Universidad de Oviedo

Programa de doctorado en Ciencias de la Salud

Medición de los Rasgos Psicológicos de la Persona Emprendedora

Measurement of the Psychological Traits of the Entrepreneur

Álvaro Postigo Gutiérrez

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Measurement of the Psychological Traits of the Entrepreneur

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RESUMEN DEL CONTENIDO DE TESIS DOCTORAL

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RESUMEN (en español)

El emprendimiento es uno de los aspectos más importantes para el crecimiento de cualquier país. Por un lado, por ser fuente de innovación, empleo y riqueza y, por otro, por las consecuencias negativas que conlleva el fracaso emprendedor, a nivel económico, social y psicológico. El estudio del emprendimiento se lleva a cabo mediante diferentes enfoques, como el social, económico, biológico y psicológico. Si bien nadie duda de la importancia de cada uno de ellos, el estudio del enfoque psicológico ha ido aumentando en las últimas décadas, situándose la personalidad emprendedora en uno de los temas más relevantes. Dentro de los instrumentos para evaluarla, la Batería para la Evaluación de la Personalidad Emprendedora (BEPE) es el único instrumento en España validado en población adulta. Este evalúa ocho rasgos específicos de personalidad: Autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos. Sin embargo, todavía existen necesidades en torno a esta herramienta, que tienen que ver con el número de ítems, evidencias de validez y exploración de nuevos rasgos relacionados con la actividad emprendedora. Por tanto, el objetivo principal de esta Tesis Doctoral es el estudio de los rasgos psicológicos de la personalidad emprendedora y generar instrumentos para su evaluación. En primer lugar, se desarrolló y calibró un

banco de 120 ítems del BEPE que permitió generar un Test Adaptativo Informatizado que evalúa la personalidad emprendedora con tan solo 16 ítems de media. En segundo lugar, se desarrolló una versión corta del BEPE, la cual se compone de 16 ítems (BEPE-16), teniendo en cuenta los dos ítems de cada faceta específica más importantes para explicar el factor general de la personalidad emprendedora. Tanto el BEPE-TAI como el BEPE-16 muestran unas excelentes propiedades psicométricas. En tercer lugar, se demostró la invarianza de medida en el BEPE en función del sexo, de la edad y de ser o no emprendedor, evaluando de manera ecuánime a las diferentes poblaciones. En cuarto lugar, el estudio de nuevos rasgos relacionados con el emprendimiento llevó al desarrollo de una nueva herramienta (Escala Grit de Oviedo; EGO) para la evaluación del grit, un rasgo psicológico basado en la pasión y perseverancia por objetivos a largo plazo. Finalmente, se desarrolló un modelo que mostró que la personalidad emprendedora predice en torno a un 3% de la varianza de convertirse en emprendedor. La presente Tesis Doctoral demuestra la importancia de la personalidad en la actividad emprendedora y discute las implicaciones prácticas sobre la necesidad de integrarla con otros aspectos personales y contextuales que amplíen la visión acerca de qué lleva a una persona a emprender un negocio.

RESUMEN (en Inglés)

Entrepreneurship is one of the most important aspects for the growth of any country. On the one hand, it is a source of innovation, employment, and wealth and, on the other, because of the negative consequences entrepreneurial failure entails, on an economic, social, and psychological level. The study of entrepreneurship is carried out through different approaches, such as social, economic, biological, and psychological. Although no one doubts the importance of each of them, the study of the psychological approach has been increasing in recent decades, placing the entrepreneurial personality as one of

the most relevant issues. Among the instruments to evaluate it, the Battery for the Assessment of Entrepreneurial Personality (BEPE) is the only instrument in Spain validated for the adult population. It evaluates eight specific personality traits: Self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance and risk-taking. However, it still needs perfecting. This has to do with the number of items, evidence of validity, and exploration of new traits related to entrepreneurial activity. Therefore, the main objective of this Doctoral Thesis is the study of the psychological traits of the entrepreneurial personality and generate instruments for their assessment and evaluation. In the first place, a bank of 120 BEPE items was developed and calibrated, which made it possible to generate a Computerized Adaptive Test that assesses the entrepreneurial personality with only 16 items on average. Second, a short version of the BEPE was developed, which is made up of 16 items (BEPE-16), taking into account the two most important items of each specific facet to explain the general factor of entrepreneurial personality. Both BEPE-TAI and BEPE-16 show excellent psychometric properties. Third, measurement invariance in the BEPE was demonstrated as a function of sex, age, and being an entrepreneur or not, assessing the different populations fairly. Fourth, the study of new traits related to entrepreneurship led to the development of a new tool (Oviedo Grit Scale; EGO) for grit assessment, a psychological trait based on passion and perseverance for long-term goals. Finally, a model was developed that showed that the entrepreneurial personality predicts around 3% of the variance of becoming an entrepreneur. This Doctoral Thesis demonstrates the importance of personality in entrepreneurial activity and discusses the practical implications on the need to integrate it with other personal and contextual aspects that broaden the vision about what leads a person to start a business.

SR. PRESIDENTE DE LA COMISIÓN ACADÉMICA DEL PROGRAMA DE DOCTORADO EN CIENCIAS DE LA SALUD

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Resumen

El emprendimiento es uno de los aspectos más importantes para el crecimiento de cualquier país. Por un lado, por ser fuente de innovación, empleo y riqueza y, por otro, por las consecuencias negativas que conlleva el fracaso emprendedor, a nivel económico, social y psicológico. El estudio del emprendimiento se lleva a cabo mediante diferentes enfoques, como el social, económico, biológico y psicológico. Si bien nadie duda de la importancia de cada uno de ellos, el estudio del enfoque psicológico ha ido aumentando en las últimas décadas, situándose la personalidad emprendedora en uno de los temas más relevantes. Dentro de los instrumentos para evaluarla, la Batería para la Evaluación de la Personalidad Emprendedora (BEPE) es el único instrumento en España validado en población adulta. Este evalúa ocho rasgos específicos de personalidad: Autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos. Sin embargo, todavía existen necesidades en torno a esta herramienta, que tienen que ver con el número de ítems, evidencias de validez y exploración de nuevos rasgos relacionados con la actividad emprendedora. Por tanto, el objetivo principal de esta Tesis Doctoral es el estudio de los rasgos psicológicos de la personalidad emprendedora y generar instrumentos para su evaluación. En primer lugar, se desarrolló y calibró un banco de 120 ítems del BEPE que permitió generar un Test Adaptativo Informatizado que evalúa la personalidad emprendedora con tan solo 16 ítems de media. En segundo lugar, se desarrolló una versión corta del BEPE, la cual se compone de 16 ítems (BEPE-16), teniendo en cuenta los dos ítems de cada faceta específica más importantes para explicar el factor general de la personalidad emprendedora. Tanto el BEPE-TAI como el BEPE-16 muestran unas excelentes propiedades psicométricas. En tercer lugar, se demostró la invarianza de medida en el BEPE en función del sexo, de la edad y de ser o

no emprendedor, evaluando de manera ecuánime a las diferentes poblaciones. En cuarto lugar, el estudio de nuevos rasgos relacionados con el emprendimiento llevó al desarrollo de una nueva herramienta (Escala Grit de Oviedo; EGO) para la evaluación del grit, un rasgo psicológico basado en la pasión y perseverancia por objetivos a largo plazo. Finalmente, se desarrolló un modelo que mostró que la personalidad emprendedora predice en torno a un 3% de la varianza de convertirse en emprendedor. La presente Tesis Doctoral demuestra la importancia de la personalidad en la actividad emprendedora y discute las implicaciones prácticas sobre la necesidad de integrarla con otros aspectos personales y contextuales que amplíen la visión acerca de qué lleva a una persona a emprender un negocio.

Summary

Entrepreneurship is one of the most important aspects for the growth of any country. On the one hand, it is a source of innovation, employment, and wealth and, on the other, because of the negative consequences entrepreneurial failure entails, on an economic, social, and psychological level. The study of entrepreneurship is carried out through different approaches, such as social, economic, biological, and psychological. Although no one doubts the importance of each of them, the study of the psychological approach has been increasing in recent decades, placing the entrepreneurial personality as one of the most relevant issues. Among the instruments to evaluate it, the Battery for the Assessment of Entrepreneurial Personality (BEPE) is the only instrument in Spain validated for the adult population. It evaluates eight specific personality traits: Self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance and risk-taking. However, it still needs perfecting. This has to do with the number of items, evidence of validity, and exploration of new traits related to entrepreneurial activity. Therefore, the main objective of this Doctoral Thesis is the study of the psychological traits of the entrepreneurial personality and generate instruments for their assessment and evaluation. In the first place, a bank of 120 BEPE items was developed and calibrated, which made it possible to generate a Computerized Adaptive Test that assesses the entrepreneurial personality with only 16 items on average. Second, a short version of the BEPE was developed, which is made up of 16 items (BEPE-16), taking into account the two most important items of each specific facet to explain the general factor of entrepreneurial personality. Both BEPE-TAI and BEPE-16 show excellent psychometric properties. Third, measurement invariance in the BEPE was demonstrated as a function of sex, age, and being an entrepreneur or not, assessing the different populations fairly. Fourth, the study of new traits related to

entrepreneurship led to the development of a new tool (Oviedo Grit Scale; EGO) for grit assessment, a psychological trait based on passion and perseverance for long-term goals. Finally, a model was developed that showed that the entrepreneurial personality predicts around 3% of the variance of becoming an entrepreneur. This Doctoral Thesis demonstrates the importance of personality in entrepreneurial activity and discusses the practical implications on the need to integrate it with other personal and contextual aspects that broaden the vision about what leads a person to start a business.

"The word "entrepreneur" has been glamourized by today's media. When you hear the word "entrepreneur," you are often shown an image of successful people with profitable, rapidly growing businesses and a glamorous lifestyle. Unfortunately, this representation of entrepreneurship reflects a minute fraction of entrepreneurs. The reality is that 8 out of 10 startups fail. The reality is that starting and running a business is psychologically and mentally distressing. It is years of dedication and relentless hard."

Mr. Ahmed Osman

Past Chair of the International Council for Small Business

1. Introducción

El emprendimiento ha sido un *asunto candente* en las últimas décadas (Chell, 2008; Gielnik et al., 2021). La fuente de innovación, empleo y productividad que supone para un país hace que sea un motor formidable para el crecimiento de cualquier economía (Global Entrepreneurship Monitor [GEM], 2020, 2021; Van Praag y Versloot, 2007). Además, el emprendimiento es esencial en la Psicología de las Organizaciones, ya que las organizaciones, empresas o negocios solo aparecen gracias a las personas emprendedoras y al emprendimiento (Baum et al., 2007). Una de las principales razones que guían el estudio del emprendimiento es analizar porqué unas personas, y no otras, se lanzan a emprender un negocio. De igual forma permite saber, porqué dentro de las personas que emprenden, unas tienen éxito mientras que otras tienen que cerrar sus negocios. Como se tratará de mostrar a lo largo de esta introducción, el fenómeno de *actividad emprendedora* es multidimensional, como multidimensionales son las características que debe tener una *persona emprendedora.*

Una de las vías que ayudan a avanzar en la investigación del emprendimiento pasa por contar con una evaluación rigurosa de las personas e identificar qué características personales hacen que una persona sea más propensa para la actividad emprendedora y para tener éxito en aquello que emprende. En este contexto, la presente Tesis Doctoral pretende avanzar en el campo de la evaluación de la personalidad emprendedora mediante el desarrollo de diferentes herramientas que permitan realizar un análisis riguroso y exhaustivo de este asunto, tanto en el contexto aplicado como de investigación básica.

1.1. Emprendimiento y Actividad Emprendedora

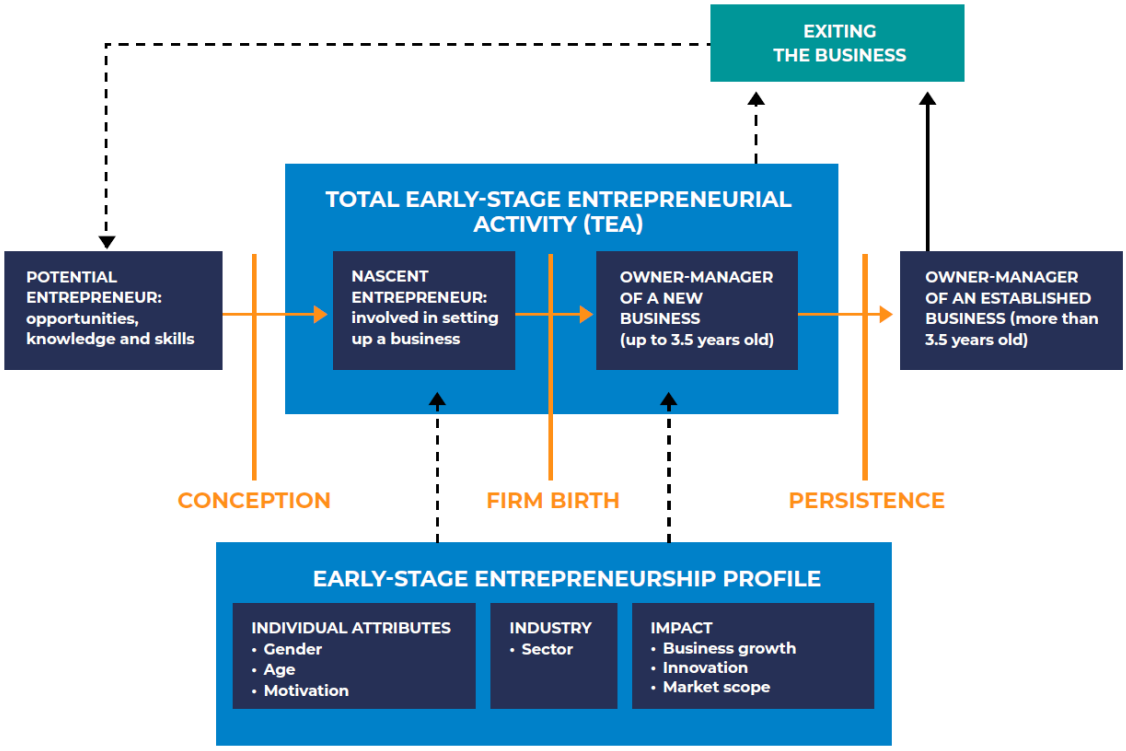
Con el emprendimiento parece suceder lo que a San Agustín de Hipona con la definición del *tiempo*; "¿qué es, pues, el tiempo? Si nadie me lo pregunta, lo sé; pero si quiero explicárselo al que me lo pregunta, no lo sé" (Ortega, 2010). A pesar de que se hace difícil mantener una única definición de emprendimiento, diversos autores han establecido definiciones consolidadas en la literatura. Por ejemplo, una posible definición es la que entiende el emprendimiento como la incesante búsqueda de oportunidades sin tener en cuenta los recursos disponibles (Hart et al., 1995; Stevenson y Jarillo, 1990). Además, Stevenson y Jarillo (1990) consideran que la incesante búsqueda puede darse tanto para uno mismo como dentro de una organización, lo que hoy en día se conoce como intraemprendimiento (véase, Mumford et al., 2021). Por su parte, Chell (2007) define el emprendimiento como "el proceso de búsqueda y reconocimiento de oportunidades con fines creativos, teniendo en cuenta todos los recursos disponibles en ese momento" (Chell, 2007, p. 18). Hay que tener en cuenta que cuando se habla de recursos estos no son sólo de corte económico, sino también humanos y sociales (Chell, 2008). No obstante, la definición de emprendimiento más aceptada en la literatura es la proporcionada por Shane y Venkataraman (2000), quienes

consideran que el emprendimiento es un proceso que involucra el descubrimiento, evaluación y explotación de oportunidades para introducir nuevos productos, servicios, procesos, organizaciones o formas de mercado. En esta línea, la presente Tesis Doctoral define la actividad emprendedora como el acto de transferencia de una idea de emprendimiento a su posterior desarrollo, independientemente de que sea llevada a cabo en términos empresariales, intraempresariales (dentro de una empresa), sociales y, por supuesto, personales.

En la Figura 1 se aporta una representación del proceso emprendedor (GEM, 2021). El emprendimiento potencial tendría que ver con la intención de emprender en los próximos tres meses y las empresas consolidadas son aquellas que llevan 42 meses operando en el mercado. En el medio se encuentra el emprendimiento naciente y el emprendimiento nuevo, conformando el índice de actividad emprendedora (*Total Entrepreneurial Activity;* TEA), a través del cual se *mide* el emprendimiento de un país. El emprendimiento naciente no lleva más de tres meses en el mercado y el emprendimiento nuevo se sitúa entre los tres y los 42 meses necesarios para considerarse una empresa consolidada (Figura 1; GEM, 2021).

Figura 1

El Proceso Emprendedor según el Proyecto GEM (2021)



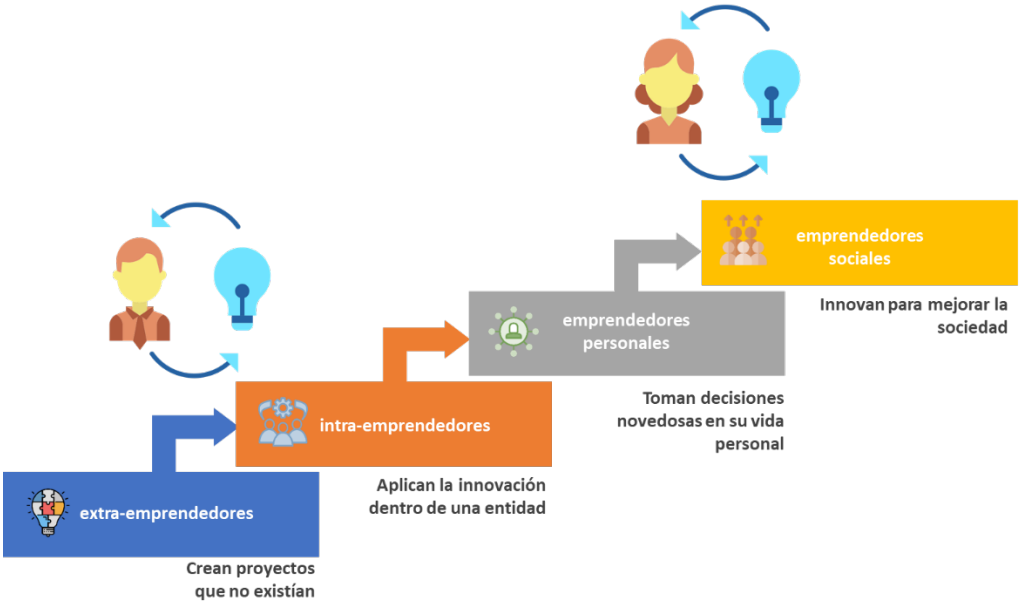
1.2. Ser o no Ser Emprendedor

Si el consenso en encontrar una definición de la actividad emprendedora es tremendamente complicado, lo mismo ocurre a la hora de intentar definir a una persona emprendedora. *Emprendedor* viene de la palabra francesa *entrepreneur,* cuyo significado es empresario (Chell, 2008). Cantillon (1756), desde un enfoque económico, define al emprendedor como la persona que asume un riesgo con la esperanza de obtener una recompensa en el futuro. Schumpeter (1934) define al emprendedor como un innovador que implementa el cambio en los mercados (nuevos productos, nuevas organizaciones o simplemente la reorganización de una empresa ya existente). Esta definición se ajusta en mayor medida al concepto que se tiene hoy en día sobre el emprendimiento ya que ha implementado el concepto de innovación. Zhao et al. (2010)

definen al emprendedor como el fundador, propietario y gerente de una pequeña empresa. Sánchez (2011), en cambio, enfatiza la importancia de las habilidades y conocimientos necesarios para el éxito empresarial, pero también los rasgos de personalidad y actitudes para lograrlo. De esta manera, resulta posible definir al emprendedor como alguien que cuenta con los conocimientos y características personales que le permitan alcanzar el éxito de un negocio, valorando los resultados económicos de su iniciativa emprendedora, al margen de que aporte nuevos productos al mercado (Pedrosa, 2015). Suárez-Álvarez (2015) define el *espíritu emprendedor* como un proceso multidimensional que determina el desarrollo personal orientado hacia la propuesta, resolución y mantenimiento de nuevos proyectos, ya sean estos de carácter económico, personal o social. De esta manera, la persona emprendedora se puede desarrollar en múltiples contextos (Figura 2; Muñiz et al., 2019). Cabe diferenciar, por tanto, a la persona cuya meta es el desarrollo de nuevos proyectos externos ligados a la creación empresarial (extraemprendedor; Rauch y Frese, 2007b), de la persona que innova dentro de una organización, mejorando proyectos que ya están en marcha (intraemprendedor; Lumpkin, 2007; Mumford et al., 2021), de la persona que maneja situaciones difíciles relacionadas con estresores, desempleo o cambios en el trabajo (emprendedor personal; Frese y Fay, 2001), y de la persona que emprende con fines sociales (emprendedor social; Dees et al., 2001). Del mismo modo, también se diferencia a la persona emprendedora en función de la etapa de negocio en la que se encuentre, del tipo de negocio (familiar, agrícola, tecnológico, del sector servicios y de franquicias) y en función de su situación previa al emprendimiento, como personas desempleadas o inmigrantes (véase, Salmony y Kanbach, 2021).

Figura 2

Tipos de Personas Emprendedoras



*Tomado de Muñiz et al. (2019)

En suma, el problema versa sobre qué tipo de acciones tiene que realizar una persona emprendedora. No sería del todo preciso igualar la creación de un nuevo negocio a la actividad emprendedora en negocios ya establecidos (intraemprendimiento), así como igualar el generar una pequeña y mediana empresa (PYME) a generar una empresa multimillonaria, ya que la evidencia científica muestra que los procesos pueden ser muy distintos (Henrekson y Sanandaji, 2014). Por ello, es esencial contar con datos actuales que puedan dar una visión global de cómo está el mundo del emprendimiento y estudiar este en base a múltiples indicadores económicos, culturales, sociodemográficos y personales.

1.3. Panorama Actual de la Actividad Emprendedora

A la hora de estudiar la actividad emprendedora, los expertos se apoyan en informes anuales que aportan información actual y detallada sobre el emprendimiento.

Los informes más conocidos son el *Global Entrepreneurship Monitor*, publicado por el *London Business School* y el *Entrepreneurship at a Glance*, publicado por la Organización para la Cooperación y el Desarrollo Económico (OCDE).

1.3.1. *Global Entrepreneurship Monitor*

GEM (*Global Entrepreneurship Monitor*) es un observatorio internacional que con carácter anual analiza el fenómeno emprendedor. Su actividad se inicia en el año 1999 de la mano del *London Business School* y *Babson College*, y se viene plasmando en informes de ámbito global, nacional, regional y local gracias al consorcio de equipos de investigación pertenecientes a los países que lo integran. Estos informes tratan temas de interés acerca de la actividad emprendedora. Concebido como herramienta integral de información, el último informe proporciona datos de las áreas fundamentales que nutren la investigación relacionada con el emprendimiento: 1. Los valores, percepciones y aptitudes emprendedoras de la población adulta activa. 2. La actividad emprendedora y sus características. 3. El contexto en el que se desarrolla el proceso emprendedor (GEM, 2021). Por tanto, este informe proporciona información muy importante sobre las características personales de los que emprenden, una foto comprehensiva acerca de cómo se encuentra la actividad emprendedora de los países, así como un análisis sobre las facilidades y las barreras que cada país ofrece a quien desea emprender. La presente Tesis Doctoral se apoyará de los informes GEM para analizar en qué situación se encuentra la actividad emprendedora en España con respecto al mundo, además de contar con indicadores sociodemográficos que serán muy relevantes para la evaluación de la personalidad emprendedora.

1.3.2. OCDE: *Entrepreneurship at a Glance*

En el año 2006, la Organización para la Cooperación y el Desarrollo Económico (OCDE) inicia el Programa de Indicadores del Emprendimiento, suponiendo un primer intento de recopilación de información sobre la intención y la actividad emprendedora de los países desde fuentes oficiales de los gobiernos. Como mínimo, han ido participando 34 países alrededor del mundo teniendo una participación alta los países europeos entre los que se encuentra España. Desde 2011, la información sobre la actividad emprendedora se detalla en el informe anual *Entrepreneurship at a glance,* presentando una colección actualizada de indicadores básicos del inicio y desempeño empresarial. Por tanto, estos informes aportan datos interesantes como que las PYMEs suponen el 99% de todos los negocios y que crean entre el 60% y el 70% de los nuevos puestos de trabajo en los países desarrollados y el 80% en los países en vías de desarrollo (OCDE, 2020). A su vez, estos informes reflejan que, en España, en torno al 90% de las empresas son PYMEs y que estas suponen más del 60% del empleo del país (OCDE, 2018). Así, estos informes dan cuenta de la importancia de las PYMES por suponer la mayoría de las empresas y de empleo y riqueza de un país. Con estos datos se pone de manifiesto la importancia de estudiar las características que rodean a la persona emprendedora de a pie, aquella persona empresaria que decide montar una PYME sin necesidad de que se convierta en una empresa multimillonaria. En otras palabras, la importancia de estudiar en profundidad lo que más popularmente se conoce como persona trabajadora por cuenta propia o persona autónoma.

1.4. Enfoques para Estudiar la Actividad Emprendedora

A lo largo del siglo XXI se mantienen principalmente cuatro enfoques para estudiar la actividad emprendedora como son el económico, sociológico, biológico y psicológico.

1.4.1. El Enfoque Económico

Dentro del enfoque económico, pueden distinguirse varias escuelas que fueron liderando este enfoque en el contexto del emprendimiento. El enfoque económico dentro del estudio del emprendimiento nace con Richard Cantillon (1756), precursor de la *escuela francesa*, quien postula que el resultado de toda actividad es incierto, lo que implica un riesgo, el cual tiene que ser asumido por alguien (la persona emprendedora) con la esperanza de obtener un beneficio en el futuro. Un siglo más tarde, la *escuela británica*, al mando de figuras como Adam Smith y Alfred Marshall, toma el relevo añadiendo el papel de la innovación como aspecto esencial en la figura del "empresario". Así, Marshall (1890) desarrolla su Teoría del Empresario, la cual pone el énfasis en la capacidad que tenga la persona que emprende de liderar el proyecto, lo que conlleva también una organización adecuada de los recursos. Por entonces, incluso desde el enfoque económico, ya se empieza a hablar de las *habilidades para ser emprendedor*, las cuales, afirmaban autores como Marshall (1890), pueden ser adquiridas. Finalmente, la *escuela austriaca* lidera el movimiento económico en torno al emprendimiento durante el siglo XX. Schumpeter (1934) y unos años más tarde Kirzner (1973) fueron sus máximos exponentes. Shumpeter (1934), en línea con la *escuela británica,* sigue apostando por la innovación como el factor clave de un sistema económico. Por su parte, Kirzner (1973) empieza a otorgar más importancia a la identificación de oportunidades en el mercado. El reconocimiento de oportunidades es visto en la literatura como un aspecto central del emprendimiento (Mitchell et al., 2021; Venkataraman, 1997).

