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Article

The Pace of Change in Videoconferencing and Face-to-Face Adult Psychotherapy: A Longitudinal Study

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ABSTRACT

Background: The current study explores the pace of psychological change in face-to-face (F2F) and videoconferencing psychotherapy (VCP). It also aims to offer a methodological tool for studying it and to suggest some hypotheses that could explain the pace of change in F2F and VCP. Change in therapy was predicted to be non-linear and faster in F2F than in VCP. **Method:** Session-by-session records of two measures of change (as assessed by therapists and clients, respectively) were collected from 113 participants from F2F (n = 57) and VCP (n = 56), resulting in 2552 therapy sessions. A non-manipulative longitudinal design was proposed in which multilevel growth curve models were performed. Different models were specified to account for the trajectories followed on average by all cases as closely as possible. **Results:** The chosen models for therapists' ($X^2 = 4.42$, $p < .05$, $r^2 = .54$) and clients' ($X^2 = 6.31$, $p < .05$, $r^2 = .53$) data, showed large effect sizes. The results were significant and showed that change was not linear and was faster in F2F, as we had predicted. **Conclusions:** Our results contribute to knowledge about psychological therapy provided through the internet. Several hypotheses are suggested to explain which processes may underlie those results.

El Ritmo de Cambio en Terapia por Videoconferencia y Presencial en Adultos: Un Estudio Longitudinal

Palabras clave:
Ritmo de cambio psicológico
E-health
Terapia psicológica por videoconferencia
Terapia psicológica presencial
Diseños longitudinales

RESUMEN

Antecedentes: En este estudio se explora el ritmo del cambio psicológico en la terapia presencial (F2F) y por videoconferencia (VCP). También pretende ofrecer una herramienta metodológica que permita su estudio y generar hipótesis que podrían explicar el ritmo de cambio en F2F y VCP. Se predijo que el cambio en la terapia sería no lineal y más rápido en F2F que en VCP. **Método:** Se recogieron registros sesión a sesión de dos medidas de cambio (evaluadas por terapeutas y clientes, respectivamente) de 113 participantes de F2F (n = 57) y VCP (n = 56), resultando en 2552 sesiones de terapia. Se propuso un diseño longitudinal no manipulativo mediante modelos multinivel de curvas de crecimiento. Se ajustaron diferentes modelos para dar cuenta de las trayectorias seguidas en promedio por los participantes. **Resultados:** Los modelos elegidos para los datos de los terapeutas ($X^2 = 4.42$, $p < .05$, $r^2 = .54$) y de los clientes ($X^2 = 6.31$, $p < .05$, $r^2 = .53$), mostraron tamaños del efecto elevados. Los resultados mostraron que el cambio era no lineal y más rápido en F2F, como habíamos predicho. **Conclusiones:** Nuestros resultados contribuyen al conocimiento de la terapia psicológica proporcionada a través de Internet. Se lanzan varias hipótesis para intentar explicar qué procesos podrían estar detrás de estos resultados.

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Information and Communication Technologies (ICTs) have proven to be useful in the provision of health services (Andersson et al., 2015; Cuijpers et al., 2014; Snoswell et al., 2021). e-Health is defined as the use of the internet and other technologies for the provision of care and health-related information (Eysenbach, 2001; World Health Organization, WHO, 2006). The disciplines covered by this concept range from Medicine, Nursing, and Nutrition to Psychology, among others (Kim & Xie, 2017). The COVID-19 pandemic has boosted both the use and scientific interest in ICT-enabled healthcare (Doraiswamy et al., 2021), which had already been growing in previous years (Richardson et al., 2009). Some challenges about its characteristics, ethics, deontology, and applicability were highlighted as a result (Inchausti et al., 2020; Larroy et al., 2020; Zach et al., 2011).

Among the disciplines included in the concept of e-Health, telepsychology is defined as "the provision of psychological services using telecommunication technologies" (American Psychological Association, APA, 2013, p. 792). It is a heterogeneous set of interventions that can be divided into four groups (Barak et al., 2009; Calero & Shih, 2016): (1) online therapy, which involves direct communications between therapists and clients through videoconferencing, email or chat, among others; (2) web-based interventions, which presents structured content such as psychoeducation or self-guided interventions accessible to clients; (3) therapeutic software, which uses virtual reality or artificial intelligence as therapeutic elements; and (4) other online interventions such as games or apps. Online therapy can be classified according to the simultaneity of communications between therapists and clients as: (1) synchronous, at the same time (e.g., videoconference, telephone, chat, etc.); or (2) asynchronous, at different times (e.g., email, video, or audio recordings) (Suler, 2000). Videoconferencing psychotherapy (VCP) has proven to be a widespread alternative for the continuation of psychological treatments following the COVID-19 pandemic emergence (Sammons et al., 2020; Wind et al., 2020).

