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A Retrospective Review of Psychosocial Outcomes After Microprocessor Knee Prescription

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1 **A retrospective review of psychosocial outcomes following microprocessor knee**
2 **prescription**

3 **Abstract**

4 **Study Design:** Retrospective Analysis

5 **Introduction:** Microprocessor knees have been shown to improve gait biomechanics and to
6 reduce the frequency of falls but evidence of their influence on psychosocial health is limited.

7 **Objective:** To evaluate the change in psychosocial outcome measures when prosthetic users
8 change from a Non-Microprocessor controlled Prosthetic Knee (NMPK) to a Microprocessor-
9 controlled Prosthetic Knee (MPK).

10 **Methods:** Using validated outcome measures, physical and psychological attributes of 26
11 MPK users were analysed using data collected at routine appointments. Baseline data were
12 collected using NMPK limbs first then compared to data collected four weeks and six months
13 following initial MPK fitting.

14 **Results:** A significant improvement of 13.7% in Reintegration to Normal Living Index
15 (RNLI) scores was observed after six months ($p=0.001$). The PHQ-9 demonstrated a 64.6%
16 significant reduction in the presence of depression-like symptoms after six months of MPK
17 use ($p<0.001$), including four participants who previously scored highly enough to be
18 diagnosed with major depressive disorder. Frequency of falls reduced significantly as well
19 ($p<0.001$). Increases in self-selected walking speed were seen in both the 2 Minute Walk and
20 6 Minute Walk Tests.

21 **Conclusions:** Significant improvements were seen in all psychosocial outcome measures,
22 indicating participants' psychosocial health improved with the prescription of an MPK
23 despite a lack of clinically important improvements in parallel performance-based outcome
24 measures.

25 **Clinical Relevance:** MPKs are well documented to reduce trips and falls which is
26 corroborated by this research. However, the psychosocial benefits of MPKs are not
27 documented extensively; this study provides evidence of an improvement in psychological
28 wellbeing in this cohort.

29 **Abstract Word Count: 214**

30 **Keywords:** Rehabilitation of prostheses users, prosthetic outcome measures, biomechanics of
31 prosthetic devices, rehabilitation of amputees, follow-up studies

32 **Introduction**

33 Psychological health is a major concern within the amputee population, with the prevalence
34 of depression and depressive symptoms reportedly as high as 28%.^{1,2} In the general
35 population, mental health is a major cause of disability in England³ with estimates of one in
36 six adults suffering with a mental health problem at any one time. Therefore, mental health
37 issues are much more common in amputees than in the general population, and there is a
38 paucity of research in this area. To date, MPK research has focused on gait biomechanics and
39 safety, but with mental health costing £6.5 billion to the UK Government in 2010/11 (most
40 recent figures)³ there is a need to understand the benefits that advanced technology may have
41 for patients psychologically.

42 Convincing evidence of improved kinetic and kinematic parameters when using a
43 Microprocessor-controlled Prosthetic Knee (MPK) compared to a Non-Microprocessor-
44 controlled Prosthetic Knee (NMPK) already exists.⁴⁻⁶ Reductions in the number of falls
45 experienced and increased symmetry of gait have been the most prominent findings in these
46 papers. Increased user satisfaction has also been reported in MPK users⁷⁻⁹ which follows
47 logically from reducing the frequency of adverse incidents. Novel research by Moller et al.
48 demonstrates that NMPK users typically exhibit greater cortical brain activity than MPK
49 users, suggesting that MPK users require less cognitive effort to walk.¹⁰ Outcome measures
50 specifically designed to study psychological health in the amputee population do exist in
51 published literature, such as the Prosthesis Evaluation Questionnaire (PEQ)¹¹ and have been
52 used to suggest preference for an MPK over NMPK limbs.⁸

53 In order to prescribe an MPK limb to a patient in England a trial must be carried out in
54 accordance with guidelines set out in the Clinical Commissioning Policy from NHS
55 England.¹² This policy has been in effect since December 2016. The policy requires
56 improvements in patient function and participation in daily life to be demonstrated using an
57 array of outcome measures before the new prosthesis can be prescribed. The authors were
58 granted access to the existing database of these outcome measures for MPK users at one limb
59 centre. Alongside the outcomes mandated by the policy, The Patient Health Questionnaire
60 (PHQ-9)¹³ was also included in this research as it was routinely recorded at the limb fitting
61 centre and deemed relevant to the aims of this study.

62 Two hypotheses were formed to guide analysis: 1) Improvements would be seen across all
63 outcome measures when comparing the NMPK measures to the MPK measures, and 2)
64 Psychosocial health improvements would come with improved physical ability.

