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Sudden e-learning: Exploring the role of user intention, enjoyment, and habit on university students' well-being

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Abstract

Suddenly, adjusting to a new way of learning is a major challenge for university students. The objective of this article was to study university student determinants of the well-being in the context of the sudden transition towards e-learning imposed by the COVID-19 lockdown. Based on the antecedents linked to the structure of e-learning and its influence on self-management and ease of use, as well as using the mediating role of user intention, perceived enjoyment, and habits, a model was tested to find well-being trajectories. Using a sample of 543 students from originally Spanish face-to-face universities and through a PLS-SEM methodology, this research obtained relevant results in two main directions. First, research found that the self-management and ease of use of e-learning systems constitute direct antecedents of student well-being. Furthermore, the research results confirmed two reinforcement itineraries of well-being. The intention built an itinerary to reinforce ease of use, and perceived enjoyment added explanatory power to self-management. However, the research also found a second explanatory and negative itinerary of sudden e-learning student well-being. This path of darkness is related to the

adverse mediating effect exerted by the habit, understood from the perspective of technological dependence, when it interacts with perceived enjoyment. The article discusses their implications for educational strategy and policy, especially indicated for those e-learning practices solely based on the enjoyment and immersion experience of their students.

1 | INTRODUCTION

From 2020, e-learning has accelerated significantly. The COVID-19 pandemic caused a drastic and unexpected transition to e-learning in higher education that forced far-reaching changes (Rutkowska et al., 2021). The cancellation of educational activities in many countries forced learners to pursue online courses to continue their education (Saxena et al., 2020). Universities around the world modified their structures and resources towards various forms of e-learning, and teachers and students immersed themselves in a profound change in the learning model (Favale et al., 2020). In the Spanish educational system, all face-to-face activities were suspended and an online teaching system was adopted for all students during the lockdown period (Costado-Dios & Piñero-Charlo, 2021; García-Peñalvo, 2021).

Despite the importance of preparing for eventualities and minimizing the risk of the transition to e-learning (Almaiah et al., 2020; Kulikowski et al., 2022), literature points out that this transition during COVID-19 pandemic was not planned (Moorhouse, 2020). Simply migrating students to a mixed face-to-face learning system or only using technologies does not guarantee success in learning. Many subjects were taught online, although they were initially designed for face-to-face teaching, without planning or ensuring that all students had the minimum technological equipment or digital skills required (Shenoy et al., 2020).

E-learning also presented challenges for university students as a result of adapting to a new way of learning (Dhawan, 2020; Huang & Zhang, 2022). Unexpected exposure to e-learning can cause more stress and undermine the subjective well-being of students (Grubic et al., 2020; Lyons et al., 2020). Research confirmed that mental well-being is one of the most serious problems related to the COVID-19 pandemic and revealed increased mental disorders of students during home confinement (e.g., stress, anxiety, depression, boredom, and loneliness) (Cao et al., 2020; Gülsen Erden et al., 2022).

In this context, the objective of the research is to analyse the link between sudden e-learning and student well-being. Taking advantage of the quasi-natural experiment characteristics provided by the COVID-19 confinement in Spain, the trajectories of student well-being are examined. In particular, the role of self-management practices and the ease and intention of using e-learning are analysed as antecedents of the subjective well-being of the students involved. In addition, research also obtains a negative mediating effect for the habit, understood in terms of technological dependency. When habit interacts with perceived enjoyment, risks of dependency are generated that can severely limit the well-being of students and their physical and mental health. The article covers the knowledge gap on the well-being trajectories linked to sudden e-learning and presents an advance on its positive antecedents and its limits of dependence (Amaechi et al., 2022). The results obtained are not only useful for students and teachers, in particular they can help university management when considering what the immersion experience and development of inclusive e-learning programs should be like (Bagga et al., 2023; Castaño-Muñoz et al., 2020; Veidemane et al., 2021).

2 | THEORETICAL BACKGROUND AND HYPOTHESES

2.1 | E-learning, self-management, and ease of use

E-learning refers to 'teaching and learning, representing all or part of the applied educational model, that is based on the use of electronic media and devices as tools to improve access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning' (Sangrà et al., 2012, p. 152). A holistic model considers e-learning as a form of information and communication system that incorporates individual factors (i.e., learners and instructors) and non-individual factors (i.e., learning management systems) (Eom & Ashill, 2018).

E-learning must be of high quality and offer schedule whenever possible, so that the student can study the subject more easily (Favale et al., 2020). Therefore, it is essential that online students are responsible for controlling their learning and be good at self-management (Zhu & Doo, 2022). The self-management of e-learning has been one of the individual issues in educational research due to its critical role in facilitating more positive e-learning performances (Huang, 2014). In autonomous online environments, it is up to students to decide when, where, and how to learn; thus, students are responsible for their own learning (Zhu et al., 2022). In this sense, research reported that to be successful in an e-learning environment, students must have the ability to plan, monitor and manage their learning (Alqahtani & Rajkhan, 2020; Goh & Yang, 2021). Learners in e-learning environments must be highly self-managed and independent. Therefore, the following hypothesis is proposed:

> **H1.** Content quality, educational technology, and technological support are related to self-management of e-learning.

To assist e-learners to become autonomous and independent, providing a social and supportive context is beneficial through autonomy-supportive and interaction. Students' learning motivations can be improved through the behaviour and attitudes of educators. The ability of e-learners to be autonomous can also be achieved through interactivity, which is characterized by clear instructions, adequate feedback, and direction, allowing learners to develop self-regulation (Chang et al., 2017). Perceived learning assistance is affected by student beliefs regarding usefulness and ease of use (Saxena et al., 2020).

Perceived ease of use refers to 'the degree to which a person believes that using a particular system will be free of effort' (Davis, 1989, p. 320). Research highlighted that teachers play a role as initiators, managers, and facilitators of students' use of e-learning (Sørebø et al., 2009). In particular, students consider the instructor's attitude as vital to the success of the e-learning experience, including the enthusiasm with online teaching and the instructor's skills when using the e-learning system (Casillas-Martín et al., 2020). In this sense, the importance of pedagogical skills and the implementation of technological and digital skills of teachers in the use of e-learning were also reported (Akram et al., 2021). Students also prioritize factors such as ease of navigation on the educational platform, the access and security of the platform, the availability and usefulness of educational resources and the possibility of using the web-based or digital platform (Sitar-Taut & Mican, 2021). Having this adequate support facilitates trust in e-learning teaching, ensuring its usefulness, interactivity, and ease of use (Alqahtani & Rajkhan, 2020). So, the following hypothesis is therefore proposed:

> **H2.** Interactivity, instructor skills and attitudes, and social influence are related to ease of use of e-learning.

