Language profiles of individuals with first-episode of psychosis, ultra-high risk, and a family history of psychosis

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Background

1. Patients with SZ, particularly those with formal thought disorder (FTD), produce utterances with referential anomalies (Rochester & Martin, 1979).
- Indefinite NPs > Definite NPs (Sevilla et al., 2018 in Spanish; Cokal et al., 2018 in English) (e.g., a cat vs. the cat)
- Bare NPs > Definite NPs (Cokal et al., 2022 in Turkish)
2. Syntactic and speech profile distinguish individuals with SZ.
- Less syntactic complexity and unfilled pauses ad utterance-initial positions (Cokal et al., 2018; 2019 in English)

Language variables distinguishing First-episode of psychosis (FEP), Ultra high risk (UHR) & Family high risk (FHP)
- The syntactic and semantic level of discourse can be predictive of psychosis onset (Bedi et al., 2015; Corcoran et al., 2018).
- FEP produced shorter and simpler sentences and fewer words per minute, along with a reduced number of lexical fillers, compared to NC (Gargano et al., 2022).
- No ambiguous referential pronouns and repetitions in FEP & UHR (Morgan et al., 2021).
- FHP differ from NC in producing more definite NPs and referential anomalies and less filled pauses (Cokal et al., 2018; 2019).

Predictions

P1. Patients with FEP would show deficits in linguistic performance compared to NCs.
P2. Patients with FEP would have referential, syntactic, and speech deficits similar those observed in chronic patients with SZs, as reported in Cokal et al., (2018, 2019, 2022).
P3. Individuals with UHR would display similar referential, syntactic, and speech profiles to those of patients with FEP.
P4. Individuals with a family history of psychosis (FHP) might have a different language profile compared to that of NC.

Socio-demographic features of groups

Group	Gender	Age	Years of education	Comparison	Age	Education	Utterance	Word
		Mean (sd)	Mean (sd)		t(df)	t(df)	Mean (sd)	Mean (sd)
NC	23 (F) 10 (M)	22 (4.25)	14 (2.51)	NC vs. FEP	t = 1.519 (69) p = 0.133	t = 3.387 (97) p= .001*	50 (13)	312 (92)
FEP	26 (F) 28 (M)	20 (4.38)	12 (3.52)	FEP vs. UHR	t= -0.882 (108) p = 0.380	t= -1.096 (86) p = .276	42 (14)	217 (92)
				FEP vs. FHP	t= 1.752 (88) p = 0.083	t= -.677 (90) p = .500		
UHR	33 (F) 29 (M)	22 (4.06)	11 (2.21)	NC vs. UHR	t = 2.371 (63) p = 0.021*	t= 5.372 (56) p= .001*	42 (15)	230 (104)
FHP	23 (F) 16 (M)	20 (3.81)	13 (2.43)	NC vs. FHP.	t = -0.534 (65) p = 0.958	t= 3.040 (65) p= .003*	48 (17)	261 (104)

First-episode of psychosis (FEP), Ultra high risk (UHR), Family history of psychosis (FHP), and neurotypical controls (NC).
All participants were native speakers of Turkish.
Patients with FEP and help-seeking youth at UHR-P were recruited from the early intervention outpatient unit (ETAP) of the Department of Psychiatry at Dokuz Eylül University Hospital.

Procedure
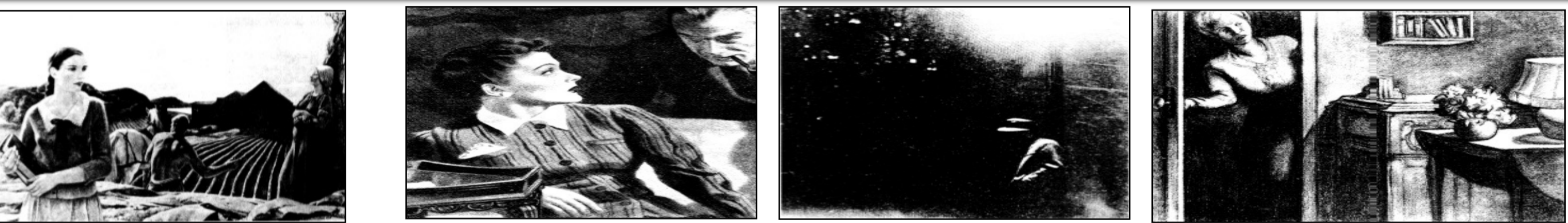
Four pictures from the Thought and Language Index (TLI) (Liddle et al., 2002). We ran Poisson regression, using the generalized linear model function (glmer), to analyze the count data. Duration of education, which was centered and scaled, was added to a model as a covariant in each model.