VCP presents several potential advantages over the face-to-face format of therapy (F2F) such as increased accessibility of treatments to people in remote areas or who, because of scheduling or time-saving reasons, may prefer this modality (Capner, 2000; Connolly et al., 2020; Field, 1996). It is successful for treating several problematics, such as anxiety related diagnoses (Backhaus et al., 2012; Berryhill, Halli-Tierney et al., 2018; Rees & Maclaine, 2015; McClelland et al., 2021) and depression (Matsumoto et al., 2021; Berryhill, Culmer et al., 2018), among others. Adherence to treatment, a traditional challenge for telepsychological interventions (Fernandez et al., 2015; Ritterband et al., 2006) is currently showing promising results in VCP (Thomas et al., 2021), although scientific literature on this subject is still limited. Moreover, VCP may be able to reduce the economic and time costs of therapy (Simpson, 2009).

A lesser studied clinical indicator is the pace of therapeutic change. A commonly used statement that therapists tend to express to their clients is *"change in therapy is not linear"*, but little is known about its nature and how to investigate it (Hayes, Laurenceau et al., 2007, Laurenceau et al., 2007). Attempts to study this phenomenon have come from the common factors paradigm (Kleinke, 1994). It has been claimed that a constant in therapy is a shift from avoidance to exposure to certain situations (Carey, 2011; Lambert, 2005; Hayes, Feldman et al., 2007). In this regard, clients' improvement may be due to the destabilization of their functioning systems, used to a maladaptive functioning (problem behavior) and forced to change to a new way of functioning (adaptive behavior learned in therapy) (Hayes et al., 2015; Stiles, 2001). Other approaches have come from the studies of processes as opposed to outcome studies (Kazdin, 2008), an example being the study of therapist-client verbal interaction patterns (Froján et al., 2006).

The pace of therapeutic change in VCP has hardly been studied: of particular interest on this subject is a systematic review in which it is claimed that the mechanisms of change should not be assumed to be the same in F2F and VCP (Mogoașe et al., 2017). The therapeutic relationship, clients' interest in therapy and the fact that techniques in therapy are F2F-ready may contribute to the differences between VCP and F2F modalities (Beatty & Binnion, 2016; Connolly et al., 2020; Norwood et al., 2018), such as a slower pace of change. Therapists may fail to adopt the necessary adaptations to adjust their communication or techniques to the new online context, which could negatively impact the quality of the treatment and result in a slower pace of change (de la Torre & Pardo, 2018). The evidence regarding the establishment of therapeutic relationships in online psychotherapy has been mixed, with some studies suggesting that it is possible to establish relationships to the same extent as in the face-to-face format, while others present contradictory findings. Additionally, the relationship between the therapeutic alliance and success in therapy has not been consistently identified in online psychotherapy to the same degree as in the face-to-face format (Andersson et al., 2015; Flückiger et al., 2018). Other mediators such as emotional (e.g., fear, hopelessness) and cognitive (e.g., perceived control, expectations) behaviors have been specified in a recent systematic review (Domhardt et al., 2021). Additionally, VCP has shown to be less efficient than F2F in a recent study (Fernández-Regueras et al., 2023), an important feature in the cognitive-behavioural therapy (CBT), yet the evidences of this phenomenon are still very limited.

Given this scenario of yet unanswered questions, an initial analysis of the characteristics of the pace of change in both VCP and F2F psychological therapy is proposed. Initial in the sense that the processes that could explain the pace of change will not be analyzed, but rather its form will be studied. This will guide the generation of hypotheses to be analyzed by future approaches. The aims of this study are: (1) to explore the differences in the pace of change between VCP and F2F and, therefore, to clarify the statement *"change in therapy is not linear"*; (2) to offer a methodological alternative to make the study of this clinical indicator possible; (3) to guide the generation of hypotheses about processes that could explain the possible differences between the modalities.