2.2 | User intention as mediator between ease of use and student well-being

Subjective well-being is defined as 'people's emotional and cognitive evaluations of their lives' (Diener et al., 2003, p. 403). Life satisfaction, frequent experiences of positive affect and infrequent negative affect are components that approach subjective well-being (Busseri & Sadava, 2011). One for evaluation criteria of the e-learning achievements is student satisfaction on their educational life (Weerasinghe & Fernando, 2017). Some previous studies investigate user satisfaction in the e-learning environment and concluded that ease-of-use factors, such as instructor attitudes and support, are important drivers for learner satisfaction (Al Mulhem, 2020). Social contact, especially between students, is associated with satisfaction with e-learning (Asanjarani et al., 2022).

Maintenance of subjective well-being of university students was a challenge posed during the period of COVID-19 pandemic (Cofini et al., 2022). Research confirmed the negative effect on the psychological well-being of university students in some countries (Giusti et al., 2021). Specifically, stressful e-learning experiences were reported to undermine students' subjective well-being (Busetta et al., 2021). In the teaching and e-learning context, the emotional distance between students is reduced by social presence and learning tools that are useful and easy to use are expected to facilitate learner satisfaction (Palos-Sánchez et al., 2024). Studies on computer-mediated or mobile technology education also show that social contact predicts academic life satisfaction (Cofini et al., 2022; Erden et al., 2022). In summary, the research found that perceived ease of use was positively related to student satisfaction and perceived value. So, the following hypothesis is therefore proposed:

H3. The ease of use of e-learning is related to the well-being.

Research on the effects of e-learning reported positive results such as effectiveness, safety, convenience, greater participation, and ability of students to use their time effectively and also negative results such as distraction and reduced concentration, workload, bad technology and Internet connectivity, or inadequate support (Fidalgo et al., 2020). Furthermore, following the technology acceptance and use models, research also corroborated that perceived ease of use of a technology affects user attitudes and positively influences the intention to adopt that technology (Abbad, 2021; Chang et al., 2017).

The literature also found that connective technologies have been instrumental in preserving social closeness despite social distances. During the COVID-19 pandemic, online learning systems enabled social online connection and increased positive perceptions about distance learning (Busetta et al., 2021). At the same time, frustrated by the lack of in-person interactions can affect e-learning performance and, in turn, the subjective well-being of the students (Grubic et al., 2020). Therefore, it is possible to postulate a hypothesis where the relationship between ease of use and the well-being of e-learning students is mediated by the intention user:

H4. The relationship between ease of use and student well-being on e-learning is positively mediated for user intention.

2.3 | Perceived enjoyment and habits as mediators between self-management and students' well-being

The quality of e-learning is an important predictor of students' satisfaction with their educational life (Cofini et al., 2022). Research on e-learner satisfaction concluded that self-management factors, such as proper e-learning planning, effective teacher feedback, quality and periodic updating of content, and methodologies that promote tasks for a better learning experience, are important predictors of satisfaction (Al Mulhem, 2020). By enhancing their engagement and motivation, self-management of e-learning results in students being more likely

to enjoy better well-being and physical and emotional health (Jang et al., 2016). In this sense, this hypothesis is, therefore, proposed:

H5. Self-management of e-learning is related to students' perceived enjoyment.

Perceived enjoyment is one of the most representative intrinsic motivators in the technology and educational use (Brown & Venkatesh, 2005). Refers to the extent to which engaging in e-learning is perceived to be enjoyable. The e-learning tools and applications, by allowing flexible, asynchronous, entertaining, and low-cost uses, are easy to develop to create interactive learning environments. These environments usually result in greater psychological well-being (Almhdawi et al., 2021) or in the generation of more creative or playful activities to deal with moments of greatest tension (Chandra, 2021). On the other hand, it has been highlighted that learners' autonomy predicts their perceived enjoyment, as well as the perceived usefulness of e-learning (Luo et al., 2021; Roca & Gagné, 2008). Thus, it is possible to hypothesize a positive mediating effect of perceived enjoyment between self-management and student's well-being in e-learning:

H6. The relationship between e-learning self-management and students' well-being is positively mediated for perceived enjoyment.

Habit is defined as 'a tendency to repeat responses given a stable support context' (Ouellette & Wood, 1998, p. 55). In the information system context, Limayem and his colleagues defined habit as 'the extent to which the use of a particular information system has become automatic in response to certain situations' (Limayem et al., 2007, p.709). Thus, Internet habits are automatic, unconscious responses to internal or external cues acquired through repeated Internet consumption (LaRose et al., 2010). Habit influences technology use in the sense that a stronger habit can lead to more frequent use intentions (Kim et al., 2005). The use of appropriate and effective technology can contribute to social connectedness, but negatively when the use of technology reaches a problematic level (Savci & Aysan, 2017). It diminishes the ability to control undesired behaviours and user feeling compelled to interact with technology despite the potentially negative consequences of continued uncontrolled use (Bayer & LaRose, 2018; LaRose et al., 2003).

Perceived enjoyment derived from the use of technology is an important factor in habit formation, and irrational expectation of enjoyment can lead to addictive behaviour (Ouellette & Wood, 1998). Pathological use of technology can lead to increased levels of addiction, especially among the youngest (Guven & Sonmez, 2021; Sert et al., 2019). Initial research on dependencies and additions in e-learning is also beginning to yield some results pointing to the threat to student well-being and health (Al-Salman et al., 2022). Prolonged use of digital tools and screens has been found to lead to addiction (Toto, 2018), where students become vulnerable to stress, tension, and depression (Albo et al., 2019).