Referentiality

Lexical items (e.g., dog, cat) were identified. Then subcategorized:

Determiner Phrase (DP): that cat (i.e., definite DP) , a cat(i.e., indefinite DP)
Anaphoric NPs: There is a cat. The cat is moving.
Bare-specific NPs: A cat is digging the soil. (accusative case marker in Turkish)
Bare-indefinite NPs: There are cats in the garden.
Bare-generic NPs: It is a thing that tells about rural and urban culture.
Bare-NPs: Turkish NP is bare (without determiners), without case, and there are no contextual indicators of indefiniteness or genericity.
Referential anomalies: Example 1: buttons with pocket. Example 2: well, they have financial problems.
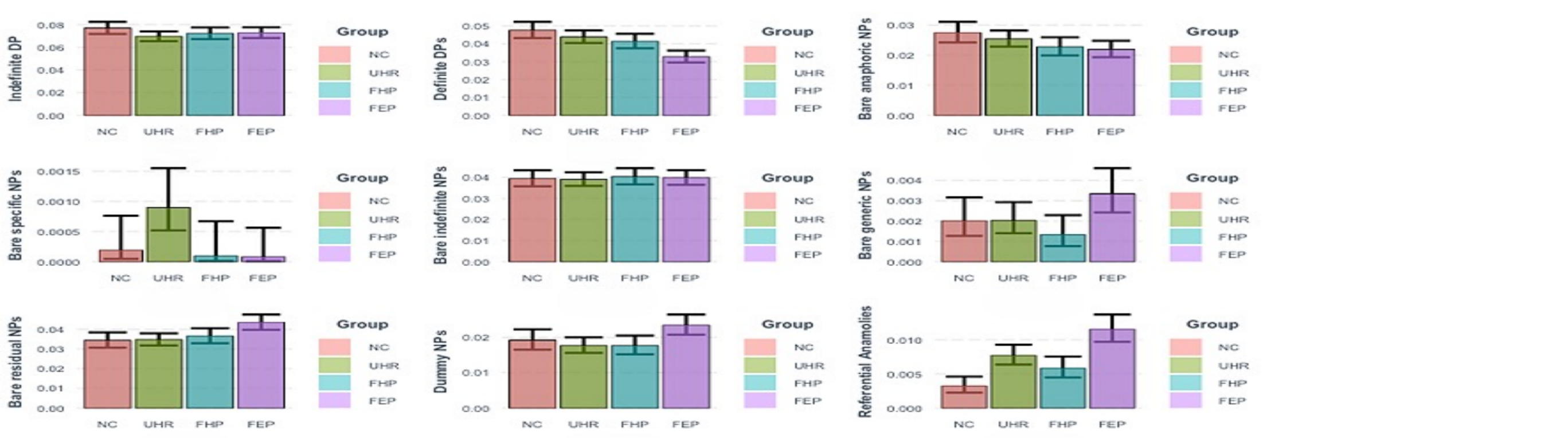

Figure 1. Illustrates the mean number of noun phrase types (a cat vs. the cat) and referential anomalies. Error bars represent 95% confidence intervals.

Definite NPs and bare anaphoric NPs distinguish FEP and FHP from NC and UHR :
Definite NP: NC VS. FEP: p = .001; NC vs. FHP: p = .042; UHR vs. FEP: p = .001.
Bare anaphoric NPs: NC VS. FEP: p = .011; NC vs. FHP: p = .038; UHR vs. FEP: p = .001.