En definitiva, las teorías económicas del emprendimiento consideran más relevantes las variables económicas, como el capital, los recursos y las oportunidades de

negocio, pero ya introducen desde sus inicios la importancia de variables de personalidad como la innovación y la toma de riesgos.

1.4.2. El Enfoque Sociológico

Las personas viven su vida dentro de un entorno social. Sus acciones y comportamientos están interconectados a través de un marco socialmente construido de normas, reglas y responsabilidades, las cuales se enmarcan en los sistemas económicos, políticos y legales. El enfoque sociológico ha sido representado por la perspectiva construccionista social que busca comprender de manera holística cómo se comportan las personas en circunstancias particulares (Chell, 2008). Ello se representa mediante la Teoría de la Estructuración que asume que el comportamiento está influido por diferentes niveles y estructuras sociales. En el primer nivel (*micro*) se encuentra el entorno personal y más cercano de la persona, incluidas sus propias conductas individuales. En este nivel entraría la familia, fuente importante de inspiración para muchos emprendedores (Aldrich y Cliff, 2003; Erdogan et al., 2020). De esta manera, el contexto social de la familia y la relación entre sus miembros influye en la propensión de un individuo a trabajar por cuenta propia (Arregle et al., 2015). Así, se ha teorizado que los descendientes de emprendedores se inspiran en "legados" de sus antepasados siendo fuente de inspiración para el comportamiento emprendedor, empleando la innovación como herramienta para fortalecer su tradición, reviviéndola para innovar (Erdogan et al., 2020; Jaskiewicz et al., 2015). Por ejemplo, Schoon y Duckworth (2012) estudiaron de manera longitudinal en una muestra de 6.116 jóvenes británicos cuáles iban a ser los predictores de convertirse en trabajadores por cuenta propia. Para los hombres, tener un padre que trabaja por cuenta propia fue el predictor más potente, mientras que para las mujeres fueron los recursos socioeconómicos de los progenitores. Cabe decir también que, en economías como la India, casi el 80% de los nuevos

emprendedores declara que su principal motivación es continuar con la tradición familiar, reduciéndose a menos del 20% en países como España (GEM, 2021). En el segundo nivel (*meso*) se encuentra el entorno empresarial y organizacional que influye a través de sus políticas y normas (Barría-González et al., 2021; Murphy y Reeves, 2019). Finalmente, el último nivel sería el *macro*, donde se encuentran todas las leyes, normas y regulaciones establecidas por la cultura, el país o la región. Por poner un ejemplo, el tiempo medio para iniciar un negocio en España son 13 días, lo que resulta un impedimento si se compara con los vecinos más próximos (Francia, 4 días; Portugal, 7 días), y con Nueva Zelanda (1 día) y Australia (2 días), pero una bendición si se compara con Camboya (99 días) o Venezuela (230 días; Banco Mundial, 2019).

1.4.3. El Enfoque Biológico

El enfoque biológico plantea la genética, la fisiología y la neurociencia como las tres piedras angulares del emprendimiento (véase, Nofal et al., 2021). Respecto a la genética, hay estudios que concluyen que los factores genéticos explican el 40% de la varianza de la variable de empezar un nuevo negocio (Lindquist et al., 2015; Nofal et al., 2018) y el 42% de la varianza de tener intención emprendedora (Nicolaou y Shane, 2010). Por su parte, el estudio desde la fisiología se ha centrado exclusivamente en la influencia de las hormonas en el emprendimiento. Así, la testosterona influye en la tendencia de las personas de convertirse en trabajadoras por cuenta propia (Greene et al., 2014). No obstante, autores como Bönte et al. (2015) concluyen que la testosterona influye en la toma de riesgos la cual influye en la actividad emprendedora. Por tanto, incluso desde el enfoque biológico hay estudios que ya dan cuenta de los rasgos de la personalidad. En cuanto a la neurociencia, se vincula la actividad cerebral a la actividad emprendedora. Laureiro-Martinez et al. (2014) muestran que las personas emprendedoras tienen una mayor eficiencia en la toma de decisiones que las personas

gerentes de una empresa, además de una activación más fuerte en la corteza prefrontal, que se ha asociado con la exploración. Pese a ello, las críticas a este enfoque son múltiples y diversas, como un excesivo enfoque sólo conceptual (Nicolaou et al., 2019), o una visión reduccionista que antepone el cerebro para explicar los asuntos humanos, como la actividad emprendedora, en lugar de considerarlo como una acción de una persona (ser) que está en el mundo (v.g., Pérez-Álvarez, 2018).

1.4.4. El Enfoque Psicológico

En los años 80 del siglo pasado, la Psicología del Emprendimiento o del Emprendedor no había encontrado su hueco dentro de la literatura. De hecho, Gartner (1989), en su famoso artículo "*Who is an entrepreneur?" Is the wrong question*, se centra en el rechazo del enfoque del rasgo (y todo lo psicológico), afirmando que no se puede definir a ningún emprendedor en función de sus características personales. La principal razón es que durante esos años este enfoque había avanzado poco en la explicación y predicción del rendimiento empresarial (Wortman, 1987). Como afirman Baum et al. (2007), a pesar de la creencia de que las características personales son importantes para la creación y éxito de los negocios, la Psicología del Emprendimiento no había sido ampliamente estudiada. Es a partir del siglo XXI cuando diferentes perspectivas dentro del enfoque psicológico empiezan a *hacerse notar* a la hora de explicar cuáles son los determinantes que llevan a las personas a emprender y a tener éxito en sus negocios. Desde entonces, se empieza a demostrar que el emprendimiento es fundamentalmente personal (Baum et al., 2007, p. 1), ya que es un esfuerzo que depende en gran medida de las acciones de la persona emprendedora (Frese, 2009). Tal es así que el informe GEM España (2020, p. 29) establece en su marco de la actividad emprendedora los atributos psicológicos como uno de los ejes centrales del emprendimiento. Por tanto, y como concluyen Cardon et al. (2021) en su reciente

capítulo titulado *The Psychology of Entrepreneurship: Looking 10 years back and 10 years ahead*, "Gartner nos desafió a todos a pensar más allá de quién es un emprendedor para así comprender un fenómeno más complejo sobre lo que hacen los emprendedores y por qué, cómo actúan, piensan y sienten" (Cardon et al., 2021, p. 566).

Uno de los aspectos esenciales del enfoque psicológico en el contexto emprendedor es el éxito que ha tenido el entrenamiento en diferentes aspectos psicológicos que tienen relación con el emprendimiento, conocido en inglés como *entrepreneurship training and transfer* (ETT; Weers y Gielnik, 2021). El ETT ha respondido a uno de los mayores debates de los profesionales; si la persona emprendedora nace o se hace (Gartner, 1989; Ramoglou et al., 2020; Schoon y Duckworth, 2012; Walter y Heinrichs, 2015). La evidencia muestra que el EET puede ser efectivo tanto en el corto como en el largo plazo (Blume et al., 2010; Martin et al., 2013; Ubfal et al., 2019; Walter y Block, 2016). No obstante, y como ocurre en múltiples disciplinas, los resultados varían mucho en función del estudio y metodología aplicados (Martin et al., 2013) y no se ha proporcionado suficiente evidencia acerca del cómo y del porqué el EET es efectivo (Wees y Gielnik, 2021).

En definitiva, las características de las personas emprendedoras impactan en su acción, pudiendo ser beneficiosas, insignificantes o incluso perjudiciales (Gartner, 1989; Gielnik et al., 2018). Esto, sumado a que se trata de características moldeables y, por tanto, se puede intervenir sobre ellas (Campos et al., 2017; Martin et al., 2013), invita al estudio de la Psicología del Emprendimiento.

Aquí se definirán las perspectivas más notables, como son la cognitiva, la afectiva y la perspectiva de la personalidad, siendo esta última el núcleo de la presente Tesis Doctoral.

1.4.4.1. La Perspectiva Cognitiva

Esta perspectiva enfatiza el reconocimiento de oportunidades de emprendimiento como motor principal para lanzarse a emprender un negocio (Mitchell et al., 2021; Venkataraman, 1997). Destaca principalmente tres tipos de variables en el contexto emprendedor: la inteligencia (Sternberg, 2004), la creatividad (Laguía et al., 2019; Mcmullan y Kenworthy, 2016; Ward, 2004) y los estilos cognitivos (Sánchez et al., 2011). Las dos primeras variables han demostrado su relación con la intención emprendedora (Chen et al., 2015), rendimiento empresarial (Sternberg, 2004; Zhao et al., 2010) e innovación (Ahlin et al., 2014). No obstante, los estilos cognitivos han adquirido especial atención en los últimos años, destacando la relevancia acerca de qué piensan los emprendedores y cómo piensan acerca de lo que piensan, algo fundamental para comprender gran parte de lo que ocurre durante las actividades de un emprendedor (Gartner et al., 1994).

1.4.4.2. La Perspectiva Afectiva

La perspectiva afectiva interactúa con la perspectiva cognitiva, donde los pensamientos influyen en los sentimientos y viceversa (Baron y Branscombe, 2017). Como bien expresa Baron (2008), hay varias razones por las que el acto de emprender es un viaje emocional. No hay que olvidarse que el entorno que rodea a las nuevas empresas es tremendamente incierto, por lo que el manejo emocional será un aspecto clave que ayudará o entorpecerá el camino de emprender (Huang et al., 2021). Los emprendedores muestran mayor satisfacción con la vida y un alto bienestar psicológico (Binder y Coad, 2013; Kautonen et al., 2017), a pesar de que estudios longitudinales evidencian la variabilidad semanal (Totterdell et al., 2006) e incluso diaria (Uy et al., 2017) de estas percepciones. La satisfacción y el alto bienestar de los emprendedores se debe, en parte, a que disfrutan de una gran autonomía en términos de auto-actualización

y renovación de su diseño de trabajo (Baron, 2010; Wiklund et al., 2018). La línea de investigación del bienestar de los emprendedores se encuentra en auge dentro del emprendimiento (Bort et al., 2021; Stephan, 2018) ya que los emprendedores valoran su propio bienestar y el de sus empleados, considerando ambos indicadores de éxito (Wach et al., 2016). Sin embargo, y a la vez, el proceso de emprender es exigente y estresante, y conlleva fracasos en los intentos, lo que desemboca en altibajos y agotamiento emocional (Fernet et al., 2016; McMullen y Dimov, 2013; Shepherd et al., 2009). Este punto ya estaría interconectado con la personalidad del emprendedor, aspecto central de esta Tesis Doctoral, como, por ejemplo, con la tolerancia al estrés, la cual ha demostrado ser buen predictor del inicio y éxito empresarial (Rauch y Frese, 2007a; Wincent y Örtqvist, 2009). Se necesita más investigación sobre esta temática, ya que hay indicios de que, para los resultados empresariales, las emociones positivas no siempre son favorables (Baron et al., 2012), ni las emociones negativas son siempre perjudiciales (Shepherd et al., 2011). Por tanto, cabe preguntarse qué características de personalidad son las que influyen en el estado emocional de un emprendedor (Huang et al., 2021).

1.4.4.3. La Perspectiva de la Personalidad Emprendedora

Esta perspectiva pone el énfasis en los rasgos de personalidad de las personas emprendedoras, los cuales ayudan a que unas sean más propensas que otras para emprender un negocio y para tener éxito en el mismo (Rauch y Frese, 2007a, 2007b). La investigación en torno a la personalidad emprendedora ha ido aumentando exponencialmente (Frese y Gielnik, 2014; Rauch y Gielnik, 2021). De hecho, de todas las revisiones meta-analíticas realizadas sobre la Psicología del Emprendimiento, las que versan sobre la personalidad emprendedora (Rauch y Frese, 2007b; Stewart y Roth, 2001; Zhao et al., 2010; Zhao y Seibert, 2006) son las más citadas en la literatura

(véase, Rauch y Gielnik, 2021, pp. 489-491). El auge de esta perspectiva ha venido incentivado por un consenso sobre un modelo general de personalidad (modelo de los cinco grandes, *Big Five*; Costa y McCrae, 1992), y por el empleo del meta-análisis como técnica para agregar y generalizar los resultados de muchos estudios individuales (Brandstätter, 2011). Así, diferentes posturas han intentado explicar, en mayor o menor medida, qué aspectos de la personalidad llevan a una persona a emprender un negocio. Una idea sería que la persona que decide emprender se muestra con determinados rasgos de personalidad que le llevan a "autoseleccionarse" para una carrera empresarial (Walter y Heinrichs, 2015).

Dentro de la personalidad emprendedora, hay un debate, que continúa hoy en día, entre los que apuestan por evaluar la personalidad emprendedora a través de rasgos amplios de la personalidad (como el modelo *Big Five*), y los que apuestan por evaluar la personalidad a través de rasgos más específicos. A continuación, se presenta la diferencia entre ambas corrientes, aspecto esencial sobre el que se sustenta la presente Tesis Doctoral.

1.4.5. Rasgos Generales versus Rasgos Específicos

Los rasgos de personalidad pueden ser medidos con diferentes grados de amplitud conceptual (Soto y John, 2017). Un rasgo de carácter amplio permite resumir gran cantidad de información comportamental y predecir una amplia variedad de criterios relevantes (teniendo la ventaja de *amplitud*). En cambio, un rasgo medido restringidamente, tiene la ventaja de *fidelidad*, es decir, expresa de manera precisa una descripción comportamental específica y puede predecir criterios estrechamente ligados a esa descripción (John et al., 2008). El hecho de que diferentes amplitudes en los rasgos de personalidad tengan ventajas y desventajas es conocido como *compensación banda ancha – fidelidad* (en inglés, *the bandwidth-fidelity tradeoff*; John et al., 1991).

Dentro de la Psicología del Emprendimiento, los investigadores se han centrado en marcos generales de la personalidad (*amplitud*), como el modelo *Big Five* (Costa y McCrae, 1992; Goldberg et al., 2006; McCrae y John, 1992). El *Big Five* capta las diferencias individuales en la forma en que las personas sienten, piensan y se comportan a lo largo de cinco grandes dimensiones: apertura a la experiencia (liberal frente a conservadora), responsabilidad (bien organizado frente a descuidado), extraversión (sociable frente a reservado), amabilidad (compasivo frente a competitivo) y neuroticismo (emocionalmente inestable frente a estable).

El *Big Five* es el marco de personalidad más ampliamente utilizado actualmente (Gosling et al., 2003; Soto y John, 2017), entre otras razones, por su capacidad predictiva en multitud de variables organizacionales, como el desempeño laboral (Barrick y Mount, 2000; Lado y Alonso, 2017; Sackett y Walmsley, 2014), la satisfacción y compromiso organizacional (Erdheim et al., 2006; Fritsch y Rusakova, 2010; Judge et al., 2002) y la efectividad del liderazgo (Do y Minbashian, 2020; Hogan et al., 1994). Apoyando la suposición de que los rasgos psicológicos desempeñan un papel importante en el proceso empresarial, la investigación muestra que el *Big Five* predice con éxito tanto la creación de negocios como el éxito empresarial (Obschonka, Duckworth, et al., 2012; Obschonka, Silbereisen, et al., 2012; Shane et al., 2010; Zhao et al., 2010; Zhao y Seibert, 2006). En comparación con los empleados, los empresarios consistentemente obtienen puntuaciones más altas en la responsabilidad y en la apertura a la experiencia, y más bajas en la amabilidad y el neuroticismo (Obschonka et al., 2013, 2014; Obschonka y Stuetzer, 2017; Zhao y Seibert, 2006). Concretamente, las dimensiones de apertura a la experiencia y responsabilidad son las que presentan mayor relación con la conducta emprendedora y con el rendimiento de la empresa (Brandstätter, 2011; Farrington, 2012; Yim y Weston, 2007). De este modo, este

enfoque sigue utilizándose actualmente en la investigación sobre la personalidad emprendedora (Antoncic et al., 2015; Dai et al., 2019; Fichter et al., 2020; Hussein y Aziz, 2017; López-Núñez et al., 2020; Sahinidis et al., 2020).

Sin embargo, otros investigadores consideran, incluida la presente Tesis Doctoral, que intentar abarcar muchos comportamientos (*amplitud*) en solo cinco grandes rasgos puede llegar a ser demasiado reduccionista (Almeida et al., 2014; Leutner et al., 2014; Muñiz et al., 2014). Los rasgos específicos de la personalidad emprendedora proporcionan una descripción más precisa (*fidelidad*) de cómo los emprendedores y los que no lo son difieren en las dimensiones conductuales específicas, lo que les permite predecir los resultados con mayor precisión (Baum et al., 2007; Cuesta et al., 2018; Paunonen y Ashton, 2001; Rauch y Frese, 2007a; Suárez-Álvarez et al., 2014). La personalidad juega un papel considerable en el emprendimiento siempre que el rasgo en cuestión coincida con conductas propias de la actividad emprendedora (Rauch y Frese, 2007b). Un ejemplo muy claro se observa en el meta-análisis de Zhao y Seibert (2006), quienes analizaron múltiples rasgos, considerándolos facetas del *Big Five*, y codificándolos dentro de su respectivo rasgo amplio. Estos autores analizaron dos facetas de la responsabilidad: motivación de logro y confianza. Mientras que para la motivación de logro la correlación (r) con el acto de emprender fue de 0,30, para la confianza fue de 0,005. Estas diferencias entre facetas quedan difuminadas al presentar la correlación global de la responsabilidad con el acto de emprender (r = 0,22). De esta manera, el *Big Five* apenas explica más de un 13% de la varianza de la actividad emprendedora y un 10% del éxito empresarial (Zhao et al., 2010). Estos resultados sugieren que los rasgos generales de la personalidad pueden explicar parte de la conducta emprendedora, pero no todas las conductas específicas que llevan a abrir un negocio. Por ejemplo, se ha encontrado que los empresarios obtienen puntuaciones más

altas en rasgos específicos como autoeficacia, motivación de logro, toma de riesgos y autonomía en comparación con sus empleados (Antoncic et al., 2018; Baron et al., 2016; Locke et al., 2004; Rauch y Frese, 2007b; Stewart y Roth, 2001). Recientes investigaciones han demostrado que estos rasgos específicos de la personalidad ofrecen, con respecto al *Big Five*, una validez incremental para la predicción tanto de la creación de negocios como del éxito empresarial (Leutner et al., 2014; Postigo, Cuesta, García-Cueto, et al., 2021). Por ejemplo, un meta-análisis realizado por Rauch y Frese (2007b) mostró que los rasgos de la personalidad que estaban más estrechamente relacionados con la tarea de dirigir una empresa eran predictores más sólidos de la creación de negocios (r = 0,247) que los rasgos generales de personalidad como el *Big Five* (r = 0,124). Por su parte, Postigo et al. (2021) analizaron los rasgos generales de personalidad (instrumento OPERAS; Vigil-Colet et al., 2013) y los rasgos específicos de la personalidad (instrumento BEPE; Cuesta et al., 2018) en una muestra de 1.301 trabajadores, 772 trabajadores por cuenta ajena y 381 trabajadores por cuenta propia. Estos autores encontraron que la capacidad predictiva de los diferentes rasgos específicos era mayor que cada uno de los rasgos generales, salvo el locus de control interno que fue superado ligeramente por la extraversión y la estabilidad emocional. Una de las posibles explicaciones tiene que ver con que el BEPE está midiendo ciertas conductas que son de difícil captación desde el *Big Five,* como aquellas relacionadas con la ambición (véase, Jones et al., 2017). Otra ventaja de tener en cuenta los rasgos específicos es que estos son más fáciles de intervenir que los rasgos generales, tipo *Big Five*. Al tratarse de rasgos más específicos (y, por tanto, conductas más específicas) es más fácil intervenir sobre ellas y tratar de potenciarlas. El cambio de personalidad no es un oxímoron, ya que una persona puede cambiar con el tiempo dependiendo de las experiencias de la vida (Blackie et al., 2014). De hecho, recientes estudios

longitudinales han demostrado que ascender en una empresa e incluso pasar de trabajador por cuenta ajena a trabajador por cuenta propia lleva a cambios en las puntuaciones de los instrumentos de personalidad (Li, Li, et al., 2021; Li, Feng, et al., 2021).

1.4.6. Modelos de la Personalidad Emprendedora

Existen diferentes modelos teóricos que han intentado definir la personalidad de una persona emprendedora. Debido a que la personalidad del emprendedor es un tema relativamente nuevo en el siglo XXI, la diversidad de rasgos de personalidad de los diferentes modelos teóricos es considerable. Si bien, hay ciertos rasgos de personalidad que son esenciales para la mayoría de los teóricos (Frese y Gielnik, 2014; Rauch y Gielnik, 2021). En esta línea, se presentan los modelos de la personalidad emprendedora más destacados hasta el momento.

Modelo de la Personalidad Emprendedora de Rauch y Frese

Las últimas décadas de investigación se han centrado en la identificación de rasgos específicos de la personalidad que permitieran mejorar la validez predictiva sobre los resultados relacionados con el emprendimiento (George et al., 2016). Rauch y Frese (2007a, 2007b) proponen un modelo conceptual que se sustenta en los resultados de un meta-análisis para identificar los rasgos específicos de la personalidad con un mayor poder predictivo. El modelo contempla variables a nivel individual, como las capacidades, habilidades, y conocimiento de las personas, así como el contexto donde se desarrollan. Las variables de la personalidad son el núcleo principal del modelo y distingue entre rasgos generales y específicos de la personalidad. Los rasgos generales, a diferencia de los específicos, se consideran un efecto indirecto en las metas y acciones estratégicas. En otras palabras, los rasgos generales de la personalidad se encuentran

mediados por seis rasgos específicos de la personalidad: autoeficacia, autonomía, innovación, locus de control, motivación de logro, y toma de riesgos. El modelo de Rauch y Frese supone un cambio de paradigma en la conceptualización del espíritu emprendedor y sentará las bases de las futuras investigaciones sobre la personalidad emprendedora.

Midiendo el Talento Emprendedor (Measuring Entrepreneurial Talent; META)

META nace con la intención de explicar el potencial emprendedor y trata de entender por qué algunas personas tienen más éxito que otras para innovar y hacer crecer los negocios (Ahmetoglu y Chamorro-Premuzic, 2013) (Ahmetoglu y Chamorro-Premuzic, 2013). Este modelo incluye cuatro aspectos individuales que están estrechamente ligados a la actividad emprendedora: creatividad y visión empresariales, oportunismo y proactividad. Se tiene en cuenta la creatividad empresarial y el oportunismo como efectos indirectos de la visión empresarial, la cual influye en la proactividad, desembocando en la innovación y el crecimiento empresarial.

Modelo del Centro Psicométrico de la Universidad de Cambridge – Barclays

El Centro Psicométrico de la Universidad de Cambridge crea un esquema conceptual (Universidad de Cambridge, 2015) que parte del modelo conceptual de Rauch y Frese (2007a) con la finalidad de entender qué factores conducen a la creación de empresas y qué factores psicológicos están relacionados con la creación de un negocio en diferentes contextos sociopolíticos. Para ello, se utiliza un modelo que incluye los rasgos generales de la personalidad y ocho rasgos específicos de la personalidad emprendedora: Propensión al riesgo, locus de control, motivación de logro, innovación, iniciativa, autoeficacia, autonomía como actitud y autonomía como necesidad. Los estudios con este modelo muestran que el emprendedor y el trabajador difieren en todos estos rasgos, tanto generales como específicos, salvo en amabilidad,

neuroticismo y extraversión. Los análisis comparativos entre países y sectores industriales reflejan que, si bien la importancia de la mayoría de estos rasgos psicológicos varía según el contexto, la necesidad de autonomía sigue siendo altamente predictiva independientemente del tipo de sector y país.

Modelo de Actitudes Entre-Emprendedoras e Intra-Emprendedoras

El modelo de Jain et al. (2015) muestra la importancia que tienen las actitudes para entender a un emprendedor. De este modo, determina que son seis las "actitudes" (orientación de logro, toma de riesgos, locus de control interno, innovación, proactividad y orientación de mercado) que tienen un impacto positivo en el rendimiento de una empresa, ya sea referido a entre-emprendedores (personas que desarrollan una idea de negocio) e intra-emprendedores (personas que desarrollan o innovan una idea dentro de la empresa en la que se encuentran trabajando).

El Sistema de la Personalidad Emprendedora (Entrepreneurial Personality System; EPS)

El Sistema de la Personalidad Emprendedora (EPS; Obschonka y Stuetzer, 2017) es un modelo basado en la teoría de los cinco factores de la personalidad (Costa y McCrae, 1985; McCrae y Costa, 2008) y nace como necesidad de aplicar este modelo al mundo del emprendimiento, basándose en la asunción de que una persona no puede entender cómo operan los rasgos si uno no entiende la personalidad como un sistema. El EPS está formado por diferentes dimensiones: tendencias básicas, adaptaciones características y autoconcepto. Primero, las tendencias básicas serían los cinco rasgos generales de personalidad. Segundo, las adaptaciones características serían rasgos más específicos, actitudes, patrones de creencias, hábitos, habilidades, roles y relaciones (Obschonka y Stuetzer, 2017, p. 207), siendo contextualizadas en función del tiempo y de las situaciones (McAdams y Pals, 2006). Dentro de estas adaptaciones

características, los autores destacan principalmente tres rasgos específicos: toma de riesgos, locus de control interno y autoeficacia. Un aspecto reseñable es que este modelo destaca el autoconcepto empresarial como un pilar fundamental en el sistema, entendido como un constructo evolutivo en el desarrollo vocacional de una persona a lo largo del curso de la vida (Savickas, 2002). Un adecuado autoconcepto empresarial ocurre cuando se da un buen ajuste entre la propia imagen de uno mismo y el rol empresarial. Al igual que otros modelos, el EPS considera que los rasgos generales de la personalidad (tendencias básicas) ejercen un efecto directo sobre los rasgos específicos de la personalidad (adaptaciones características). Por su parte, el autoconcepto, que tiene influencia de las tendencias básicas, influye de manera directa tanto en los rasgos específicos de la personalidad como en los resultados empresariales. A nivel global, el modelo considera que el EPS en su conjunto está influido por aspectos biológicos, culturales y por la ecología social de la vida cotidiana, la cual estaría formada por la educación, las experiencias laborales y las experiencias de socialización (Schmitt-Rodermund, 2004). Por último, el EPS destaca cuatro propuestas clave en su marco de trabajo: Una perspectiva orientada en la persona ("el todo es mayor que la suma de las partes"), el alcance (considerando los rasgos generales, tipo *Big Five,* como aspectos más estables en la persona y las adaptaciones características y el autoconcepto como más moldeables), el efecto de gravedad (la interacción continua entre cada aspecto del modelo a lo largo del curso de la vida) y los límites (el modelo está influenciado por los genes, las experiencias de vida y la actuación y pensamiento empresarial).