Technological addiction has also been associated with mental or psychological health problems, such as loneliness, emptiness, depression, anxiety, or difficulty perceiving reality (Gürarslan & Karatay, 2020; Sigerson et al., 2017). Research in the field has indicated that immersion time is closely related to addiction to the Internet and digital games (Lin et al., 2022). However, and despite these negative results, the desire to use digital technologies, especially social networks and digital games, tends to be extremely strong and even irresistible (Burleigh et al., 2020). By tilting the balance of digital well-being towards continued connectivity, a strong habit of connecting and using e-learning can increase the probability that, through its excessive use, problems of procrastination, lower satisfaction, or greater stress will be generated (Meier, 2022; Meier et al., 2016). In this context, it was hypothesized that habit, in the sense of technological dependence, will exert a negative mediating effect on the relationship between perceived enjoyment and well-being of e-learning students:

H7. The relationship between perceived enjoyment and the well-being of students learning e-learning is negatively mediated for habit.

3 | METHODOLOGY

3.1 | Data collection

Data were collected through a Google Forms survey of users of e-learning systems to test the proposed model. University education students have been included in the target population of other previous studies in research on mobile applications (Shorfuzzaman & Alhussein, 2016) and the use of cell phones (Tan et al., 2014).

The survey was distributed on Google Forms with a link posted in public digital forums. The research was publicized in several social networks widely used by the students of the analysed Universities. Specifically, the link with access to the survey was distributed in student groups on *Facebook*, *Twitter*, and *WhatsApp*.

The surveyed individuals were between 18 to 40 years old. A small sample of Spanish university students from the University of Sevilla were included during the initial study in the first six months of April 2020. Then, a nonprobability convenience sample of e-learning students from the University of Seville, the University of Extremadura, UDIMA, the University Pablo de Olavide, the University Loyola Andalucia and 9 other universities in Spain were constructed. The sample consists of a random selection of e-learners from all degree programs of the universities participating in this study. As there were many users of the e-learning systems, which meant that a large sample size could be quickly reached, a convenience sample was used. Discarding invalid questionnaires, the final sample was 543 web or digital platform-based university students.

Table 1 presents the descriptive statistics of the student sample obtained. The results obtained indicate that the sample of students trained by e-learning were mainly women, unemployed or inactive, residing in cities or large cities, and belonging mainly to the Universities of Extremadura and Seville.

3.2 | Variables measurement

The research was posted on the Internet so that learners could easily access it to answer the survey. The study analyses the different relationships of the constructs used in the model. All of them are considered latent variables, without the possibility of direct measurement. Therefore, different indicators were used to assess the perceptions of university students of each construct. Students in the survey were web-based educational applications and were all habitual digital technology. Most of the students used two specific educational platforms (*Moodle* and *Blackboard*) to follow online classes and to be able to upload files with assignments requested by teachers.

To determine the opinions and perceptions of the students, a structured questionnaire was offered electronically to the entire study population. The responses followed a five-point Likert scale, ranging from a value of 1 ('strongly disagree') to a value of 5 ('strongly agree'). The final questionnaire consisted of 60 items, which are shown in the Appendix 1 and corresponded to the 12 constructs included in Course content quality (5 items), Educational technology (6 items), Technological support (10 items), Interactivity (3 items), Instructor skills and attitude (8 items), Social influence (2 items), Ease of use of e-learning (7 items), User intention (4 items), Self-management of e-learning (5 items), Perceived enjoyment (3 items), Habit (4 items) and Student well-being (3 items) (Table A1).

3.3 | Data analysis

The questionnaires with valid responses were analysed using PLS-SEM. This is a multivariate and covariance analysis technique that researchers have been increasingly using in recent years (Hair et al., 2019). In this

TABLE 1 Sociodemographic descriptive statistics of the sample of the student e-learning ($n = 543$).

Variable	Frequency	Valid percentage
Gender		
Feminine	306	56.4
Masculine	229	42.2
Other	8	1.5
Job		
Homemaker (housework)	46	8.5
Retired	9	1.7
Unemployed	290	53.4
Salaried worker	40	7.4
Self-employed (Freelance)	16	3.0
Others	142	26.2
Residence		
Out of Spain	3	0.6
City >100.000 inhabitants	207	38.1
Town between 20.000 and 100.000 inhabitants	219	40.3
Town <20.000 inhabitants	70	12.9
Village <5.000 inhabitants	44	8.1
University		
Extremadura	219	40.3
Sevilla	189	34.8
UDIMA	28	5.2
Pablo de Olavide	15	2.8
Loyola Andalucía	6	1.1
Cádiz	5	0.9
Zaragoza	4	0.7
Complutense de Madrid	3	0.6
Others	74	13.6

research, the Smart PLS v.3 software was used (Ringle et al., 2015). The PLS-SEM uses a two-stage analysis (Chin et al., 2020). First, the reliability and validity of the measurement model must be found, and then, the ordinary least squares algorithm was applied noniteratively to find the loading for both the visible and the latent variables of the relationships in the structural model. To close the analysis treatment, a bootstrapping process was performed in order to obtain the statistical significance of the relationships in the proposed structural model (Shiau et al., 2019). There is related work that has successfully used PLS-SEM in research on e-learning platforms adoption (Mora-Cruz et al., 2023), digital disconnection (Arenas-Escaso et al., 2024), e-government adoption (García-Rio et al., 2023), entrepreneurial education (Martin-Navarro et al., 2023), telework adoption (Ficapal-Cusí et al., 2023) or digital transformation (Brazo et al., 2023; Marino-Romero et al., 2022; Palos-Sánchez et al., 2023).

4 | RESULTS

4.1 | Measurement model

The analysis begins by studying the individual reliability of the different indicator loadings (λ) of the reflective items. For an item to be accepted as part of a construct, the value of λ must be at least 0.707 ($\lambda \geq 0.707$). However, some other authors consider this minimum acceptance level to be excessively rigid for the initial stages of an investigation of a relatively unstudied phenomenon. In this sense, λ values between 0.5 and 0.6 are considered acceptable (Chin et al., 2020). All values found in this study exceeded the minimum load levels (Hair et al., 2019). The composite reliability (CR) and Cronbach's alpha were used to find the internal consistency of each of the constructs (Henseler et al., 2012). The higher the value of Cronbach's alpha, which can be between 0 and 1, the more internal consistency a construct has. The minimum acceptance limit for internal consistency of a construct is understood to be 0.6 to 0.7 (Hair, 2020). Average variance extracted (AVE) measures the variance of a construction due to the measurement error of the indicators (Hair et al., 2017). The AVE is estimated to be 0.50, meaning that the indicators are responsible for more than 50% of the variance of a construct. Table 2 shows the values obtained in this study for Cronbach's alpha, composite reliability, and AVE.