65 **Methods**

66 Outcome measures were recorded for all potential MPK limb candidates at the limb fitting
67 centre in accordance with the prescription policy by the clinical team comprising of
68 prosthetists and specialist amputee physiotherapists. The authors of this paper analysed the
69 data separately from the clinical team and in retrospect. A short summary of the prescription
70 process is given:

71 The NHS England MPK prescription policy is a set of guidelines and procedures that are
72 applicable nationally. Potential participants are screened by the clinical team to check they
73 meet the inclusion criteria outlined in the policy, namely: amputation involving destruction or
74 loss of the knee joint, ability to walk utilising a free mechanical prosthetic knee with the
75 potential or ability to vary cadence, ability to walk more than 50 yards on level ground,
76 presents with a history of falls or co-existing medical condition that has a very high risk of
77 injury due to a fall, and demonstration of adequate commitment, strength and balance to
78 utilise the MPK unit. The limb fitting centre had added the criteria of wearing a prosthetic
79 socket rated 7 or higher on the Socket Comfort Score.¹⁴ A duplicate socket was then
80 produced, and all participants were assessed using their normal NMPK prescription as the
81 baseline measure before being fitted with the MPK. Each participant completed a 4-week
82 acclimation period before the first review and then were reviewed again at six months.

83 All outcome measures were completed at each review. This included all mandatory measures
84 from the prescription policy and any additional outcomes elected by preference of the
85 prosthetic service. During the four-week acclimation period each participant attended one
86 hour of physiotherapy per week. The data came from users who were provided with an Orion
87 3 MPK and Echelon prosthetic foot (Blatchford Ltd, Basingstoke UK): this was the preferred
88 MPK prescription of the centre.

89 To date, the majority of MPK research has focused on alternative manufacturers of MPKs.^{4,6}
90 .^{15,16} For this reason, temporospatial outcome measures have been included in this study to
91 facilitate comparison with the populations in previously published literature. The Timed Up
92 and Go (TUG) Test was omitted from analysis since one specific function of an MPK is to

93 slow down knee flexion when moving to sit down, and the TUG Test regards faster speeds as
94 more positive. The outcome measures analysed are provided below:

95 Psychosocial outcome measures

96 I. The PHQ-9 questionnaire¹⁷ has 9 questions resulting in a total score between 0-27
97 and was used to assess the severity of depression at each point. A score ≥ 10 can
98 indicate major depressive disorder; therefore a lower score is considered more
99 positive. The PHQ-9 has been proven to be sensitive to change over time^{13,17,18} and
100 is valid for use in the general outpatient population.¹³

101 II. The RNLI questionnaire measures how well-integrated to normal life the user feels
102 and is validated for use with people with mobility limitations.^{19,20} A score of 100%
103 represents the participant feeling fully reintegrated to community living, and 0%
104 represents no reintegration to community living. This is an important aspect of
105 amputee rehabilitation as the aim of treatment is to facilitate normal daily life.

106 III. The PEQ investigates multiple aspects of perceived life and prosthesis quality and
107 has been used extensively in the published literature. The PEQ was analysed in 9
108 subsets as described by Legro et al.¹¹ Each subset relates to a different aspect of the
109 prosthesis allowing for more specific comparison to be made between different
110 users/time points.

111

112 Physical performance measures

113 I. Self-reported patient diaries of trips and falls experienced over the four-week
114 period leading up to each of the 3 appointments were completed.

115

116 II. The 2 Minute Walk Test (2MWT) as described by Brooks et al.²¹ (2006) was
117 conducted with verbal encouragement to ensure the participant achieved their best
118 result.²² For consistency for the participant, a version of the 6 Minute Walk Test
119 (6MWT) based on Brooks' 2MWT method was used. All tests were carried out
120 according to published protocol by a senior prosthetist or specialist amputee
121 physiotherapist. These tests have previously been validated for use with amputees²³
122 ²⁴ and can be easily converted to a walking speed, allowing comparison with the
123 existing literature.

124 One author accessed the database of MPK prosthesis users at the limb fitting centre and
125 included patients who had completed the six-month review. Where individual data points
126 were missing, the author manually searched the patient's paper records for the information.
127 Statistical analysis was performed using SPSS 2018 v. 26. Approval for this analysis of
128 patient information was provided by XXXX and XXXX. Patients had previously signed
129 informed consent for their data to be used in future research.