Two hypotheses were generated based on the literature consulted and the clinical experience of the members of our research team, following the recommendation of Laurenceau and colleagues (2007), as the scarce research material in this regard could limit this task (Goldfried & Wolfe, 1996; Laurenceau et al., 2007).

- *The pace of therapeutic change will not follow a linear trajectory in either VCP or F2F:* in line with the statement *"change in*

therapy is not linear". Different trajectories will be adjusted until the one that best reflects the empirical data is found.

- *The pace of therapeutic change will be faster in F2F than in VCP:* the slope of the trajectory is expected to be steeper in F2F compared with VCP as the literature suggests that the implementation of the techniques or the establishment of a therapeutic relationship could be less difficult in the former.

Method

Participants

Longitudinal data, session by session (one per week), from complete treatments of 113 participants was collected from the university clinic of Psychology of the Autonomous University of Madrid (CPA-UAM). The total number of therapy sessions used for the analyses was 2552. All the participants were clients of individual psychological therapy from either VCP (n = 56) or F2F (n = 57). To control for potential confounding variables between the treatments, we ensured that all cases, both in F2F and VCP, began treatment during or after the academic year 2019-2020, thus excluding the effect of the pandemic emergency. Blended interventions (BI, combining online and face-to-face sessions) have been acknowledged in the scientific literature as being different both from pure online and face-to-face treatments (Erbe et al., 2017). As there was a greater number of cases in F2F (more than 75% if the sessions held face-to-face), purely online (more than 75% of the sessions held online, n = 26) and BI (between 25% and 75% of the sessions held online, n = 30) cases were integrated in the same group (VCP) to favor the comparison with F2F, as small sample sizes interfered with the statistical analyses (Bates et al., 2015). All participants were adults aged between 18 and 78 (M = 25.01, SD = 9.54): VCP (M = 24.93, SD = 9.94) and F2F (M = 25.09, SD = 9.22), no differences were found between the groups (t[111] = -0.159, p = 0.930). They all signed informed consents authorizing the use of their data for research and teaching purposes. No significant differences were found between the modalities in any of the sociodemographic variables. Therapy users younger than 18 years were excluded from the final sample as they could show differences with the main sample, complicating data interpretations. Table 1 shows some sociodemographic data from the participants.

Twenty-two CBT therapists participated, 19 women and three men, who provided therapy both in the F2F and VCP modalities. During the data collection period, the centre carried out a four-year residency program for the training of novice therapists. Each year, between four and six therapists entered the first year of residency (R1) and two of them continued as second (R2), third (R3) and fourth-year (R4) residents. The team also includes expert therapists who are university professors that, in addition to their therapeutic commitments, provide training and supervision to the less experienced therapists. The diagnoses treated at the clinic were varied. Once again, no significant differences were found between VCP and F2F in any of the variables. No significant differences were found between the groups in the dropout rate as well. Table 2 provides descriptive data on the diagnoses of the cases, the experience of their therapists and the dropout rate.

All therapists and clients agreed to participate and signed informed consent in compliance with the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation, GDPR), and with the Spanish legislation on data protection and digital rights *Ley Orgánica* 3/2018 of 5 December 2018 (*Ley Orgánica de Protección de Datos y Garantía de los Derechos Digitales, LOPDGDD*).

Table 1
Clients' Sociodemographic Data

Sociodemographic variables	VCP		F2F		Sig. of the differences
	n	%	*n*	%	
Gender					
Female	39	69.64	38	66.67	$X^2(1) = .115, p = .734$
Male	17	30.36	19	33.33	
Nationality					
Spanish	51	91.07	51	89.47	$X^2(1) = .082, p = .775$
Other	5	8.93	6	10.53	
Civil status					
Single	31	55.36	36	63.16	$X^2(1) = .712, p = .399$
Married or with a partner	25	44.64	21	36.84	
Educational level					
Primary or secondary studies	3	5.36	5	8.77	$X^2(3) = 3.021, p = .388$
Baccalaureate	39	69.64	31	54.38	
University	11	19.64	15	26.32	
Postgraduate/PhD	3	5.36	6	10.53	
Ocupation					
Student	46	82.14	44	77.19	$X^2(1) = .427, p = .513$
Employed	10	17.86	13	22.81	