The measurement model was analysed first and afterwards the structural model. When the measurement model is analysed, the square root of AVE of one construct must be higher value than the values of AVE of the other constructs in the model. The indicators or measurement items should have more variance with the related construct than with any of the other constructs in the model (Henseler et al., 2012). Therefore, the square root of the AVE of the indicators was calculated to make sure that any one had a higher value with itself than with any of the other constructs of the model. All the indicators in the model fulfilled this condition (see Table 3). Therefore, the indicators of each construct have more variance with the construct than with any other construct in the model and have discriminant validity based on this first analysis.

Simulation studies by Henseler et al. (2016) showed that the Heterotrait-Monotrait ratio (HTMT) was the best way to identify a discriminant validity. The HTMT ratio gives a value to the average of the heterotrait heteromethod correlation and the average of the monotrait heteromethod correlation. The heterotrait correlations in a well-adjusted model should be lower than the monotrait correlations. For this to be true, the HTMT ratio should be below 0.9. Table 3 shows that this condition is fulfilled in the proposed model and therefore the constructs have discriminant validity.

TABLE 2 Assessment of the measurement model.

Construct	Cronbach's alpha	Composite reliability (CR)	AVE
Course content quality (CCQ)	0.897	0.936	0.830
Educational technology (EDT)	0.923	0.940	0.724
Technological support (TSU)	0.950	0.958	0.715
Interactivity (INT)	0.863	0.916	0.784
Instructor skills and attitude (ISA)	0.951	0.959	0.744
Social influence (SIN)	0.872	0.940	0.886
Ease of use (EoU)	0.928	0.942	0.700
User intention (UIN)	0.891	0.925	0.754
Self-management of e-learning (SMA)	0.876	0.909	0.666
Perceived enjoyment (PEN)	0.825	0.919	0.850
Habit (HAB)	0.841	0.895	0.682
Student well-being (SWB)	0.901	0.938	0.835

TABLE 3 Discriminant validity.

Fornell-Larcker criterion												
Construct	**CCQ**	**EDT**	**TSU**	**INT**	**ISA**	**SIN**	**EoU**	**UIN**	**SMA**	**PEN**	**HAB**	**SWB**
Course content quality	0.911											
Educational technol.	0.800	0.851										
Technological support	0.776	0.820	0.840									
Interactivity	0.724	0.756	0.817	0.886								
Instructor skills	0.664	0.685	0.809	0.714	0.863							
Social influence	0.615	0.621	0.673	0.626	0.611	0.941						
Ease of use	0.642	0.730	0.773	0.666	0.669	0.603	0.837					
User intention	0.699	0.723	0.746	0.677	0.655	0.642	0.575	0.869				
Self-management	0.775	0.797	0.829	0.747	0.716	0.678	0.710	0.770	0.816			
Perceived enjoyment	0.733	0.667	0.773	0.714	0.668	0.558	0.552	0.772	0.749	0.922		
Habit	0.636	0.708	0.700	0.612	0.615	0.601	0.625	0.765	0.711	0.622	0.826	
Student well-being	0.610	0.581	0.630	0.600	0.620	0.507	0.552	0.633	0.662	0.657	0.508	0.914
HTMT												
Construct	**CCQ**	**EDT**	**TSU**	**INT**	**ISA**	**SIN**	**EoU**	**UIN**	**SMA**	**PEN**	**HAB**	**SWB**
Course content quality												
Educational technol.	0.878											
Technological support	0.840	0.874										
Interactivity	0.816	0.838	0.895									
Instructor skills	0.720	0.730	0.851	0.880								
Social influence	0.695	0.690	0.737	0.713	0.771							
Ease of use	0.703	0.788	0.823	0.736	0.711	0.669						
User intention	0.777	0.789	0.805	0.760	0.718	0.725	0.624					
Self-management	0.851	0.872	0.893	0.831	0.764	0.773	0.773	0.853				
Perceived enjoyment	0.848	0.759	0.869	0.836	0.751	0.656	0.625	0.835	0.852			
Habit	0.732	0.804	0.790	0.710	0.688	0.679	0.706	0.880	0.825	0.744		
Student well-being	0.679	0.636	0.679	0.673	0.669	0.572	0.603	0.701	0.716	0.762	0.583	

4.2 | Structural model

The results of the structural model were assessed following a systematic approach (Hair et al., 2017). First, a multicollinearity analysis was performed, confirming its non-presence (all VIF values less than 5). Second, bootstrapping based on 5000 subsamples was used to verify the statistical significance of the model path coefficients. The magnitude, statistical significance, and algebraic sign of these relationships were all analysed. A one-tailed test for a Student's t distribution was used to assess the direct and indirect effects considered in the model (95% confidence interval). The signs of all the path coefficients (β) are as hypothesized and 0 is not included in the confidence intervals. Standardized path coefficients explain the amount a predictor variable contributes to the endogenous

variable variance. When the correlation coefficients of two different variables are multiplied, the results explain the variance of an endogenous variable with a latent variable (Henseler et al., 2016). Analysis of the statistical significance of these coefficients provides a check on the research hypotheses. Chin et al. (2020) consider β values between .2 and .3 acceptable, although a higher value is more favourable. Table 4 shows the values of β, *t*-Statistic and *p*-value and the results of this test. These results show whether the hypotheses are supported or not.

Third, the R^2 determinant coefficient gives a numerical value for the explanatory power. It shows the construct variance which can be understood from the variables that predict any endogenous construct of the model. R^2 values range between 0 to 1. A higher value means that the variable has more predictive ability for the model. The values of R^2 should be above a minimum value for explanatory power. Chin (2001) considered the following values of R^2 and their predictive capacity: .67 is substantial, .33 is moderate, and .19 is weak. The results (see Figure 1) show that all the constructed constructs had at least, a moderate predictive power.