130 **Statistics:**

131 ANOVA Tukey tests for multiple comparisons were used to understand the mean differences
132 between the three time-points for normally distributed data, whilst Kruskal-Wallis was used
133 for non-normally distributed data. Additionally, groups were split into two groups and t-tests
134 were used to determine statistical differences between NMPK and MPK at each timepoint.
135 When differences on the t-tests were observed, post-hoc Bonferroni adjustments were used to
136 control for Type 1 error using a new significance level of 0.017 (99.98% C.I.). Similarly,
137 Mann-Whitney (99.98% CI) were applied for non-normally distributed data. Clinical
138 significance was measured against pre-existing published literature and expertise. For clarity,
139 the measurement time points will be referred to as follows:

- 140 • NMPK – Measurement taken when participant was using their NMPK prosthesis and
141 used as a baseline for comparison.
- 142 • MPK 4 weeks – Measurement taken 4 weeks after supply of the MPK prosthesis, at
143 the end of the trial period.
- 144 • MPK 6 months – Measurement taken 6 months after the MPK prosthesis was
145 supplied; at this point the MPK was no longer being trialled and had been the
146 participant's daily prosthesis for approximately 21 weeks.

147 **Results**

148 **TABLE 1 ABOUT HERE**

149 Patient demographics are shown in Table 1. 26 patients had completed the six-month review
150 at the time of data collection. There were 4 females and 22 males, 25 transfemoral amputees
151 and 1 person with knee disarticulation, and the majority of amputations were due to trauma
152 (77%). On average, these prosthetic users had had their amputations for 29.5 years (range 8-
153 55 years). Results from the outcome measures are presented in Table 2.

154 **TABLE 2 ABOUT HERE**

155 The mean number of falls were: 1 (± 0.98) at NMPK baseline, 0 (± 0.19) at MPK 4 weeks, and
156 0 (± 0.19) at MPK 6 months. The number of falls was statistically significantly different (K-
157 W, $p < 0.001$; M-W, $p < 0.001$) with the number of falls significantly greater for NMPK than at
158 both MPK timepoints (Figure 1).

159 **FIGURE 1 ABOUT HERE**

160 Walking speeds derived from both timed walk tests are presented in Table 3. This was
161 calculated by dividing the distance covered by the time of the test. No statistical difference
162 was found between groups (ANOVA, $p = 0.964$), however statistical significance was found
163 when comparing between groups (NMPK and MPK) at the different timepoints (t-test,
164 $p < 0.001$).

165 **TABLE 3 ABOUT HERE**

166

167 **PHQ-9:** The mean PHQ-9 score when using NMPK prostheses was 5.27 (± 6.40); at MPK 4
168 weeks the mean was 1.31 (± 2.67), and at MPK 6 months it was 1.89 (± 2.89). A significant
169 decrease was found in the depression scores when NMPK and MPK 4 weeks were tested
170 ($W = 838.00$, $p = 0.003$). A statistically significant decrease was also found when comparing
171 NMPK to MPK 6 months ($W = 800.00$, $p = 0.022$). There was no significant difference found
172 between MPK 4 weeks and MPK 6 months ($W = 634.50$, $p = 0.843$).

173 As detailed in Figure. 2, of the 5 participants who could have been diagnosed with major
174 depressive disorder when using their NMPK limb (PHQ-9 score ≥ 10), 4 scored below this
175 cut-off after 4 weeks of MPK use. Only one participant continued to score above this cut-off
176 score and had improved by 18.75%.

177 **FIGURE 2 ABOUT HERE**

178 **RNLI:**

179 The average score in the RNLI questionnaire when using an NMPK was 80.17% (± 21.80).
180 As shown in Fig. 3, after 4 weeks of MPK use this increased to 91.53% (± 13.25), and at 6
181 months it was 92.73% (± 10.04). Significant differences were found between NMPK and
182 MPK 4 weeks ($W = 562.00$, $p = 0.010$, at 99.98% CI), and NMPK and MPK 6 months
183 ($W = 553.50$, $p = 0.007$). No statistically significant mean difference was found between MPK 4
184 weeks and MPK 6 months ($W = 685.00$, $p = 0.474$).

185 **FIGURE 3 ABOUT HERE**

186 **PEQ:** For the purposes of this paper the authors focussed on 3 subsets of the PEQ:
187 “appearance”; “social burden”; and “utility”. In the “appearance” subset, significant
188 improvement was found between NMPK and MPK 4 weeks ($W=509.50$, $p=0.001$ at 99.98%
189 CI), and between NMPK and MPK 6 months ($W=515.50$, $p=0.001$), across all participants.
190 No significant difference was found between the MPK measures ($W=687.50$, $p=0.493$). In
191 the “social burden” subset (shown in Figure 4), significant differences were found in the
192 mean scores between NMPK and both MPK time-points ($W=515.50$, $p=0.001$, and
193 $W=556.00$, $p=0.008$, respectively). No significant mean difference was found between MPK
194 measures ($W=732.50$, $p=0.790$). In the “utility” subset, significant improvements were found
195 between NMPK and both MPK timepoints ($W=484.50$, $p<0.001$, and $W=503.00$, $p<0.001$,
196 respectively). No significant difference was found between the two MPK measures
197 ($W=686.00$, $p=0.482$).

