 (<5 falls)** **6-month Fall History category 4 (>5 falls)**	Social Support Score	.145	.078	.006
	Anxiety Score	.206*	.113	.146
	Depression Score	.273**	.200*	.222*
	Disability/Health condition=1	.097	.132	.182*
	Age=60-64	.036	-.062	-.034
	Age=65-69	.062	.026	.040
	Age=70-74	.159*	.129	.067
	Age=75-79	-.002	.008	-.044
	Age=80-84	-.128	-.096	-.133
	Age=85-89	-.083	.008	.073
	Age=90-94	-.103	-.039	.002
	Ethnicity=Saudi	.271**	.060	.058
	Ethnicity=British	-.255**	-.050	-.051
	Highest Education Level=Did not complete or attend school	.094	.108	-.013
	Highest Education Level=Secondary School or High school graduate or GED	-.010	.000	.023
	Highest Education Level=College graduate (BA or BS)	.031	-.056	-.042
	Highest Education Level=Post graduate degree (MD, PhD, JD)	-.054	-.048	.037
	Health status=2	.179*	.185*	.185*
	Health status=3	-.046	-.105	-.047
	Health status=4	-.012	-.010	-.054
	Health status=5	-.148	-.089	-.109

All the participants (n = 176) were included in the partial correlation model, as shown in Table 3. The variables anxiety score, depression score, age = 70–74, ethnicity = Saudi, and health status = 2, were all positively correlated with the standard FES-I ($P<0.05$). There was a significant positive correlation between the best FES-I and worst FES-I with both depression score and health status = 2, (i.e., perceived health status 'fair'), ($P<0.05$). Interestingly, disability/health condition = 1 (i.e., presence of disability/health conditions) was only significantly correlated to the worst FES-I ($P<0.05$). This would mean that when controlling for participants' mobility and fall history, the changes in FES-I scores was still found to be associated with the changes in some of the independent variables.

Aim 4: Determine Whether there are Significant Distinctions and Associations Between the Independent Variables and FES-I Dependent Variables

This was done using one-way repeated-measures ANOVA to determine whether there would be a significant difference between the independent variable categories across the three reporting tendencies. Figures 14-17, represent the means of the different categories across the different tendencies. Additionally, multiple linear regression analysis was done to assess the significance of their relationship and whether the independent variable scores could be used to predict the reporting tendencies.

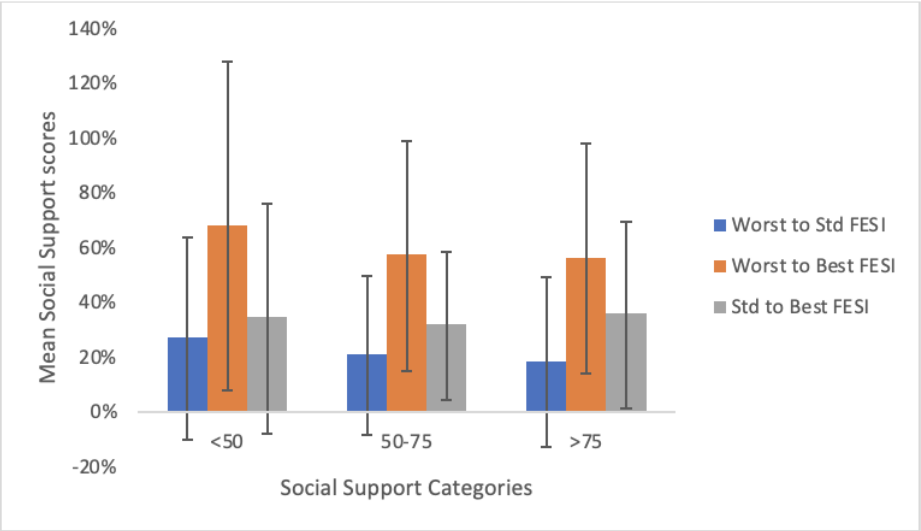

*Figure 14 shows the reporting tendencies across the social support categories. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

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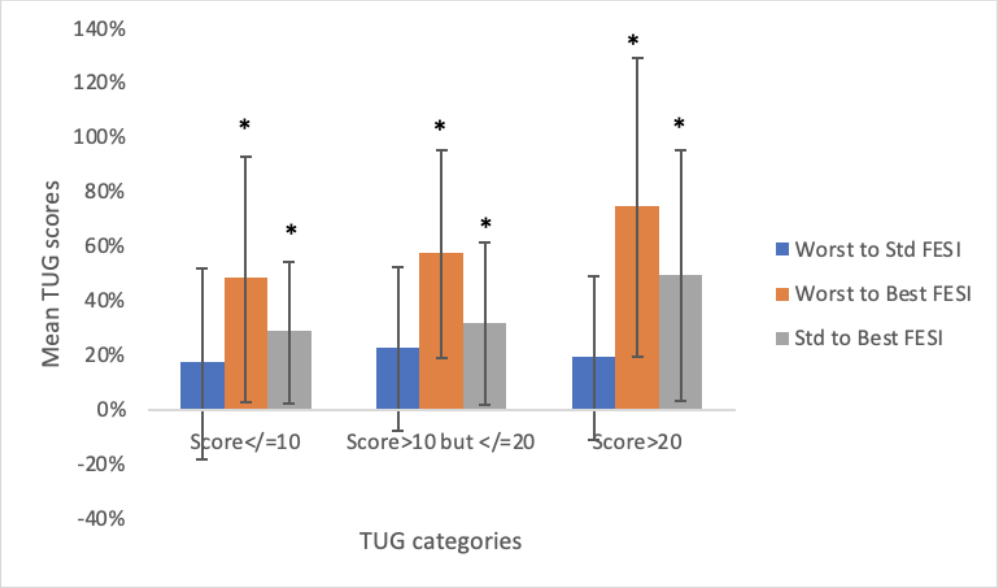