As Table 4 and Figure 1 show, the results obtained supported all the hypotheses raised. Firstly, the two proposed antecedent trajectories of e-learning were confirmed. Course content quality, Educational technology and, particularly, Technological support were revealed as valid antecedents of Self-management of e-learning (supporting Hypothesis 1). On the other hand, Interactivity, Instructor skills and attitude and Social influence also confirmed their validity as antecedents of the Ease of use of e-learning (supporting Hypothesis 2). Second, the research also found that the well-being of e-learning students is directly related to their ability to self-manage it and the ease of use of web pages or digital learning platforms. In this way, a direct effect was validated between ease of use of e-learning and Student well-being (supporting Hypothesis 3) and between self-management of e-learning and Student well-being (supporting Hypothesis 5).

Third, research has found partial mediating effects that also predict well-being in e-learning students. The user intention positively mediates the relationship between ease of use and Student well-being (supporting Hypothesis 4), and the perceived enjoyment positively mediates the relationship between self-management of e-learning and Student well-being (supporting Hypothesis 6). Finally, the results obtained also highlight the existence of a partial and negative mediating effect that would worsen the well-being of students trained via

TABLE 4 Path coefficients (direct effects).

Hypotheses	β coeff.	*t*-statistic	*p*-value	Supported
Course content quality → Self-management	.232	5.152	.000	Yes***
Educational technology → Self-management	.243	4.688	.000	Yes***
Technological support → Self-management	.449	9.223	.000	Yes***
Interactivity → Ease of use	.300	6.378	.000	Yes***
Instructor skills & attitude → Ease of use	.321	7.228	.000	Yes***
Social influence → Ease of use	.219	5.163	.000	Yes***
Ease of use → Student well-being	.170	4.034	.000	Yes***
Ease of use → User intention	.575	17.398	.000	Yes***
User intention → Students well-being	.251	3.825	.000	Yes***
Self-management → Student well-being	.216	3.523	.000	Yes***
Self-management → Perceived enjoyment	.749	36.201	.000	Yes***
Perceived enjoyment → Student well-being	.302	5.321	.000	Yes***
Perceived enjoyment → Habit	.622	18.718	.000	Yes***
Habit → Student well-being	−.132	2.555	.011	Yes*

Note: Number of subsamples = 500, using student *t*-distribution (499) with one tail.

***$p < .001$ (t (0.001; 499) = 3.107); **$p < .01$ (t (0.01, 499) = 2.334); *$p < .05$ (t (0.05, 499) = 1.648).

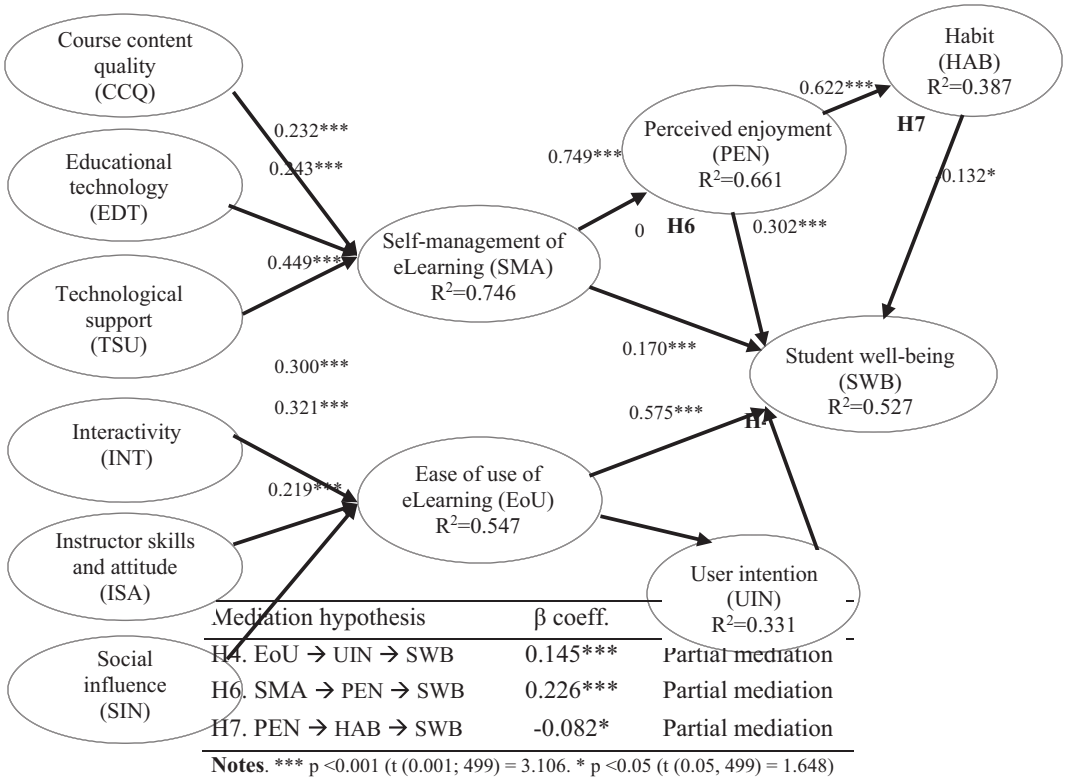

FIGURE 1 Results of the PLS-SEM estimation (direct and specific indirect path effects, *p*-value, R^2 and mediation interpretation).

e-learning. Thus, it was verified that Habit partially and negatively mediates the relationship between perceived enjoyment and the Student well-being (supporting Hypothesis 7).

5 | DISCUSSION

This research investigated the well-being trajectories of students suddenly integrated into e-learning. To do this, seven research hypotheses were tested using a PLS-SEM statistical method and for a sample of 543 university students in Spain who suddenly joined e-learning systems during the COVID-19 lockdown. Following the most recent literature and going beyond the usual research on the predictors of e-learning satisfaction (Conrad et al., 2022; Malkawi et al., 2020; Mohd Satar et al., 2020), the differential purpose of the analysis was to verify the existence of lights and shadows in the explanation of the students' well-being suddenly incorporated into e-learning (Amaechi et al., 2022).

5.1 | Sociotechnical factors of e-learning

A first important result of the research was the verification of a wide set of predictors for the two antecedents of the well-being trajectories of students suddenly incorporated into e-learning. This wide set of predictors found confirms the previous evidence on the establishment of socio-technical systems to evaluate the results of

e-learning (Ficapal-Cusí et al., 2013; Martínez-Cerdá et al., 2020). Research found that factors that determine the quality of technology and knowledge, such as technological support, educational technology, or educational content, predicted the self-management capacity. For their part, communication and social interaction factors, such as interactivity, teacher skills or social influence, were revealed as predictors of e-learning ease of use (Alhabeeb & Rowley, 2018; Baber, 2021).