Note: n = group size; X^2 = chi-squared statistic; p = critical value

Table 2
Diagnoses of the Clients and Experience of Their Therapists

Variables	VCP		F2F		Sig. of the differences
	n	%	*n*	%	
Diagnostic group (DSM-5)					
Anxiety disorders	26	46.43	26	45.61	$X^2(3) = .426, p = .935$
Depressive disorders	8	14.28	9	15.79	
Trauma related disorders	10	17.86	8	14.04	
Other	12	21.43	14	24.56	
Experience of the therapists					
Inexperienced	52	92.86	48	84.21	$X^2(1) = 2.074, p = .150$
Experienced	4	7.14	9	15.79	
Dropout rate					
Complete	45	80.36	45	78.95	$X^2(1) = .035, p = .852$
Dropout	11	19.64	12	21.05	

Note: n = group size; X^2 = chi-squared statistic; p = critical value

Instruments

As the pace of change in therapy is a hardly studied clinical indicator, two innovative longitudinal measures, reported in each session by the clients and by the therapists, respectively, were considered. Measurements of both clients and therapists are routinely taken, per center protocol, at each treatment session, so the hypotheses could not influence the therapists, clients, or researchers when collecting the sample.

Clients' longitudinal Measure

At the beginning of each therapy session, clients must rate if their week went worse, the same or better than the previous week. A numerical code was assigned to each of the three responses (-1, 0 and 1, respectively). A cumulative sum was made over the sessions (e.g., if a client indicated the first three sessions that the week went better, the third week the score would be 3; if a client indicated the first two sessions that the week went worse, the second week the score would be -2). The cumulative sum was transformed into a 0–100 scale, where 0 is the minimum value reached by each client, and 100 is the maximum value. This was done to standardize the data and make it comparable among different clients. This measure only captures whether the individual feels better or worse since the previous week, without assessing the degree of improvement or worsening of their condition. We decided not to use an interval scale due to the heterogeneous nature and inconsistent shapes of the assessments of change in therapy made by the clients. Instead, the proposed transformation was utilized, which provided curves more closely aligned with our hypothesis and those assessed by the therapists. A positive change in therapy was defined as a shift towards more frequent assessments that the week had gone better.

Therapists' Longitudinal Measure

Each session, the therapists rate from 0 to 100 the percentage of resolution of the case so far. No transformation was made as the data were already standardized among all the cases.

Procedure

All the therapists collected the data session by session between 2019 and 2022. At the end of each therapy session, therapists filled out a clinical history in an electronic platform in which they recorded both clients' and therapists' longitudinal measures, in addition to other information. Data were exported to an Excel spreadsheet and client longitudinal measures were transformed as explained above.

Data Analysis

Multilevel growth curve modelling, using maximum likelihood (ML), was performed, as it is flexible for the analyses of data with heterogeneous trajectories and makes a more efficient use of missing values (Hoffman, 2015). This is a procedure for the quantification of longitudinal measures that adjusts different models to explain, as closely as possible, trajectories followed on average by all data as a whole. This could be assimilated into a regression model: equations are calculated in which, by substituting each value of the independent variable (in this case, session number) a prediction of the dependent variable (in this case, change in therapy) can be obtained.

Different effects were introduced to try to account, as closely as possible, for the average trajectories (via fixed effects, including main and interaction effects) and variation (random effects) in these trajectories. The following features were introduced:

- *Shape of the pace of change:* "time as predictor", with time being the session number: (1) *linear* (the pace of change always follows the same pace, there are no faster or slower periods); (2) *quadratic* (the pace of change undergoes one change of trend, acceleration or deceleration, i.e., there is a period in which it is faster and another one in which it is slower); (3) *cubic* (the pace of change undergoes two changes of trend).
- *Variation of slopes:* (1) *fixed slopes* (it is assumed that all cases change in the same way); (2) *random slopes* (it is assumed that the cases can change in different ways). Therefore, models include fixed and random effects.
- *Modality of therapy:* whether considering the way of receiving therapy *(VCP* or *F2F)* helps to better predict the pace of change than taking all the data together.

Data analyses were carried out using the programming language R. Package "lme4" (Bates et al., 2015) was used to adjust different models to estimate the trajectories that best fit the empirical data, and package "afex" (Singmann et al., 2015) was used to calculate the significance value of the effects included in the chosen models. Clients' and therapists' data were analyzed separately, gradually adjusting from less to more complex models.