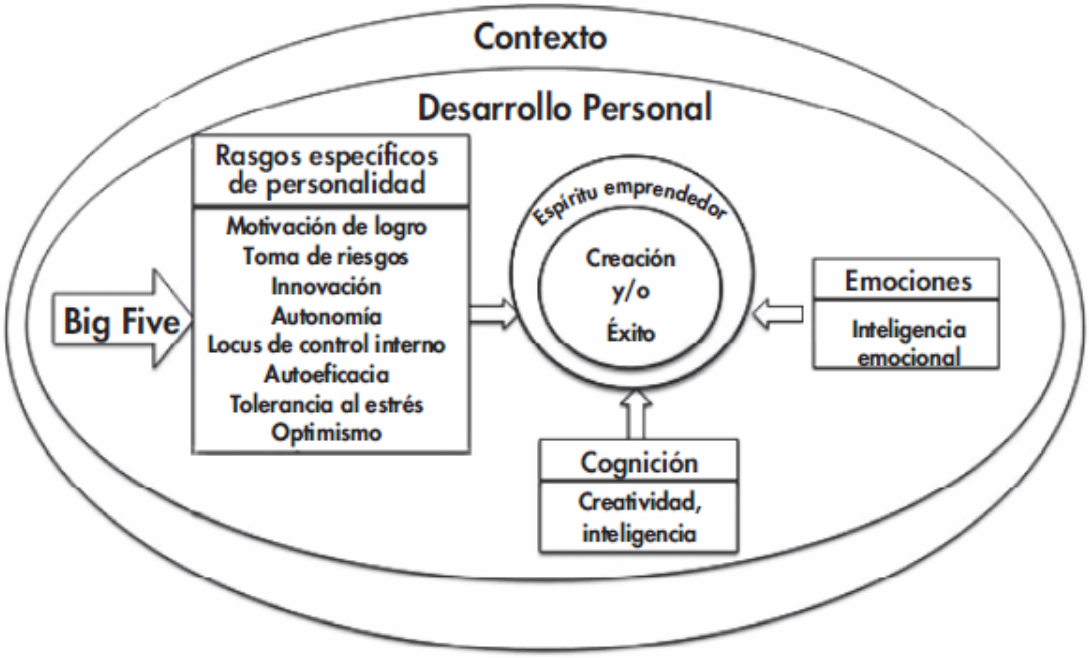
El Modelo Integral del Espíritu Emprendedor

El Modelo Integral del Espíritu Emprendedor (Suárez-Álvarez y Pedrosa, 2016) se basa en un modelo adaptado de Rauch y Frese (2007a). Este modelo, presentado en la Figura 3, considera que la conducta emprendedora es multidimensional y que hay que

tener en cuenta las diferentes dimensiones de manera conjunta. En primer lugar, el modelo presta atención al contexto socioeconómico en el que se desenvuelve la persona, tales como educación, familia, cultura y sistema de leyes y regulaciones (GEM, 2020), de vital importancia como se ha visto en líneas precedentes. *Por debajo* de ese contexto, está la zona de desarrollo personal. Esta zona no olvida otras perspectivas de especial relevancia como la perspectiva afectiva (Inteligencia Emocional), la cual ha demostrado su relación con la conducta emprendedora y con rasgos específicos de la personalidad (Ahmetoglu et al., 2011; Muñiz et al., 2014; Suliman y Al-Shaikh, 2007). También considera la relevancia de la perspectiva cognitiva, con variables como la inteligencia y la creatividad, donde ambas han mostrado su hueco en la conducta emprendedora (Laguía et al., 2019; Sternberg, 2004). Finalmente, se centra en ocho rasgos específicos de la personalidad (autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos), los cuales consideran que son los rasgos más importantes de la conducta y éxito emprendedor (Muñiz et al., 2014). En estudios iniciales, los autores también habían considerado el locus de control externo, el cual fue eliminado del modelo por no demostrar relación con el espíritu emprendedor (Suárez-Álvarez et al., 2014). Como se puede observar en la Figura 3, los autores no se olvidan de los cinco grandes rasgos de la personalidad (*Big Five*), los cuales consideran que tienen influencia sobre los rasgos específicos.

Figura 3

Modelo Integral del Espíritu Emprendedor (Suárez-Álvarez y Pedrosa, 2016)



Un resumen de los modelos de personalidad emprendedora con las definiciones que aportan sus autores se puede encontrar a continuación (Tabla 1).

Tabla 1

Modelos de la Personalidad Emprendedora

Modelo	Dimensiones	Definición
Modelo de la personalidad emprendedora (Rauch y Frese, 2007a)	Motivación de logro	La preferencia por los retos más que por las rutinas, asumir la responsabilidad personal por su desempeño y la búsqueda de feedback sobre su desempeño y de nuevas formas para mejorarlo (Rauch y Frese, 2007a).
	Toma de riesgos	La probabilidad o propensión de una persona a asumir riesgos (Rauch y Frese, 2007a).
	Innovación	La inclinación e interés para buscar nuevas formas de acción (Patchen, 1965).
	Autonomía	La preferencia por tener el control, evitar restricciones y reglas por parte de las organizaciones y, por tanto, elegir la labor emprendedora (Brandstätter, 1997).
	Locus de control	Implica que uno tiene la creencia de controlar su destino y su futuro (Rotter, 1966).
	Autoeficacia	Es la creencia de ser capaz de realizar una determinada acción eficazmente (Rauch y Frese, 2007a).

Modelo del Centro Psicométrico de la Universidad de Cambridge - Barclays	Propensión al riesgo	El grado por el cual uno está dispuesto a tomar riesgos y perder experiencias.
	Locus de control	El alcance por el que un individuo cree que sus acciones y comportamientos determinan los resultados de eventos externos.
	Motivación de logro	El nivel en el que una persona necesita éxito para la auto-motivación y se esfuerza por la excelencia y el reconocimiento.
	Autoeficacia	La forma en la cual las personas perciben su capacidad como la forma en la que desempeñan tareas novedosas y difíciles y salen adelante de la adversidad.
	Autonomía como actitud	Actitudes hacia el grado en el que otros necesitan autonomía.
	Autonomía como necesidad	El grado en el cual una persona necesita independencia y libertad para tomar las decisiones libremente, especialmente a las expectativas de su lugar de trabajo.
	Iniciativa	El nivel de cómo una persona se comporta en el trabajo.
	Innovación	El nivel en el que una persona busca la novedad y la complejidad, estando dispuesta a aceptar e impulsar el cambio.
Modelo de Actitudes Entre-Emprendedoras e Intra-Emprendedoras (Jain et al., 2015)	Orientación de logro	Una fuerza motriz para el emprendimiento exitoso.
	Toma de riesgos	La capacidad de un individuo para asumir riesgos calculados y desafíos alcanzables.
	Locus de control interno	La creencia personal sobre la influencia que tiene una persona sobre los resultados a través de su capacidad (Rotter, 1966).
	Innovación	La tendencia a comprometerse y apoyar nuevas ideas, procesos creativos y experimentación que puede llevar a productos, servicios y procesos tecnológicos nuevos (Lumpkin y Dess, 1996).
	Proactividad	Una perspectiva de búsqueda de oportunidades y visión de futuro que implica nuevos productos o servicios por delante de los competidores y actuar anticipándose a la demanda futura para crear cambios (Lumpkin y Dess, 2001).
	Orientación de mercado	La generación de inteligencia de mercado que concierne a necesidades futuras de los clientes, promocionando la inteligencia horizontal y vertical dentro de la organización (Jaworski y Kohli, 1993).
Measuring Entrepreneurial Talent (META; Ahmetoglu y Chamorro-Premuzic, 2013)	Creatividad empresarial	La habilidad para generar ideas innovadoras de negocio.
	Oportunismo	La tendencia para detectar nuevas oportunidades de negocio.
	Proactividad	La tendencia a ser proactivo sobre proyectos.
	Visión	La habilidad para ver a nivel global el negocio y crear un progreso de este.
The Entrepreneurial Personality System (EPS; Obschonka y Stuetzer, 2017)	Toma de riesgos	La probabilidad o propensión de una persona a asumir riesgos (Rauch y Frese, 2007a).
	Locus de control interno	Implica que uno tiene la creencia de controlar su destino y su futuro (Rotter, 1966).
	Autoeficacia	Es la creencia de ser capaz de realizar una determinada acción eficazmente (Rauch y Frese, 2007a).

Modelo Integral del Espíritu Emprendedor (Suárez-Álvarez y Pedrosa, 2016)	Autonomía	La motivación de creación empresarial como un intento de alcanzar cierta libertad individual (Van Gelderen y Jansen, 2006).
	Autoeficacia	La convicción de que uno puede organizar y ejecutar acciones de manera eficiente tan bien como persistir cuando se enfrentan a obstáculos para producir resultados deseados (Costa et al., 2013).
	Innovación	La disposición e interés respecto a nuevas formas de hacer las cosas (Rauch y Frese, 2007b).
	Locus de control interno	La atribución causal de que las consecuencias de un comportamiento dependen de uno (Chell, 2008; Rauch y Frese, 2007b; Suárez-Álvarez et al., 2013).
	Motivación de logro	El deseo por lograr estándares de excelencia (Rauch y Frese, 2007b; Suárez-Álvarez et al., 2013).
	Optimismo	Las creencias de una persona respecto a la ocurrencia de eventos positivos en su vida más que negativos (Shepperd et al., 2002).
	Tolerancia al estrés	La resistencia para percibir estímulos ambientales y estresantes gracias a un adecuado uso de estrategias de afrontamiento (Lazarus y Folkman, 1986).
	Toma de riesgos	La tendencia y disposición de las personas a hacer frente a ciertos niveles de inseguridad que le permitirán lograr un objetivo que presente beneficios mayores a las posibles consecuencias negativas (Moore y Gullone, 1996).
Variables añadidas en el Modelo Integral del Espíritu Emprendedor por la presente Tesis Doctoral	Autocontrol	La capacidad de cambiarse a sí mismo para desarrollar un mejor ajuste entre la persona y el mundo (Mischel et al., 1996).
	Grit	La pasión y la perseverancia por objetivos a largo plazo (Duckworth, 2016).

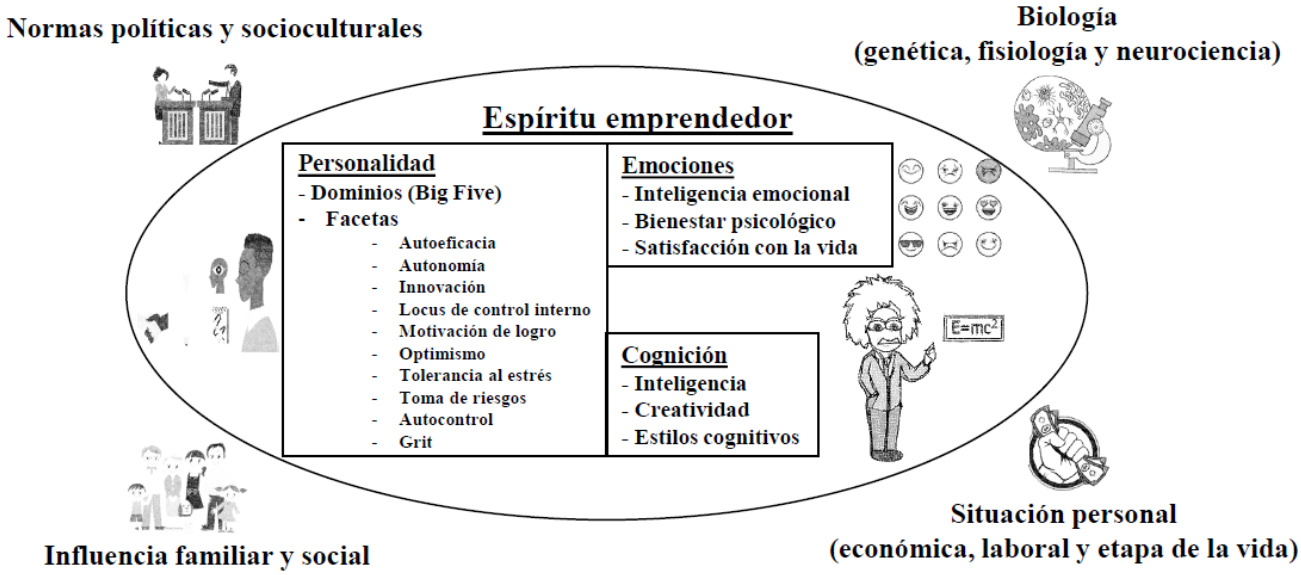
Con todo lo anterior, se desarrolla un nuevo esquema del espíritu emprendedor (Figura 4), basado en Suárez-Álvarez y Pedrosa (2016), actualizando los últimos avances y áreas comentados hasta el momento en el campo del emprendimiento.

La Figura 4 muestra diferentes aspectos que influyen en el espíritu emprendedor. Se tiene en cuenta la biología, de modo que la genética con el ADN, la fisiología con las hormonas y la neurociencia con la actividad cerebral han demostrado ciertos patrones correlacionales en el emprendimiento. También, las normas políticas y socioculturales son importantes por tratarse del nivel contextual más amplio en el que se desenvuelve la persona, donde entran en juego las leyes, regulaciones e impuestos de cada país o región. En suma, las facilidades y dificultades que maneja la persona en aquel lugar donde quiera emprender. La familia y el entorno social de la persona también tiene relevancia en la actividad emprendedora. La familia puede ser fuente de inspiración

para emprender o para todo lo contrario. A su vez, muchas personas emprendedoras heredan negocios familiares, evitando así las primeras estaciones del camino emprendedor. A continuación, se encuentra la situación actual de la persona, tanto a nivel económico como laboral. El nivel económico de la persona y la situación laboral (tener o no trabajo, estabilidad y salario del mismo, satisfacción con el trabajo y con la organización, etc.) son variables relevantes a la hora de tomar la decisión de emprender o no. Todo ello influye en el espíritu emprendedor, donde se encuentra la parte personal, caracterizada por las variables psicológicas relevantes para la actividad emprendedora. La perspectiva cognitiva (inteligencia, creatividad y estilos cognitivos) y la perspectiva afectiva (inteligencia emocional, bienestar psicológico y satisfacción con la vida) ayudan a explicar la creación y éxito empresarial. Finalmente, como piedra angular de la Tesis Doctoral, se pone de relieve la importancia de la personalidad de los individuos. Esta se considera tanto desde la amplitud de los dominios, tipo *Big Five*, como de la fidelidad de las facetas, incluyendo, además de las ocho variables que conforman la Batería para la Evaluación de la Personalidad Emprendedora, el grit y el autocontrol (parte final de la Tabla 1).

Figura 4

Modificación del Modelo Integral del Espíritu Emprendedor



1.4.7. Instrumentos de Evaluación de la Personalidad Emprendedora

Hasta la fecha, se han desarrollado múltiples instrumentos de medida para evaluar cada uno de los rasgos de personalidad implicados en la conducta emprendedora, tales como la motivación de logro (Schuler et al., 2004; Suárez-Álvarez et al., 2013), el locus de control (Goldberg et al., 2006; Schjoedt y Shaver, 2012; Suárez-Álvarez et al., 2016), la autoeficacia (Moriano et al., 2012; Schwarzer y Jerusalem, 1995), la autonomía (Boerjan et al., 2010; Lumpkin et al., 2009), la iniciativa (Frese et al., 1997), la innovación (De Jong y Den Hartog, 2010; Zheng et al., 2009) y la toma de riesgos (Aguado et al., 2011; Shead y Hodgins, 2009), entre otros.

Sin embargo, el número de instrumentos se reduce drásticamente cuando el objetivo es encontrar un único instrumento que evalúe de manera conjunta los diferentes rasgos. Por suerte, en las últimas décadas, con el objetivo de mejorar la coherencia

metodológica, el desarrollo de instrumentos que integran la evaluación de los rasgos de la personalidad emprendedora en un único instrumento ha sido vertiginoso. En la Tabla 2 se presentan los principales instrumentos de medida de evaluación del espíritu emprendedor desarrollados hasta la fecha. En primer lugar, cabe decir que la presente Tabla 2 es una continuación de la información aportada por Suárez-Álvarez y Pedrosa (2016), donde los autores presentaban siete instrumentos de evaluación de la personalidad emprendedora. Hoy en día, la tabla se ha duplicado, lo que es un buen síntoma del auge de la evaluación en el campo del espíritu emprendedor. Alguna de estas escalas está orientada a la evaluación de diferentes colectivos como adolescentes (Muñiz et al., 2014; Oliver y Galiana, 2015), universitarios (Caird, 2006; Oliver y Galiana, 2015) y trabajadores (Almeida et al., 2014; Cuesta et al., 2018; Robinson et al., 1991). Otro de los aspectos destacados es la tendencia a desarrollar instrumentos utilizando métodos de autoinforme, habitualmente mediante escalas tipo Likert.

Tabla 2

Instrumentos de Medida de la Personalidad Emprendedora

Nombre	Dimensiones	Ítems	Referencia
Entrepreneurial Attitude Orientation [EAO]	Motivación, innovación, control personal percibido y autoestima percibida, en los negocios	75	Robinson et al. (1991)
Entrepreneurial Aptitude Test [TAI]	Orientación hacia metas, liderazgo, adaptación, motivación de logro, realización personal, innovación, flexibilidad y autonomía.	75	Favretto et al. (2003)
Skills Confidence Inventory [SCI]	Realista, investigadora, artística, social, emprendedora y convencional.	60	Betz et al. (2005)
General Enterprising Tendency [GET2]	Necesidad de logro, autonomía, determinación, toma de riesgos y creatividad.	54	Caird (2006)
Entrepreneurial Intention Questionnaire [EIQ]	Atracción profesional, valoración social, capacidad e intención empresariales.	20	Liñán y Chen (2006)

Cuestionario de Orientación Emprendedora [COE]	Locus de control, autoeficacia, propensión al riesgo y proactividad.	34	Sánchez, (2010)
Measure of Enterpreneurial Tendencies and Abilities [META]	Creatividad, oportunismo, proactividad y visión.	44	Almeida et al. (2014)
Batería para la Evaluación de la Personalidad Emprendedora en jóvenes (BEPE-J)	Autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos	87	Muñiz et al. (2014)
Escala de Actitudes Emprendedoras para Estudiantes [EAEE]	Proactividad, ética profesional, empatía, innovación, autonomía y toma de riesgos.	18	Oliver y Galiana (2015)
Entrepreneurial Mindset Profile [EMP]	Rasgos de personalidad: Independencia, estructura limitada, inconformismo, aceptación de riesgos, orientación a la acción, pasión y necesidad de logro. Habilidades: Enfoque futuro, generación de ideas, ejecución, confianza en sí mismo, optimismo, persistencia y sensibilidad interpersonal.	72	Davis et al. (2016)
High Entrepreneurship, Leadership and Professionalism Questionnaire [HELP]	Emprendimiento, liderazgo y profesionalismo.	9	Di Fabio et al. (2016)
Role Related Personal Profile [FLORA]	Extraversión (Interacción, Multitarea, Iniciativa, Activismo, Influencia, Liderazgo, Autonomía). Sociabilidad (Sensibilidad interpersonal, Afecto, Colaboración, Apoyo, Afectividad positivo). Conciencia (Fiabilidad, Constancia, Precisión, Deliberación, Logro). Apertura (Aprendizaje, Inventiva, Profundización, Flexibilidad). Estabilidad emocional (Tolerancia al estrés, Tolerancia a la frustración, Autocontrol).	176	Sartori et al. (2016)
Batería para la Evaluación de la Personalidad Emprendedora en adultos (BEPE-A)	Autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos	80	Cuesta et al. (2018)

MindCette Entrepreneurial Test [MCET]	Confianza, diligencia, deseo emprendedor, innovación, liderazgo, motivación, permanencia, resiliencia y autocontrol	38	Shaver et al. (2019)

Nota. Ampliado y actualizado de Suárez-Álvarez y Pedrosa (2016).

Llama la atención, ya no tanto el tipo de dimensiones, como la disparidad en el número de rasgos que mide cada instrumento. De este modo, se podría ir desde el HELP (Di Fabio et al., 2016) con únicamente tres dimensiones hasta el EMP (Davis et al., 2016) con 14. Además, el EMP resalta por su distinción entre habilidades, como puede ser la generación de ideas y rasgos de personalidad, como por ejemplo la necesidad de logro, siendo estos últimos mejores predictores de la conducta emprendedora. El número de ítems es algo también en lo que difieren enormemente, yendo desde nueve ítems (HELP; Di Fabio et al., 2016) hasta los 176 ítems del FLORA (Sartori et al., 2016). Por otro lado, los únicos desarrollados en España son el Cuestionario de Orientación Emprendedora, la Escala de Actitudes Emprendedoras para Estudiantes y la Batería para la Evaluación de la Personalidad Emprendedora, tanto en su versión para adolescentes como para adultos, aunque otros estén traducidos y adaptados de diferentes culturas (Almeida et al., 2014; Caird, 2006; Liñán y Chen, 2006). Por otra parte, el FLORA (Sartori et al., 2016) está construido desde la perspectiva del *Big Five*, pero a su vez, desglosa cada rasgo general en determinados rasgos específicos o facetas (véase Tabla 2). El MCET (Shaver et al., 2019) evalúa diez dimensiones, sin embargo, se echa en falta una explicación detallada del proceso de construcción del instrumento. Finalmente, el BEPE-A (en adultos, Cuesta et al., 2018), cuyo germen, como se verá, es el BEPE-J (en jóvenes, Muñiz et al., 2014), evalúa ocho rasgos específicos de la personalidad, y será el núcleo de la presente Tesis Doctoral.

1.4.7.1. Características de los Instrumentos de Evaluación de la Personalidad Emprendedora

Una vez identificados los instrumentos de medida de la personalidad emprendedora en la actualidad, se realiza una valoración global orientativa de la calidad de estos instrumentos en función de los criterios establecidos por la Federación Europea de Asociaciones de Psicólogos (EFPA) para la evaluación de los test (Evers et al., 2013) y los Estándares para la Evaluación Educativa y Psicológica (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education [AERA, APA, NCME] 2014). La información mostrada en la Tabla 3 corresponde, principalmente, a la información proporcionada por los autores en el documento original en que se muestra el desarrollo del instrumento, completado con artículos científicos indexados en bases de datos internacionales. Esto excluye la posible existencia de documentos no indexados en dichas bases que aporten información sobre los aspectos que no se encuentran cubiertos en dicha Tabla.

En primer lugar, resulta llamativo que, si bien algunos autores mencionan la validez de contenido, son pocos los que proporcionan datos basados en juicios de expertos e indicadores cuantitativos (Pedrosa et al., 2014; Sireci y Faulkner-Bond, 2014). Aunque también es cierto que los instrumentos de medición más recientes parecen prestar más atención a este aspecto durante el proceso de construcción (Davis et al., 2016; Di Fabio et al., 2016; Oliver y Galiana, 2015). Otros aspectos que no han sido apenas contemplados son el estudio del Funcionamiento Diferencial de los Ítems (*Differential Item Functioning*; DIF) y la invarianza de medida. En el caso del DIF, sólo el BEPE lo ha tenido en cuenta, tanto en su versión para adolescentes (Muñiz et al., 2014), como en su versión para adultos (Cuesta et al., 2018). Más olvidada aún es la invarianza de medida, ya que ninguno de los instrumentos de personalidad

emprendedora ha analizado este aspecto psicométrico. Ambos son esenciales, ya que permiten identificar, grosso modo, si el contenido de los ítems que componen el instrumento está midiendo de manera diferente a un determinado grupo, ya sean hombres y mujeres, jóvenes y adultos, o emprendedores y no emprendedores, entre otras posibles poblaciones (Pendergast et al., 2017; Sandilands et al., 2013; Zumbo, 2007). Finalmente, a pesar de los avances que permite la TRI en la evaluación psicológica (Van der Linden, 2016), parece que sólo el BEPE en jóvenes (Muñiz et al., 2014) ha sido desarrollado desde este marco metodológico, desarrollando un Test Adaptativo Informatizado en esta población (Pedrosa et al., 2016). Finalmente, llama la atención que, pese al elevado número de ítems que contempla la evaluación de la personalidad emprendedora, así como los contextos complejos en los que se desarrolla la evaluación, ninguno de los instrumentos haya desarrollado una versión corta. Los instrumentos que tienen un menor número de ítems son el EIQ (Liñán y Chen, 2006) con 20 ítems, el EAEE (Oliver y Galiana, 2015) con 18, y el HELP-Q (Di Fabio et al., 2016) con nueve ítems. Sin embargo, estos instrumentos a pesar de que cuentan con pocos ítems no ofrecen una puntuación total de personalidad emprendedora, limitándose a evaluar con un escaso número de ítems cada una de las dimensiones de las que se componen. En la Tabla 3, se observan los puntos fuertes y débiles de cada instrumento de evaluación de la personalidad emprendedora mencionados anteriormente. Respecto a España, en la actualidad existen al menos seis instrumentos de medida para evaluar la personalidad emprendedora: EIQ (Liñan y Chen, 2006); COE (Sánchez, 2010); META (Almeida et al., 2014), EAEE (Oliver y Galiana, 2015) y BEPE-J (Muñiz et al., 2014), y BEPE-A (Cuesta et al., 2018). Es importante resaltar que todos los instrumentos mencionados han sido desarrollados originalmente en España salvo el META, el cual simplemente ofrece una traducción de sus ítems al castellano, lo cual, como bien se

sabe, no es suficiente para confirmar su uso fiable y válido en el contexto español (Hernández et al., 2020; Muñiz et al., 2013).