Digital transformation in higher education is becoming intertwined with individuals, economy, and society to the point that it is beginning to build specific sociotechnical systems. The new e-learning systems bring together technologies, techniques, teaching methodologies, learning tasks, and new forms of relationship between students and between them and the rest of the agents of the educational system (Cidral et al., 2018). Furthermore, the sociodemographic characteristics of students and their labour context, as well as some of their personality traits, are also determinants of achieving greater predispositions to e-learning results, such as satisfaction or employability (Aparicio et al., 2017; Torrent-Sellens et al., 2016). In this sense, once universities have been introduced to e-learning, most of them without planning it, the levers of change that they can access are multiple, diverse and not always clear. Clarifying the implementation trajectories and results of the different sociotechnical factors of e-learning has important practical and managerial implications. For example, if the problems of access or maintenance of e-learning are associated with the difficulties that students manifest to self-manage their learning, then the technological and knowledge levers are indicated. If, on the contrary, e-learning access or maintenance problems are associated with the ease of use of its systems, then the communication and interaction levers between agents are the most indicated. In both cases, the university's culture and transformational leadership (Bagga et al., 2023), as well as its ability to create inclusive learning environments (Gbobaniyi et al., 2023; Veidemane et al., 2021), are fundamental.

5.2 | The light and dark side of the e-learning student well-being of e-learning

A second important result of the investigation was that self-management and ease of use of e-learning systems constitute direct antecedents of student well-being. In this way, research confirms the results already present in the literature of the field (Al-Fraihat et al., 2020; Cofini et al., 2022; Erden et al., 2022). However, the research went further and confirmed two reinforcement itineraries for the achievement of e-learning student's well-being. The first pathway is related to the mediator role of the user intention. The second pathway is related to the mediating role of perceived enjoyment. When the ease of use interacts with the user intention (Fidalgo et al., 2020) and when the self-management of e-learning interacts with the perceived enjoyment (Almhdawi et al., 2021; Chandra, 2021), the impulse on the e-learners' well-being is reinforced.

In terms of educational institutions, these results have as their main corollary the growing need to take into account students' perceptions of students about e-learning and its user experience (Kim et al., 2019; Mourlam et al., 2020). If universities want their e-learning activities to be long-lasting, plannable and promote the well-being of their students, it is very important that they incorporate their opinions and assessments from the design of their educational programs. The new learning analytics and machine learning tools are powerful tool that universities should incorporate to understand the e-learner experience, to predict behaviours, and to design their e-learning systems (Silvola et al., 2021; Yang et al., 2023).

However, this research also found a third important result that qualifies the whole set of good news about the sudden use of e-learning and its results (Busetta et al., 2021; Grubic et al., 2020). This path of darkness is related to the adverse mediating effect exerted by the habit, understood from the perspective of technological dependence, when it interacts with perceived enjoyment. This result, in clear harmony with the findings of research on dependencies and additions in e-learning (Sert et al., 2019; Sigerson et al., 2017), alerts us to the limits of the search for enjoyment as a strategy for the promotion of e-learning. When this enjoyment turns

into excessively long and uncontrolled immersion times and experiences in e-learning, the risks to students' physical and mental health multiply exponentially (Meier, 2022; Zhou & Zhang, 2019). During the COVID-19 lockdown, the sudden emergence of e-learning increased many of these risks (Besalti & Satici, 2022; Naddeo et al., 2021).

From the point of view of educational strategy and policies, this result suggests that Universities should take very seriously the generation or increase of the technological habits of their students. This implies that e-learning programs should be very cautious with immersion times and experiences, in a context already dominated by the digitalization of all areas of their students' lives. Although e-learning systems were, on many occasions, the only way to keep academic activity alive during COVID-19 confinement, the experience gained from this academic practice should be useful for the future (Bao, 2020). The debate for the immediate future is no longer the discussion of yes or no. What should concern us as academics is what type of e-learning should be designed to promote the well-being, present and future, of students.

5.3 | Limitations and future research directions

One of the main limitations of the study was that it focused on a single interest group from the university and the e-learning systems. In our case, the research obtained only information for students, allowing future research and analysis of other important interest groups for the evaluation of e-learning, such as professors or university managers. Furthermore, future research should also explore the issue of sudden e-learning and its continuity. With this objective, it was intended to expand the sample of students and their analysis periods, both for face-to-face Universities and for purely online Universities. Our objective will be to verify if there are explanatory differences in the well-being of students depending on the type of e-learning model (purely online or blended) or its implementation structure (sudden or planned, with previous experience or without previous experience). Finally, future research also wants to expand the limitations of the perceived well-being construct. Specifically, it was intended to address a more detailed analysis of the risks and health and well-being associated with the problematic use of e-learning.

6 | CONCLUSIONS

Research in the field has shown the broad set of explanatory factors of the satisfaction and well-being of students in e-learning practices. However, the evidence for sudden forms of transition towards e-learning is scarcer. Taking advantage of the confinement situation that characterized university education in Spain during the COVID-19 pandemic, this research takes the form of a quasi-natural experiment and analyses the explanatory trajectories of student well-being with sudden e-learning. The results obtained suggest the existence of various well-being trajectories, with positive starting points for student self-management and the ease of use of educational websites or platforms. Although user intention and perceived enjoyment reinforce positive trajectories of well-being, a negative trajectory has also been detected. This happens when students move from enjoyment to habit and dependence on technology. This result, which could anticipate future risks and health problems for students, has implications in terms of the social sustainability and inclusivity of e-learning. In the context of digital transformation of all dimensions of life, universities must be very cautious with the immersion times and experiences of their students when developing e-learning programs. Nevertheless, these results only include a sample of sudden e-learners in face-to-face universities during an exceptional situation. In the future, it will be necessary to expand the student samples, the analysis periods, and the typologies of content and universities.