Bare residual NPs and dummy NPs distinguish FEP from NC: Residuals NPs: NC vs. FEP: p = .001; Dummy NPs: NC vs. FEP: p = .040.
Referential Anomalies distinguish three groups from NC: NC vs. FEP: p = .001; NC vs. FHP: p = .008; UHR vs. NC: p = .001; UHR vs. FEP: p = .003.
High referential anomalies in both UHR and FEP.
UHR produced more bare specific NPs, which was not significant, UHR vs. NC: p = .195.
No association between these variables and the years of education.

Syntactic complexity

Number of dependents: The woman is talking to a man.
Dependents: 2 [the woman & a man]
Embedded clauses: The woman is talking to a man who is smoking.
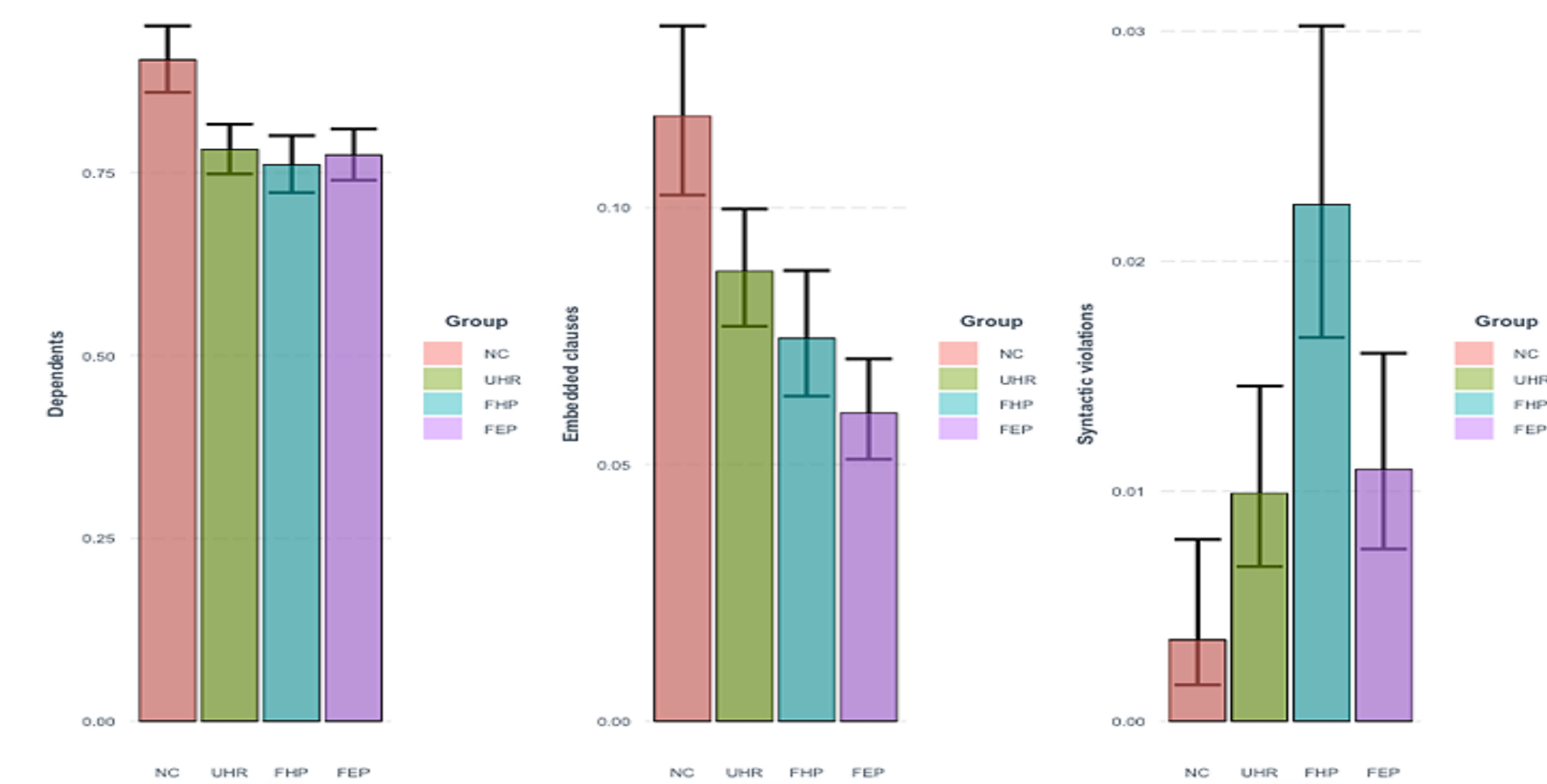Syntactic violations