Tabla 3

Propiedades Psicométricas de los Diferentes Instrumentos de Evaluación de la Personalidad Emprendedora

Test	Fiabilidad	Evidencias de validez: Contenido	Evidencias de validez: Constructo	Evidencias de validez: Criterio	DIF	Invarianza de medida	TAI	Versión corta	Disponible en español
EAO	✓	✓	×	✓	×	×	×	×	×
TAI	✓	×	✓	✓	×	×	×	×	×
SCI	✓	✓	✓	✓	×	×	×	×	×
GET2	✓	×	✓	✓	×	×	×	×	×
EIQ	✓	×	✓	×	×	×	×	×	✓
COE	✓	×	✓	×	×	×	×	×	✓
META	✓	×	✓	✓	×	×	×	×	✓
BEPE-J	✓	✓	✓	×	✓	×	✓	×	✓
EAEE	✓	✓	✓	✓	×	×	×	×	✓
EMP	✓	✓	✓	✓	×	×	×	×	×
HELP	✓	✓	✓	✓	×	×	×	×	×
FLORA	✓	×	✓	✓	×	×	×	×	×
BEPE-A	✓	✓	✓	✓	✓	×	×	×	✓
MCET	✓	×	✓	×	×	×	×	×	×

Nota. Rodeado con un círculo aquellos aspectos que forman parte de los objetivos de la presente Tesis Doctoral.

1.5. La Batería para la Evaluación de la Personalidad Emprendedora (BEPE)

1.5.1. Los Inicios del BEPE: El BEPE en Jóvenes (BEPE-J)

La Batería para la Evaluación de la Personalidad Emprendedora (BEPE-J) nace para cubrir una necesidad en el campo de la evaluación psicológica por la escasez de

instrumentos de personalidad emprendedora correctamente desarrollados o adaptados en el contexto español, especialmente en población adolescente. Además, el emprendimiento en el contexto educativo es el marco menos desarrollado a nivel mundial (GEM, 2021), por lo que una adecuada evaluación de la personalidad emprendedora adolescente podría ser un buen punto de partida.

El BEPE-J ha sido validado en población adolescente ($M_{años}$ = 16,52; $DT_{años}$ = 1,38). La prueba muestra una estructura de ocho factores de primer orden, y un único factor de segundo orden, lo que justifica la obtención de una puntuación global de personalidad emprendedora. Además, recientemente se han demostrado nuevas evidencias de validez del BEPE-J (Ortuño-Sierra et al., 2021). El BEPE-J muestra correlaciones positivas con el nivel socioeconómico, con dos dimensiones de la inteligencia emocional (claridad y reparación), con el rendimiento académico y con los cinco grandes rasgos de la personalidad (Muñiz et al., 2014).

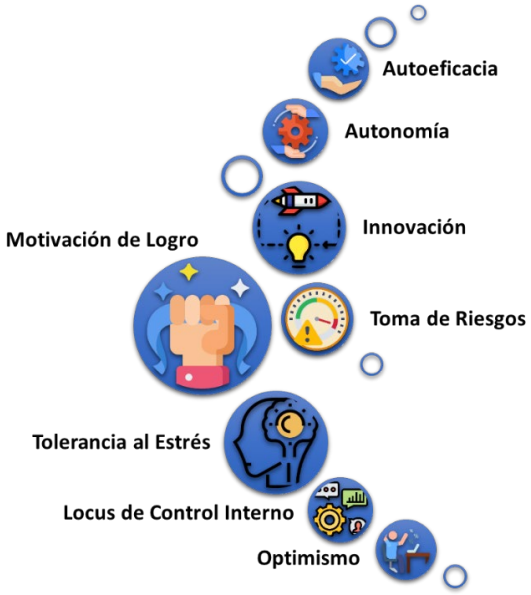
1.5.2. El BEPE en Adultos: BEPE-A

El BEPE-A (Cuesta et al., 2018) nace de la necesidad de evaluar la personalidad emprendedora a través de un instrumento con adecuadas propiedades psicométricas en población adulta. El BEPE-J tiene múltiples ventajas en la evaluación de los adolescentes, pero existía aún la necesidad de evaluar la personalidad emprendedora en personas con mayor posibilidad de emprender en el momento de la evaluación (mayores de 18 años y en estado laboral activo). Por tanto, Cuesta et al. (2018) desarrollan con estos fines el BEPE-A, el cual nace del BEPE en su versión para adolescentes. El proceso de construcción de los ítems fue el siguiente: Ya que el BEPE-A va dirigido a mayores de 18 años que se encuentran en estado activo de empleo, los 87 ítems del BEPE-J fueron reformulados para conseguir un lenguaje más preciso para población adulta, además de la construcción directa de nuevos ítems focalizados para esta

población, desembocando en un total de 161 ítems. Tras diferentes estudios piloto cualitativos y cuantitativos, el BEPE-A cuenta con 80 ítems y 8 dimensiones (10 ítems por dimensión): autoeficacia, autonomía, innovación, locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos (Figura 5; Muñiz et al., 2019).

Figura 5

Ocho Rasgos de la Personalidad Emprendedora



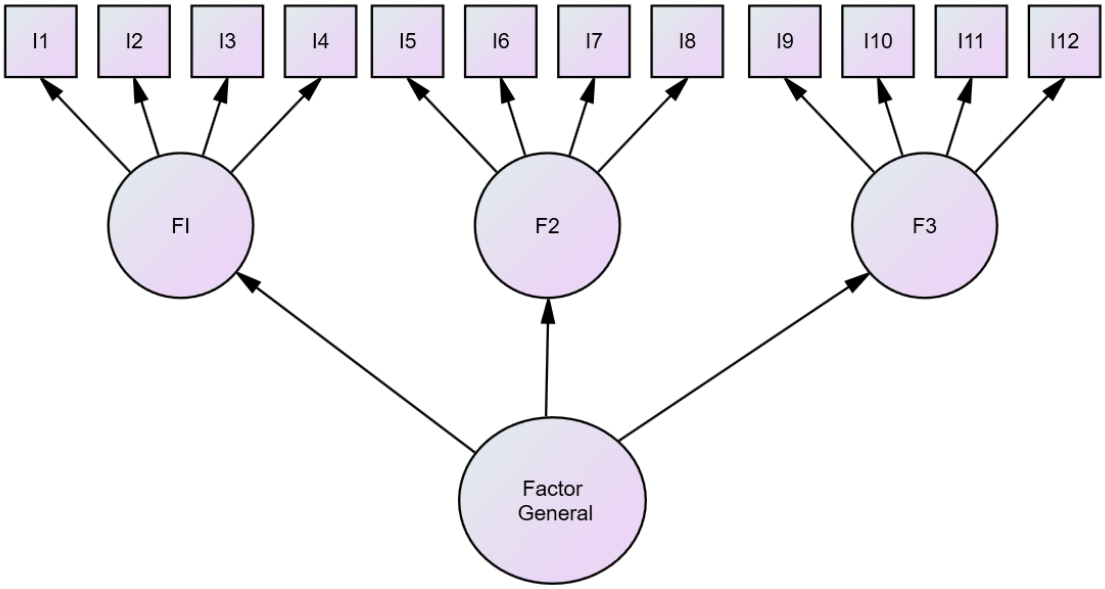
*Tomado de Muñiz et al. (2019)

Una de las grandes diferencias del BEPE-A frente al BEPE-J es la estructura interna del instrumento. Mientras que el BEPE-J fue validado con una estructura factorial de ocho factores de primer orden y un factor de segundo orden, el BEPE-A fue validado mediante un modelo bifactor, con ocho factores específicos y un factor general de personalidad emprendedora. Existen importantes matices que diferencian ambos enfoques. El modelo de segundo orden es también conocido como modelo jerárquico indirecto (McDonald, 1999), en tanto que la influencia del factor de segundo orden (personalidad emprendedora) sobre los indicadores observables (ítems) se hace

indirectamente a través de los factores de primer orden (v.g., autoeficacia), no habiendo nunca relación directa entre el nivel más alto de la jerarquía y el más bajo (Figura 6). De esta manera, la influencia ejercida por el factor general (personalidad emprendedora) sobre los indicadores observables queda difuminada por el hecho de que es filtrada a través de los factores de primer orden.

Figura 6

Representación Gráfica de un Modelo de Segundo Orden

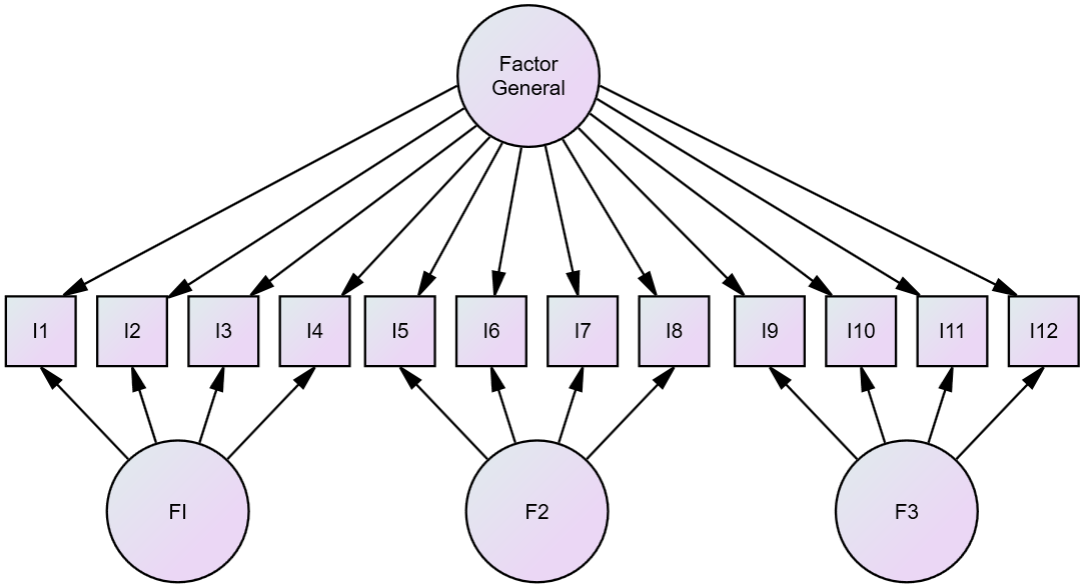


El modelo bifactor, en cambio, es un modelo estructural que indica que la covariación presente entre las respuestas a un conjunto de ítems puede ser explicada por un factor general único (personalidad emprendedora) que refleja la varianza común que está presente en todos los ítems del instrumento (BEPE), y una serie de factores de grupo (ocho rasgos específicos) que reflejan varianza común adicional entre grupos de ítems, habitualmente de contenido similar (Reise, 2012). La Figura 7 muestra una representación gráfica del modelo bifactor, donde el factor general ya no está *contaminado* por los factores específicos (Chen y Zhang, 2018; Reise et al., 2018). De esta manera, cada una de las dimensiones del BEPE-A tiene identidad propia, si bien

todas ellas se articulan en una dimensión general de emprendimiento. Por tanto, la batería BEPE permite obtener un perfil de personalidad emprendedora de ocho dimensiones, así como una puntuación global de emprendeduría.

Figura 7

Representación Gráfica de un Modelo Bifactor



El BEPE-A será el foco central de la presente Tesis Doctoral, a través del cual se desarrollen los objetivos.

1.5.2.1. Un Test Adaptativo Informatizado

Un Test Adaptativo Informatizado (TAI) es un test informatizado que ajusta la presentación de los ítems, de manera progresiva, al nivel de habilidad que el evaluado manifiesta en función de las respuestas dadas por este (Abad et al., 2011). En esencia, la finalidad de un TAI es elaborar un test que sea óptimo para cada persona evaluada (Meijer y Nering, 1999). Los TAI son desarrollados desde el marco de la TRI, lo que permite que haya invarianza muestral y paramétrica, algo que no es posible desde la Teoría Clásica de los Test (Kubinger, 2016; Muñiz, 2010, 2018). De esta manera, la

TRI permite que las puntuaciones de los participantes, independientemente de los ítems a los que hayan respondido, se puedan situar en la misma escala de medida, pudiendo así comparar las puntuaciones entre las personas (Hambleton et al., 1991). Por estas razones, el uso de los TAI ha ido aumentando a lo largo de los años (International Association for Computerized Adaptive Testing [IACAT], 2021; Reckase, 2010), incorporándose su uso a la evaluación de diferentes áreas profesionales como la educativa (Liu et al., 2013), de la salud (Devine et al., 2015; Rebollo et al., 2010), la clínica (Fonseca-Pedrero et al., 2013; Gibbons et al., 2014, 2021), la aptitudinal (Abad et al., 2021), organizacional (véase, Barney y Fisher, 2016) y de la personalidad (Forbey et al., 2012; Pedrosa et al., 2016), entre otras.

En suma, como concluyen Barney y Fisher (2016), los enfoques adaptativos están preparando el escenario para mejorar la medición y la intervención en los entornos organizacionales. De hecho, hoy en día los modelos psicométricos de la TRI en general y los TAI en particular, requieren especial atención por el impacto que están teniendo en los profesionales de la Psicología en España (Hernández et al., 2021; Muñiz et al., 2020).

A pesar de lo comentado anteriormente, en el campo de la evaluación de la personalidad emprendedora llama la atención la escasez en el uso de la TRI en general y de los TAI en particular (véase, Tabla 3). Solo ha sido desarrollado un TAI de la personalidad emprendedora, cuyo banco de ítems está basado en el BEPE-J. Así, Pedrosa et al. (2016) desarrollan un TAI para evaluar la personalidad emprendedora en jóvenes, concluyendo que tan solo son necesarios 10 ítems de media (de un banco final de 107 ítems) para evaluar la personalidad emprendedora sin perder apenas precisión respecto a la versión no adaptativa.

Por tanto, a vistas de los beneficios claros de los TAI, así como de los buenos resultados obtenidos en la evaluación adaptativa de la personalidad emprendedora en jóvenes, es de suma importancia la creación de un TAI que evalúe la personalidad emprendedora de manera adaptativa en población adulta.

1.5.2.2. Una Versión Corta

Frecuentemente, instrumentos de medida largos y comprehensivos son construidos para recoger una amplia información sobre las personas examinadas, independientemente del campo al que se refiera (Greer y Liu, 2016). Sin embargo, muchos de estos instrumentos pueden ser costosos de producir, administrar y puntuar. Además, la naturaleza de este tipo de medidas puede ocasionar efectos adversos en la recogida de datos, produciendo fatiga y déficits en la atención.

Estos problemas, que pueden no ser menores, se suman al hecho de que rara vez se evalúa un constructo aislado. En muchas ocasiones, tanto en el contexto aplicado como de investigación, se requiere evaluar un constructo junto con otro conjunto de variables psicológicas, lo que puede llevar en ciertas ocasiones a una cantidad de ítems inmanejable. Además, el proceso de evaluación en contextos aplicados de selección (departamentos de selección de personal, entidades financiadoras, administraciones públicas, etc.), se da en procesos que tienden a ser muy largos y tediosos, con diferentes fases y muchos aspectos a evaluar. Esto hace que se requiera en muchas ocasiones una visión inicial para detectar posibles necesidades para realizar una evaluación más completa a posteriori.

Por estas razones, las formas cortas pueden ser desarrolladas con el fin de recoger información inicial a través de una rápida evaluación (Reise et al., 2000; Smith et al., 2000), nunca siendo sustitutiva de la forma larga, siendo ambas complementarias

entre sí. La forma corta es una medida abreviada derivada de un test largo y completo al que se le reduce su número de ítems. Mientras que los instrumentos breves proporcionan beneficios en términos de tiempo, coste y esfuerzo, desarrollar estos instrumentos con adecuadas propiedades psicométricas es todo un reto, el cual, si se supera, puede ofrecer enormes beneficios en contextos de aplicación e investigación. Una versión corta puede cumplir las necesidades de los usuarios y a su vez, ser factible para los evaluadores (v.g., selección de personal), aplicando la medida rápidamente sin entrenamiento adicional. Además, una versión corta puede ser consistente en su contenido, de tal forma que sea capaz de captar aquellas personas que destacan en el rasgo medido (v.g., personalidad emprendedora), minimizando el número de falsos positivos y negativos (Glover y Albers, 2007). En el caso de los test que pueden defender una puntuación global del instrumento, como es el BEPE, lo más común es optar por elegir ítems de todas sus dimensiones o áreas de contenido (Gameroff et al., 2012). La forma corta no es un test de screening per se, ya que estos, en cambio, suelen ser versiones ultra-cortas, como el *Penn State Worry Questionnaire* (PSWQ-3; tres ítems; Kertz et al., 2014) y el *Big Five Inventory-2* (BFI-2-XS, con un ítem por cada faceta del *Big Five*; Soto y John, 2017a).

En esta línea, y como se observa en la Tabla 3, no hay ninguna versión corta de los instrumentos que evalúan la personalidad emprendedora, a pesar del alto número de ítems que conlleva evaluarla. Una versión corta es posible dada la relación que muestran las dimensiones o facetas que conforman la personalidad emprendedora entre sí, independientemente del instrumento al que se haga referencia.

1.5.2.3. El Estudio de la Invarianza de Medida

En la medición psicológica, un instrumento que es diseñado para medir uno o varios rasgos debe de revelar diferencias entre aquellos grupos que difieren en el rasgo.

Sin embargo, las personas no deben de obtener diferentes puntuaciones por el hecho de pertenecer a un determinado grupo (Counsell et al., 2019.; Millsap, 2011; Thompson, 2016). En los instrumentos de personalidad emprendedora, así como en muchos otros constructos psicológicos, es habitual que los investigadores asuman que el constructo evaluado permanece invariante a través de diferentes poblaciones (Sass y Schmitt, 2013). Los Estándares para la Evaluación Psicológica y Educativa establecen que un test es ecuánime cuando refleja el mismo constructo para todas las personas, así como que las puntuaciones tengan el mismo significado para todos los individuos (AERA, APA, NCME, 2014). Esta propiedad psicométrica es conocida como invarianza de medida (Meredith, 1993), siendo un prerrequisito lógico para llevar a cabo comparaciones entre grupos (Vandenberg y Lance, 2000). La idea de la invarianza de medida no es nueva (véase, Meredith, 1993), lo que ocurre es que su uso y comprobación ha ido facilitándose gracias a los avances tecnológicos. De esta manera, hoy en día son múltiples los procedimientos y métodos para comprobar la invarianza de medida como la TRI (Walker, 2011), el Análisis Factorial Confirmatorio Multigrupo (MCFA; Dimitrov, 2010), el Modelo Exploratorio de Ecuaciones Estructurales (ESEM; Marsh et al., 2011), y el método de alineación (Asparouhov y Muthén, 2014), siendo este último de gran utilidad cuando se pretenden comparar muchos grupos (Muthén y Asparouhov, 2018).

En el contexto de los instrumentos de medida en el campo de la personalidad, se ha producido un auge en el estudio de la invarianza de medida, tanto en estudios transculturales (Bowden et al., 2016; Lui et al., 2019; Thielmann et al., 2020), como en función del sexo y de la edad (Laverdière et al., 2013; Ock et al., 2019; Picconi et al., 2018; Shchebetenko et al., 2019). Dong y Dumas (2020), a través de una revisión sistemática, encuentran 1.647 artículos que se focalizan en el estudio de la invarianza de

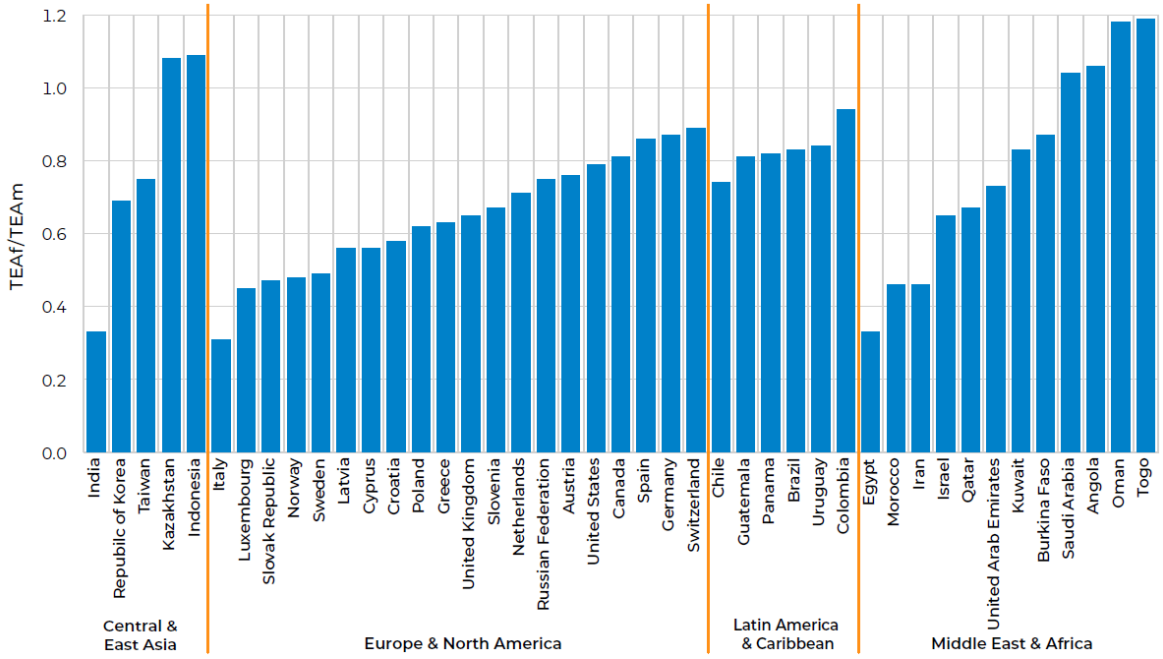
medida en instrumentos de personalidad, ya sea en función de la cultura o etnia, del sexo o de la edad. La idea es clara y es que, si no se demuestra la invarianza de medida, las comparaciones entre grupos quedan en entredicho, ya que puede que el test en concreto no tenga la misma estructura factorial entre los grupos en cuestión (invarianza configural), los ítems no tengan la misma importancia para el factor en cuestión (invarianza métrica), o incluso que los grupos no tengan la misma probabilidad de seleccionar una u otra alternativa en el ítem de los test politómicos (invarianza escalar). Como se puede observar en la Tabla 3, ninguno de los instrumentos de personalidad emprendedora se ha centrado en este aspecto psicométrico. Estudios como los de Hansen et al. (2011) o Runyan et al. (2011) analizan la invarianza de medida en la Escala de Orientación Emprendedora (EO; Covin y Slevin, 1989) a través de diferentes culturas, sin embargo, este instrumento está orientado más a nivel organizacional y no personal. Demostrar la invarianza de medida en la personalidad emprendedora puede llegar a tener múltiples ventajas en diferentes poblaciones. Concretamente, en variables sociodemográficas como el sexo y la edad resulta de máximo interés, debido a las diferencias que han ido mostrando las personas tanto en la actividad emprendedora como en las variables psicológicas relacionadas con la misma. Además, las poblaciones de trabajadores por cuenta propia y por cuenta ajena son también un eje importante para estudiar la invarianza de medida, debido a que si se quiere demostrar la capacidad discriminativa de un instrumento de personalidad emprendedora (mayores puntuaciones las personas que emprenden frente las que no), se ha de demostrar primero que la estructura factorial es la misma para ambas poblaciones.

1.5.2.3.1. Diferencias en la Actividad Emprendedora en Función del Sexo

El informe GEM, desde sus inicios, lleva mostrando datos que avalan la brecha de género en la actividad emprendedora (GEM, 1999, p. 23). Esta brecha ha permanecido a lo largo de los años, emprendiendo una mujer de cada diez frente a dos hombres de cada diez (OCDE, 2017) y emprendiendo un 8,9% más los hombres universitarios que las mujeres universitarias (Encuesta Global Universitaria del Espíritu Empresarial de Estudiantes [GUESS], 2019). En la Figura 7 se muestra la ratio de mujeres emprendedoras dividida entre la ratio de hombres emprendedores. En 2020, hay seis economías en las que el nivel de emprendimiento femenino supera la tasa masculina: todas de Asia Central y Oriental o de Oriente Medio y África. Las proporciones más bajas de emprendimiento femenino frente a masculino se encuentran en Italia, India y Egipto. Cada uno de ellos tiene aproximadamente tres hombres que inician o dirigen una nueva empresa por cada mujer que hace lo mismo. A nivel nacional, vemos que la brecha de género ha desaparecido casi en España (Figura 8; tercer país por la derecha de la sección Europa y América del Norte). De hecho, la tasa de emprendimiento en España es del 6,1%, siendo del 6,3% para hombres y del 6,0% para mujeres. Esto ocurre también en la población universitaria, donde la brecha de género entre los estudiantes emprendedores es inferior en España en comparación con el resto de los países (GUESS, 2019). Esto va en la línea con estudios recientes que demuestran el importante papel del espíritu empresarial de la mujer para la creación de valor económico, social y ambiental en todo el mundo.

Figura 8

Tasa de Actividad Emprendedora de las Mujeres Dividida entre la de los Hombres en el Año 2020 (GEM, 2021)



Las motivaciones para emprender tampoco son las mismas entre mujeres y hombres. Las mujeres emprendedoras suelen estar más de acuerdo que los hombres con la afirmación de que emprenden por hacer un cambio en el mundo, además de ver el emprendimiento como una opción de salir de la pobreza. Los hombres, en cambio, tienen como motivación principal generar riqueza y continuar con los negocios familiares (GEM, 2020a).

Estas diferencias entre hombres y mujeres, tanto a la hora de emprender como a la declaración de intereses para realizar dicha actividad, hacen que sea necesario el análisis de estas posibles diferencias en la personalidad emprendedora. Los últimos datos apuntan a que las diferencias entre hombres y mujeres en la personalidad tienden a ser muy pequeñas, tanto a nivel de rasgo general como de facetas (Furnham y Treglown, 2021).