*Figure 15 shows the reporting tendencies across the TUG categories. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

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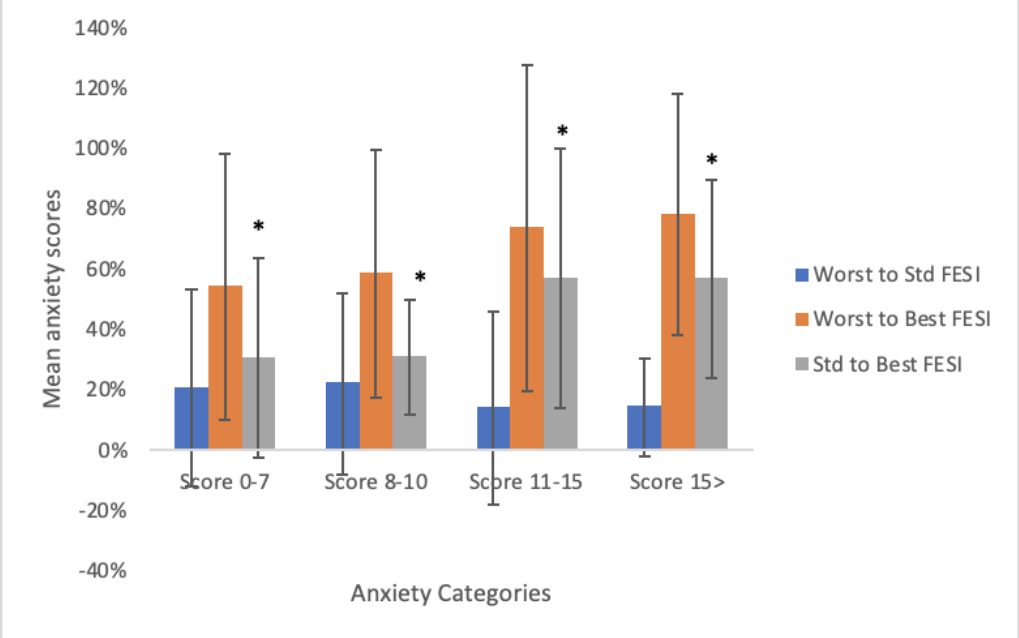

*Figure 16 shows the reporting tendencies across the anxiety categories. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

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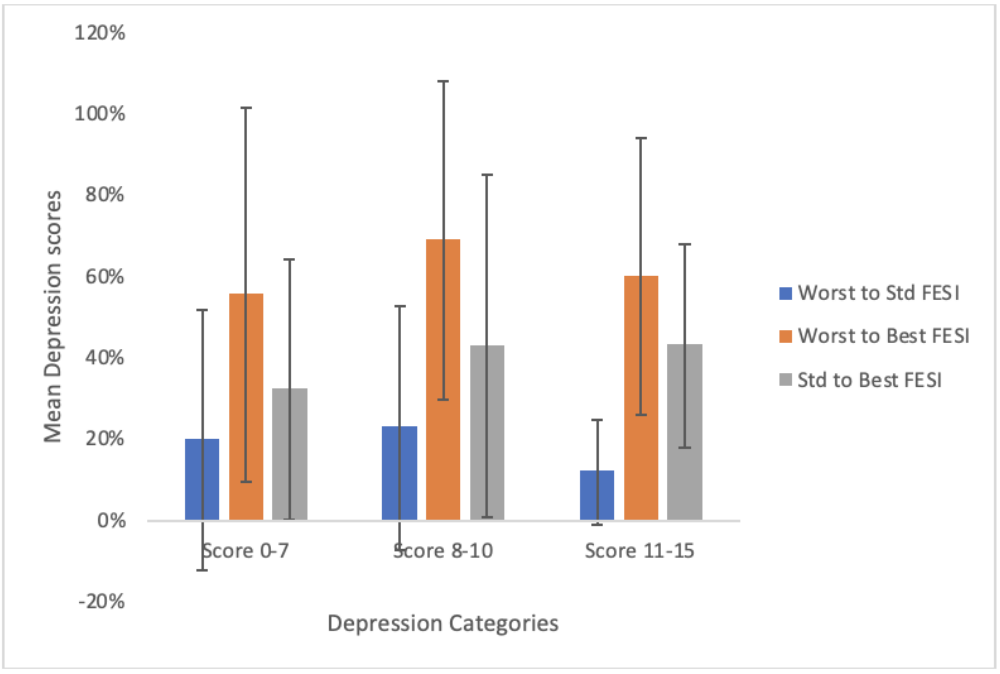

*Figure 17 shows the reporting tendencies across the depression categories. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

516

517 Figures 14 and 17 show no significant score differences (P > 0.05) between the social support or
518 depression categories across the different reporting tendencies. Figure 15 shows that the TUG
519 categories had a borderline significant difference between std.-to-best and worst-to-best FES-I
520 reporting tendencies (F = 2.97, P= 0.057) and (F = 3.04, P= 0.053), respectively.

521 Figure 16 shows that the anxiety categories were significantly different across the std.-to-best FES-
522 I reporting tendency (F = 4.61, P < 0.05).

*Table 4: Correlation interval of Spearman's rho (FES-I reporting tendencies and the independent variables). * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed)*

	Worst-to-Best FES-I Reporting Tendency	Worst-to-Std FES-I Reporting Tendency	Std-to-Best FES-I Reporting Tendency
Anxiety score	.130	-.53	.135
Depression score	.045	-.036	.134
Social Support score	-.029	-.139	.105
Tug score	.248**	.105	.160*
6 month Fall History categories	-.182*	-.039	-.218*
Age categories	.005	.200*	-.206*
Ethnicity=Saudi	.070	-.195*	.326**
Ethnicity=British	-.071	.180*	-.310**
Highest education Levels categories	.022	.073	-.037
Disability/Health Conditions categories	.054	.108	-.065
Health Status categories	-.061	-.021	-.056

523

524 Table 4 highlights that both the worst-to-best and std.-to-best FES-I reporting tendencies were
525 positively correlated with TUG and inversely correlated with the 6-month fall history variable
526 (P<0.05).