Figure 2. Illustrates the mean number of dependents, embedded clauses, and syntactic violations. Error bars represent 95% confidence intervals

- The number of dependents is lower in three groups than that in NC, NC vs. FEP: p = .001; NC vs. FHP: p = .001; NC vs. UHR: p = .001; UHR vs. FEP: p = .001.
- A gradual decline in the production of embedded clauses, NC vs. FEP: p = .001; NC vs. FHP: p = .001; NC vs. UHR: p = .002; UHR vs. FEP: p = .001.
- Higher syntactic violations in UHR, FEP, and FEP than those in NC, NC vs. FEP: p = .001; NC vs. FHP: p = .001; NC vs. UHR: p = .002; UHR vs. FEP: p = .001.
- UHR- FEP are similar in the use of dependents, p= 0.956, and syntactic violations, p = 0.883.
- UHR and FEP are getting closed with respect to embedded clauses, p = .001.

Speech dysfluency

| Dysfluency types	Syntactic positions	Example	Explanation
Unfilled pauses	Utterance-initial	(PAUSE<1sec) He phoned his friend	Unfilled pause is at the beginning of the utterance.
	Within-utterance pauses Pauses before embedded clauses	He phoned (PAUSE <1sec) his friend He phoned his friend (PAUSE <1sec) whom he has not seen since the graduation.	Unfilled pause is between a verb and an NP. Unfilled pause before an embedded clause (in this case a relative).
Filled pauses (fillers)		(FILLER) He phoned his friend.	
		London is (FILLER) my favourite capital city. He phoned his friend (FILLER) whom he has not seen since the graduation.	
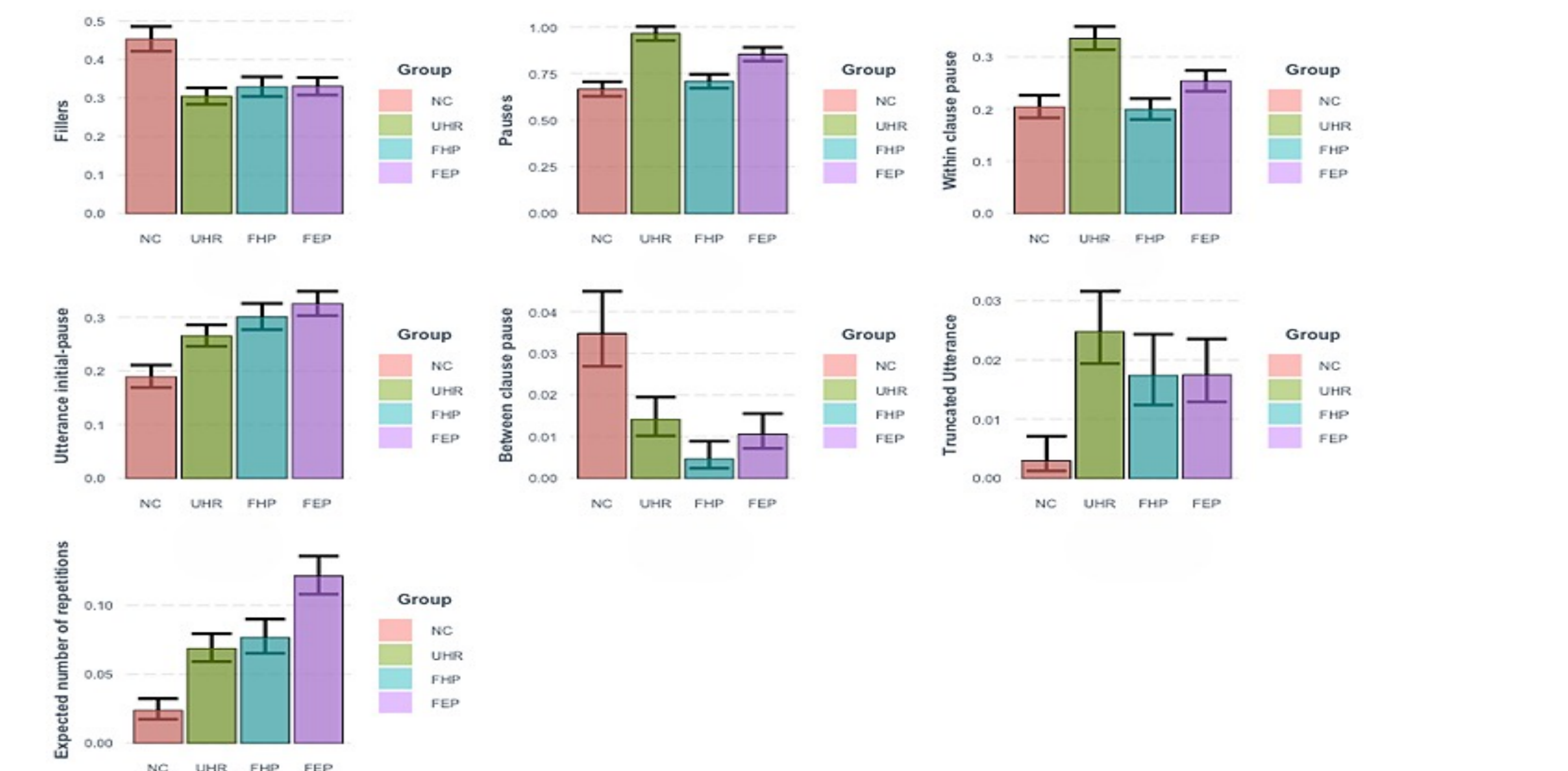
Figure 3. Illustrates the mean number of speech dysfluency. Error bars represent 95% confidence intervals