198 **FIGURE 4 ABOUT HERE**

199 While detailed results are presented from the analyses of only three subsets, statistically
200 significant improvements were seen in all PEQ subsets between NMPK and MPK
201 measurements.

202 **Discussion**

203 This research sought to investigate if the introduction of an MPK influenced patient outcomes
204 with a specific focus on psychosocial health. It builds on the previous research predominantly
205 concerned with physical outcomes. Two hypotheses were tested. Firstly, if improvements
206 would be seen in all outcome measures by replacing the NMPK limb with an MPK. This
207 hypothesis holds true for this population as statistically significant improvements were seen
208 in both physical and psychosocial outcomes. Secondly, the hypothesis presuming physical
209 improvement would lead to psychosocial benefits needs to be examined further in subsequent
210 research as the mental health benefits found in this study were disproportionate to the
211 increases in physical performance. While statistical significance was seen, the clinical
212 relevance of walking 6 metres further over the course of two minutes is negligible.

213 The reduction in falls represents an important reason to advocate for the use of MPK
214 prostheses and has been documented with multiple MPK prescriptions.^{6-8,25} As shown in
215 Figure 1, only 1 of the 27 participants reported a fall when using the MPK, compared to 17

216 who reported falling with their NMPK. The participant who reported one fall for each 4 week
217 period with the MPK had reported 3 falls in the 4 weeks of NMPK use. Average walking
218 speeds found here are comparable to those reported by Orendurff²⁶ and Kahle²⁵. These
219 results align the current study with the published literature for alternative MPKs.

220 Significant improvement was seen in the PHQ-9 between NMPK and both MPK time points,
221 suggesting a reduction in the presence of depression-like symptoms in these lower limb
222 amputees when changing to an MPK prosthesis. In all but one of the patients who scored 10
223 or above using the NMPK prosthesis, scores at MPK 4 weeks were then below this threshold
224 and importantly did not relapse at MPK 6 months. This cut-off score of 10 has been shown to
225 be acceptably specific and sensitive to identifying major depression,²⁷ therefore this is
226 considered a clinically meaningful improvement in this patient group.

227 The RNLI measures integration in domains including comfort in social situations, personal
228 relationships and the ability to carry out daily activities. The introduction of a new prosthesis
229 demonstrated a significant increase in these users' perception of being able to integrate with
230 society. The improvements in RNLI scores seen in this study when using an MPK are of
231 interest as these patients were established prosthetic users who lived in the community for an
232 average of 28.5 years. The improvements are above the 7% minimum clinically important
233 difference reported by Mayo et al.²⁸ and it is possible that a ceiling effect was present
234 particularly at the latter measurement time points.

235 The individual domain scores cannot be isolated for the RNLI but the PEQ subset "social
236 burden" provides more of an insight into this area. Significantly higher scores were reported
237 after the introduction of the MPK prosthesis and maintained six months later, again
238 suggesting this type of prosthesis had a positive impact on the patients' lives. In the "utility"
239 subset comparable results were found, and similar findings were seen again in the
240 "appearance" subset. To date, the minimum detectable changes and clinically important
241 differences for PEQ subsets have not been reported, nor have these values been reported for
242 the PEQ as a whole. Research which was able to provide these values would potentially add
243 weight to the findings of this study.

244 It is important to note that no statistically significant improvements were found with ANOVA
245 in the timed-walk tests, however, when the data was treated as groups and t-tests were
246 performed, statistical significance was found in between groups (Table 2), however, these
247 do not necessarily imply clinically meaningful differences^{21,23,29}. One plausible explanation

248 for this is that since these participants are established prosthetic users and are already
249 ambulatory in a community setting; they have already achieved a desirable self-selected
250 walking speed. The lack of clinically important differences does however suggest that these
251 participants did not have any marked changes to their physical ability during the study period,
252 thus increasing the likelihood of the new prosthesis being the cause of any differences in
253 outcome measures.

254 All users attended physiotherapy once per week for the first four weeks. The effect this had
255 on outcomes should not be overlooked when interpreting these results. It is difficult to isolate
256 the effect of each treatment component on overall results in this study and it would be
257 interesting to see a similar study conducted with an intervention group receiving four weeks
258 of physiotherapy and continuing to use an NMPK. Notably, the lack of change in outcome
259 measures between MPK 4 weeks and MPK 6 months would suggest that the new prosthesis
260 was an important factor in the differences between NMPK and MPK measurements.