After establishing the relationship between the independent variables and the reporting tendencies, multiple linear regression was used to assess if those relationships were predictive of the changes in the reporting tendencies. The three linear regression models can be seen in Tables 5, 6, and 7.

Table 5: Coefficient Output (std.-to-best FES-I).

**. Significant at the 0.05 level (2-tailed). **. Significant at the 0.01 level (2-tailed). Excluded Variables: Interpreters=Interpreters, Age=60-64 and Highest Education Level=College graduate (BA or BS).*

Dependent variables		Model 1		
	Particulars	B	t	Sig.
Std. to Best FESI	(Constant)	-.198	-.545	.586
	TUG score	.009	3.505	0.00**
	Social Support score	.002	1.335	.184
	Depression score	.003	.360	.719
	Anxiety score	.014	1.989	.048*
	6 month Fall History	-.039	-1.212	.227
	Age=65-69	.013	.169	.866
	Age=70-74	.022	.273	.785
	Age=75-79	.025	.260	.796
	Age=80-84	.079	.741	.460
	Age=85-89	.054	.491	.624
	Age=90-94	.064	.508	.612
	Age=95-99	.238	1.138	.257
	Ethnicity=Saudi	.458	1.361	.175
	Ethnicity=British	.156	.477	.634
	Highest Education Level=Did not complete or attend school	-.171	-2.216	.028*
	Highest Education Level=Secondary School or High school graduate or GED	-.119	-1.811	.072
	Highest Education Level=Some college/AA degree/Technical school training	-.134	-1.647	.102
	Highest Education Level=Post graduate degree (MD, PhD, JD)	-.085	-.840	.402
	Interpreter=Non-Misinterpreters	-.144	-2.166	.032*
	Misinterpreter=Misinterpreter	-.135	-2.311	.022*
	R Square		.278	
	Adjusted R Square		.185	
	Std. Error of the Estimate		.3.04	
	F statistics		2.99	
	P value		.000	

Table 6: Coefficient Output (worst-to-best FES-I).

**. Significant at the 0.05 level (2-tailed). **. Significant at the 0.01 level (2-tailed). Excluded Variables: Interpreters=Interpreters, Age=60-64 and Highest Education Level=College graduate (BA or BS).*

Dependent variables		Model 1		
	Particulars	B	t	Sig.
Worst to Best FESI	(Constant)	.350	.667	.506
	TUG score	.014	3.643	.000**
	Social Support score	-.002	-.897	.371
	Depression score	-.011	-.758	.450
	Anxiety score	.011	1.050	.295
	6 month Fall History	-.101	-2.195	.030**
	Age=65-69	-.028	-.256	.798
	Age=70-74	-.068	-.568	.571
	Age=75-79	-.034	-.248	.805
	Age=80-84	.020	.128	.898
	Age=85-89	.149	.940	.349
	Age=90-94	.078	.428	.669
	Age=95-99	.057	.188	.851
	Ethnicity=Saudi	.310	.637	.525
	Ethnicity=British	.137	.290	.772
	Highest Education Level=Did not complete or attend school	-.146	-1.317	.190
	Highest Education Level=Secondary School or High school graduate or GED	.012	.131	.896
	Highest Education Level=Some college/AA degree/Technical school training	.012	.103	.918
	Highest Education Level=Post graduate degree (MD, PhD, JD)	.198	1.357	.177
	Interpreter=Non-Misinterpreters	-.035	-.366	.715
	Misinterpreter=Misinterpreter	.019	.323	.257
	R Square		.154	
	Adjusted R Square		.045	
	Std. Error of the Estimate		.440	
	F statistics		1.41	
	P value		.125	

532

Table 7: Coefficient Output (worst-to-std. FES-I).

**. Significant at the 0.05 level (2-tailed). **. Significant at the 0.01 level (2-tailed). Excluded Variables: Interpreters=Interpreters, Age=60-64 and Highest Education Level=College graduate (BA or BS).*

Dependent variables	Model 1			
	Particulars	B	t	Sig.
Worst to Std FESI	(Constant)	.550	1.524	.129
	TUG score	-.003	1.204	.230
	Social Support score	-.002	-1.640	.103
	Depression score	-.012	-1.256	.211
	Anxiety score	-.004	-.560	.576
	6 month Fall History	-.040	-1.257	.211
	Age=65-69	-.025	-.331	.741
	Age=70-74	-.086	-1.05	.296
	Age=75-79	-.095	-1.00	.318
	Age=80-84	-.095	-.897	.371
	Age=85-89	.026	.240	.810
	Age=90-94	-.019	-.149	.882
	Age=95-99	-.167	-.801	.424
	Ethnicity=Saudi	-.233	-.698	.486
	Ethnicity=British	-.076	-.233	-816
	Highest Education Level=Did not complete or attend school	-.002	-.032	.974
	Highest Education Level=Secondary School or High school graduate or GED	.058	.893	.373
	Highest Education Level=Some college/AA degree/Technical school training	.099	1.22	.244
	Highest Education Level=Post graduate degree (MD, PhD, JD)	.201	1.99	.047*
	Interpreter=Non-Misinterpreters	.102	1.55	.123
	Misinterpreter=Misinterpreter	.019	.323	.747
	R Square		.172	
	Adjusted R Square		.065	
	Std. Error of the Estimate		.302	
	F statistics		1.61	
	P value		.057	

Similarly to the results of the correlation analysis, Table 6 shows that the 6-month falls history (B= -0.101, P< 0.05) and TUG score (B = 0.014, P < 0.05) were both significant predictors of worst-to-best FES-I reporting tendency. TUG score was also a significant predictor of the std.-to-best FES-I reporting tendencies (B = 0.09, P< 0.05), but while the 6-month fall history was found to have a correlation with std.-to-best FES-I reporting tendencies, it was not its predictor.