1.5.2.3.2. Diferencias en la Actividad Emprendedora en Función de la Edad

La edad es otra variable clave en la actividad emprendedora, dadas las diferencias y peculiaridades a la hora de emprender a lo largo de las etapas de la vida (GEM, 2020, 2021; Lévesque y Stephan, 2020; OCDE, 2020). En la última década se ha percibido un incremento en el interés acerca de los efectos de la edad en el emprendimiento (Zacher et al., 2019; Zhao et al., 2021). Para los más jóvenes, el empleo se ha vuelto cada vez más inestable en tiempos de cambio demográfico, globalización y avance tecnológico. La tasa mundial de desempleo juvenil (15-24 años) se estima actualmente en el 13,8% (Organización Internacional del Trabajo [OIT], 2020), con algunos récords extremos, especialmente en los países en desarrollo (por ejemplo, 57,4% en Sudáfrica; ONU, 2018). Por su parte, España lidera el ranking de países europeos con mayor tasa de desempleo juvenil, estando en el 40,2%, siendo el doble que nuestros vecinos franceses (20,2%) y casi siete veces más que Alemania (6,1%). Incluso para los jóvenes empleados, el pensamiento empresarial y emprendedor se vuelve cada vez más como una competencia laboral clave esperada en el mundo organizacional (Obschonka et al., 2011). En el polo opuesto, el emprendimiento también es importante para las personas que entran en edad de jubilación, proporcionando una oportunidad de continuar siendo un miembro activo del lugar de trabajo. En esta etapa, iniciar un negocio puede constituir una fuente de seguridad financiera, autonomía y significado en etapas avanzadas de la vida (Halvorsen y Morrow-Howell, 2017), además de que elimina cierta presión a los sistemas de seguridad social de los países (Pilkova et al., 2014).

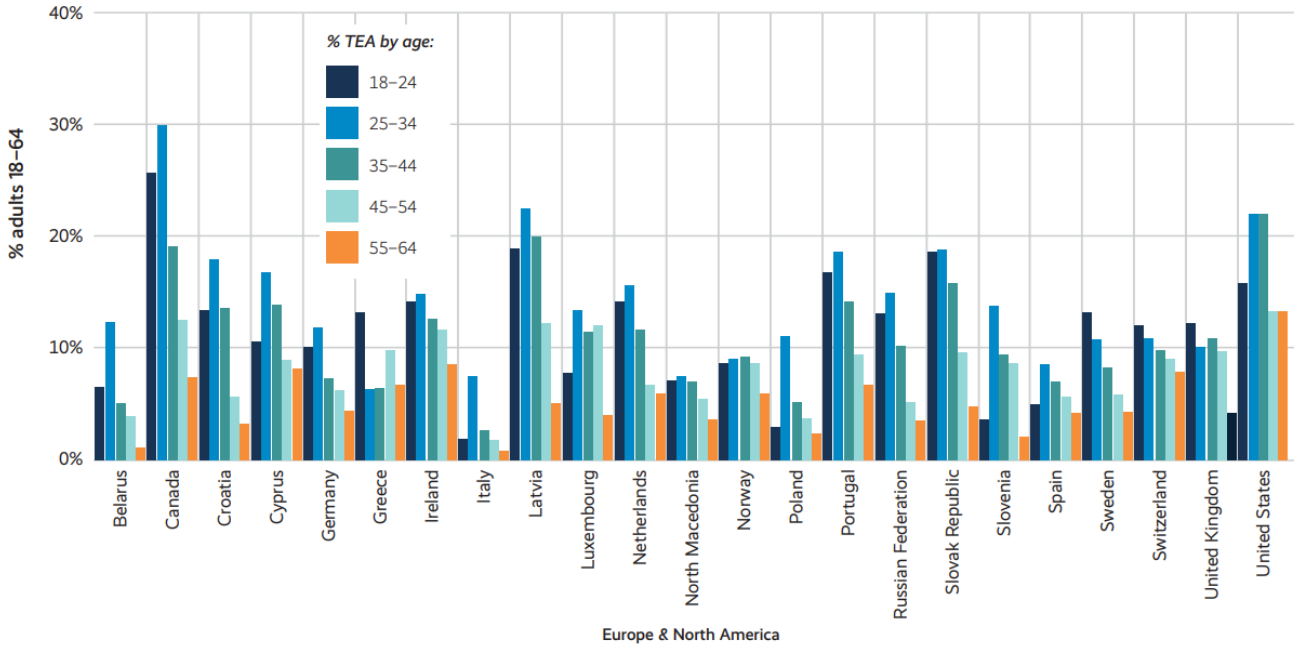
Si bien los teóricos coinciden en el hecho de que convertirse en emprendedor constituye una oportunidad atractiva tanto para las personas más jóvenes como las que

se encuentran en etapas posteriores de la vida, la investigación proporciona evidencia contradictoria sobre si el envejecimiento pudiera aumentar o disminuir la motivación para la identificación de oportunidades y la puesta en marcha de empresas. En la Figura 7 se puede observar la actividad emprendedora en función de diferentes grupos de edad, tanto en Europa como en América del Norte. En líneas generales, las edades de mayor emprendimiento se encuentran entre los 18 y los 34 años, siendo a partir de esta edad cuando se observa un descenso en el acto de emprender. En el caso de España (quinto país por la derecha de la Figura 8), las personas que más emprenden se encuentran entre los 25 y los 44 años. Estos datos coinciden con la postura más afianzada en este tema que apuesta por una relación curvilínea entre la edad y las intenciones empresariales, situándose el pico de emprendimiento entre los 40 y los 50 años (Kautonen et al., 2014). Mensmann y Zacher (2021) determinan, desde una perspectiva de desarrollo a lo largo de la vida, que una explicación de la relación curvilínea entre la edad y la intención empresarial podría ser que los adultos de mediana edad se caractericen por mayores niveles en ciertas características psicológicas. Las personas tienden a volverse más maduras y socialmente competentes a medida que envejecen, lo que se traduce en un aumento en los niveles de rasgos como la responsabilidad, la amabilidad y la estabilidad emocional (Nye y Roberts, 2019). Además, las personas de mediana edad cuentan con recursos personales importantes para el espíritu empresarial (por ejemplo, experiencia, madurez y financiación) y no han experimentado aún deterioros relacionados con la edad que podrían reducir sus intenciones empresariales (por ejemplo, habilidades de procesamiento de la información). De esta manera, dado el papel relevante que juega la edad en la actividad emprendedora, sumado a los resultados poco concluyentes, es relevante analizar la invarianza de medida y las posibles diferencias en la personalidad emprendedora en función de la edad. Esto se debe a que el espíritu emprendedor no es

algo estable ni un resultado final, sino un proceso dinámico y de adaptación a los cambios personales y contextuales a lo largo de la vida (Mensmann y Zacher, 2021).

Figura 8

Tasa de Actividad Emprendedora en Función de Diferentes Grupos de Edad en Europa y América del Norte en el Año 2019 (GEM, 2020a)



1.6. El Grit

Recientemente, hay una serie de factores importantes de la personalidad relacionados con la actividad emprendedora que han despertado el interés de los expertos. En esta línea, como bien mencionan Baum et al. (2007), en la investigación del emprendimiento los profesionales de la Psicología deben de interesarse por nuevos conceptos de personalidad, así como renovar el foco en conceptos antiguos a través de un análisis exhaustivo de sus posibles facetas (Soto y John, 2017b). Ejemplos de variables que están emergiendo en el campo del emprendimiento, por mencionar algunas, son la resiliencia (Korber y McNaughton, 2018), la mentalidad de crecimiento

(Burnette et al., 2019), los diferentes tipos de pasión (Cardon et al., 2017; Lex et al., 2020; Newman et al., 2019), y el grit (Duckworth, 2016).

Cabe decir, por tanto, que aparte de las variables de personalidad más clásicas que contempla el BEPE, como la autoeficacia y la motivación de logro, otras variables están emergiendo en torno a la intención y éxito empresarial. El marco conceptual no cambia, es la piedra angular en la que se sustenta todo, pero aparecen nuevas facetas para integrar y dar nombre a conductas relevantes. La presente Tesis Doctoral se centra en el grit, por ser uno de los rasgos que mayor atención ha recibido en la última década en el campo de la personalidad y del emprendimiento.

El grit, cuya traducción al español sería *tenacidad* o *determinación*, es un concepto que *renace* en el año 2007, tras un estudio de Duckworth et al. (2007). La precursora del término, Angela Lee Duckworth, propuso el término grit al ver que la capacidad intelectual no era lo único que diferenciaba a sus peores y mejores estudiantes (Duckworth, 2016), sino que lo que más les diferenciaba era una combinación de mostrar interés y esfuerzo por lo académico. De esta manera, Duckworth et al. (2007) estudian el grit en diferentes contextos (v.g., escolar y militar), encontrando que el grit muestra validez incremental de diferentes medidas de éxito (v.g. rendimiento académico) por encima del cociente intelectual y de la responsabilidad del modelo *Big Five*. A partir de entonces, ha habido una gran proliferación de investigaciones que demuestran que el grit se relaciona con aspectos importantes en la vida de las personas, como una buena salud física y mental (Datu et al., 2019; Moore et al., 2018; Silvia et al., 2013) y un mejor rendimiento académico (Postigo, Cuesta, Fernández-Alonso, et al., 2021a, 2021b; Tang et al., 2021), por mencionar sólo algunos. Vaya por delante que el término de grit no nace de la nada, sino que otros investigadores del mundo empresarial ya habían hablado anteriormente de la

importancia de la pasión, del interés y del esfuerzo (v.g. Baum y Locke, 2004). De hecho, Eskreis-Winkler et al. (2016, p. 380) señalan que "*el grit tiene una historia corta pero un pasado largo*", y sus orígenes se remontan a la observación de Galton y Cox de que la perseverancia o la persistencia son características clave que comparten las personas exitosas.

El grit se define como la pasión y la perseverancia por objetivos a largo plazo (Duckworth, 2016; Duckworth et al., 2007). Concretamente, "*el grit implica trabajar denodadamente hacia los desafíos, manteniendo el esfuerzo y el interés durante años a pesar del fracaso, la adversidad y los estancamientos en el progreso. La persona con altos niveles de grit se acerca al logro como un maratón; su ventaja es la resistencia*" (Duckworth et al., 2007, p. 1087). Este constructo se compone de dos dimensiones, perseverancia en el esfuerzo y consistencia del interés.

A pesar de que el estudio del grit en el contexto organizacional es algo novedoso (Southwick et al., 2020), diversos autores han tenido tiempo para demostrar el papel relevante del grit en este contexto. El grit predice la satisfacción con el trabajo y con el salario, incluso después de controlar variables cognitivas, el nivel educativo y variables sociodemográficas como la edad y el sexo (Danner et al., 2020). Ha demostrado también ser un buen predictor de la retención de los trabajadores en diferentes contextos. Ha sido capaz de predecir la permanencia de residentes de medicina (Salles et al., 2017) y de trabajadores del ejército después de completar uno de los entrenamientos más duros conocidos en los Estados Unidos (Duckworth et al., 2007; Farina et al., 2019). El grit predice la continuidad de los trabajadores en puestos de ventas después de controlar tanto la antigüedad en la empresa como la experiencia en el sector (Eskreis-Winkler et al., 2014). En el contexto emprendedor, el grit predice la creación y éxito empresarial de los que emprenden (Arco-Tirado et al., 2019;

Mooradian et al., 2016; Mueller et al., 2017), además del rendimiento laboral de sus trabajadores (Dugan et al., 2019; Jordan et al., 2019). La idea es que el proceso empresarial está plagado de desafíos (Cardon y Patel, 2015), y las personas con mayores niveles de grit es más probable que interpreten los obstáculos como problemas a resolver en lugar de razones para abandonar (Southwick et al., 2020; Yeager y Dweck, 2020). De esta manera, adoptan una mentalidad estratégica hacia la resolución de problemas, considerando enfoques alternativos que pueden ser más eficientes y efectivos que sus primeros intentos (Chen et al., 2020). Ello lleva al grit a relacionarse con constructos organizacionales más clásicos que han demostrado tener una alta capacidad predictiva del rendimiento laboral, como el compromiso en el trabajo y el *burnout* (Brateanu et al., 2020; Ceschi et al., 2016; Eskreis-Winkler, Shulman, y Duckworth, 2014; Suzuki et al., 2015). Está claro que el grit, pese a su corta edad, ha empezado a demostrar su relación con la actividad emprendedora, lo que hace importante analizar su relación con la personalidad emprendedora.

2. Objetivos e Hipótesis

El principal objetivo de esta Tesis Doctoral es el estudio de los rasgos psicológicos de la personalidad emprendedora y generar instrumentos para su evaluación. Para alcanzar este objetivo, previamente se revisaron los diferentes instrumentos de personalidad emprendedora existentes en la literatura y así analizar las diferentes necesidades que existen en este campo de evaluación psicológica. Además, se analizaron qué variables novedosas, además de las clásicas, están emergiendo en el campo de la evaluación de la personalidad emprendedora. Para alcanzar el objetivo general se plantean cinco objetivos específicos:

- Objetivo 1: Desarrollar un Test Adaptativo Informatizado para la medida de la personalidad emprendedora.
- Objetivo 2: Desarrollar una versión corta para la medida de la personalidad emprendedora.
- Objetivo 3: Estudiar la invarianza de medida de la Batería para la Evaluación de la Personalidad Emprendedora en función de las variables sociodemográficas sexo y edad y de ser persona trabajadora por cuenta propia o ajena.
- Objetivo 4: Desarrollar un nuevo instrumento de medida de grit que permita estudiar este constructo de manera fiable y válida en población española.
- Objetivo 5: Desarrollar un modelo de variables de personalidad para intentar predecir la actividad emprendedora.

Como guía se encuentra la hipótesis general acerca de si se estudian adecuadamente los rasgos específicos que componen la personalidad emprendedora, se podrán desarrollar diferentes herramientas de medición que evalúen de manera adecuada la personalidad emprendedora en diferentes contextos y para diferentes necesidades. Además, se plantean cinco hipótesis para cada uno de los objetivos establecidos:

- Hipótesis 1: Si se construye y calibra adecuadamente un banco amplio de ítems que evalúen la personalidad emprendedora, será posible desarrollar un Test Adaptativo Informatizado.
- Hipótesis 2: Si se demuestra la existencia de un factor general de personalidad emprendedora, será posible la creación de una versión corta de la Batería para la Evaluación de la Personalidad Emprendedora.
- Hipótesis 3: Si la Batería para la Evaluación de la Personalidad Emprendedora mantiene la misma estructura factorial en función del sexo, de la edad y de ser o no trabajador por cuenta propia, entonces se cumplirá la invarianza de medida.
- Hipótesis 4: Si se construye un instrumento de medida de grit con adecuadas propiedades psicométricas, entonces será posible medir este constructo de manera fiable y válida en el contexto emprendedor.
- Hipótesis 5: Si se construye adecuadamente un modelo que integre las diferentes variables de personalidad que componen el espíritu emprendedor, este modelo podrá ayudar a predecir la actividad emprendedora.

3. Publicaciones

Los objetivos e hipótesis planteados se desarrollan con detalle en los cinco artículos que se presentan, todos ellos publicados en revistas con Factor de Impacto JCR (*Journal of Citation Reports*). En el primer artículo *Development of a computerized adaptive test to assess entrepreneurial personality* (Postigo, Cuesta, Pedrosa, et al., 2020), se desarrolla y calibra un banco amplio de ítems en torno a la Batería para la Evaluación de la Personalidad Emprendedora (BEPE) para desarrollar un Test Adaptativo Informatizado. El segundo artículo *Assessment of the enterprising personality: A short form of the BEPE battery* (Postigo, García-Cueto, et al., 2020), analiza exhaustivamente la batería BEPE bajo un modelo bifactor y se desarrolla una versión corta de la batería en base al factor general de personalidad emprendedora. En el tercer artículo *Measurement invariance of entrepreneurial personality in relation to sex, age, and self-employment* (Postigo, García-Cueto, et al., 2021), se analiza la invarianza de medida de la batería BEPE en función del sexo, de la edad y de ser trabajador por cuenta propia o ajena, además del estudio de las diferencias en función de estas variables. El cuarto artículo *Grit assessment: Is one dimension enough?* (Postigo, Cuesta, García-Cueto, et al., 2020), desarrolla una nueva conceptualización de la estructura del constructo de grit, además de un nuevo instrumento de grit para población española. Por último, el quinto artículo *Entrepreneurial personality, conscientiousness, self-control, and grit: The psychological side of self-employment* (Postigo, Cuesta, y García-Cueto, 2021), estudia posibles agrupaciones dentro de la personalidad emprendedora y propone un modelo explicativo sobre convertirse en trabajador por cuenta propia.

3.1. Primer Artículo

Postigo, Á., Cuesta, M., Pedrosa, I., Muñiz, J., y García-Cueto, E. (2020). Development of a computerized adaptive test to assess entrepreneurial personality. *Psicologia: Reflexão e Crítica, 33*, 1-10. https://doi.org/10.1186/s41155-020-00144-x

El objetivo de este artículo es el desarrollo y validación de un banco de ítems en torno a la Batería para la Evaluación de la Personalidad Emprendedora (BEPE). Una vez desarrollado, validado y calibrado el banco de ítems, el presente estudio trata de desarrollar un Test Adaptativo Informatizado que evalúe la personalidad emprendedora de manera adaptada a cada persona. La principal aportación de este artículo a la presente Tesis Doctoral es disponer de una versión adaptativa informatizada para evaluar la personalidad emprendedora de manera rápida, fiable y adaptada a la persona, tanto en el contexto aplicado como de investigación.

Factor de impacto JCR 2020 = 1,429; Q3.

Psicologia: Reflexão e Crítica

RESEARCH Open Access

Development of a computerized adaptive test to assess entrepreneurial personality

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Abstract

Background/objective: Entrepreneurial behavior is of great importance nowadays owing to its significance in the generation of economic, social, personal, and cultural wellbeing. This behavior is influenced by cognitive and personality characteristics, as well as by socioeconomic and contextual factors. Entrepreneurial personality is made up of a set of psychological traits including self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking. The aim of this research is the development of a computerized adaptive test (CAT) to evaluate entrepreneurial personality.

Method: A bank of 120 items was created evaluating various aspects of the entrepreneurial personality. The items were calibrated with the Samejima Graded Response Model using a sample of 1170 participants (M_{age} = 42.34; SD_{age} = 12.96).

Results: The bank of items had an essentially unidimensional fit to the model. The CAT exhibited high accuracy for evaluating a wide range of θ scores, using a mean of 16 items with a very low standard error (M = 0.157). Relative validity evidence for the CAT was obtained with two additional tests of entrepreneurial personality (the *Battery for the Assessment of the Enterprising Personality* and the *Measure of Enterpreneurial Tendencies and Abilities*), with correlations of .908 and .657, respectively.

Conclusions: The CAT developed has appropriate psychometric properties for the evaluation of entrepreneurial people.

Keywords: Entrepreneurial personality, Evaluation, Computerized adaptive test, Adults

Entrepreneurship has been on the rise in recent years in developing countries and has become consolidated in mature economies owing to its importance in the modern economy (GEM, 2018, 2019). Organizations such as the Global Entrepreneurship Research Association monitor entrepreneurship annually to analyze its social and economic impact (GEM, 2019).

The study of entrepreneurship has attracted research attention and in recent years has become consolidated as a multidisciplinary field bringing together three main perspectives: economics (Obschonka et al., 2015), sociology (Chell, 2008), and psychology (Chandra, 2018; Gorgievski & Stephan, 2016). All kinds of individual variables have been examined from the psychological perspective, especially personality characteristics (Omorede, Thorgren, & Wincent, 2015), such as self-efficacy (Newman, Obschonka, Schwarz, Cohen, & Nielsen, 2019), locus of control (Asante & Affum-Osei, 2019), and optimism (Adomako, Danso, Uddin, & Damoah, 2016), among others. There are two overarching strategies that mark research into entrepreneurial personality: on the one hand are researchers focusing on general, Big Five-type personality traits (Brandstätter, 2011; Zhao, Seibert, & Lumpkin, 2010), and on the other hand are those who concern themselves with more specific traits related to entrepreneurial personality (Muñiz, Suárez-Álvarez, Pedrosa, Fonseca-Pedrero, & García-Cueto, 2014), based on the model of Rauch and

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Frese (2007). Researchers in this latter group argue that specific traits provide better predictive capability than the general traits (George, Parida, Lahti, & Wincent, 2016; Leutner, Ahmetoglu, Akhtar, & Chamorro-Premuzic, 2014). Once specific traits were identified (e.g., self-efficacy, internal locus of control, achievement motivation, risk taking), a variety of instruments have been proposed to evaluate entrepreneurial personality (Suárez-Álvarez & Pedrosa, 2016). Standouts include the *Entrepreneurial Mindset Profile* (EMP; Davis, Hall, & Mayer, 2016), the *High Entrepreneurship, Leadership and Professionalism Questionnaire* (HELP; Di, Di, Bucci, & Gori, 2016), the *Measure of Enterpreneurial Tendencies and Abilities* (META; Almeida, Ahmetoglu, & Chamorro-Premuzic, 2014), and the *Battery for the Assessment of the Enterprising Personality* (BEPE) for young people (Muñiz et al., 2014; Suárez-Álvarez, Pedrosa, García-Cueto, & Muñiz, 2014) and adults (Cuesta, Suárez-Álvarez, Lozano, García-Cueto, & Muñiz, 2018). These measuring instruments all have their strengths and weaknesses. They can all evaluate different specific traits of entrepreneurial personality in a single instrument, are reliable, and have sufficient evidence of validity (see, Suárez-Álvarez & Pedrosa, 2016). On the other hand, most of them do not use the latest psychometric developments, such as Item Response Theory (IRT) models, and thus suffer from the drawbacks associated with that (Van der Linden, 2016), such as the lack of invariance with respect to instruments extracted from the same bank of items, as well as the sample used to estimate the properties of the test. IRT also offers a more rigorous methodological framework which allows computerized adaptive testing (CAT) to be used.

The fundamental thing about CAT is that it allows tests to be adapted to the person being evaluated, which has clear advantages, significantly reducing testing time without losing accuracy (Abad, Olea, Ponsoda, & García, 2011; Muñiz, 2018; Olea, Ponsoda, & Prieto, 1999; Van der Linden & Glas, 2010), meaning rapid and accurate evaluations. A CAT allows items to be selected based on the participant's responses to previous items, modifying the test to the test taker (De Ayala, 2009; Meijer & Nering, 1999). Due to these advantages, CAT testing has taken off exponentially in the last few decades (Zenisky & Luecht, 2016), particularly in a broad range of evaluation areas such as entrepreneurial personality in young people (Pedrosa, Suárez-Álvarez, García-Cueto, & Muñiz, 2016), personality from the Big Five model (Nieto et al., 2017), organizational climate (Menéndez, Peña-Suárez, Fonseca-Pedrero, & Muñiz, 2017), schizotypal personality (Moore, Calkins, Reise, Gur, & Gur, 2018), schitzotipy (Fonseca-Pedrero, Menéndez, Paino, Lemos-Giráldez, & Muñiz, 2013), and general intelligence (Herranz-Torres, 2017).

Despite the psychometric advantages of CAT, to date, nothing has been developed to evaluate entrepreneurial personality in adults. The objective of this study, therefore, is to develop a CAT for the evaluation of entrepreneurial personality for adults. The computerized adaptive test of entrepreneurial personality will provide clear psychometric and economic advantages over the classic forms of testing and will be an appealing and beneficial alternative in organizational environments, especially in a recruitment context, where its intended use would be to evaluate a large number of candidates in a very short time.

Method

Participants

The initial sample comprised 1324 participants recruited through a snowball procedure. The final sample was 1170 people, owing to low scores (less than 8 out of 10) in a scale controlling response quality, described in the "Instruments" section. The mean age of the sample was 42.34 years old with a standard deviation of 12.96, the minimum age was 18, and the maximum was 80. Over half (59.9%) were women. A minority (13%) were self-employed. Self-employed people were those who had set up a business and were working in it; non-self-employed people were those in a salaried position in either public or private entities.

Instruments

Pool of items (BEPE-CAT)

The development process of the CAT used the following process (Muñiz & Fonseca-Pedrero, 2019). A team of eight experts in Psychometrics constructed an initial bank of 161 items, in Spanish, designed to measure the eight specific facets defining entrepreneurial personality: self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (Cuesta et al., 2018; Rauch & Frese, 2007). For an item to be selected, all members of the expert group had to agree on its content. The items were in a Likert-type format with five response categories ranging from "completely disagree" to "completely agree." All of the items were in a positive direction to minimize response bias (Suárez-Álvarez et al., 2018). How well the 161 items represented the content was evaluated by 15 experts in psychological evaluation (none of whom had been on the first development team) using a scale of 1 to 10 to indicate their level of agreement with the definition they were provided of the variable to measure. This team of 15 was made up of professors from the area of personality and psychological evaluation from various Spanish universities. Items with an average score below 8 were reformulated. Following that, 142 psychologists, selected through convenience sampling, with the sole

criterion that they were graduates in Psychology, rated the suitability of each item on a scale of 1 to 10. Any item scoring below 9 was reviewed and revised. Once the 161 items were reviewed, a pilot study was performed with a sample of 132 participants, selected through convenience sampling, in order to perform a first study of how the items functioned. An exploratory factor analysis of each subscale was performed, using the polychoric correlation matrix and the method of generalized least squares. The items with factorial loadings below 0.30 and/or with discrimination indexes below .20 were eliminated iteratively one by one (Muñiz, Fidalgo, García-Cueto, Martínez, & Moreno, 2005). The final bank was made up of 120 items. Examples of the item bank are "I can make risky decisions" and "I like to face new challenges."

Battery for the Assessment of the Enterprising Personality (BEPE)

The BEPE (Cuesta et al., 2018) is a battery made up of 80 items and measures eight dimensions (10 items per dimension): self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking. These eight dimensions combine to a common factor of entrepreneurial personality. This instrument has been developed from the pool of items presented in this study. According to Cuesta et al. (2018), the scale has the following reliability data: self-efficacy (α = .88), autonomy (α = .81), innovation (α = .88), internal locus of control (α = .85), achievement motivation (α = .86), optimism (α = .89), stress tolerance (α = .84), risk-taking (α = .87), and enterprising personality (α = .97), which are excellent according to CET-R (Hernández, Ponsoda, Muñiz, Prieto, & Elosua, 2016).