AUTHOR CONTRIBUTIONS

Pilar Ficapal-Cusí: Conceptualization; investigation; writing – original draft; project administration; visualization; formal analysis. **Joan Torrent-Sellens:** Investigation; validation; formal analysis; writing – original draft; methodology; visualization. **José A. Folgado-Fernández:** Investigation; writing – review and editing; supervision; writing – original draft; conceptualization; project administration. **Pedro R. Palos-Sánchez:** Formal analysis; validation; data curation; writing – original draft; software; methodology.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX 1

The proposal of the research indicators was based on previous studies and adapted to the context of e-learning university students (Sun et al. 2008; Cidral et al., 2018). More specifically, to measure Course Content Quality (CCQ), the scales of Lee et al. (2009) and Abou-Zeid and Taha (2014) were used. Educational Technology (EDT) was assessed with the scales of Pituch and Lee (2006) and Cheng et al. (2012). Technological support (TSU) was assessed using Pituch and Lee (2006), Selim (2007a, 2007b), Liao and Lu (2008), Cho et al. (2015) and Cheng et al. (2012) scales. Interactivity (INT) was measured based on the scales proposed in the study by Pituch and Lee (2006). As for the measurement of Instructor skills and attitude (ISA), the scales Ozkan and Koseler (2009) and Cheng et al. (2012) were used. Finally, to measure Social influence (SIN) the Musa and Othman (2012) and Alhabeeb and Rowley (2018) scales were used.

Regarding the estimated constructs, the research has also used a whole set of previous instruments. Ease of use (EoU) was measured based on the scales proposed by Cheng et al. (2012) and Tarhini et al. (2017). User intention (UIN) was assessed using previous research on technology adoption and use. The previous works of Davis (1989), Gefen et al. (2003), Selim (2007a), Menchaca and Bekele (2008), Ahmed (2013) and Mikalef et al. (2016) were used. Lee et al. (2009) and Lin's et al. (2011) e-learning-specific research was also used. The Self-management of e-learning construct were created using Alkhaldi and Abualkishik (2019) scale. Perceived Enjoyment (PEN) was measured using the scales of Cheng et al. (2012) and Musa and Othman (2012). Habit (HAB) was assessed using the previous research of Tarhini et al. (2017). Finally, Student well-being construct was measured using recent research of Almhdawi et al. (2021), Chandra (2021), Luo et al. (2021) and Meier (2022). In Appendix 1, the original and adapted references, constructs and items used in the research are reproduced.

TABLE A1 Constructs, authors and items (original and adapted).

Construct	Authors	Original item	Adapted item (in Spanish)
Course content quality (CCQ)	Lee et al. (2009) Abou-Zeid and Taha (2014)	1. The e-learning system can provide learning content that I need 2. Whether the learning material is up-to-date 3. The e-learning system can provide learning content that I need. 4. The level of difficulty of the learning content is appropriate 5. The delivery schedule of learning content is flexible	1. El sistema de aprendizaje electrónico puede proporcionarme suficiente contenido de aprendizaje 2. El sistema de aprendizaje electrónico a menudo proporciona la información actualizada 3. El sistema de e-learning puede proporcionarme el contenido de aprendizaje que necesito 4. El nivel de dificultad del contenido del aprendizaje es apropiado 5. El programa de entrega del contenido de aprendizaje es flexible
Educational technology (EDT)	Pituch and Lee (2006) Cheng et al. (2012)	1. The e-learning system can offer multimedia types of course content 2. The e-learning system can allow me control over the pace of my learning 3. The e-learning system can provide the means for taking tests and turning in assignments 4. The e-learning system can present course content in a readable and well-organized format 5. The e-learning system can clearly present course content 6. The e-learning system can offer flexibility in learning as to time and place	1. La plataforma de cursos online puede ofrecer tipos de contenido como demos, presentaciones o videos 2. La plataforma de cursos online puede permitirme controlar el ritmo de mi aprendizaje 3. La plataforma de cursos online puede proporcionar los medios para tomar exámenes y entregar tareas 4. La plataforma de cursos online puede presentar el contenido del curso en un formato legible y bien organizado 5. La plataforma de cursos online puede presentar claramente el contenido del curso 6. La plataforma de cursos online puede ofrecer flexibilidad en el aprendizaje en cuanto a tiempo y lugar

TABLE A1 (Continued)

Construct	Authors	Original item	Adapted item (in Spanish)
Technological support (TSP)	Pituch and Lee (2006) Selim (2007a, 2007b) Liao and Lu (2008) Cho et al. (2015) Cheng et al. (2012)	1. The e-learning system is very quick in responding to my request 2. The response time of the e-learning system is consistent 3. The response time of the e-learning system is reasonable 4. I believe the e-learning website would be easy to use 5. The layout of the e-learning system is in good structure 6. My interaction with the e-learning website is clear and understandable 7. The e-learning system can provide me with individualized learning management 8. I can acquire adequate support services from the help desk of the e-learning system to help my learning 9. I can acquire adequate support services from the services administrators of the e-learning system to help my learning 10. Overall, support services of the e-learning system are satisfactory	1. El sistema de aprendizaje electrónico es muy rápido en responder a mi solicitud 2. El tiempo de respuesta del sistema de aprendizaje electrónico es consistente 3. El tiempo de respuesta del sistema de aprendizaje electrónico es razonable 4. La disposición del sistema de aprendizaje electrónico es fácil de usar 5. La disposición del sistema de aprendizaje electrónico está en buena estructura 6. El diseño general de la interfaz de usuario del sistema de aprendizaje electrónico es satisfactorio 7. El sistema de aprendizaje electrónico puede proporcionarme una gestión individualizada del aprendizaje 8. Puedo adquirir los servicios de apoyo adecuados del servicio de asistencia del sistema de aprendizaje electrónico para ayudar a mi aprendizaje 9. Puedo adquirir servicios de apoyo adecuados de los administradores de servicios del sistema de aprendizaje electrónico para ayudar a mi aprendizaje 10. En general, los servicios de apoyo del sistema de aprendizaje electrónico son satisfactorios
Interactivity (INT)	Pituch and Lee (2006)	1. The e-learning system enables interactive communication among learners 2. The e-learning system enables interactive communication between the instructor and learners 3. The communicational tools in the e-learning system are effective	1. El sistema de aprendizaje electrónico permite la comunicación interactiva entre los alumnos 2. El sistema de aprendizaje electrónico permite la comunicación interactiva entre el instructor y los alumnos 3. Las herramientas de comunicación del sistema de aprendizaje electrónico son eficaces

(Continues)

TABLE A1 (Continued)