261 Finally, albeit statistically significant, the differences in results between interventions were
262 relatively low and deserve further exploration on a greater sample size. A prospective trial
263 with a larger sample size that controls for the effect of physiotherapy input for example,
264 would be useful in gaining a clearer picture of the whole population. Nonetheless, 26
265 participants is a relatively large cohort for research of this kind in an amputee population.

266 The loss of a lower limb is a life-changing situation in which people are left to deal with a
267 notable change in their quality of life and independence. This study adds to the existing
268 evidence base for the use of an MPK compared to non-MPK knees to positively affect quality
269 of life for above-knee amputees.

270

271 Word Count: 2867

272

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355

356

357

358 Table 1 patient demographics

Patient	Gender	Age (years)	Time from amputation (years)	Cause of amputation	Level of amputation	K level	NMPK (used prior to baseline MPK measure)
1	F	64	55	Trauma	TF	3	Smart IP
2	F	62	36	Neoplasm	TF	3	Smart IP
3	M	65	48	Trauma	TF	3	ESK
4	M	53	12	Trauma	TF	3	Smart IP
5	M	55	37	Trauma	TF	3	Smart IP
6	M	61	45	Neoplasm	TF	3	IP+
7	F	33	17	Congenital	KD	3	Total Knee
8	M	61	43	Trauma	TF	3	ESK
9	M	31	15	Neoplasm	TF	3	Mercury
10	M	47	23	Trauma	TF	3	IP+
11	M	56	39	Trauma	TF	3	Smart IP
12	M	48	14	Trauma	TF	3	Mercury
13	M	45	8	Vascular	TF	3	ESK CaTech
14	M	60	43	Trauma	TF	2	Smart IP
15	M	65	48	Trauma	TF	3	ESK
16	M	41	12	Trauma	TF	2	ESK PSPC
17	M	36	14	Trauma	TF	3	Mercury
18	M	70	11	Trauma	TF	3	ESK PSPC
19	M	54	37	Trauma	TF	3	Smart IP
20	M	72	9	Trauma	TF	3	ESK PSPC
21	M	32	13	Congenital	TF	3	KX06
22	M	67	48	Trauma	TF	3	Smart IP
23	M	69	15	Trauma	TF	3	ESK PSPC HOKL
24	M	61	40	Trauma	TF	3	Smart IP
25	M	56	33	Trauma	TF	3	ESK PSPC
26	M	71	52	Trauma	TF	3	Smart IP
<i>Total</i>	<i>3F, 23M</i>	<i>55.19, Range: [31,72]</i>	<i>29.50, Range: [8,55]</i>	<i>Trauma:20, Vascular: 1, Neoplasm:3, Congenital:2</i>	<i>TF:25, KD:1</i>	<i>Level 2: 2; Level 3: 25.</i>	

359

360

361 (Table 2_Mean_Participant_Outcomes)

362

Outcome measure		NMPK (mean ± SD)	MPK (4 weeks) (mean ± SD)	MPK (6 months) (mean ± SD)
Falls		(1 ± 0.98)	(0 ± 0.19)*	(0 ± 0.19)*
2MWT [m]		(125 ± 25)	(133 ± 21)*	(131 ± 22)*
6MWT [m]		(362 ± 74)	(391 ± 67)*	(385 ± 69)*
PHQ-9		(5 ± 6)	(1 ± 3)*	(2 ± 3)*
RNLI		(80 ± 21)	(92 ± 13)*	(93 ± 10)*
PEQ	Ambulation	(50 ± 21)	(86 ± 13)*	(85 ± 16)*
	Appearance	(67 ± 24)	(86 ± 14)*	(86 ± 14)*
	Frustration	(52 ± 34)	(87 ± 17)*	(83 ± 22)*
	Perceived Response	(85 ± 18)	(95 ± 7)*	(93 ± 8)*
	Residual Limb Health	(71 ± 27)	(88 ± 11)*	(84 ± 12)*
	Social Burden	(72 ± 25)	(93 ± 8)*	(88 ± 16)*
	Sounds	(61 ± 31)	(82 ± 20)*	(86 ± 25)*
	Utility	(66 ± 22)	(85 ± 11)*	(85 ± 12)*
	Wellbeing	(63 ± 26)	(91 ± 10)*	(89 ± 11)*

363 * Denotes statistical significance when compared to the NMPK intervention (t-tests, p<0.001).