Measure of Entrepreneurial Tendencies and Abilities (META)

The META test (Ahmetoglu & Chamorro-Premuzic, 2013) has 44 items which measure four personality traits relevant to entrepreneurial success: proactivity, creativity, opportunism, and vision. The items are in a Likert-type format with five response categories ranging from "completely disagree" to "completely agree." The reliability (Cronbach alpha) for the four scales is as follows; proactivity, .84; creativity, .83; opportunism, .86; and vision, .76 (Ahmetoglu & Chamorro-Premuzic, 2013). The present study obtained the following values for the alpha coefficient: proactivity (.70), creativity (.81), opportunism (.86), and vision (.76).

NEO Five Factor Inventory (NEO-FFI)

The NEO-FFI test (Costa & McCrae, 1985) is an inventory made up of 60 Likert-type items with five response categories from "totally disagree" to "totally agree." It is made up of five scales (12 items per scale) following the *Big Five* personality model: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. The adaptation to Spanish was carried out by Cordero, Pamos, and Seisdedos (2008). The reliability data for the scales are as follows (Cronbach alpha): neuroticism, .90; extraversion, .84; openness, .82; agreeableness, .83; and conscientiousness, .88 (Cordero et al., 2008). The present study obtained the following values for the alpha coefficient: neuroticism (.90), extraversion (.84), openness (.82), agreeableness (.83), and conscientiousness (.88).

Control of Attention Scale

The aim of this scale is to detect participants who respond randomly or thoughtlessly to the items in any of the instruments used. It is made up of 10 obvious prompts such as "in this item, choose the option completely agree." Participants should respond correctly to all items. Participants who responded incorrectly to two or more items were eliminated. This meant that 11.6% of the sample (154 participants) were eliminated from the study.

Procedure

An online application, developed ad hoc, was used for the aforementioned 120-item bank along with the other instruments. Informed consent was obtained from the participants, who were recruited via snowball sampling. Potential participants who met the inclusion criteria (workers over 18 years old) were personally contacted. They were asked to answer the online questionnaire and provide contact details for other potential participants. These new potential participants were asked to collaborate both in answering the questionnaire and in obtaining contact details for more new participants. The response process was open for 3 months (February to April, 2017). The average response time estimated in the test phase was 40 min. Participants did not receive any kind of reward for participating in the study. The anonymity of each participant in this study was scrupulously respected, confidentiality was maintained, and the ethical code of the Officials Colleges of Psychologists was followed.

Data analyses

The unidimensionality of the responses to the item bank was checked via confirmatory factor analysis with cross-validation. The participants were divided into two similarly sized, random subsamples. A confirmatory factor analysis was performed with the first subsample (n_1 = 589). With the second subsample (n_2 = 581), the confirmatory analysis was repeated to demonstrate the convergence of the indices of fit obtained (Byrne, 2001; Jackson, Gillaspy, & Purc-Stephenson, 2009). We used

Robust Maximum Likelihood as the estimation method (Kline, 2011). The indices of fit we used were X^2/df, *Comparative Fit Index* (CFI), and *Root Mean Square Error of Approximation* (RMSEA), with fit being adequate when X^2/df < 3, CFI > .90 y RMSEA< .08 (Kline, 2011). It should be noted that CFI is sensitive to the number of items, and it is not recommended for studying the unidimensionality of an item bank (Calderón-Garrido, Navarro-González, Lorenzo-Seva, & Ferrando-Piera, 2019; Cook, Kallen, & Amtmann, 2009); therefore, RMSEA and X^2/df were the most suitable for looking at the fit. However, the CFI was a commonly cited index in the literature. MPlus 8 software was used to perform the confirmatory factorial analysis (Muthén & Muthén, 2017).

Differential Item Functioning (DIF) by gender was analyzed via logistical regression (Gómez-Benito, Hidalgo, & Zumbo, 2013; Hidalgo, Gómez, & Padilla, 2005; Zumbo, 1999). To calculate DIF, the SPSS24 (IBM Corp., 2016) statistical package was used.

The bank of 120 items was applied to the 1170 participants, estimating the information function of the bank, the standard error of measurement, the skill level of the participants, and performing calibration of all items. This was done using the Samejima Graded Response Model (Samejima, 1969).

Following that, two complementary studies were performed using simulation procedures. A sample of 130, 000 participants was simulated, divided into 13 subsamples depending on their true score (θ between −3 y + 3) with intervals of 0.5. This sample responded first to the complete bank of items, and via the aforementioned Samejima Graded Response Model (Samejima, 1969), the deviation of the estimated ability was calculated compared to the real ability of each simulated participant, i.e., the measurement error for each ability level using the complete bank of 120 items. Secondly, the same sample responded to the CAT. The algorithm used to apply the CAT was as follows: (1) use a minimum of 10 items, (2) select as a starting criterion one of the items with an *a* parameter over 3, and (3) the stop criteria are a maximum of 35 items presented, or the reduction in error is less than 5% compared to the previous estimation.

All estimations were performed via maximum likelihood procedures. Depending on each participant's response, in each step, the level of θ (Meijer & Nering, 1999) is estimated, selecting an item from the bank with the maximum information function for the estimated level of θ. Following that, a new θ and standard error (SE) are calculated for each participant, and the process is repeated until one of the stop criteria are met.

Finally, the algorithm was used to simulate the application of the CAT to the 1170 participants based on their responses to the complete item bank. In addition, the correlation between the θ from the participants in the 120 items and their estimated (θ) score by the CAT was calculated. All IRT analyses and the simulation were performed using MAGP software (García-Pérez, 2018).

To produce predictive validity evidence for the CAT, the correlation was calculated between θ estimated by the CAT and the participants' scores in the BEPE, META, and NEO-FFI tests.

Finally, also as evidence of validity, we calculated whether there were statistically significant differences in the θ estimated by the CAT between the group of self-employed workers and those who worked for others, using the Student *t* test for independent samples.

Results

Table 1 shows that the indexes of fit for the two subsamples were very similar, demonstrating convergence of the indices of fit, and serving as evidence of cross-validation with respect to the proposed factor structure. In addition, the RMSEA and X^2/df were sufficient to confirm the essential unidimensionality of the responses to the bank of items. Although the values of the CFI index are relatively low, this may be due to the high number of items that we are working with, something which reduces the value of this indicator (Cook et al., 2009). The other two values are, in any case, adequate, which would confirm the fit of the model (Mosewich, Hadd, Crocker, & Zumbo, 2013).

Of the 120 items in the bank, only item 98 exhibited uniformly statistically significant DIF in relation to gender. However, the effect size of the DIF for this item was low.

With respect to the fit of the Samejima Graded Response Model, the analysis of the standardized residuals gave a mean of 0.14 and a standard deviation of 0.87 for the items as a whole. These results are close to the ideal values of a distribution of standardized residuals (M = 0; SD = 1). All the items were statistically significant (p < .05). Therefore, we can state that the bank fits the Samejima Graded Response Model (Samejima, 1969). The *a* parameter of the items exhibited appropriate values, between 0.66 and 4.59 (Fig. 1) (Baker, 1985). The *b* parameters for each item were adequate and scaled in the expected order, going from smaller to larger. The maximum information for each item was, in general, within a range of θ scores between − 1 and + 2.

Table 1 Confirmatory factor analysis of the item bank

CHI-2/DF		CFI		RMSEA (CI)	
N1	N2	N1	N2	N1	N2
2.27	2.30	.69	.69	.046 [.046, − .050]	.048 [.048, − .050]

Note: DF degrees of freedom, *CFI* Comparative Fit Index, *RMSEA* Root Mean Square Error of Approximation, *CI* confidence interval

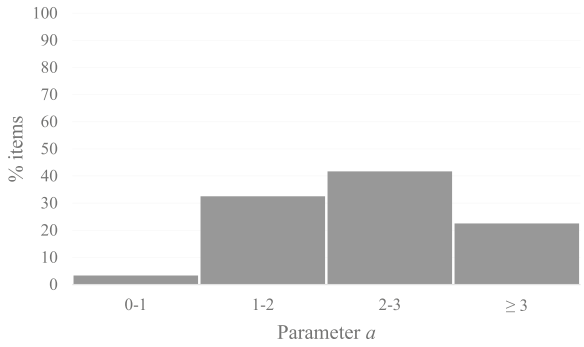

Fig. 1 Distribution of the parameter *a* values of the items

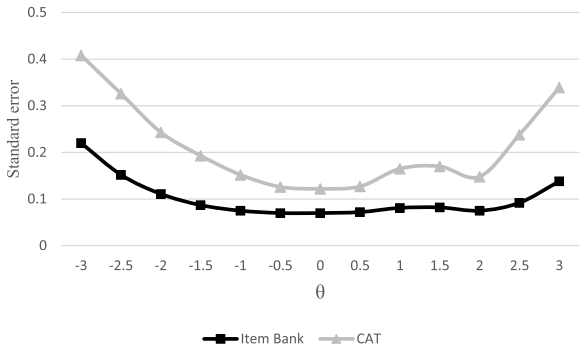

Fig. 3 Comparison of standard error for the item bank and the CAT

We used the standard error (SE) of estimated participants' scores (θ) to evaluate the accuracy of the item bank. The information function was estimated for a range of scores between − 4 and + 4. This is shown in Fig. 2, where the thick line represents the error of estimation and the fine line represents the information provided by the item bank. The accuracy is sufficient, with a small error of estimation for all skill levels (M = 0.142), below 0.1 between scores of − 2 and + 2.5.

Once the accuracy of the item bank had been demonstrated with empirical data, we examined how it functioned with larger, heterogeneous samples (130,000 participants). The simulation indicated that the item bank demonstrated better accuracy for θ levels between − 1.5 and + 2.5. Nonetheless, the errors of estimation were very small for all ranges of θ (M = 1.101). To confirm the functioning of the CAT, the same sample was simulated responding to the CAT. The result of the simulation was that the use of the items ranged between a mean of 12 for θ = 3 and 19 for θ = − 0.5. We found a mean error of estimation of 0.212, larger than when the complete item bank was applied (M = 0.101), but even so, it may be considered particularly small, bearing in mind the number of items used, suggesting a small loss of information. That may be seen in Fig. 3, which shows a comparison of the error of estimation applying the full item bank and applying the CAT, with large, heterogeneous samples.

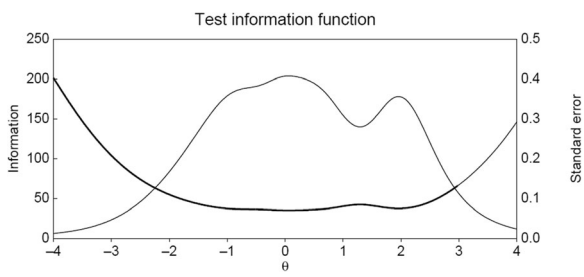

Fig. 2 Test information function of the item bank

Table 2 shows the percentage use of each of the CAT items. Items used as starting criteria due to their high discriminatory power ($a \geq 3$) are highlighted.

We simulated applying the CAT to the 1170 participants, based on their responses to the full item bank. The CAT used between 10 and 26 items, with a mean of 16 items used, and used fewer than 20 items with 78.4% of participants. A mean error of estimation was produced (M = 0.157) which was very small given the low number of items used. The correlation between θ for the participants with the 120-item bank and their estimated (θ) score in the CAT was very high ($r_{\theta 1-\theta 2}$ = .948).

For evidence of validity, we calculated the Pearson correlation between the CAT estimated θ scores of the 1170 participants and their scores in the BEPE, META, and NEO-FFI. The θ scores from the CAT correlated very strongly with the four META dimensions and with the META total, which demonstrates high convergence between the two instruments. In terms of general personality traits, the CAT θ scores showed strong correlations with conscientiousness, extraversion, and neuroticism, with the latter correlation being negative. Lastly, the CAT θ scores showed very strong correlations with the BEPE dimensions and the overall BEPE (Table 3)

Finally, we looked at whether there were statistically significant differences between people who worked for themselves and people who worked for others. The self-employed group (M_θ = 1.20) demonstrated higher mean entrepreneurial personality estimated by CAT than the non-self-employed (M_θ = 1.12), but there were no statistically significant differences (t = − 1.508; p = .132), and the effect size was small (d = 0.13).

Discussion and conclusions

Interest in the study of entrepreneurial personality has grown considerably in recent years (Brandstätter, 2011; Chandra, 2018; Zhao et al., 2010), as has the creation of measuring instruments to evaluate it. However, to date, these evaluations have not made use of the psychometric

Table 2 Frequency of computerized adaptive test item use

Items	Frequency (%)	Items	Frequency (%)	Items	Frequency (%)
Item 1	0	Item 41	2.8	Item 81	0.1
Item 2	49	Item 42	9.4	Item 82	15.5
Item 3	59.5	**Item 43**	51.8	**Item 83**	57.7
Item 4	30	**Item 44**	8.5	Item 84	0
Item 5	9.5	Item 45	0	Item 85	0
Item 6	27	Item 46	13.1	Item 86	0
Item 7	0.3	Item 47	0.6	Item 87	0
Item 8	15.6	**Item 48**	20.6	Item 88	0
Item 9	54.6	Item 49	0	**Item 89**	54.5
Item 10	0	Item 50	2.2	Item 90	0.1
Item 11	19.4	Item 51	0.5	**Item 91**	54.1
Item 12	12.2	Item 52	8	Item 92	0.8
Item 13	51.5	Item 53	5.2	Item 93	0
Item 14	58.3	Item 54	3.3	Item 94	0
Item 15	39.9	Item 55	1.82	Item 95	0
Item 16	4	Item 56	0.1	Item 96	1.7
Item 17	8.7	Item 57	23	Item 97	0.4
Item 18	0.7	Item 58	8.5	Item 98	3.6
Item 19	0	Item 59	0	Item 99	3.4
Item 20	3.6	Item 60	11.5	Item 100	0.3
Item 21	1.6	Item 61	14.7	Item 101	1.6
Item 22	2.1	**Item 62**	52.7	Item 102	15.2
Item 23	4.3	Item 63	19.4	Item 103	1.3
Item 24	23.3	Item 64	17.2	Item 104	0.3
Item 25	11.4	Item 65	0.7	Item 105	0
Item 26	23.8	**Item 66**	20.4	Item 106	6.1
Item 27	0.5	**Item 67**	47	**Item 107**	54.1
Item 28	15	Item 68	0	Item 108	7.7
Item 29	5.4	Item 69	6	Item 109	11.6
Item 30	28.4	Item 70	4.6	Item 110	0.9
Item 31	7.4	**Item 71**	54.1	Item 111	0.1
Item 32	1	**Item 72**	43.8	**Item 112**	26.1
Item 33	19.1	Item 73	11	Item 113	0.4
Item 34	0	Item 74	1.4	Item 114	20.3
Item 35	15.5	Item 75	0.3	Item 115	1.3
Item 36	0.	Item 76	0	Item 116	0.1
Item 37	20.5	Item 77	0	Item 117	9.4
Item 38	0	Item 78	0.1	**Item 118**	34.2
Item 39	2.2	Item 79	0	Item 119	0
Item 40	16.3	**Item 80**	4.9	Item 120	8.1

Items in bold are those used as starting criteria due to their high *a* parameters

advances offered by IRT models, specifically the application of CAT, and this is the objective of our study. A bank of 120 items to measure entrepreneurial personality was developed to be used in a future CAT application, as the two simulations carried out in this study demonstrate. The item bank exhibited good

Table 3 Pearson correlations between θ CAT scores and BEPE, META, and NEO-FFI tests

NEO-FFI	θ CAT	META	θ CAT	BEPE	θ CAT
Agreeableness	.092	Opportunism	.517	Self-efficacy	.892
Openness	.223	Proactivity	.374	Autonomy	.569
Extraversion	.472	Creativity	.544	Innovativeness	.738
Neuroticism	– .413	Vision	.573	Internal locus of control	.567
Conscientiousness	.412	META Total	.657	Achievement motivation	.803
				Optimism	.696
				Stress tolerance	.581
				Risk-taking	.788
				BEPE total	.908

psychometric properties; we confirmed its essentially unidimensional structure and its fit to the Samejima Graded Response Model. The θ scores estimated by the CAT were very accurate and correlated very strongly ($r_{\theta 1-\theta 2}$ = .948) with the participants' scores in the full bank of 120 items. This indicates appropriate calibration of the set of items, which is essential for a CAT to work correctly (Olea et al., 1999; Van der Linden & Glas, 2010). In addition, item bank showed no DIF by gender, thus ensuring that gender biased scores are not produced.

The CAT for adults has demonstrated its ability to provide accurate measurements for a wide range of θ scores with a small number of items. Through the simulation, we were able to predict what may be expected from the CAT and that this improvement in evaluation efficiency comes without significantly losing accuracy (Barnard, 2018). In most cases, an accurate evaluation by CAT (M = 0.157) was achieved with a mean presentation of 16 items.

In terms of evidence of validity, the CAT demonstrates strong correlations with general personality traits such as the Big Five, which makes sense as both approaches (specific vs general traits) predict entrepreneurial success, although predictive capacity is greater using specific traits (Leutner et al., 2014). In addition, there was strong correlation with the META (r = .657), one of the most used instruments nowadays for measuring entrepreneurial personality (Almeida et al., 2014), which gives evidence of external validity. Finally, the CAT correlated very strongly (r = .908) with the classical version of the BEPE (Cuesta et al., 2018), validating the functioning of the computerized adaptive version. The CAT has various potential fields of application along these lines and is a resource for any type of organization interested in supporting people with high entrepreneurial personalities or in reevaluating people following specialized training in this field. In this regard, the recruitment field can benefit from the use of CAT, as it can provide rapid, online, mass evaluations and is therefore cheaper.

The main limitation was that, despite seeing a tendency of self-employed people to exhibit more entrepreneurial personality (θ), the sample of this group was limited (13%), which does not allow us to draw conclusions about the self-employed and non-self-employed or analyze a posteriori whether the CAT correctly discriminates between these two groups, being aware that being self-employed does not necessarily imply having an entrepreneurial personality (Hurst & Pugsley, 2011). In addition, there is no clarification of the type of entrepreneurs that may be found (Hsieh & Wu, 2019). Along these lines, there are other variables that may be considered such as entrepreneurial intent (Hu, Wang, Zhang, & Bin, 2018; Molino, Dolce, Cortese, & Ghislieri, 2018; Newman et al., 2019), dissatisfaction with the current job (Sousa, Araújo, Lua, & Gomes, 2019), and emotional regulation (Castellano, Muñoz-Navarro, Toledo, Spontón, & Medrano, 2019). It is well known that using self-reports leads to many limitations such as acquiescence bias and social desirability bias (Navarro-González, Lorenzo-Seva, & Vigil-Colet, 2016). However, alternatives such as the Implicit Association Test (IAT) have not been shown to be adequate or reliable when evaluating personality traits (Martínez-Loredo, Cuesta, Lozano, Pedrosa, & Muñiz, 2018).

It would be essential in future projects or lines of research to apply the instrument to a subsample of participants in order to check the functioning of the CAT and thus check the results obtained against the simulations (Pedrosa, 2015). In addition, follow-up and re-evaluation of the participants at different time points would make it possible to perform longitudinal studies and observe what leads to business success long term. In addition, as the item bank is constructed from a model with eight facets of entrepreneurial personality (Rauch & Frese, 2007; Suárez-Álvarez & Pedrosa, 2016), an algorithm

could be created in the CAT functioning that obliges the use of a determined number of items from each facet, creating a profile of entrepreneurial personality in an adaptive computerized manner. Finally, it would be interesting to differentiate between workers in public and private companies, as well as in different sectors (banking, education, construction, health, human resources), to study the possible differences in responses to the item bank between these groups.

In summary, the present study highlights five important points. First, a computerized adaptive test was developed from a bank of 120 items for the evaluation of entrepreneurial personality. Second, the structure of the item bank was essentially unidimensional and the items were calibrated via the Samejima Graded Response Model. Third, the CAT used a mean of 16 items to evaluate people's entrepreneurial personality with high accuracy. Fourth, the accuracy of the CAT, evaluated via the information function, was very high for a wide range of scores. Fifth, evidence of predictive validity was produced, with strong correlations between the CAT scores and scores from BEPE and META tests which also evaluate entrepreneurial personality. In short, the CAT for evaluating entrepreneurial personality exhibits good psychometric properties and is an alternative in this field of psychological evaluation for adults.

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Authors' contributions
ÁP conceived of the study, participated in its design and coordination, performed the statistical analyses, and drafted the manuscript; MC participated in the design and coordination and interpretation of the data; IP participated in the design and coordination of the study and performed the measurement; JM conceived of the study, participated in its design and coordination, and helped to draft the manuscript; EGC participated in the design of the study, performed the statistical analyses, and helped to draft the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate
The anonymity of each participant in this study was scrupulously respected, confidentiality was maintained, and the ethical code of the Officials Colleges of Psychologists was followed.

Competing interests
The authors declare that there are no conflicts of interest.

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Publisher's Note

3.2. Segundo Artículo

Postigo, Á., García-Cueto, E., Cuesta, M., Menéndez-Aller, Á., Prieto-Díez, F., y Lozano, L. M. (2020). Assessment of the enterprising personality: A short form of the BEPE battery. *Psicothema, 32*(4), 575-582.

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El objetivo de este artículo es el desarrollo de una versión corta de la Batería para la Evaluación de la Personalidad Emprendedora. La principal aportación de este artículo a la presente Tesis Doctoral es disponer de una versión corta de la Batería. Se estudiarán diferentes modelos estructurales de la Batería para analizar a posteriori cuál es la mejor estrategia para desarrollar una versión corta con garantías en sus propiedades psicométricas.

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Assessment of the Enterprising Personality: A Short Form of The BEPE Battery

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Abstract

Background: Enterprising personality is related to business creation and success. The objective of this study was the development and psychometric analysis of a reduced version of the BEPE Battery for the Evaluation of Enterprising Personality. **Method:** We used a sample of 1,170 people, 60% women, with a mean age of 42.34 years (SD = 12.96). We carried out psychometric analyses within the frameworks of Classical Test Theory and Item Response Theory models. **Results:** The short version (BEPE-16) consists of 16 items, demonstrating an essentially unidimensional structure. The reliability was excellent (α= .94; Ω= .94) and evidence of validity was found in relation to various variables: Measure Of Entrepreneurial Talents And Abilities (META test) (r=.71), extraversion (r=.57), conscientiousness (r=.50), neuroticism (r=-.54). The correlation between scores from the BEPE-16 and the original version was very high (r=.95). **Conclusions:** The BEPE-16 reduced version for the evaluation of enterprising personality demonstrated good psychometric properties, both in terms of reliability and validity. As such, it can be used in place of the original when the professional or research circumstances require it.

Keywords: Enterprising Personality, assessment, reduced version.

Resumen

Evaluación de la Personalidad Emprendedora: Versión Corta de la Batería BEPE. **Antecedentes:** la personalidad emprendedora está relacionada con la creación y éxito empresarial. El objetivo del presente trabajo es el desarrollo y análisis psicométrico de una versión reducida de la Batería BEPE para la Evaluación de la Personalidad Emprendedora. **Método:** se empleó una muestra de 1.170 participantes, 60% mujeres, con media de 42,34 años y desviación típica de 12,96. Se llevaron a cabo análisis psicométricos dentro del marco de la Teoría Clásica de los Test y de los modelos de Teoría de Respuesta a los Ítems. **Resultados:** la versión corta desarrollada (BEPE-16) consta de 16 ítems, mostrando una estructura esencialmente unidimensional. La fiabilidad fue excelente (α= ,94; Ω= ,94), y se obtuvieron evidencias de validez en relación con distintas variables: Test META de tendencias y capacidades empresariales (r=,71), extraversión (r=,57), responsabilidad (r=,50), neuroticismo (r=-,54). La correlación entre las puntuaciones de la versión corta BEPE-16 y la versión original fue muy elevada (r=,95). **Conclusiones:** la versión reducida BEPE-16 para la evaluación de la Personalidad Emprendedora muestra unas buenas propiedades psicométricas, tanto en lo relativo a la fiabilidad como a la validez; por tanto, puede utilizarse en vez de la original cuando el contexto profesional y de investigación lo demande.

Palabras clave: personalidad emprendedora, evaluación, versión reducida.

Nowadays, enterprising people are considered to be fundamental in the progress of any economy (OECD, 2013), which has driven research into enterprising behavior (Chandra, 2018; Liñán & Fayolle, 2015). Various organizations such as the *Global Entrepreneurship Research Association* (GEM), and the *Organization for Economic Co-operation and Development* (OECD) currently evaluate enterprising activity in many countries (GEM, 2020; OECD, 2018). There are many contextual and individual factors that influence enterprising behavior, some centered on economic and social aspects (Obschonka et al., 2015) and others on more personal characteristics such as attitudes and personality (Cuesta et al., 2018). There have been attempts to link enterprising behavior with many personality variables such as achievement motivation, risk-taking, innovation, autonomy, self-efficacy, stress-tolerance, optimism, and internal and external locus of control (Frese & Gielnik, 2014; Miller, 2015; Muñiz et al., 2014; Rauch & Frese, 2007a, 2007b; Suárez-Álvarez et al., 2014; Zhao et al., 2010). Various measuring instruments have been developed to assess these and other variables: achievement motivation (Suárez-Álvarez et al., 2013), locus of control (Goldberg et al., 2006; Suárez-Álvarez et al., 2016), self-efficacy (Moriano et al., 2012), autonomy (Lumpkin et al., 2009), initiative (Frese et al., 1997), innovation (De Jong & Den Hartog, 2010), and risk-taking (Shead & Hodgins, 2009). However, there are few comprehensive measuring instruments which evaluate Enterprising Personality as a whole and which allow a profile of Enterprising Personality to be described (Suárez-Álvarez & Pedrosa, 2016). One such

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instrument is the Battery for Evaluating Enterprising Personality (BEPE; Cuesta et al., 2018), which has demonstrated suitable metric properties. The properties of the BEPE have been studied both from the perspective of Classical Test Theory (CTT) (Muñiz et al., 2014; Suárez-Álvarez et al., 2014), and from Item Response Theory (IRT) models (Pedrosa et al., 2016; Postigo et al., 2020). The BEPE battery contains 80 items, evaluating a general factor of Enterprising Personality using eight specific dimensions: self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (Cuesta et al., 2018; Muñiz et al., 2014). The high number of items (80) is a practical limitation to the BEPE, as that means it is difficult to apply in contexts where time is limited. This raises the need for a short version, which is normal practice in research and professional contexts (Blanca et al., 2020; Muñiz & Fonseca-Pedrero, 2019; Smith et al., 2000). Organizations who finance entrepreneurial projects may benefit from a reduced version of the battery to support their decision making (Lumpkin, 2007; Rauch & Frese, 2007b). Other areas, such as personnel selection, careers guidance, counselling, coaching, and workplace promotion may also benefit from a short version of the BEPE battery to evaluate Enterprising Personality.