Construct	Authors	Original item	Adapted item (in Spanish)
Instructor skills and attitude (ISA)	Ozkan and Koseler (2009) Cheng et al. (2012)	1. The instructor timely returns learners' e-mails via the e-learning system 2. The instructor frequently updates lecture notes for learners on the e-learning system 3. The instructor promptly responds to learners' questions via the e-learning system 4. The instructor friendly responds to learners' concerns via the e-learning system 5. Overall, the instructor's attitude is conducive to learners' learning via the e-learning system 6. Instructor's enthusiasm while teaching using e-learning tools 7. Instructor's ability to use the e-learning system effectively 8. Instructor's style of teaching using e-learning technologies	1. El profesor devuelve oportunamente los correos electrónicos de los alumnos a través del sistema de aprendizaje electrónico 2. El profesor actualiza con frecuencia las notas de las conferencias para los alumnos en el sistema de aprendizaje electrónico 3. El profesor responde rápidamente a las preguntas de los alumnos a través del sistema de aprendizaje electrónico 4. El profesor responde amistosamente a las inquietudes de los alumnos a través del sistema de aprendizaje electrónico 5. En general, la actitud del profesor es propicia para el aprendizaje de los alumnos a través del sistema de aprendizaje electrónico 6. El profesor muestra entusiasmo mientras enseña usando herramientas de eLearning 7. El profesor está capacitado para utilizar la plataforma de formación online de manera efectiva 8. El estilo de enseñanza y la metodología del profesor usando la plataforma de aprendizaje online es adecuado
Social influence (SIN)	Musa and Othman (2012) Alhabeeb and Rowley (2018)	1. My colleagues think that I should participate in the e-learning activities 2. Non-academic groups (e.g., friends and family) important to me think that I should participate in e-learning	1. Las personas que influyen en mi comportamiento piensan que debo usar la plataforma online 2. La gente del ámbito no académico que es importante para mí piensa que debo usar la plataforma de clases online

TABLE A1 (Continued)

Construct	Authors	Original item	Adapted item (in Spanish)
Ease of use (EoU)	Tarhini et al. (2017) Cheng et al. (2012)	1. My interaction with the e-learning system is clear and understandable 2. Interacting with the e-learning system does not require a lot of my mental effort 3. I find e-learning system easy to use 4. Learning how to use the e-learning system is easy for me 5. It is easy for me to become skilful at using e-learning system. 6. Learning how to use the e-learning system is easy for me 7. I find e-learning system easy to use	1. Mi interacción con la plataforma fue clara y comprensible 2. Interactuar con la plataforma no requirió mucho de mi esfuerzo mental 3. Encontré la plataforma libre de problemas 4. Me resultó fácil hacer que la plataforma me dejara descargar contenidos 5. Era simple hacer lo que quería con la plataforma 6. Fue fácil para mí ser hábil en el uso de la plataforma 7. Encontré la plataforma fácil de usar
User intention (UIN)	Davis (1989), Gefen et al. (2003) Selim (2007a) Menchaca and Bekele (2008) Lee et al. (2009) Lin et al. (2011) Ahmed (2013) Mikalef et al. (2016)	1. I recognize that lockdown has motivated me to learn through the online class platform 2. The fact of having free time helps me to take better advantage of the classes through the virtual platform 3. My concern about employment prospects after confinement makes me apply myself more in e-learning 4. Overall, COVID-19 lockdown has helped me discover the advantages of training through e-learning	1. Reconozco que el confinamiento me ha motivado a aprender a través de la plataforma de clases online 2. El hecho de tener tiempo libre me ayuda a aprovechar mejor las clases a través de la plataforma virtual 3. Mi preocupación por las perspectivas del empleo tras el confinamiento hacen que me aplique más en las clases a través de la plataforma virtual 4. En general, el confinamiento me ha ayudado a descubrir las ventajas del aprendizaje a través del eLearning
Self-management of e-learning (SMA)	Alkhaldi and Abualkishik (2019)	1. I have the ability to learn by myself 2. I can impose self-control on my learning 3. I can achieve my learning goals by accessing blackboard using my smart phone 4. The online class platform helped me feel updated 5. I find the e-learning system to be useful in my learning	1. Tengo la capacidad de aprender por mí mismo 2. Puedo imponer el autocontrol en mi aprendizaje 3. Puedo alcanzar mis objetivos de aprendizaje accediendo a la plataforma online 4. La plataforma de clases online me ayudó a sentirme actualizado/a 5. Encuentro que el sistema de e-learning es útil para mi aprendizaje

(Continues)

TABLE A1 (Continued)

Construct	Authors	Original item	Adapted item (in Spanish)
Perceived enjoyment (PEN)	Cheng et al. (2012) Musa and Othman (2012)	1. I find using the e-learning system to be enjoyable. 2. Learning using computers and e-learning services is fun. I have fun using the e-learning system 3. I enjoy while using technology	1. Encuentro que el uso del sistema de aprendizaje electrónico es agradable 2. Me divierto usando el sistema de aprendizaje electrónico 3. Disfruto mientras uso la tecnología
Habit (HAB)	Tarhini et al. (2017)	1. The use of Internet and e-learning system has become a habit for me 2. I am addicted to using Internet and e-learning system for educational purposes 3. I must use Internet and e-learning in my learning activities 4. Using Internet and e-learning system has become natural to me	1. El uso de Internet y el sistema de aprendizaje electrónico se ha convertido en un hábito para mí 2. Soy adicto al uso de internet y del sistema de aprendizaje electrónico con fines educativos 3. Debo usar internet y e-learning en mis actividades de aprendizaje 4. Usar internet y el sistema de e-learning se ha convertido en algo natural para mí
Student well-being (SWB)	Almhdawi et al. (2021) Chandra (2021) Luo et al. (2021) Meier (2022)	1. e-learning activities reduced my stress during COVID-19 lockdown 2. e-learning activities helped me spend better time during COVID-19 lockdown 3. The weekly class routine and e-learning activities provided me with an escape from worries during COVID-19 lockdown	1. El uso de la plataforma en las clases online logró disminuir mi estrés en el confinamiento 2. La plataforma de clases online me ayudó a pasar mejor el tiempo durante el confinamiento 3. La plataforma de clases online proporcionó un escape a las preocupaciones durante el confinamiento, por la rutina semanal de clases