Intriguingly, anxiety score was a predictor of std.-to-best reporting tendency (B = 0.14, P< 0.05). Two of the highest education level categories were also significant predictors for the reporting tendencies. As shown in Table 5, the category 'did not attend or complete school' inversely predicts std.-to-best FES-I reporting tendency (B = -0.171; P< 0.05). In Table 7, the 'post-graduate degree' category significantly predicted the worst-to-std. FES-I reporting tendency (B = 0.201, P < 0.05).

Aim 5: Determine Whether there is a Significant Difference Between Interpretation Groups Across FES-I Scores and Reporting Tendencies

To address this aim, one-way ANOVA with Bonferroni correction was used to determine whether there was a significant difference between the interpreter groups and the reporting tendencies. Figure 18 shows that the three interpretation groups had a strongly significant difference between them and the three FES-I scores (F = 8.54, P < 0.001). The interpretation groups had a significant difference in means when it came to their standard (F = 5.57, P < 0.05) and worst FES-I scores (F= 6.53, P< 0.05). Figure 19 illustrates no significant difference between the interpretation groups' means and their worst-to-best, worst-to-std., or std.-to-best FES-I reporting tendencies (P > 0.05). So, despite the three groups' scores significantly differing in their worst, std. and best FES-I scores, this was not reflected in their reporting tendencies.

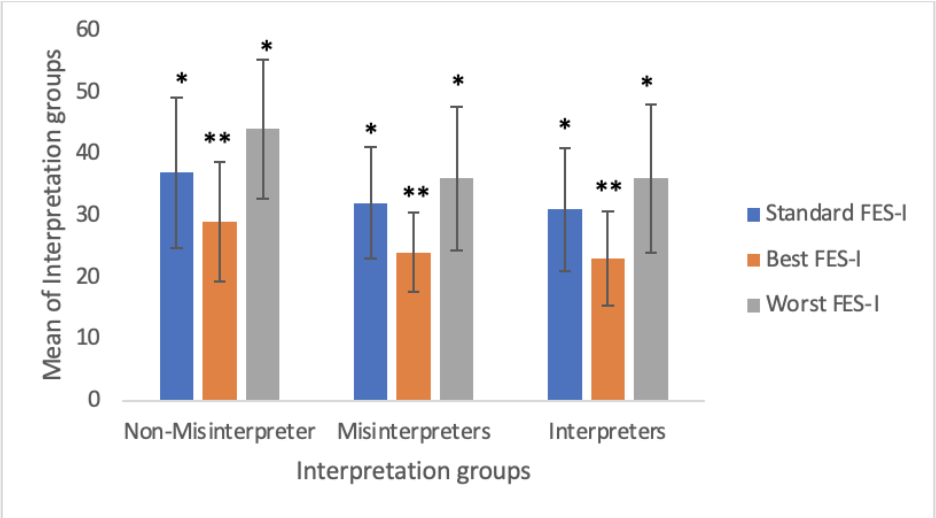

*Figure 18: Bar graph depicting differences between the means of the interpretation groups across the different reporting tendencies. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

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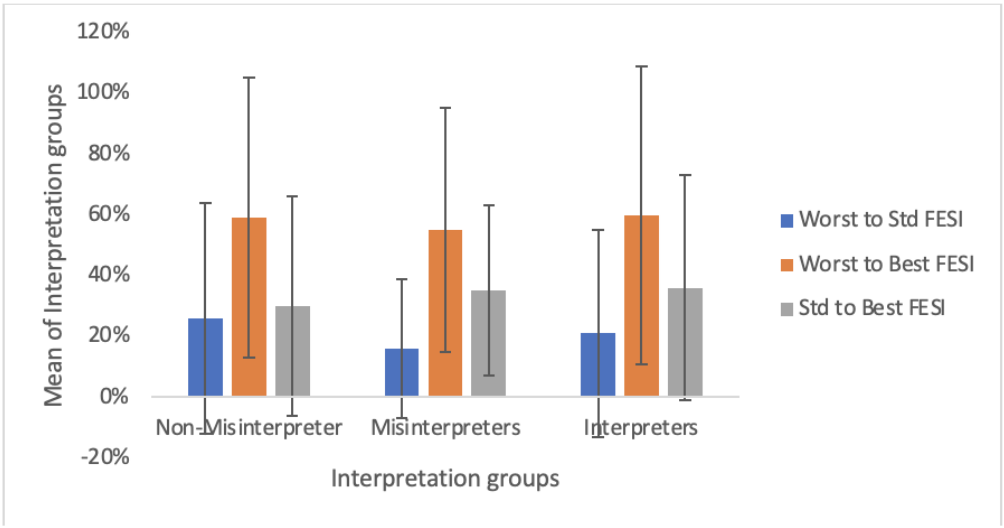

*Figure 19: Bar graph depicting the difference between the mean of the interpretation groups across the different FES-I scores. *. Difference in means is significant at the 0.05 level. **. Difference in means is significant at the 0.01 level.*

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558 **Aim 6: Determining the Predictive Value of Independent Variables in Categorizing**
559 **Participants into Interpretation Groups**

Multinomial logistic regression analysis was performed to assess the impact of several factors on the likelihood that participants would be misinterpreters or interpreters using the nonmisinterpreter group as the reference category. Three models were created. The first contained the psychological variables (i.e., anxiety categories, social support categories, and depression categories), the second included the participants' sociodemographic characteristics (i.e., health status categories, disability/health condition categories, age categories, and education categories), and the third model was the participants' mobility and fall history (i.e., TUG categories and 6-month fall history categories). These tables can be found in Section 2 of the Supplementary Data.