Data analyses were performed using R open code packages publicly available at the CRAN package repository. The data reported were obtained from the clinic's private databases and have not been previously published in other manuscripts either accepted or under review. We followed Journal Article Reporting Standards (JARS, Appelbaum et al., 2018) for the preparation of this manuscript.

Results

The mean number of sessions in each modality differed significantly (F2F = 20.11; VCP = 29.34, $t(111) = 4.328$, $p < .001$). A comparison between nested models was performed combining the aforementioned terms (the shape of the pace of change, the variation of slopes and the modality of therapy). That is, each new model includes the components of all previous models. The likelihood ratio (G2) was used to determine whether one model improved the adjustment (better predicted the empirical data) compared to the previous one. Effect sizes were calculated following Nakagawa & Schielzeth (2013) recommendations for general linear mixed-effect models (GLMM). r^2_{GLMM} can be interpreted as the amount of variance (0-1) explained in the outcome variance using fixed effects alone (marginal r^2_{GLMM}) or both fixed and random effects (conditional r^2_{GLMM}). Cut scores for small,

medium, and large effects were .01, .09 and .25, respectively. Table 3 shows all the models adjusted for therapists and clients, respectively, and the likelihood ratio of each one.

We chose to include only the fixed effects in the results, as the random effects do not provide relevant information for our hypotheses and would be of more interest in a methodological article. The data and the Rstudio script are openly available for researchers who wish to access this information.

Growth Curve Model for Therapists' Data

The chosen model, according to the likelihood ratio comparison procedure shown in Table 3, was model 6. This model includes all the components of the previous models. More complex models were not chosen, given that the level of marginal R-squared, attributed solely to fixed effects, notably decreased. Effect sizes were calculated for each of the fixed effects using r^2, using Field and colleages (2012) formula (p. 641). This decision was made to continue the general tone of the scientific literature, recognizing its limitations especially for the interactions (Field et al., 2012). The reported estimates, moreover, show the effect that increasing one unit (independent variable: therapy session) has on the dependent variable (therapy change) whilst holding other variables constant. Table 4 shows the model coefficients (fixed effects), which will be explained below.

According to the therapists' assessment of the percentage of case resolution, it is estimated that clients start therapy with an average -1.21% of case resolution (intercept is the score estimated by the chosen model on the dependent variable at time zero, the beginning of therapy). Since time as a linear and quadratic predictors are significant, it can be concluded that the clients' change in therapy, according to their therapists, is not purely linear, as hypothesized. Time as a linear predictor coefficient (3.90) shows that at each session, there is an estimated increase of 3.90 in the percentage of case resolution. Time as a quadratic predictor coefficient (-0.04), negative although small, shows that there is a slight slope deceleration: clients change slower as therapy progresses.

Regarding the second hypothesis, modality does not significantly explain the change in therapy by itself, but the interaction between modality and time as a linear predictor was positive and significant. This implies that participants in F2F improve 1.78 points each session faster than participants in VCP, as predicted by the second hypothesis. Figure 1 shows the trajectory of change in therapy assessed by therapists (percentage of case resolution) in the first 25 sessions (average number of therapy sessions) in both modalities.

Growth Curve Model for Clients' Data

Model 6 was chosen, as in the therapists' data, based on the results of the likelihood ratio comparison (Table 3). Again, we chose not to consider more complex models as the percentage of the total variance explained by the fixed effects decreased. Table 5 shows the model coefficients (fixed effects), which will be explained below.

According to the clients' session-by-session assessment of improvement, model 9 estimates that clients start therapy with an average score of 18.75 (intercept) on the improvement scale. According to the first hypothesis, the model describes a non-linear trajectory since time as quadratic and as cubic predictor terms are significant. Time as a linear predictor (0.58) is not significant. Time as a quadratic predictor is positive (0.13): there is an acceleration in the slope (at the beginning, clients rate a greater change in the pace of change than at the end, but change is faster as therapy progresses). Time as a cubic predictor is negative although small (less than -0.01): there is a deceleration of the acceleration (clients assess that there is a slower change in the pace of therapeutic change at the end).