The objective of the current study is the development and psychometric analysis of a reduced version of the BEPE battery for the evaluation of Enterprising Personality. This general objective gives rise to three specific objectives. Firstly, to study the factorial structure of the original BEPE battery, from which we will construct the reduced version. Secondly, to examine the psychometric properties of this reduced version with regard to internal structure, reliability, evidence of validity in relation to other psychological variables, and to study the possible differences between groups based on sex, being self-employed, or being a potential entrepreneur. The third and final objective is to produce a norm reference based on the percentiles of the new, reduced version.

Method

Participants

The sample was initially composed of 1,324 Spanish adults from the general population. The sampling was done via the snowball method. The final sample comprised 1,170 people as we removed those who did not give sufficiently correct responses to the control questions included in the questionnaires. Most of the sample (60%) were women, the mean age was 32.34 years old (SD = 12.96), and 13% of the sample were self-employed.

Instruments

Battery for the Evaluation of Enterprising Personality (BEPE). This questionnaire assesses eight dimensions of Enterprising Personality: self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (Cuesta et al., 2018; Muñiz et al., 2014). Responses to the items are on a five-point Likert-type scale (1 –completely disagree, 5 –completely agree). The items are all formulated in a direct manner to minimize response bias (Lozano et al., 2008; Suárez-Álvarez et al., 2018; Vigil-Colet et al., 2020). From the classical perspective, the psychometric properties of the scale are very satisfactory, both in terms of the reliability of the dimensions and the evidence of validity (Cuesta et al., 2018). The alpha coefficients for the sample in this study were: *Overall Enterprising Personality Score* (α=.97), *Self-efficacy* (α=.88), *Autonomy* (α=.81), *Innovation* (α=.88), *Internal locus of control* (α=.85), *Achievement motivation* (α=.86), *Optimism* (α=.89), *Stress tolerance* (α=.84), and *Risk-taking* (α=.87).

NEO-Five Factor Inventory (NEO-FFI). Initially developed by Costa and McCrae (1985), in our study we used the version adapted for the Spanish population by Cordero et al. (2008). This inventory contains 60 items (12 in each scale) with five-point Likert-type response options (from "completely disagree" to "completely agree"). It evaluates the Big Five personality factors: *Neuroticism* (α=.90); *Extraversion* (α=.84)*; Openness* (α=.82); *Agreeableness* (α=.83); and *Conscientiousness* (α=.88) (Cordero et al., 2008). The alpha coefficients for the sample in this study were *Neuroticism* (α=.88), *Extraversion* (α=.83), *Openness* (α=.81), *Agreeableness* (α=.73), and *Conscientiousness* (α=.81).

Measure of Entrepreneurial Tendencies and Abilities (META). This instrument was developed by Ahmetoglu et al. (2011), there is a Spanish version available, which we used in this study. It contains 44 Likert-type items with 5 responses for each item (from "completely disagree" to "completely agree"). It assesses four traits of Enterprising Personality: *Proactivity* (α=.84); *Creativity* (α=.83)*; Opportunism* (α=.86); and *Vision* (α=.76) (Ahmetoglu et al., 2011). The values of alpha for the sample used in this study were: *Proactivity* (α=.70), *Creativity* (α=.81), *Opportunism* (α=.86), and *Vision* (α=.76).

Control of attention scale. This is a scale made up of 10 Likert-type items with 5 responses for each item. The purpose of this scale is to detect participants who answer the questionnaire without sufficient care and attention. The items are of the type "If you are reading this question, you should answer completely agree", and were included among the items in the various questionnaires. We removed 154 participants from the study who responded incorrectly to two or more of these items.

Procedure

Initially we made individual contact with potential participants who met the inclusion criteria (over 18 and working). We asked them to complete the questionnaire online and to provide the email addresses of other potential participants. We then contacted those new potential participants and asked them to do the same. This process continued for three months. The participants received no incentives to participate. Respondents' anonymity was scrupulously ensured, bound by professional confidentiality and according to the code of ethics of the Board of Spanish Psychologists' Associations.

Data analysis

Firstly, we confirmed that the factorial structure of the original BEPE was the best fit to the data. In order to do that, we performed various Confirmatory Factor Analyses (CFA) on the polychoric correlation matrix, testing the fit of unidimensional, multidimensional (eight dimensions), and bifactor models. We used the cut-off points for the various indices of fit (RMSEA, SRMSR, NNFI, and CFI) proposed by Hu and Bentler (1999). To evaluate the overall fit of the model to the ordinal response format, we calculated the M2* statistic (Cai & Hansen, 2013). To

select the model with the best fit, we calculated the AIC and BIC for each model. The criteria are that a difference of nine points or more between the AIC and BIC indices is indicative that the model with a lower index has a better fit to the data (Anderson, 2008). In addition, because we were dealing with added models, we also performed a hierarchical chi-square tests to determine which model had the best fit to the data. Subsequently, we assessed the fit of the model to the data at the item level. This was to understand the extent to which the proposed model predicted the item responses. To do that, we used the index of fit proposed by Orlando-Thissen-Bjorner (Orlando & Thissen, 2003), correcting it via the Benjamini-Hochberg procedure to keep type I error constant (Benjamini & Hochberg, 1995). When the value obtained is not statistically significant, the evaluated model is considered to adequately predict the item responses.

From the factorial structure obtained for the BEPE battery, we selected the 16 items that demonstrated the greatest factorial loadings in the general dimension of Enterprising Personality (Ferrando et al., 2019). This produced the 16 items in the short version of the battery (BEPE-16). The first step with the BEPE-16 was to carry out an analysis of the descriptive statistics: mean, standard deviation, item discrimination indices, skewness, and kurtosis. We examined the impact and both uniform and non-uniform Differential Item Functioning (DIF) using the logistical regression procedure (Gómez-Benito et al., 2013). We calculated reliability using the α and ω coefficients (Revelle & Condon, 2019). Subsequently, following Samejima's (1969) graded response model, we calculated the *b* (difficulty) and *a* (discrimination) parameters for each of the items in the BEPE-16, along with the test Information Function. To examine dimensionality, we performed a CFA on the polychoric correlation matrix; the extraction method was Weighted Least Square Mean and Variance (WLSMV). To examine the validity in relation to other variables, we calculated the Pearson correlation between the overall BEPE-16 score and the different dimensions of the NEO-FFI, the overall META score, and the various dimensions and overall score of the full 80-item BEPE, correcting for attenuation (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education, 2014). To produce evidence of the discriminating capacity of the BEPE-16, we examined whether there were differences by sex, by being a self-employed or not, and by being a potential entrepreneur or not. We performed various one-tailed t tests for independent samples. We used Cohen's *d* to assess effect size, according to which, effect sizes are small when *d* is between 0.2 and 0.4, medium, when it is between 0.4 and 0.7, and large when it is greater than 0.7 (Cohen, 1988). Lastly, we norm referenced the scores, based on percentiles.

We used the program Jamovi (The jamovi project, 2020) to perform the descriptive analysis and to calculate discrimination indices, reliability, and between group differences. The CFAs were performed using Mplus 8 (Muthén & Muthén, 2017). We used the "mirt" package in R (Chalmers, 2012) for Samejima's graded response model.

Results

Selection of items for the BEPE-16

Using the fit of the various models tested to the data (Table 1), we confirmed that the bifactor model, according to the criteria set out by Hu and Bentler (1999), gave the best overall indices of fit. Similarly, comparing the values of AIC and BIC for the different models, the bifactor model gave the lowest values in both indices, with the differences greater than 9 points (Anderson, 2008). These results are consistent with the comparison of the different models via chi-square hierarchical testing, which showed that the multidimensional model had a better fit than the unidimensional model $\chi^2(28) = 6{,}118.056$, $p < .001$; and that the bifactor model had a better fit than the multidimensional model χ^2 (52) = 3,442.602, $p <$,001.

The values from M2* indicated that none of the models we evaluated fit strictly to the data, which may be because M2* is very sensitive in terms of rejecting model fit when the sample size is large (Xu et al., 2017). In terms of item-level fit of the model (last row in Table 1) we confirmed that the totality of the items in the unidimensional and bifactor models were not significant, which indicates that these two models adequately predict the response of all of the items making up the BEPE. In contrast, the eight-dimension model could only adequately predict the response to four of the items. Although the unidimensional and bifactor models gave identical results for item-level fit, overall the bifactor model demonstrated a better fit to the data. Therefore, we used that model as the basis for selecting the items to make up the short version, the BEPE-16. We selected the two items in each specific aspect with the greatest factorial loading on the general Enterprising Personality factor (Table 2), producing the reduced version with 16 items (BEPE-16). For *innovation* and *achievement motivation*, we used the additional criterion of the explained common variance for each item, as they had the same factorial loading.

Descriptive statistics and reliability of BEPE-16

We assessed the descriptive statistics of the BEPE-16, with most of the items exhibiting suitable values in both skewness and kurtosis (Table 3). None of the items demonstrated impact, nor uniform or non-uniform DIF. We also confirmed that all of the items had high discrimination indices, above 0.49.

The reliability of the BEPE-16 scores via the alpha and omega coefficients was excellent (α= .94; ω= .94).

Table 1
Fit of the unidimensional, multidimensional, and bifactor models

	Unidimensional	Multidimensional	Bifactor
RMSEA	.087 [.086 - .087]	.086 [.084 - .086]	.045 [.044 - .046]
SRMSR	.075	.255	.054
NNFI	.75	.75	.93
CFI	.76	.77	.94
AIC	174,816.2	168,754.1	165,415.5
BIC	176,821.8	170,901.6	167,826.3
M2*	28,006.15 (2,844)***	26,985.24 (2,816)***	9,386.93 (2,764)***
Number of items fit to the model	80	4	80

Note: RMSEA = Root mean square error of approximation [90% CI]; SRMSR = Standardized root mean square residual; NNFI = Non-normed fit index; CFI = Comparative fit index; AIC = Akaike information criterion; BIC = Bayesian information criterion.
*** $p < .001$

Table 2
Factorial loadings of the items on the general factor of Enterprising Personality (BEPE)

Item	Factor loading	Item	Factor loading	Item	Factor loading	Item	Factor loading
Self-efficacy		**Innovation**		**Achievement motivation**		**Stress tolerance**	
01	.74	01	.52	01	.66	01	.77*
02	.81	02	.64	02	.74	02	.30
03	.70	03	.60	03	.63	03	.55
04	.74	04	.64	04	.57	04	.39
05	.74	05	.54	05	.74*	05	.45
06	.82*	06	.57	06	.74*	06	.40
07	.70	07	.62	07	.66	07	.40
08	.79	08	.75*	08	.71	08	.41
09	.85*	09	.64*	09	.69	09	.34
10	.76	10	.57	10	.62	10	.62*
Autonomy		**Internal locus of control**		**Optimism**		**Risk-taking**	
01	.44	01	.49	01	.60	01	.67
02	.16	02	.70*	02	.54	02	.78*
03	.67*	03	.54	03	.58	03	.56
04	.65*	04	.55	04	.66	04	.63
05	.33	05	.44	05	.82*	05	.71*
06	.29	06	.35	06	.64	06	.60
07	.35	07	.66*	07	.52	07	.60
08	.52	08	.40	08	.55	08	.69
09	.59	09	.46	09	.75*	09	.62
10	.61	10	.51	10	.52	10	.49

* Items selected for the short version

IRT analysis of BEPE-16 items

From the analysis using Samejima's graded model, the *a* discrimination parameters for the items were high. The *b* parameters for each item were adequate and were found to scale in the expected order, always going from lower to higher (Table 2). With respect to the test Information Function, the precision is adequate throughout the full ability scale, and demonstrates lower precision for moderate ability levels and for the highest ability levels (Figure 1).

Table 3
Descriptive statistics and IRT parameters for the items in BEPE-16

Item	Mean	SD	Skewness	Kurtosis	D.I.	λ	a	b_1	b_2	b_3	b_4
i01	3.99	0.67	-1.05	2.78	.64	.77	2.29	-3.49	-2.14	-1.36	1.18
i02	3.81	0.66	-0.85	1.79	.70	.81	2.75	-3.12	-2.03	-0.83	1.56
i03	3.51	0.83	-0.31	-0.26	.56	.65	1.56	-4.07	-1.74	-0.19	2.04
i04	3.98	0.68	-0.78	1.69	.49	.57	1.38	-4.97	-2.96	-1.53	1.40
i05	3.67	0.83	-0.78	0.53	.63	.72	2.00	-3.13	-1.64	-0.64	1.67
i06	3.78	0.67	-0.81	1.35	.52	.62	1.51	-4.61	-2.55	-0.97	2.10
i07	3.92	0.63	-0.72	2.08	.52	.65	1.58	-4.28	-2.97	-1.31	1.62
i08	3.76	0.81	-0.58	0.32	.52	.61	1.43	-4.32	-2.23	-0.80	1.60
i09	3.77	0.71	-0.65	0.89	.57	.68	1.78	-3.98	-2.28	-0.79	1.75
i10	3.95	0.70	-0.88	1.75	.61	.75	2.00	-3.86	-2.23	-1.26	1.2
i11	4.01	0.61	-0.95	3.06	.65	.80	2.59	-3.91	-2.19	-1.44	1.21
i12	3.69	0.72	-0.43	0.26	.60	.71	1.78	-4.39	-2.22	-0.55	1.88
i13	3.67	0.72	-0.70	0.89	.66	.77	2.18	-3.30	-1.97	-0.54	1.88
i14	3.73	0.82	-0.77	0.64	.50	.60	1.41	-3.98	-2.09	-0.87	1.80
i15	3.73	0.75	-0.78	0.92	.66	.78	2.30	-3.19	-1.82	-0.69	1.59
i16	3.84	0.74	-0.96	1.71	.55	.66	1.68	-3.60	-2.19	-1.08	1.57

Note: n = 1,170; SD = standard deviation; D.I. = discrimination index; λ = item factorial loading; a = discrimination parameter (IRT); b = threshold (IRT)

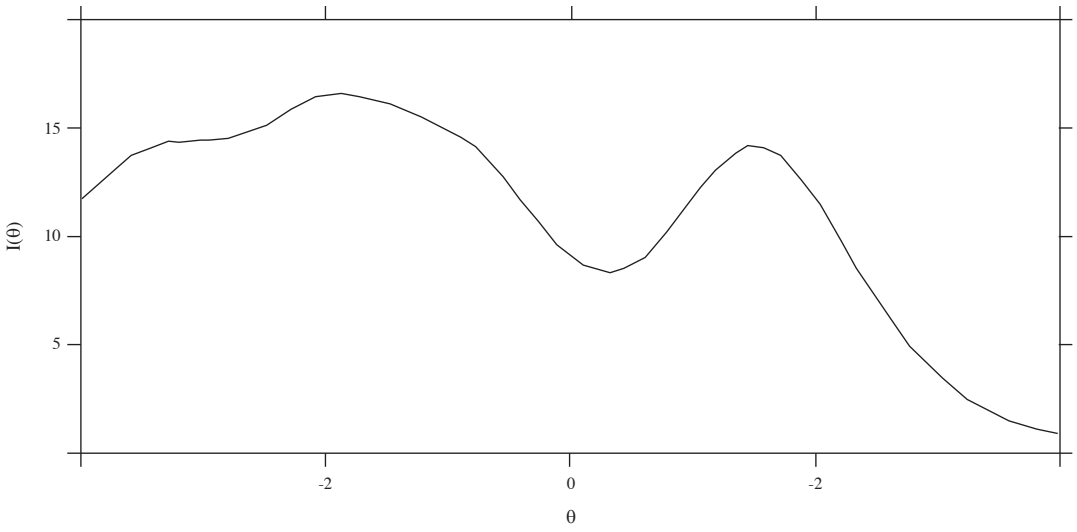

Figure 1. Information Function for BEPE-16

Validity evidence for the internal structure

We performed a CFA to provide evidence of validity related to the internal structure. The CFA demonstrated a good fit, thus it seems reasonable to say that the test can be considered essentially unidimensional (RMSEA= .058 90% CI [.053-.063], CFI= .982, NNFI= .977, SRMR= .032). The factorial loadings are given in Table 3, and range between .57 and .81.

Validity evidence in relation to other variables

In relation to other variables, the BEPE-16 demonstrated strong correlations with the overall META score and its various dimensions, as well as with the original 80-item BEPE. The BEPE-16 also exhibited strong correlations with extraversion, conscientiousness, and neuroticism, although the correlation with the latter was negative (Table 4).

Table 4
Correlation between total score in the BEPE-16 and the BEPE, NEO-FFI, and META

	BEPE-16			
	R	**95% CI**	**Attenuated R**	**95% CI**
NEO-FFI				
Agreeableness	.10***	[.04, .16]	.12	[.06, .18]
Openness to experience	.24***	[.18, .29]	.28	[.19, .29]
Extraversion	.50***	[.46, .54]	.57	[.53, .61]
Neuroticism	-.49***	[-.53, -.45]	-.54	[-.58, -.50]
Conscientiousness	.45***	[.40, .49]	.50	[.46, .54]
META				
Opportunism	.49***	[.44, .53]	.55	[.51, .59]
Proactivity	.42***	[.37, .47]	.53	[.37, .47]
Creativity	.54***	[.49, .58]	.63	[.59, .66]
Vision	.56***	[.52, .60]	.70	[.67, .73]
Total	.65***	[.62, .69]	.71	[.68, .74]
BEPE 80	.95***	[.94, .95]	–	–

Note. R = Pearson correlation coefficient; CI = confidence interval.
*** $p < .001$

Differences between groups in the BEPE-16

In terms of differences by sex, men had higher mean scores than women in the BEPE-16 ($t_{(1168)} = 4.92$, $p < .001$, $d = 0.29$ 95% CI [0.17; 0.41]). The differences between the self-employed and others were not so clear, although they were close to statistical significance and the effect size was small ($t_{(1168)} = 1.64$, $p = 0.0502$, $d = 0.14$ 95% CI [0.03; 0.25]), however there were differences between those who were not self-employed but who intended to become so in the next few months (who might be considered potential entrepreneurs) and those who did not ($t_{(1016)} = 1.81$, $p = 0.035$, $d = 0.20$ 95% CI [0.08; 0.32]).

Norm reference

Lastly, we norm referenced the scores based on percentiles (Table 5).

Table 5
Norm referenced scores for BEPE-16

Total BEPE-16 score	**Men's score BEPE-16**	**Women's score BEPE-16**	**Percentiles**
16 - 49	16 - 50	16 - 48	5
50 - 53	51 - 54	49 - 52	10
54 - 56	55 - 58	53 - 55	20
57 - 58	59 - 60	56 - 58	30
59 - 60	61	59	40
61	62	60 - 61	50
62 - 63	63	62	60
64	64 - 65	63	70
65 - 66	66 - 68	64 - 65	80
67 - 70	69 - 72	66 - 69	90
71 - 75	73 - 77	70 - 73	95
76 - 80	78 - 80	74 - 80	99

Discussion

The objective of this study was the development of a reduced version of the BEPE battery for the evaluation of Enterprising Personality. The new short version (BEPE-16) has sixteen items, two from each of the eight dimensions in the original. This ensures that all of the relevant aspects of Enterprising Personality are assessed. We studied the psychometric properties using CTT and IRT models. We tested different models to examine the factorial structure of the original BEPE battery, with the bifactor model demonstrating the best fit both overall and for the items. Using the bifactor model, we selected the two items from each aspect with the greatest factorial loading in the general factor, in this way attempting to best reflect the eight factors that define Enterprising Personality. This gave us a short version containing 16 of the original 80 items.

Once the new short version, the BEPE-16 was constructed, we examined its psychometric properties. The results of the CFA allow us to speak of an essentially unidimensional structure (Calderón-Garrido et al., 2019). In terms of item analysis, the discrimination index (CTT) and parameter *a* (IRT) were very high for all items, indicating that the BEPE-16 discriminated very well between those with low and high levels of Enterprising Personality. The reliability of the scores was excellent (α= .94; ω= .94), especially given the drastic reduction in the number of items from 80 to 16. The Information Function indicated adequate precision over the whole ability range. The lowest precision was for moderate and for the highest levels of Enterprising Personality.

The evidence of validity in relation to other variables was consistent with findings from previous studies using the BEPE (Cuesta et al., 2018; Muñiz et al., 2014; Pedrosa et al., 2016; Postigo et al., 2020). Firstly, the BEPE-16 demonstrated a .95 correlation with the original BEPE, indicating that the reduced version similarly assesses Enterprising Personality. Secondly, the BEPE-16 exhibited a strong relationship to META (Ahmetoglu et al., 2011), one of the most well-known instruments for evaluating Enterprising Personality, both with its four dimensions (Proactivity: r=.53; Opportunism: r=.55; Creativity: r=.63; and Vision: r=.70), and its overall score (r=.71). Therefore the correlation between the BEPE-16 and the META can be regarded as adequate, according to the evaluation criteria in the European Federation of Psychologists' Associations' Test Review Model (Evers et al., 2013). In terms of correlations between the BEPE-16 and the Big Five personality factors, it is worth highlighting the relationship with extraversion (r=.57), neuroticism (r=.54), and conscientiousness (r=.50), with the latter being the most strongly related to Enterprising Personality and entrepreneurial success (Zhao et al., 2010). These relationships once again highlight the connection between specific personality traits and the Big Five, as shown in the adapted model from Suárez-Álvarez and Pedrosa (2016). Nonetheless, it is important to note that specific traits, which make up the BEPE-16, increase the predictive validity of entrepreneurial success compared to the sole use of the general Big Five personality model (Leutner et al., 2014).

With respect to differences between groups, there were statistically significant differences according to sex, with men scoring higher in the BEPE-16 (Fisher & Yao, 2017; Verheul et al., 2012). This may help to explain why men tend to start new businesses more than women (OECD, 2017). In addition, there were significant differences between working people who wanted to start businesses and those who did not, with the former scoring higher in Enterprising Personality. This has already been demonstrated in other studies (López-Núñez et al., 2020; Obschonka et al., 2017; Şahin et al., 2019).

In summary, we have developed a reduced version of the BEPE with 16 items (BEPE-16) that reliably evaluates Enterprising Personality, with suitable evidence of validity. The BEPE-16 is offered as a complementary tool to the original BEPE (Cuesta et al., 2018; Muñiz et al., 2014). The original version of the BEPE allows a more thorough and detailed study of Enterprising Personality, allowing profiles within the construct to be studied in accordance with its dimensional structure. In contrast, we present the BEPE-16 as a screening tool, which has advantages for both research and professional contexts. In a more general context, organizations that provide funding for entrepreneurial projects can use the BEPE-16 in support of their decision-making, with rapid evaluation of people's Enterprising Personality. In a more organizational context, more related to internal business innovation, companies can benefit from the BEPE-16 providing initial information on candidates to help in the selection process and shortlisting, saving them time and money. Outside of personnel selection, the BEPE-16 can also be a useful tool within a company, such as when offering training courses in the various psychological traits that make up Enterprising Personality, with the intention of assessing possible effects and efficacy of the courses given. Finally, in the research context, the BEPE-16 will offer a rapid, viable alternative for evaluating Enterprising Personality when it is being measured in relation to other variables. One of the limitations of the current study is that we did not use a social desirability scale to control the possible bias of the participants wanting to present a favorable image. It would be interesting for future studies to extend the sample of entrepreneurs, although the problem lies in the thin line separating them from the self-employed (Henrekson & Sanandaji, 2014), who are not necessarily entrepreneurs, but work for themselves because they have to (GEM, 2019), or merely to make a living (Baum et al., 2007; GEM, 2020).

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3.3. Tercer Artículo

Postigo, Á., García-Cueto, E., Muñiz, J., González-Nuevo, C., y Cuesta, M. (2021). Measurement invariance of entrepreneurial personality in relation to sex, age, and self-employment. *Current Psychology.* Advance online publication. https://doi.org/10.1007/s12144-021-01685-9

El objetivo de este artículo es el estudio de la invarianza de medida de la Batería para la Evaluación de la Personalidad Emprendedora en función del sexo, de la edad y de ser trabajador por cuenta propia o ajena. La principal aportación de este artículo a la Tesis Doctoral es demostrar que la estructura factorial no varía en función del sexo, la edad o el ser una persona trabajadora por cuenta propia o ajena. Posteriormente, se estudian las posibles diferencias en la personalidad emprendedora en función de estas variables.

Factor de impacto JCR 2020 = 4,297; Q1.

Measurement Invariance of Entrepreneurial Personality in relation to Sex, Age, and Self-employment

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Abstract

The analysis of sociodemographic variables such as age and sex has demonstrated their importance in entrepreneurial activity. Therefore, it is important to study the role these variables play in entrepreneurial personality. The aim of this research was to examine measurement invariance of the Battery for the Assessment of the Enterprising Personality (BEPE), and to study the differences in entrepreneurial personality as a function of sex, age, and being self-employed or not. The sample comprised 1,170 participants (>30 years old: 76.1%; women: 60%; self-employed: 13%). We analyzed various levels of measurement invariance: configural, metric, scalar, and residual invariance. The BEPE showed measurement invariance with respect to age, sex and type of employment at all of the invariance levels. We also found differences in entrepreneurial personality as a function of these sociodemographic variables.

Keywords: *invariance; equivalence; factor structure; sex; age; self-employment; entrepreneurial personality*

Introduction

Studying entrepreneurial activity is fundamental for the growth and development of every country (OECD, 2019), as various international reports have shown, including *Entrepreneurship at a Glance* (OECD, 2018) and *Global Entrepreneurship Monitor* (GEM, 2020). When it comes to attempting to explain what underlies someone becoming an entrepreneur there have been various approaches from the economic (Obschonka et al., 2015) and sociological (Chell, 2008), to the psychological (Baum et al., 2007; Frese & Gielnik, 2014). One of the different lines of research in the psychological approach is individuals' personal characteristics, with the study of entrepreneurial personality standing out (Kerr et al., 2018; Rauch & Frese, 2007b). Entrepreneurial personality can be studied from global Big Five-type models (Zhao et al., 2010), or through specific personality traits (Muñiz et al., 2014; Rauch & Frese, 2007a).