The first model's parameter estimates showed that psychological variables were significant predictors of the probability of whether a participant would be a misinterpreter or an interpreter compared to the probability of them being a nonmisinterpreter ($\chi2$ (14) = 33.87, $P < 0.05$). The social support categories ($\chi2$ (4) = 13.11, $P < 0.05$) and anxiety categories ($\chi2$ (6) = 20.35, $P < 0.05$) were found to have a significant impact. Specifically, among the different social support categories, only Category 1 has a significant negative impact on the probability of being an interpreter compared to the probability of being a nonmisinterpreter (B = 2.119, $P < 0.05$).

Next, for the anxiety score categories, Categories 1 (B = -17.07, $p < 0.001$), 2 (B = -17.99, $p < 0.001$), and 3 (B = -15.85, $p < 0.001$), were all found to have a significant negative impact on the probability of a participant being a misinterpreter compared to the probability of being a nonmisinterpreter. This was also the case for the three anxiety categories impact on the probability of being an interpreter compared to the probability of being a nonmisinterpreter (B = -18.28, $P < 0.001$), (B = -18.29, $P< 0.001$), and (B = -14.92, $P< 0.001$), respectively. The depression category was not significant ($\chi2$ (4) = 7.78, $P > 0.05$).

582 Model 1 explained between 17.5% (Cox and Snell R square) and 19.8% (Nagelkerke R squared)
583 of the proportion of the total variance in which the misinterpreter and interpreter groups compared
584 to the nonmisinterpreter group could be explained by the psychological variables, and correctly
585 classified 52.3% of cases.

586 This would mean that participants in the low social support category and normal, mild and
587 moderate anxiety level categories are much more likely to be in the nonmisinterpreters group over
588 the chances of being in one or both of the other two interpretation groups.

589 The second model's parameter estimates showed that the sociodemographic characteristics had a
590 borderline significant impact ($\chi 2$ (32) = 45.95, P = 0.05). With one exception, the
591 sociodemographic variables did not have statistically significant impacts on the probability of a
592 participant being an interpreter or misinterpreter compared to their probability of being a
593 nonmisinterpreter (P > 0.05). The health status categories were the variable found to be significant
594 ($\chi 2$ (8) = 18.75, P < 0.05). Among the different health status categories, only Category 2 (i.e.,
595 perceived health status 'fair') had a borderline significant positive impact on the probability of a
596 participant being an interpreter compared to their probability of being a nonmisinterpreter (B =
597 1.93, P = 0.053). Although the age categories were insignificant, Age Category 5 also had a
598 borderline significant positive impact on the probability of a participant being an interpreter
599 compared to their probability of being a nonmisinterpreter (B = 2.51, P = 0.050). The second
600 model explained between 23% (Cox and Snell R square) and 26% (Nagelkerke R squared) and
601 correctly classified 48.9% of cases.

602 This means that participants who describe their health status as fair are more likely to be in the
603 interpreters' group over the chances of being in the nonmisinterpreters' group.

Model 3's parameter estimates show that the mobility and fall history categories did not significantly impact the probability of a participant being an interpreter or misinterpreter compared to their probability of being a nonmisinterpreter ($\chi 2$ (10) = 8.55, P > 0.05).

Aim 7: Investigate the underlying rationale driving FES-I scores among older adults in the UK and the KSA.

The bespoke questionnaire in Table 8 focused on the rationales behind the participants' answers to the std. FES-I.

Table 8: Variable frequency in the Bespoke questionnaire.

Particulars	Frequency	Percent
Is Assistance needed with any of the FESI tasks		
No	81	46.0
Yes	93	52.8
Missing	2	1.1
I am only concerned during tasks where I receive assistance		
Strongly Agree/ Agree	23	13.1
Neutral	10	5.7
Strongly Disagree/ Disagree	143	81.3
My initial answers to the FESI reflected when I felt my best and am in a familiar environment		
Strongly Agree/ Agree	135	76.7
Neutral	19	10.8
Strongly Disagree/ Disagree	22	12.5
Fear is a main barrier when it comes to performing these tasks		
Strongly Agree/ Agree	72	40.9
Neutral	11	6.3
Strongly Disagree/ Disagree	93	52.8
Even with tasks I can perform alone, I prefer to have assistance		
Strongly Agree/ Agree	44	25.0
Neutral	12	6.8
Strongly Disagree/ Disagree	120	68.2
I will only preform certain tasks if I have assistance		
Strongly Agree/ Agree	92	52.3
Neutral	7	4.0
Strongly Disagree/ Disagree	77	43.8
I will not perform certain tasks even with assistance		
Strongly Agree/ Agree	39	22.2
Neutral	7	4.0
Strongly Disagree/ Disagree	130	73.9
Total	176	100.0

Most of the participants, 52.8%, answered the FES-I while imagining assistance being given with at least one task. When it came to what the participants pictured when they answered the FES-I, 76.7% of them said they answered with the mindset that they were feeling their best, had any assistance they needed, and were in a familiar environment. Over half of the participants (52.3%) agreed with the statement that there were certain FES-I tasks they would only do with assistance. Still, a large majority (73.9%) disagreed with the statement that there were some tasks they would not perform even with help. Furthermore, concerns about falling were not limited to the tasks that require assistance, as shown by the 81.3% of participants who disagreed with question 2 (see Table 8). This would indicate that concerns about falling are shaped by the need for assistance or lack thereof and other personal factors.

Concerning the survey question 'Fear is a main barrier when it comes to performing these tasks', 52.8% of the participants disagreed, 40.9% agreed, and 6.3% were neutral. This highlights how the meaning behind fall efficacy and what the FES-I is asking is unclear to participants. Whether the rationale behind the scoring choices was built on reasonable fear, anxiety-based or mobility/balance-based concerns, appears to be participant and task-specific.

Table 9: Participants' scores on the Performance FES-I.