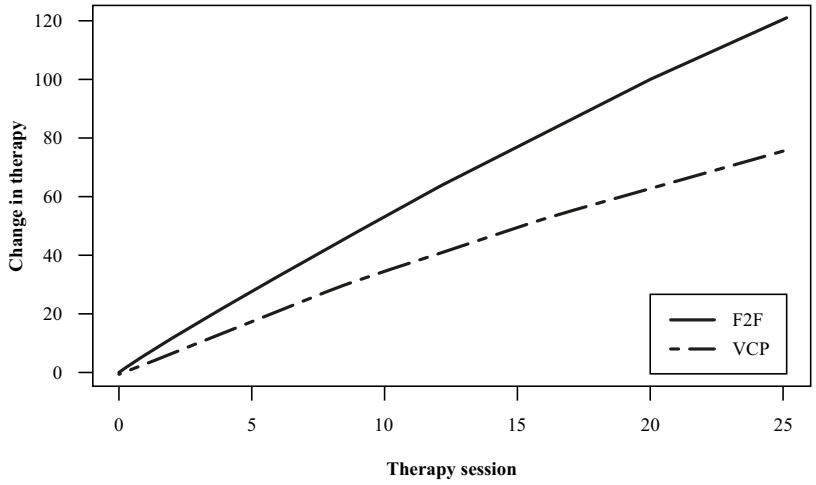
Regarding the second hypothesis, modality cannot significantly explain the pace of change, as in the case of the therapist assessment. Once again, the interaction between modality and time as a linear predictor was significant: F2F participants improved 2.65 points faster, session by session, than those in VCP, as predicted by the hypothesis. Figure 2 shows the trajectory of change in therapy assessed by clients in the first 25 sessions (average number of therapy sessions) in both modalities.

Table 3
Models Adjusted to Predict Change in Therapy

Model	Terms included in each step	Therapists			Clients		
		G^2	Marginal r^2_{GLMM}	Conditional r^2_{GLMM}	G^2	Marginal r^2_{GLMM}	Conditional r^2_{GLMM}
Empty model	Dependent variable: change in therapy.						
Model 1	Time as linear predictor.	2260.09**	.56	.80	1577.91**	.47	.65
Model 2	Random slopes for time as linear predictor.	2392.95**	.55	.98	1089.33**	.48	.92
Model 3	Time as quadratic predictor.	221.11**	.52	.97	65.93**	.51	.94
Model 4	Time as cubic predictor.	2.08	.52	.97	71.85**	.51	.95
Model 5	Modality as predictor.	2.44	.52	.97	8.52*	.52	.94
Model 6	Modality and time as linear predictor interaction.	22.49**	.54	.97	21.10**	.53	.93

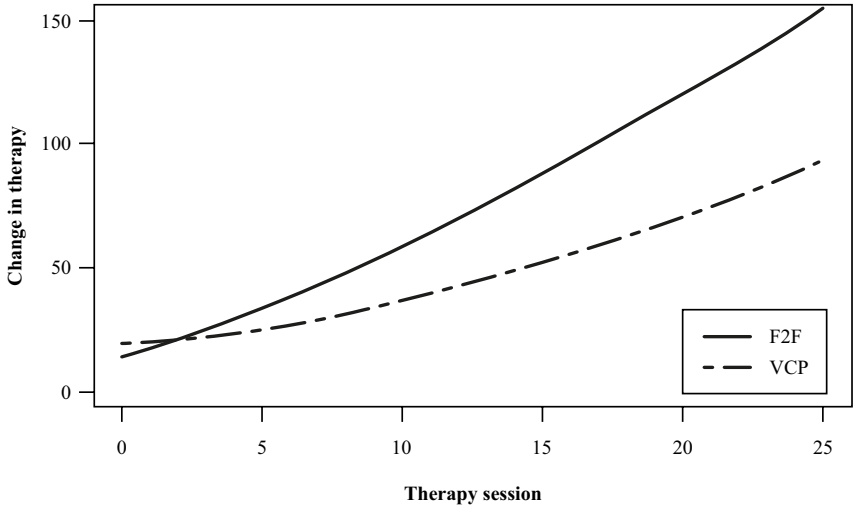
Note: **p < .001; *p < .01; G^2 = likelihood ratio; r^2_{GLMM} = effect size indicator

Figure 1
Estimation of the Pace of Change in Therapy Assessed by the Therapists According to Model 6



Note: F2F = Face-to-face psychotherapy; VCP = Videoconferencing psychotherapy.