- Fillers and between-clause pauses: NC > UHR> FEP > FHP, ps = .001
- Pauses (irrespective of syntactic categories): UHR > FEP > FHP > NC, ps = .001
- Gradual increase in utterance initial pauses and word repetitions: NC < UHR < FHP < FEP
- Within-utterance pauses: UHR > FEP > NC = FHP
- Truncated utterances: NC < UHR < FHP < FEP

Overall conclusions

- **P1 is supported**: FEP have (a) bare NPs/residual NPs, (b) referential anomalies, (c) less propositional density, (d) more unfilled pauses, and (e) word repetitions.
- **P2 is supported:** FEP and SZ with FTD have (a) bare NPs and referential anomalies, (b) reduced proposition density (syntactic complexity), (c) utterance-initial and within utterance pauses, and (d) word repetitions.
- **P3 is supported:** UHR-FEP group is getting closer with respect to referential anomalies, speech profile, and syntactic complexity. Deficits in referential anomalies, number of dependents in syntax, and syntactic violations are similar.
- **P4 is supported:** FEP and NC differ. FEP use fewer complex syntactic structures – specifically dependents- and display reduced fillers in speech. They produce more truncated utterances and utterance-initial pauses.
- **UHR and FEP groups are becoming more similar** in terms of referentiality, speech dysfluency, and propositional density.

Further exploration into these linguistic markers holds the potential to shape the development of diagnostic and therapeutic approaches.

References

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