Performance Survey regarding FES-I tasks:	***Cleaning the house***	*Dressing and undressing*	***Preparing a simple meal***	*Showering/ Bathing*	***Going shopping***	*Getting in or out of a chair*	***Going up or down the stairs***	*Walking in the neighbor hood*	***Taking something from above or reaching down***	*Answering the phone before it stops ringing*	***Walking on a slippery surface***	*Visiting a friend or relative*	***Walking in a crowded place***	*Walking on a rocky or uneven pavement*	***Walking up or down a slope***	*Going to a social event*
Score 1 (Independent)	38 (20.2%)	143 (76.1%)	81 (43.1%)	121 (64.4%)	88 (46.8%)	150 (79.8%)	72 (38.3%)	93 (49.5%)	96 (51.1%)	86 (45.7%)	59 (31.4%)	99 (52.7%)	84 (44.7%)	62 (33%)	66 (35.1%)	96 (51.1%)
Score 2 (Need assistance/device)	36 (19.1%)	29 (15.4%)	40 (21.3%)	48 (25.5%)	66 (35.1%)	22 (11.7%)	75 (39.9%)	69 (36.7%)	52 (27.7%)	14 (7.4%)	62 (33%)	67 (35.6%)	67 (35.6%)	85 (45.2%)	90 (47.9%)	68 (36.2%)
Score 3 (Not relevant)	93 (49.5%)	0	52 (27.7%)	0	11 (5.9%)	0	14 (7.4%)	6 (3.2%)	9 (4.8%)	72 (38.3%)	23 (12.2%)	5 (2.7%)	13 (6.9%)	13 (6.9%)	8 (4.3%)	5 (2.7%)
Score 4 (Cannot perform)	6 (3.2%)	1 (0.5%)	0	4 (2.1%)	8 (4.3%)	1 (0.5%)	12 (6.4%)	5 (2.7%)	16 (8.5%)	1 (0.5%)	29 (15.4%)	2 (1.1%)	9 (4.8%)	13 (6.9%)	9 (4.8%)	4 (2.1%)

Table 9 displays the performance level for each task, with most participants choosing independent as their level of performance for 11 out of the 16 tasks. The tasks 'going up or down the stairs,'

‘walking on a slippery surface,’ ‘walking up or down a slope,’ and ‘walking on a rocky or uneven pavement’ all had the ‘need assistance/assistive device’ as the most-picked option. ‘Not relevant’ was often chosen for ‘cleaning the house’ and the second-most-picked response for ‘answering the phone before it stops ringing.’ ‘Cannot perform’ was not the highest-picked response for any of the tasks.

Discussion

The two primary research aims were to investigate the ambiguity that affects the FES-I scale and, by extension, the ICON FES-I by assessing the impact of increasing clarity in the instructions. The findings revealed that the participants’ standard FES-I and ICON FES-I scores significantly differed from those in the worst and best FES-I iterations. This established that the specificity of the instructions affected how older adults interpreted and scored their level of concern. The mean FES-I scores consistently decreased as the scenarios changed from the worst FES-I to standard FES-I and best FES-I iterations. These trends are corroborated by the statistically significant differences between each of the FES-I scores, with analysis confirming a substantial difference between each one and the overall significance of these variations, signifying that the parameters set by stating the presence or absence of assistance options, significantly influenced participants’ concerns.

The findings confirmed the sensitivity of the FES-I to contextual shifts. The almost equal mean values between the ICON and FES-I scores, for Saudi and British participants, were especially interesting. The standard FES-I was the second questionnaire the participants completed, while the ICON was the last. Despite six questionnaires between them, the participants still answered both relatively the same. This further strengthens the claim that people interpret and score the FES-I based on their own rationale when presented with the same unclear instructions, even when the

tasks are depicted. These results have implications for both research and clinical applications on older adults, emphasising the need for nuanced instructions that account for various scenarios and contain specific parameters for how the tasks are done. These changes will enable a more genuine understanding of what participants think regarding their perceived risk of falling. It also highlights that the ICON FES-I suffers from the same issues as the standard version, even when visual elements are incorporated.

The secondary aims of this study were to uncover the role of the independent variables on FES-I scores, reporting tendencies and the interpretation groups. This was first achieved by investigating the independent variables' correlation with the three FES-I scores when controlling for participants' mobility and fall history. The findings emphasised that perceived health status (specifically, 'fair' health) and depression scores exhibited significant correlations with all three FES-I iteration scores. Anxiety, conversely, only displayed significant associations with the standard and worst FES-I scores. At the same time, the presence of a disability or health condition was only linked to the worst FES-I. This indicates that the utilisation of objective measures and/or fall history adjacent to or directly against FES-I scores may be a flawed approach, especially when the participants' specific circumstances are not considered.

Secondly, by comparing the means of the independent variable categories across reporting tendencies, TUG and anxiety were the only ones that exhibited significant differences. These significant differences were observed in the transition from the std.-to-best FES-I reporting tendencies, with no significant changes when deviating from worst-to-std. This suggests that for a considerable number of participants across the different TUG and anxiety categories, the confirmation that assistance and assistive devices were available substantially influenced their FES-I scores.

Thirdly, it is clear that this rationale extends to the associations between the independent variables and participants' FES-I reporting tendencies. TUG scores and 6-month fall history responses were significantly correlated with the worst-to-best and the std.-to-best FES-I reporting tendencies, albeit in opposite directions (TUG positively, fall history negatively). This implies that the higher the TUG scores (indicating a higher fall risk), the greater the deviation between the worst and std. FES-I to the best FES-I, meaning that participants' FES-I scores change significantly with the reassurance that assistance and devices are available. For fall history, the inverse relationship would suggest that the original standard FES-I scores were already given with the presumption that assistance or assistive devices were available. Meaning those with a greater history of falls would have a smaller deviation between standard to best FES-I scores compared to the original best FES-I scores (i.e., std.-to-best reporting tendency).