Figure 2
Estimation of the Pace of Change in Therapy Assessed by the Clients According to Model 6



Note: F2F = Face-to-face psychotherapy; VCP = Videoconferencing psychotherapy.

Table 4
Model 6 Coefficients (Fixed Effects): Therapists' Data

Components	Estimates	Std. error	*t*	r^2
Intercept	-1.21	1.27	-0.95	.007
Linear time	3.90	.27	14.38*	.616
Quadratic time	-.04	.01	-5.70*	.013
Cubic time	< .001	< .01	1.38	.017
Modality	0.89	1.74	0.51	< .001
Modality and linear time interaction	1.78	.36	2.14*	.208

Note: Dependent variable: % of case resolution; *p < .001; t = t-statistic; r^2 = effect size indicator.

Table 5
Model 6 Coefficients (Fixed Effects): Clients' Data

Components	Estimates	Std. error	*t*	r^2
Intercept	18.75	3.00	6.24*	.238
Linear time	.58	.43	1.33	.011
Quadratic time	.13	.01	10.70*	.046
Cubic time	< -.01	< .01	-8.61*	.030
Modality	-4.39	4.16	-1.05	.010
Modality and linear time interaction	2.65	.55	4.83*	.200

Note: Dependent variable: clients' improvement rating; *p < .001; t = t-statistic; r^2 = effect size indicator.

Discussion

This study has found that change in therapy, conceptualised as percentage of fulfilment of treatment and subjective wellbeing, is not linear (or at least not uniquely linear) and that it is faster in F2F than in VCP. The hypotheses in this study came from the clinical experience of the members of our research team and dealt with some warnings launched in the scientific literature about VCP (Connolly et al., 2020; Norwood et al., 2018; de la Torre & Pardo, 2018). A task for the future will be to analyze the reasons that could be behind these results.

As the results have shown, the pace of therapeutic change, as therapists tend to tell their clients, cannot be considered linear, neither according to the therapists' nor the clients' assessment. In the case of the pace of change in therapy as assessed by the clients, there is an accelerated change at the beginning of the therapy and slight deceleration of this change as the therapy progresses. The more pronounced changes after time could be due to the start of implementation of the techniques when clients begin to improve more rapidly. Later, the deceleration of change in therapy could be due to the clients reaching a limit in which the pace of therapeutic change can no longer continue to increase at the same speed, since they have already made the most important changes to be achieved in therapy. In the case of the pace of change as assessed by the therapists, they perceive a rapid change from the first sessions, with this change slowing down as the therapy progresses. This early change may be because therapists are familiar with the normal progress in therapy and can appreciate subtle changes in the clients' behavior that might go unnoticed by them. Further research is needed to elucidate these hypotheses.

Regarding the differences between VCP and F2F in the pace of change in therapy, as we predicted, the slope of change is faster in F2F than in VCP. These results are in line with what Mogoașe and colleagues (2017) already anticipated: it should not be assumed that the mechanisms related to change in therapy are the same in VCP and F2F. Further investigation would be needed to continue in this direction.

Beyond our hypotheses, it is also striking that change session by session as assessed by the clients might not be as obvious as it is for therapists (since time as a linear predictor is significant for therapists and not for clients). As we hypothesized before, it is possible that therapists, as they know how therapy works, may perceive changes that go unnoticed by the clients. Further investigation of this phenomenon will be necessary in the future.

This is an initial study that aims to provide researchers with tools for the analysis of this little-explored clinical indicator. The main contribution of this study is, therefore, the onset of the research of an important clinical indicator that could contribute to the optimization of treatments, as it could be related to other indicators such as efficiency, adherence to treatment and success (efficacy and effectiveness). Getting to know the moments in which the pace of change in therapy is faster and when it is slower will enable therapists to adapt their interventions. Also, knowing the differences between VCP and F2F aligns with the same objective and answers to the demands of the scientific community regarding the need of a differential study of change in therapy and the factors to which it is due in the two modalities (Mogoașe et al., 2017). Given these reasons, this study and those that follow in this line have clear implications for clinical practice. On the other hand, an initial proposal has been made in the search for a methodological tool that enables the study of the pace of change in therapy. Our aim is to continue and encourage other researchers to continue with its study by trying increasingly complex methodologies. The goal of this research line is to publish a methodological guide that will provide researchers with a way to quantify this clinical indicator and implement changes in therapy to optimize it.