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367 Table 3: Converted TWT distances to average walking speeds

	Average walking speed at each time point		
	NMPK	MPK 4 weeks	MPK 6 months
2MWT	1.064 ms ⁻¹ (±0.174)	1.125 ms ⁻¹ (±0.154)	1.114 ms ⁻¹ (±0.164)
6MWT	1.030ms ⁻¹ (±0.167)	1.102ms ⁻¹ (±0.168)	1.022ms ⁻¹ (±0.169)

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371 **Table captions**

372 **Table 1.** Patients demographics (age, gender) and time (in years) from amputation; cause and level of
373 amputation; K level; and type of NMPK used when recruited for the trial.

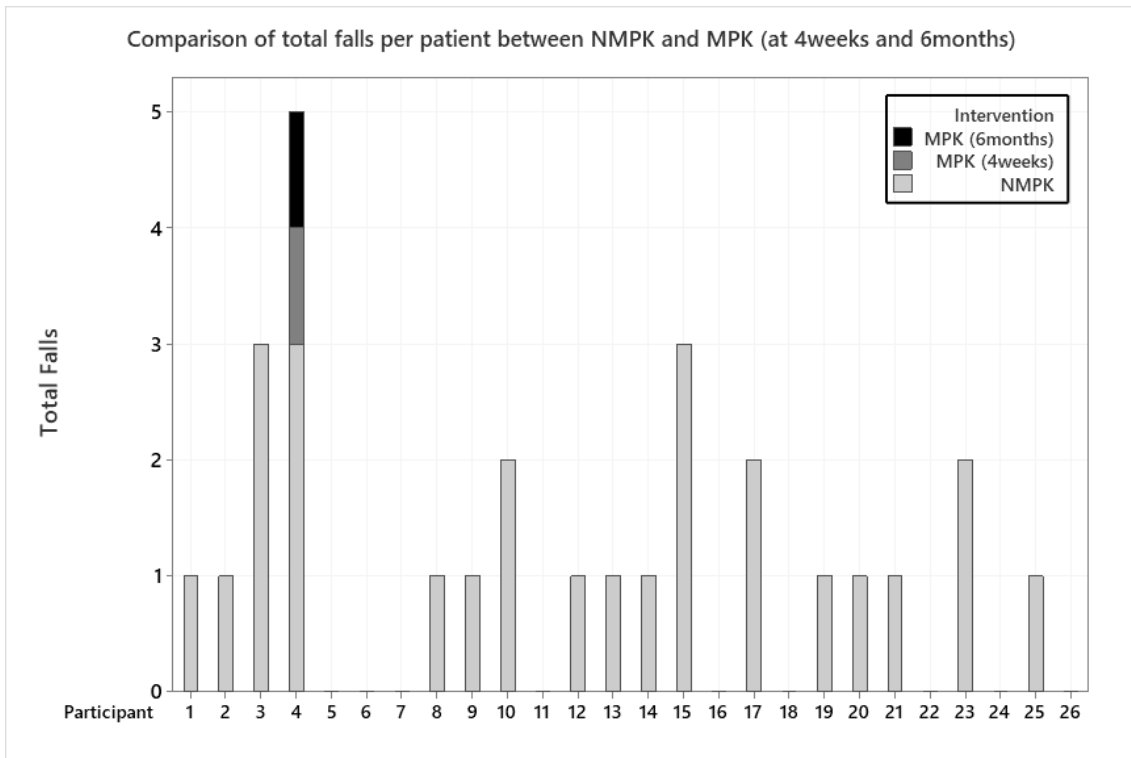
374 **Table 2.** Mean and SD for all completed outcome measures by time point