Moreover, linear regression analysis results further corroborated the importance of the independent variables as predictors. TUG scores, anxiety scores, and the highest education level categories were all found to be significant predictors of the degree of deviation between standard and best FES-I scores, with the regression model having a p-value of less than 0.001. This emphasises the multifaceted nature of how individuals perceive and respond to these questions and the role of diverse factors in shaping these interpretations.

Having established that personal factors differ between and influence the FES-I and its reporting tendency, this study addressed the impact of interpretation groups on FES-I reporting tendencies. Although the interpretation groups did not significantly differ concerning the reporting tendencies, they exhibited significant differences in their mean scores across the FES-I iterations.

The predictive modelling results revealed the vital role of psychological factors (e.g., social support and anxiety) and sociodemographic attributes (e.g., rating health status as fair) in determining whether an individual will understand the FES-I questions as an interpreter or misinterpreter compared to nonmisinterpreters. This result, combined with the fact that the TUG and fall history model were insignificant, is the greatest supporter of this study's rationale. This, more so than the rest of the analysis, shows how much the interpretation of the FES-I is susceptible to cognitive bias. The mind's interpretation of the FES-I is seen through the lenses of one's own life experiences and knowledge, affecting what concern, fall efficacy, and even fear mean to them.

The study's final aim delved into participants' cognitive processes when responding to the standard FES-I. The results revealed that the majority of participants (52.8%) needed assistance with at least one task when responding to the FES-I, suggesting that participants view their fall-related efficacy in the context of task-specific assistance. This highlights that perceived efficacy is closely tied to the availability and need for help. Furthermore, most participants' responses indicated that although they acknowledged the potential need for assistance, 73.9% would not avoid performing tasks if help was unavailable. Participants frequently adopted a comprehensive approach to assessing their fall-related efficacy, integrating personal well-being, environmental familiarity, and assistance availability. This underscores the importance of disentangling the distinct dimensions of the FES-I—fear-driven concerns and performance-related considerations encompassing mobility and balance.

This study must acknowledge the irony of critiquing one subjective self-reporting scale while using others. However, the study maintains that its core intent is to neither belittle the FES-I nor undermine the substantial threat falls pose to the well-being of older adults. Instead, the study highlights the importance of self-reporting scales as convenient tools for assessing diverse

concerns and viewpoints. These scales offer an accessible means for individuals from varied backgrounds to effectively express their perspectives. However, this pragmatic utility should not discourage the pursuit of continued improvements or critical inquiry into potential issues with the use of the FES-I. The interplay of cognitive biases, psychological factors, sociodemographic attributes, and physical performance intricately shape people's FoF perceptions. The responsiveness of FES-I reporting to wording variations accentuates the pivotal role of meticulous questionnaire design in capturing accurate data.

Study Limitations

- To create a realistic interpretation of the FES-I tasks for the Saudi participants, the 'walking around the neighbourhood' task was expanded to include walking around the backyard and walking to the mosque.
- The TUG for the Saudi participants was obtained from the physical therapists assigned to the patients; whereas the researcher administered the TUG to the British participants in the same facility they were recruited from.
- Two of the Saudi participants were from the inpatient facility in SBAHC.
- The study focused on a specific cultural context (South-West Britain, UK, and Riyadh, KSA), limiting the generalizability of findings to other populations.
- The cross-sectional design precludes causal inferences, and self-report measures might introduce response biases. Future longitudinal research could establish causal relationships.

Conclusions

In conclusion, this study effectively met its aims, revealing the multifaceted factors that shape FES-I reporting among older adults. Differences in reporting tendencies across FES-I versions

highlight the importance of having a clear questionnaire design for a comprehensive assessment. The interplay between cognitive biases, psychological factors, sociodemographic attributes, and physical performance shapes FoF perceptions and FES-I reporting. This stresses the significance of precise questionnaire construction for accurate data collection. Given the pivotal role of the FES-I in fall prevention and management programs, understanding its scope and addressing potential issues is critical. This recognition underscores the need for a comprehensive understanding to optimise its use in safeguarding older adults' well-being. By unravelling these complex relationships, this study enhances the understanding of how cognitive biases and other factors collectively influence FES-I reporting tendencies among older adults. These insights offer valuable guidance for healthcare practitioners, researchers, and others, working to enhance intervention strategies intended to address the FoF and fall safety programs. Subsequent research should probe into the long-term effects of other factors on FES-I reporting and related outcomes.

List of Abbreviations

ANOVA, Analysis of variance

BA, Bachelor's

FES-I, Falls Efficacy Scale-International

FoF, Fear of falling

HADS, Hospital Anxiety and Depression Scale

KSA, Kingdom of Saudi Arabia

Std., Standard

TUG, Timed Up and Go

UK, United Kingdom

Declarations

Before data collection, all participants were fully informed about the study's purpose, procedures, potential risks, and benefits. Each participant provided informed consent by checking a box on the first page of the Google Form Survey outlining their consent, understanding, and willingness to participate. Participants were informed that they could withdraw from the study at any time.

Consent for Publication

Availability of Data and Materials

All data generated or analysed during this study are included in this article and its supplementary data.

Competing Interests

The author declares that she has no competing interests.

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Authors' Contributions

SA gathered, analysed, and interpreted the participants' data regarding the FES-I and all subsequent scales and questionnaires. SA was the sole contributor in writing the research article. SA read and approved the final research article.

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Supplementary Data

Section one

Ethical Declarations

Data Handling and Confidentiality

Data collected during the study were stored securely, and access was restricted to the research team. All data were deidentified and coded to ensure confidentiality. Only aggregated data were analysed and reported without disclosing individual participants' identities.

Optional Iconographic FES-I

Permission was obtained from copyright holder for use of the Iconographic FES-I, and its images to use and adapt research purposes.