Regarding the generalizability of the results, the findings in this study could apply to university clinics such as the CPA-UAM and, by extension, to all Psychology clinics that work under the CBT paradigm. This could be asseverated as previous studies have shown that the population treated at the center does not differ from that of other clinics of Psychology (Calero et al., 2018). A limitation of this manuscript is that the clinic does not collect information on the ethnicity of the clients, so we were unable to provide this information. As a counterpart, information on the nationality of the participants was provided.

This study has some limitations. First, the small sample size of purely online and blended cases, as compared to F2F ones made it necessary to unify them into a "compound VCP" group. Therapies in these two different modalities could have some repercussions in the forging of an adequate therapeutic relationship (Calero & Shih, 2016). This could have altered the results, as some differences between purely online and blended cases trajectories could have been masked. In future approaches, it will be necessary to recruit a larger sample of participants in the aforementioned modalities so that their data could be compared separately with F2F. Moreover, due to the characteristics of the clinic from which we obtained our sample, some cases leave the center without completing their treatments. As a university clinic, the clinic is a training center for novice therapists who, after completing their training, leave the center (and, sometimes, so do the clients they are treating). We do not consider that this could have largely altered the results, since these cases were distributed in both conditions.

Other limitations have to do with the measures and methodology we used to quantify the change in therapy. The methodological proposal for the study of the pace of change is still very initial and needs to be refined to account for the heterogeneity of the data. Average trajectories were adjusted in an attempt to describe as closely as possible the multitude of available data, but common clinical phenomena such as setbacks in the pace of change were overlooked. Single case designs could be appropriate to account for differences between the cases. Finally, it is worth mentioning that therapists' and clients' measures of change in therapy were different (percentage of case resolution and improvement rating). As this is an initial study, our desire was to explore diverse options to try to find the most suitable one. We are open to exploring other options that other researchers may propose in future approaches. Regarding the measure of change as assessed by clients, by standardizing the change measures between 0 and 100, the results must be interpreted with caution when throwing out-of-

range predictions. Exponential models or a logistic model (with transformation of those percentages on a logit scale) could be considered in future approaches. Lastly, it could be necessary, in the future, to measure the follow-up results (6+ months after the end of the therapy).

Future lines of research, already planned by our research team, will focus on the analysis of verbal interactions between therapists and clients to try to shed some light on the mechanisms of change behind the differences between modalities found in this study. We will focus on the study of the therapeutic relationship, a phenomenon that may occur differently in F2F and VCP or play different roles in treatment outcomes (Andersson et al., 2015; Flückinger et al., 2018; Norwood et al., 2018). Also, the scientific literature highlights differential features that may be necessary to establish good therapeutic relationships in VCP and F2F (Calero & Shih, 2016). Failure to adapt interactions between therapists and clients in therapy to these differential features could be behind some differences in the pace of change between VCP and F2F. Moreover, it is also necessary to continue studying the methodological tools needed to account for the pace of change in therapy. The final aim of this research line, in addition to deepen our knowledge of the way people change in therapy, is to develop a methodological guide to provide researchers with a tool to quantify it, thus being able to propose improvements in the different modalities of therapy.

In conclusion, the objectives of this study have been addressed: (1) differences in the pace of change between VCP and F2F have been explored, thereby clarifying the statement *"change in therapy is not linear"*; (2) a methodological alternative has been proposed to make the study of this clinical indicator possible; (3) hypotheses have been developed to account for processes that could explain the differences between F2F and VCP. VCP is a useful alternative for psychological intervention, although the processes that make the difference with F2F remain to be explored. The results and conclusions of this study can be taken up in future studies to raise some new research questions.

Author Contributions

Diego Fernández-Regueras: Conceptualization, Methodology, Software, Validation, Formal Analysis, Investigation, Data Curation, Writing – Original Draft, Visualization. **Ana Calero-Elvira:** Conceptualization, Resources, Writing – Review & Editing, Supervision, Project Administration, Funding Acquisition.

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Declaration of Interests

The authors declare that there is no conflict of interest.

Data Availability Statement

All data needed to perform the growth curve models and to obtain the sociodemographic descriptive data, as well as the R script used are available at the APA's repository on the Open Science Framework (OSF) and can be accessed at https://doi.org/10.17605/OSF.IO/8NK7M

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