375 **Table 3.** Average walking speeds by time point

376

377 FIGURES

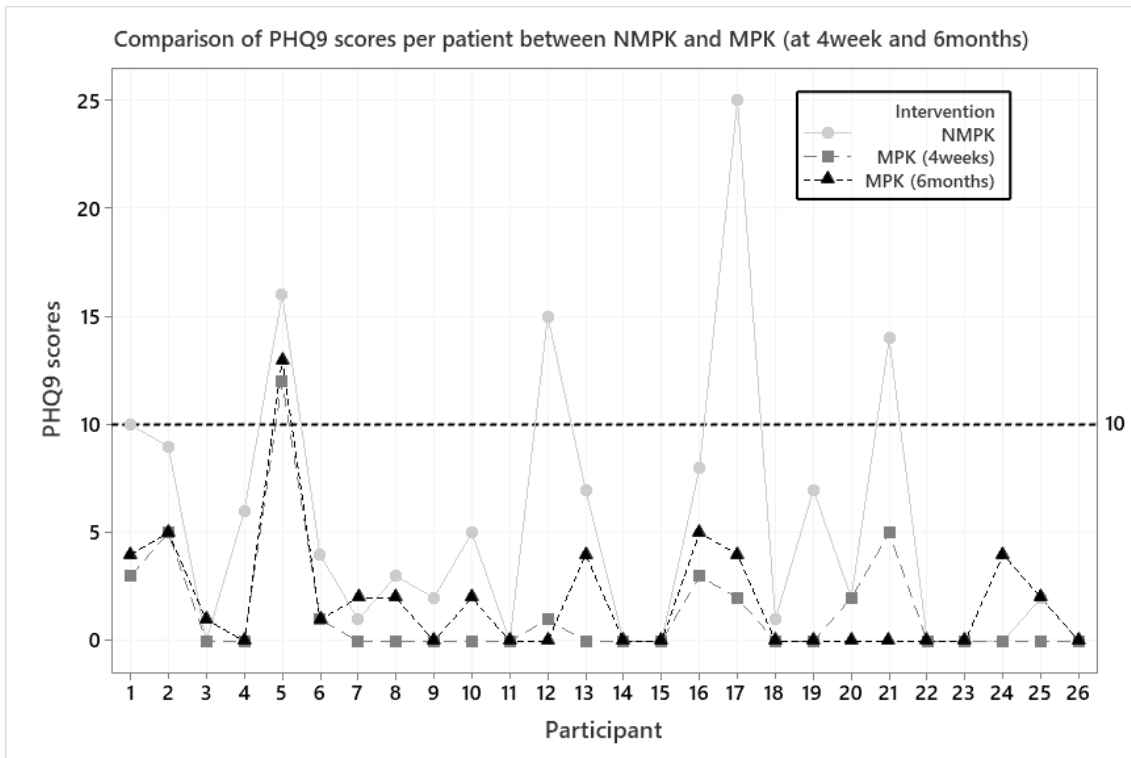
378 Figure 1



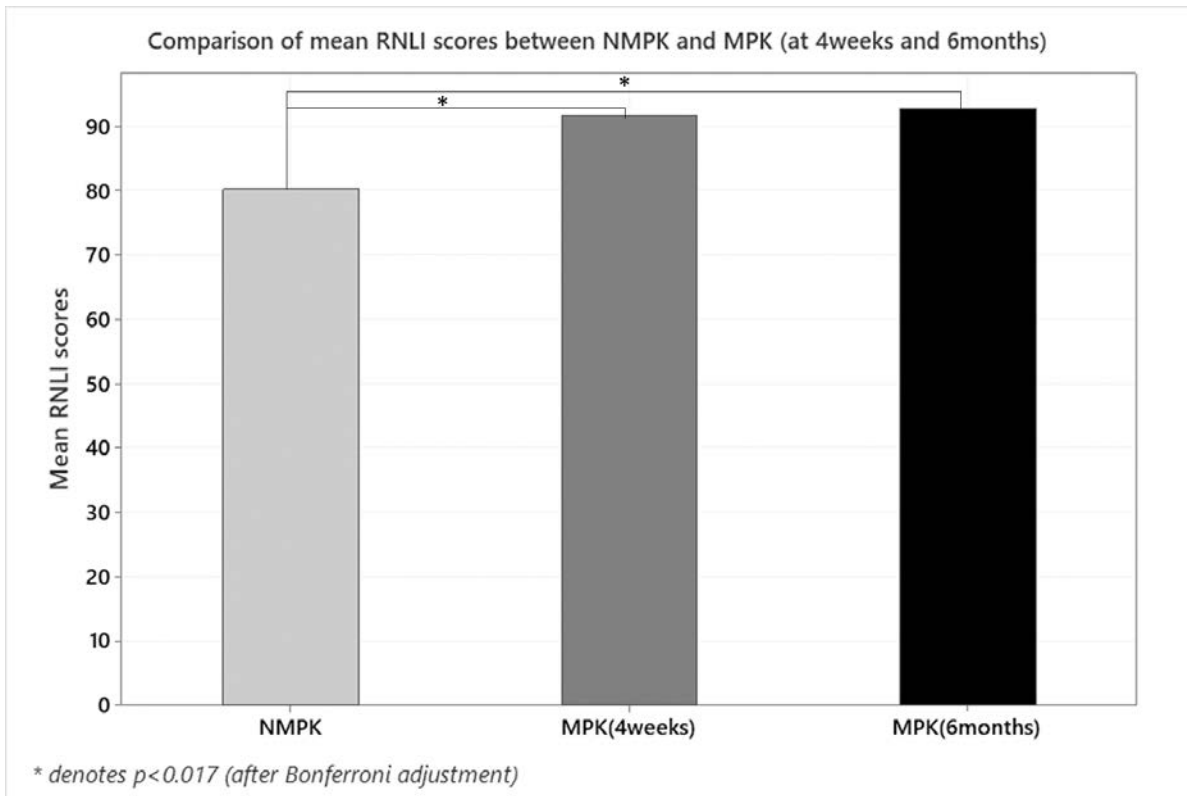
379

380 **Figure 2**

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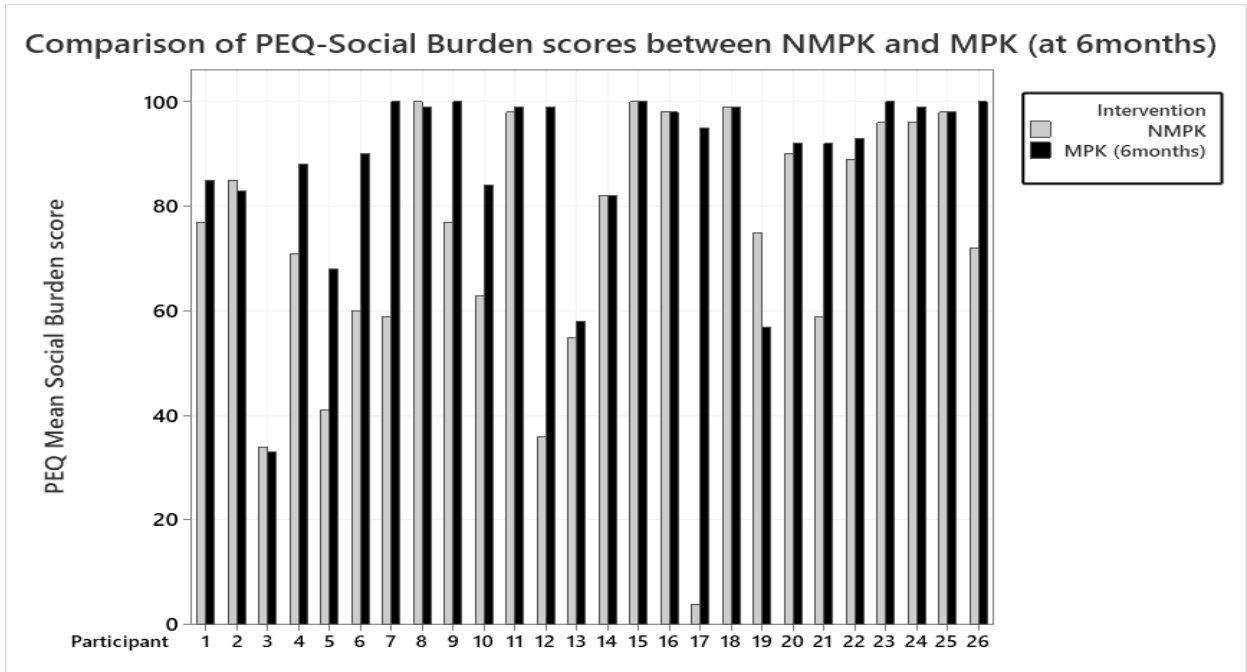


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385 **Figure 4**

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387 **Figure Captions**

388 **Fig. 1** – Comparison of the total falls per patient between NMPK and MPK at 4weeks and NMPK and MPK at
389 6months. There was a 94% decrease in the number of people falling using MPKs (regardless of the timepoint)
390 when compared to NMPKs. Only 1 of the 26 patients reported to fall when using the new MPK prescription at
391 both 4weeks and 6 months, compared to 17 patients who reported falling with their NMPK

392 **Fig. 2** – Comparison of PHQ9 scores per patient between the three interventions: NMPL, MPK at 4weeks and
393 MPK at 6months. From the 26 patients, 5 would have been diagnosed with a major depressive disorder when
394 using their NMPK prescription (as shown by the Threshold for depression diagnosis dotted line ≥ 10). From
395 those ones, four scored below this threshold after 4 weeks of MPK use whilst one patient continued to score
396 above it, however, a score improvement of 18.75% can be appreciated.

397 **Fig. 3** – Comparison of the mean RNLI scores between interventions. When using an NMPK, the RNLI was
398 80.17% (± 21.45), after 4 weeks of MPK use the average score was 91.53% (± 13.25), and at 6 months it was
399 92.73% (± 10.04). Significant mean differences were found between NMPK and MPK 4 weeks, and NMPK and
400 MPK 6 months (* denotes $p=0.001$). No statistically significant mean difference was found between MPK 4
401 weeks and MPK 6 months. Error bars denote standard error.

402 **Fig. 4** – Comparison of PEQ scores for the Social Burden subset between NMPK and MPK at 6months.
403 Statistically significant mean differences were found between these two interventions ($W=245.5$, $p<0.001$).

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