Modified FES-I

Any modifications or adaptations made to the FES-I were performed in compliance with copyright regulations, and full credit was given to the original authors and developers of the scale. Additional materials or questionnaires used in the study were also properly sourced and cited. We ensured that this cross-sectional study was conducted with the utmost respect for the rights, well-being, and privacy of the participating older adults in both the UK and the KSA by obtaining ethical approval and adhering to the highest ethical standards.

HADS

The Arabic and English versions were obtained with permission from the Mapi Research Trust and GL Assessment Ltd. (Work order No. [2306350]).

Section two

Tables

Multinominal Regression Table (Model 1):

		B	df	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Misinterpreters	Intercept	16.19	1	.000		
	Anxiety score categories=1	**-.17.07**	**1**	**.000**	1.47E-9	1.02E-9
	Anxiety score categories=2	**-17.99**	**1**	**.000**	6.05E-10	3.92E-7
	Anxiety score categories=3	**-15.85**	**1**	**.000**	1.22E-8	1.41E-6
	Anxiety score categories=4	0[b]	0			
	Depression score categories=1	1.20	1	.335	.290	38.16
	Depression score categories=2	1.70	1	.179	.459	65.81
	Depression score categories=3	0[b]	0			
	Social support categories=1	.960	1	.283	.453	15.05
	Social support categories=2	.786	1	.123	.809	5.95
	Social support categories=3	0[b]	0			
Interpreters	Intercept	16.22	1	.000		
	Anxiety score categories=1	**-18.28**	**1**	**.000**	9.051E-10	1.461E-7
	Anxiety score categories=2	**-18.39**	**1**	**.000**	8.56E-10	1.24E-7
	Anxiety score categories=3	-14.92	1		3.32E-7	3.32E-7
	Anxiety score categories=4	0[b]	0			
	Depression score categories=1	2.12	1	.100	.665	104.62
	Depression score categories=2	.980	1	.456	.202	35.09
	Depression score categories=3	0[b]	0			
	Social support categories=1	**2.12**	**1**	**.012**	1.60	43.36
	Social support categories=2	.490	1	.373	.556	4.80
	Social support categories=3	0[b]	0			

Model Fit and Likelihood Ratio Tests

	Chi-square	df	Sig.
Final	33.87	14	.002
Anxiety categories	20.35	6	.002
Depression categories	7.77	4	.100
Social Support categories	13.11	4	.011

Model Summary[a]

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	80.353[a]	.175	.198

Classification Table[b]

Observed	Predicted			
	Interpreters			Percentage Correct
	Non-misinterpreters	Misinterpreters	Interpreters	
Non-misinterpreters	8	29	3	20%
Misinterpreters	5	54	10	78.3%
Interpreters	4	33	30	44.8%
Overall Percentage	9.7%	65.9%	24.4%	52.3%

Multinominal Regression Table (Model 2):

		B	df	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Misinterpreters	Intercept	19.20	1	.995		
	Age=1	-.18.00	1	.995	.000	.[b]
	Age=2	-17.99	1	.995	.000	.[b]
	Age=3	-17.77	1	.995	.000	.[b]
	Age=4	-18.33	0	.995	.000	.[b]
	Age=5	-16.38	1	.996	.000	.[b]
	Age=6	-18.62	1	.995	.000	.[b]
	Age=7	-18.35	1	.995	.000	.[b]
	Age=8	0[c]	0			
	Highest education level=1	-1.38	1	.154	.038	1.67
	Highest education level=2	-.531	1	.575	.092	3.76
	Highest education level=3	-.984	1	.342	.049	2.85
	Highest education level=4	.191	1	.851	.165	8.90
	Highest education level=5	0[c]	0			
	Health status=1	-17.60	1	.995	.000	.[b]
	Health status=2	-.322	1	.760	.092	5.71
	Health status=3	.299	1	.665	.348	5.22
	Health status=4	.184	1	.792	.306	4.73
	Health status=5	0[c]	0			
	Disability/Health Condition=0	-.234	1	.688	.252	2.49
	Disability/Health Condition=1	0[c]	0			
Interpreters	Intercept	.141	1	.913		
	Age=1	.310	1	.735	.228	8.16
	Age=2	.351	1	.698	.241	8.38
	Age=3	.054	1	.995	.167	6.68
	Age=4	-.039	1	.967	.151	6.13
	Age=5	2.51	1	.053	.965	155.8
	Age=6	.084	1	.923	.199	5.95
	Age=7	.825	1		2.28	2.28
	Age=8	0[c]	0			
	Highest education level=1	-1.28	1	.203	.038	1.99
	Highest education level=2	-.527	1	.593	.085	4.08
	Highest education level=3	-1.34	1	.215	.032	2.18
	Highest education level=4	-.351	1	.742	.087	5.69
	Highest education level=5	0[c]	0			
	Health status=1	-17.60	1	.995	.000	.[b]
	Health status=2	-.424	1	.733	.057	7.46
	Health status=3	1.93	1	.050	.997	47.60
	Health status=4	.422	1	.570	.355	6.55
	Health status=5	0[c]	0			
	Disability/Health Condition=0	.163	1	.778	.379	3.66
	Disability/Health Condition=1	0[c]	0			

985

Model Fit and Likelihood Ratio Tests

	Chi-square	df	Sig.
Final	45.95	32	.052
Age	17.82	14	.215
Highest education level	8.78	8	.361
Health status	18.75	8	.016
Social Support categories	.642	2	.725

Model Summary[a]

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
2	259.72[a]	.230	.260

Classification Table[b]

Observed	Predicted			
	Interpreters			Percentage Correct
	Non-misinterpreters	Misinterpreters	Interpreters	
Non-misinterpreters	8	29	3	20%
Misinterpreters	5	54	10	78.3%
Interpreters	4	33	30	44.8%
Overall Percentage	9.7%	65.9%	24.4%	52.3%

Section 3

Additional Files

Excel worksheet

Excel worksheet containing all the variables and information. Click either the icon or the hyperlink to open the database.