In line with the two theoretical approaches, various measuring instruments have been developed based on the Big Five (Sartori et al., 2016) and specific traits of entrepreneurial personality (Muñiz et al., 2014; Rauch & Frese, 2007a). Among the latter, there are many instruments that measure specific traits individually, but far fewer if one looks for a questionnaire that combines the traits that make up entrepreneurial personality (Suárez-Álvarez & Pedrosa, 2016). One of the instruments that addresses this issue, evaluating eight specific traits of entrepreneurial personality in a single questionnaire is the Battery for the Assessment of the Enterprising Personality (BEPE; Cuesta et al., 2018). The BEPE shows a good fit to a standard bifactor model with one general factor of entrepreneurial personality and eight uncorrelated specific dimensions (Cuesta et al., 2018). The specific dimensions are: Autonomy, Innovation, Achievement

motivation, Internal locus of control, Self-efficacy, Risk-taking, Stress tolerance, and Optimism.

Autonomy refers to the motivation toward entrepreneurial creation as an attempt to achieve certain individual freedom (Van Gelderen & Jansen, 2006). *Innovation* is defined as the interest in and willingness to search for new ways of doing things (Rauch & Frese, 2007b). *Achievement motivation* is defined as the desire to achieve standards of excellence (Suárez-Álvarez et al., 2013). *Internal locus of control* refers to the causal attribution that the consequences of a behavior depend on oneself (Suárez-Álvarez et al., 2013). *Self-efficacy* relates to the conviction that one can effectively organize and execute actions as well as persist when faced with obstacles in order to achieve desired results (Costa et al., 2013). *Risk-taking* is about people's tendency and willingness to take on certain levels of insecurity that will allow them to achieve a goal that presents greater benefit than the potential negative consequences (Antoncic et al., 2018; Moore & Gullone, 1996). *Stress tolerance* is defined as the resistance to perceiving environmental stimuli as stressful thanks to appropriate use of coping strategies (Lazarus & Folkman, 1986), and *Optimism* is defined as a person's belief about the occurrence of positive rather than negative events in life (Shepperd et al., 2002).

The BEPE battery for adults (Cuesta et al., 2018) originated from a prior version for adolescents (Muñiz et al., 2014; Pedrosa et al., 2016; Suárez-Álvarez et al., 2014). A short version of the battery for adults with 16 items, 2 per specific factor, has recently been developed (Postigo, García-Cueto, et al., 2020), as well as a Computerized Adaptive Test version (Postigo, Cuesta, Pedrosa, et al., 2020). The BEPE has demonstrated relationships to academic performance (Muñiz et al., 2014) as well as to other psychological constructs related to entrepreneurial activity such as emotional intelligence (Muñiz et al., 2014) and grit (Postigo, Cuesta, García-Cueto, et al., 2020).

Given the relative newness of these instruments, one of the aspects that must still be examined more thoroughly is measurement equivalence or measurement invariance (MI). MI is the idea that following the development and validation of an instrument, researchers should ask themselves whether it measures different populations in the same way. If it does not, and it measures different groups differently, it raises the question of whether the scale can be used for comparisons, or making decisions about these populations (Thompson, 2016). Despite that, it is common for researchers to assume that the construct being evaluated is invariant in different populations (Sass & Schmitt, 2013). In this regard, as French and Finch (2016) argued, fairness in instrument construction is essential, as shown by the attention of the legal system, politicians, instrument creators and instrument users, researchers, and the general public, considering an instrument fair when it reflects the same construct for all the people being tested, and when the scores have the same meaning for all individuals (AERA, APA, NCME, 2014). In psychological measurement, an instrument that is designed to measure a trait should show differences between individuals who differ in that trait, and people should not get different scores in this trait just because they belong to a certain group (Amérigo et al., 2020; Thompson, 2016). In this way, MI has become a logical prerequisite for comparisons between groups (Vandenberg & Lance, 2000). In fact, common tests of mean differences (e.g., t-test, analysis of variance) are biased if MI cannot be established for a given scale.

There has been an increase in the study of MI in personality instruments in transcultural studies (Thielmann et al., 2020), as a function of sex and age (Ock et al., 2020), and even as a function of applying the instrument online or in pencil and paper format (Vecchione et al., 2012), among others. However, despite it having been stressed that in order to better understand “entrepreneurial spirit”, the modulating effects of

sociodemographic variables such as age and sex should be studied (Bohlmann et al., 2017; Cuesta et al., 2018), the MI of the BEPE battery, which would provide validity evidence justifying unbiased comparisons, has not yet been studied.

When it comes to age, people aged between 18 and 30 are generally more likely to become entrepreneurs (GEM, 2020), and there is a negative relationship between age and becoming self-employed (Bohlmann et al., 2017; Hatak et al., 2015). Other authors have found an inverted-U shaped relationship between age and entrepreneurship (Coduras et al., 2018; Lévesque & Minniti, 2006). Nonetheless, Kautonen et al. (2014) found that entrepreneurial activity increased with age for those who wanted to be self-employed, rejecting the idea of considering youth to be a key part of having entrepreneurial success (Azoulay et al., 2020). More specifically, in order to better understand this link, the relationship between age and different personality traits has been studied, including optimism, self-efficacy, autonomy, innovation, stress tolerance, and risk-taking, which are variables that are positively correlated with age (Baron et al., 2016; Gärtner & Hertel, 2020; Jiménez et al., 2017; Kozubíková et al., 2016; Lévesque & Minniti, 2011), whereas internal locus of control is negatively correlated (Molino et al., 2018).

Another extremely interesting topic is the difference between men and women in terms of entrepreneurial activity (Henry et al., 2016; Marlow & Martínez-Dy, 2018; Verheul et al., 2012), with only one in ten women becoming self-employed compared to two in ten men (OECD, 2017). These differences may be due to women having less desire to become entrepreneurs (Verheul et al., 2012), although other authors have stated that sex has no effect on the intention to start a business (Hatak et al., 2015). Gender differences are also reflected in the personality traits related to entrepreneurial activity, and are greater in more advanced economies (Mueller, 2004). In terms of the

Big Five, female entrepreneurs or women who want to start businesses score higher than men in extraversion, conscientiousness, and openness to experience (López-Núñez et al., 2020; Obschonka et al., 2014). In the specific personality traits, women exhibit more realism, or less optimism (Niederle & Vesterlund, 2007), less self-efficacy (Molino et al., 2018), less tolerance to stress (Falavarjani & Yeh, 2019), and they are less likely to take risks (Perez-Quintana et al., 2017), whereas there are no differences in autonomy between men and women (Kozubíková et al., 2016).

Lastly, it is important to note that entrepreneurs have tended to exhibit high levels in the various specific traits making up entrepreneurial personality (Rauch & Frese, 2007a, b). For example, Baron et al. (2016) found that one reason why entrepreneurs demonstrated lower levels of stress is because they have more psychological resources such as self-efficacy (see, Newman et al., 2019) and optimism, with the latter related to humor (Menéndez-Aller et al., 2020). Other characteristics of entrepreneurs include motivation for success, internal locus of control, and risk-taking (Antoncic et al., 2018; Tyszka et al., 2011).

It is clear that differences between the sexes, age, and working for oneself or not have been studied in relation to entrepreneurship, both through the Big Five and through specific traits of the entrepreneurial personality. However, studies into entrepreneurship with these sociodemographic variables have focused on the analysis of specific traits singly, and studies have not considered the simultaneous analysis of the specific traits making up the entrepreneurial personality (Cuesta et al., 2018; Muñiz et al., 2014; Rauch & Frese, 2007a). In addition, to the best of our knowledge, nor has MI been examined in the BEPE Battery instrument through which these possible differences can be assessed. The objective of this study is to examine the possible differences in entrepreneurial personality, and in the specific traits that make it up, according to age,

sex, and being self-employed or not. This general objective gives rise to two specific objectives. First, to study MI in the BEPE, and so determine whether it is possible to compare the scores in entrepreneurial personality, and the eight specific dimensions making up the instrument, in terms of age (under-30s compared to over 30s), sex, and being self-employed or not. Second, to examine the possible differences in entrepreneurial personality, and the eight specific traits that make it up, as a function of the aforementioned sociodemographic variables.

With regard to the first objective, we hypothesize that the BEPE scores will be invariant with respect to age (under-30s compared to over-30s), sex, and being self-employed or not, and that therefore there will be no differences simply due to the fact of belonging to one group or other. With regard to the second objective, based on results from previous studies by other researchers, we hypothesize that the BEPE scores will show differences according to age, sex, and being self-employed or not, with higher scores from younger people (under 30), men, and the self-employed.

Method

Participants

The sample initially comprised 1,324 Spanish volunteers from the adult population. The sampling was non-probabilistic snowball sampling. The inclusion criteria were to be over 18 years old and to be currently working. The final sample was made up of 1,170 participants, following the removal of those who were insufficiently careful answering the control questions in the questionnaire. The mean age was 42.34 years (SD = 12.96). Table 1 gives the distributions according to the groups of interest. Over half (56%) of the participants worked in the tertiary or service sector, 68.5% of the self-employed had been so for more than four years, and 86.4% of those with their own businesses had fewer than five employees.

……. *Insert Table 1 about here*……...

Instruments

Battery for the Assessment of the Enterprising Personality (BEPE)

The BEPE has 80 items evaluating eight dimensions (ten items per dimension), which have been identified in the literature as the most strongly related to entrepreneurial personality: Self-efficacy, Autonomy, Innovativeness, Internal locus of control, Achievement motivation, Optimism, Stress tolerance, and Risk-taking (Cuesta et al., 2018; Muñiz et al., 2014). The items use a Likert-type scale with five response alternatives (from strongly disagree to strongly agree). To maximize the psychometric properties of the scale, all of the items are given in a direct form (stronger agreement with the item is related to a higher level of the evaluated construct; Vigil-Colet et al., 2020). The instrument's psychometric properties are satisfactory, both from a classical perspective (Cuesta et al., 2018), and Item Response Theory (Postigo, Cuesta, et al., 2020). Cuesta et al. (2018) reported very good results for the BEPE in terms of reliability (α= .808 - .965) and construct validity (adequate fit to a standard bifactor model). In addition, they reported adequate evidence of validity in relation to other variables, such as the well-known entrepreneurial personality instrument, *Measure of Entrepreneurial Tendencies and Abilities* (META; Ahmetoglu et al., 2011). Postigo, Cuesta, Pedrosa, et al. (2020) developed a bank of BEPE items which allowed them to create a Computerized Adaptive Test for evaluation enterprising personality with a reduced number of items with hardly any loss of measurement accuracy.

The α coefficients for the sample in the present study were: Overall Enterprising Personality Score (α = .97), Self-efficacy (α = .88), Autonomy (α = .81), Innovation (α = .88), Internal locus of control (α = .85), Achievement motivation (α = .86), Optimism (α = .89), Stress tolerance (α = .84), and Risk-taking (α = .87). The BEPE battery was

originally developed and validated in Spain (Cuesta et al., 2018), and it was this version used in our study.

Attentional control scale.

This is a scale with 10 Likert-type items with five response alternatives. The scale is used in order to detect participants who respond to the questionnaire at random. Items are of the type "If you read this question you should respond strongly agree", and were included among the items in the BEPE. We removed 154 participants from the sample for responding incorrectly to two or more of these questions.

Procedure

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. Informed consent was obtained from the participants, who were recruited via snowball sampling. Potential participants who met the inclusion criteria (workers over 18 years old) were personally contacted. They were asked to answer the online questionnaire and provide contact details for other potential participants. These new potential participants were asked to collaborate both in answering the questionnaire and in obtaining contact details for more new participants. The response process was open for three months (February to April, 2017). The average response time estimated in the instrument phase was 20 min. Participants did not receive any kind of reward for participating in the study. The anonymity of each participant in this study was scrupulously respected, confidentiality was maintained, and the ethical code of the Official Colleges of Psychologists was followed.

Data Analyses

We used the Multigroup Confirmatory Factor Analysis (MCFA) process to examine MI between the groups, which occurs at different levels; configural, metric, and scalar invariance. Owing to the nested nature of the models that underlie the

different levels of invariance, we used the *forward approach*, which is to successively add restrictions onto a base model (Dimitrov, 2010). This means that each model assumes that the lower levels are invariant. In our study there were four items in the BEPE where none of the participants chose alternative 1, which led us to combine alternatives 1 and 2 together for the MI study in order for the software to be able to produce the models. For estimating parameters, we used Weighted Least Squares, and the Mean and Variance (WLSMV) adjusted as estimation method. When the number of categories is small (fewer than five or six), categorical variable methodology with a robust estimator such as WLSMV within Mplus (Finney et al., 2016; Thompson, 2016) is generally recommended. As a base model, we performed various CFA's under a bifactor structure to examine the fit of the instrument for each group separately. We performed validation studies of the BEPE using a standard bifactor model, assuming a general factor of enterprising personality and eight uncorrelated specific factors. We used X^2/df, the *Confirmatory Factor Index* (CFI), and *Root Mean Square Error of Approximation* (RMSEA) as indices of fit. Fit is adequate when $X^2/df < 3$, CFI $\geq .95$ and RMSEA $\leq .06$ (Hu & Bentler, 1999).

Once the fit of the models was confirmed separately, we performed successive multi-group CFAs to analyze the different types of MI in the instrument. The series of models most often used to evaluate MI is defined by applying sets of between-group constraints on less constrained models, yielding pairings of more-constrained models that are nested within less-constrained models. The first step is the configural invariance model (M0), which posits that the same items belong to the same factor in all of the groups, but that the factor loadings and thresholds vary freely between groups, in other words, the measuring instrument has the same factorial structure in the groups being compared. To identify the model, the variance of each factor was set to one and the

means to zero for both groups. The second step was to estimate the metric invariance, or weak invariance (M1), where the factor loadings are set as equal between the groups, and thus determine that the factor loadings are within the same interval between the groups. The third step was to estimate scalar invariance, or strong invariance (M2), where, in addition to the above, the item thresholds are set as equal, being ordinal data (Pendergast et al., 2017), determining that the units of measurement are equal between the groups. Finally, we examined a new model freeing the residual variances (M3A), to examine the final level of invariance, residual invariance, or strict invariance (M3B), through which the residual variances are restricted. This type of invariance indicates that the differences between groups in means, variance, and covariance is solely due to differences in the latent variable (Dimitrov, 2010; Thompson, 2016). To accept MI, the reduction in CFI must be below .01 (ΔCFI<-.01) and the increase in RMSEA less than .015 (ΔRMSEA<.015) (Chen, 2007).

Following that, we examined the differences in the eight specific dimensions and the general entrepreneurial personality factor with regard to the different sociodemographic variables. We examined whether there were differences between the self-employed and non-self-employed and one sex and the other, and whether there were differences between the under- and over-30s and sex. To do that, we performed two MANOVAs with two independent variables, being self-employed or not and sex, and age and sex, respectively. We used F from Pillai's Trace as the test statistic as it is the most robust test (Meyers et al., 2016). We analyzed the effect size using Cohen's *d*, with values between 0.2 and 0.4 indicating a small effect size, between 0.5 and 0.7 a moderate effect size, and 0.7 and above a large effect size. As we were dealing with 8 variables to compare, we corrected Type I errors using Bonferroni's correction (α=.05/8), producing a level of significance of <.0063 to be considered significant.

The MI analysis was performed with MPlus8 (Muthen & Muthen, 2017). Differences between groups was examined using SPSS 24 (IBM Corp, 2016).

Results

We examined MI in each of the conditions. Table 2 (sex), Table 3 (age), and Table 4 (self-employed or not) show that the BEPE demonstrated adequate fit to a bifactor model in each of the groups we considered (Hu & Bentler, 1999). In addition, both CFI and RMSEA demonstrated that MI was confirmed at all levels, including residual invariance, for all of the conditions studied in the BEPE (sex, age, and being self-employed) (Chen, 2007).

……. *Insert Table 2 about here*……...

……. *Insert Table 3 about here*……...

……. *Insert Table 4 about here*……...

We performed two MANOVAs to determine whether there were differences depending on being self-employed or not and sex, and depending on being under- or over-30 and sex. In both MANOVAs the interaction was not statistically significant (self-employment and sex; p =.857, age and sex; p =.303), thus we moved on to study the main effects. Table 5 gives the differences in direct scores in the general entrepreneurial personality factor, and in the eight specific dimensions, as a function of being self-employed or not, being over or under 30 years old, and of being a man or woman. In terms of self-employment, there were only notable differences in autonomy, with a moderate effect size (d = 0.43), with the self-employed scoring higher. In terms of age, there were statistically significant differences in self-efficacy (d = 0.30), innovation (d = 0.25), internal locus of control (d = 0.33), risk-taking (d = 0.32), and in the general entrepreneurial personality factor (d = 0.23), with young people (under 30) scoring higher. Lastly, there were statistically significant differences with respect to sex

in self-efficacy (d = 0.21), autonomy (d = 0.24), innovation (d = 0.22), stress tolerance (d = 0.44), risk-taking (d = 0.35), and in the general entrepreneurial personality factor (d = 0.30). The power of the test was above .7 in all variables except those mentioned above where no differences were found.

……. *Insert Table 5 about here*…….

Discussion

The study of entrepreneurial activity, and in particular the phase related to starting a business (Baron & Shane, 2008), is fundamental to the development of any economy (OECD, 2019). This includes the determinants that surround it, such as personal factors and the study of entrepreneurial personality (Kerr et al., 2018). Research into entrepreneurial personality has needed studies assessing the role of sociodemographic variables (Bohlmann et al., 2017; Cuesta et al., 2018) and this is what frames our study. Despite the importance that MI has acquired in psychometric personality research (Ock et al., 2020; Thielmann et al., 2020), the instruments that assess entrepreneurial personality (see, Suárez-Álvarez & Pedrosa, 2016) need a more thorough assessment of MI, as it is a prerequisite for making comparisons between groups (Thompson, 2016; Vandenberg & Lance, 2000). Given that, our study was split between two specific objectives. One was to assess MI in the BEPE (Cuesta et al., 2018) according to sex, age, and whether the subject was self-employed or not, demonstrating that the BEPE reflected the same construct for the groups being examined, and that the scores it gave had the same significance for everyone assessed (AERA, APA, NCME, 2014). The other was to examine the differences in entrepreneurial personality and the eight psychological traits that make it up between the self-employed and non-self-employed, between men and women, and between the under 30s and the over 30s. The self-employed scored higher in autonomy (Rauch &

Frese, 2007a). Men were more stress-tolerant than women, and lastly, the under-30s scored higher in self-efficacy, internal locus of control, and risk-taking (Bohlmann et al., 2017; López-Núñez et al., 2020).

Firstly, we examined MI in the BEPE (Cuesta et al., 2018) to determine whether there were biases when evaluating the different groups. The bifactor structure of the BEPE was shown to be invariant at all levels with respect to sex, age, and being self-employed or not. The invariance demonstrated by the BEPE allows for the comparison of not only an overall entrepreneurial personality score, but also the eight specific dimensions, with the possibility of making comparisons of entrepreneurial personality profiles between different groups (Kerr et al., 2018).

Secondly, we examined the possible differences between the self-employed and the non-self-employed. Although we might talk about trends in all of the traits, there were only statistically significant differences in autonomy, with the self-employed scoring higher than those working for someone else (Rauch & Frese, 2007b), which is consistent with entrepreneurs having to make decisions without supervisors and independently develop plans of action (Baum et al., 2007). One unresolved question is establishing the line separating someone who works for themselves from an entrepreneur, and the one separating an entrepreneur who starts a business because they want to, and so has an idea and a project to put into practice, from someone who starts a business because they need to; such a project, rather than being the result of a propensity for entrepreneurial activity, may result from the need to *make a living*, as recent Spanish data shows (GEM, 2019, 2020).

Finally, we looked at the existence of differences in traits of entrepreneurial personality as a function of sex and age. Sex and age are two variables that have been shown to be key in entrepreneurial activity (GEM, 2020; OECD, 2017), and essential in

better understanding “entrepreneurial spirit” (Bohlmann et al., 2017). With regard to sex, men scored significantly higher in all of the entrepreneurial personality traits except for internal locus of control, motivation for success, and optimism, where we found no significant differences. The difference in stress tolerance stood out, with men exhibiting more tolerance of stressful situations (Falavarjani & Yeh, 2019). This may help to explain the difference in the ratio of entrepreneurs between men and women, where the business context is a source of stimuli that could be classed as stressful, and where personality plays a modulating role in stress (Wincent & Örtqvist, 2009). The pattern of men scoring higher in entrepreneurial personality agrees with previous research which has looked at some of these traits singly (Molino et al., 2018; Niederle & Vesterlund, 2007), putting these differences down to women valuing external support for starting a business more than personal characteristics such as self-efficacy (Molino et al., 2018).

With regard to age, it was important to differentiate between the younger participants (aged 18 to 30) and those over 30, as recent international reports have indicated that the under-30s demonstrate greater likelihood of becoming entrepreneurs (GEM, 2020). Optimism and stress tolerance were traits that were stable between the two age groups, and autonomy was the only trait that gave higher scores as subjects were older, so both men and women consider these variables important as they age. The variables which younger participants scored highly (under 30 vs. over 30) were self-efficacy, innovation, internal locus of control, and risk taking, along with the general entrepreneurial personality factor, although effect sizes were small. These results are in line with the idea that age is negatively correlated with entrepreneurial activity (Bohlmann et al., 2017; GEM, 2020; Hatak et al., 2015), but disagree with other studies that have shown positive correlations between some specific personality traits (including self-efficacy, autonomy, and optimism) and age (Baron et al., 2016; Gärtner

& Hertel, 2020; Jiménez et al., 2017; Kozubíková et al., 2016; Lévesque & Minniti, 2011). Generally, levels of entrepreneurial personality decrease with the passage of time, as young people from the age of majority onwards demonstrate high levels in all entrepreneurial personality traits, which is why the evaluation and stimulation of entrepreneurial spirit is so important in the educational context (Muñiz et al., 2014). This is because more attention needs to be paid to the psychological side of things to encourage entrepreneurialism (Frese et al., 2016), training abilities that would help people take on the challenges facing the self-employed (Santos et al., 2018).

There are some considerations that should be borne in mind in terms of future lines of research. In the first place, the sample of self-employed workers in our study was small (13%), future studies should try to have a larger sample of this population. Secondly, entrepreneurial activity is a worldwide phenomenon, which is monitored regularly in most countries owing to its economic, social, and psychological importance (GEM, 2020; OECD, 2019). As such, validating and confirming the invariance of the BEPE and the model it is based on (Rauch & Frese, 2007a) in other cultures would help to provide a transculturally invariant tool for assessing entrepreneurial personality, similar to the HEXACO model of general personality, for example (Thielmann et al., 2020). Thirdly studying how entrepreneurial personality progresses throughout life is extremely important in helping understand what lies beneath this phenomenon, so it would be extremely interesting to have more age groups as well as longitudinal studies to extend the results from our study, and in so doing determine whether there is an inverted-U progression in the psychological traits that has been seen in entrepreneurial activity (Coduras et al., 2018; Lévesque & Minniti, 2006). These results should be taken with some caution because in a bifactor model, such as the one we used to analyze the BEPE, not all of the items have the same loadings in each of the specific factors

analyzed. To consider these differential loadings, one would have to use the factor scores rather than the empirical scores, which would add significant complexity in applied and professional contexts.

Various practical conclusions can be drawn from this study. It shows that the BEPE instrument for entrepreneurial personality is invariant with regard to sex, age, and being self-employed or not, allowing unbiased comparison between the different groups. This confirms that the BEPE may be used to evaluate people of different sexes, ages, and employment conditions, and opens the door to future studies that may look in more depth at the role of enterprising behavior in terms of various sociodemographic, non-cognitive, and cognitive variables. In addition, it provides evidence for the idea that men exhibit higher levels in all of the entrepreneurial personality traits, with the differences in stress tolerance being notable. As Verheul et al. (2012) put it, one of the ways of reducing the differences between men and women in entrepreneurial activity, in addition to government policies aimed at removing obstacles (see, Foss et al., 2019), is to address women's preferences and attitudes towards self-employment, offering help to acquire relevant knowledge and skills, such as training those aspects that make up the entrepreneurial personality (Cuesta et al., 2018), and taking new paths in researching entrepreneurialism in women. It is also important to consider the impact of sociocultural factors that influence these gaps (Dheer et al., 2019), as the stereotypes and beliefs around gender in each culture affect men's and women's opportunities, all too often to the detriment of women, who do not share equal conditions. Finally, we conclude that self-employed workers are more autonomous than those who work for someone else, and that over-30s have lower levels of entrepreneurial personality than those who are younger.

In short, given that the BEPE showed measurement invariance based on sex, age, and employment type, it seems a good starting point to fairly assess the different specific traits of the entrepreneur's personality. So, it will be possible to intervene on them to begin to reduce the entrepreneurial gaps with respect to the sociocultural factors that exist today.

Data Availability Statement

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Conflict of Interest statement

The authors declare that there are no conflicts of interest.

Informed Consent to participate

Informed consent to participate was obtained from the participants.

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Table 1

Sample Distribution by Sex, Age and Employment Type

Sex	Men	Women
	469 (40%)	701 (60%)
Age (years)	≤30	>30
	280 (23.9%)	890 (76.1%)
Employment type	Self-employed	Non Self-employed
	152 (13%)	1,018 (87%)

Table 2

Measurement Invariance for the BEPE Based on Sex

	X^2 (p)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
Women	7201.054 (<.0001)	2.40	.918	.045 [0.045-0.046]	-	-	-
Men	5462.999 (<.0001)	1.82	.939	.042 [0.040-0.044]	-	-	-
M0	12571.533 (<.0001)	2.09	.926	.043 [0.042-0.044]	-	-	-
M1	11287.037 (<.0001)	1.83	.942	.038 [0.037-0.039]	M1-M0	.016	-.005
M2	11534.313 (<.0001)	1.80	.942	.037 [0.036-0.038]	M2-M1	0	-.001
M3A	12580.809 (<.0001)	1.99	.930	.041 [0.040-0.042]	-	-	-
M3B	11534.313 (<.0001)	1.80	.942	.037 [0.036-0.038]	M3B-M3A	.012	-.004

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 3

Measurement Invariance for the BEPE Based on Age

	X^2 (p)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
≤30	4439.842 (<.0001)	1.48	.929	.041 [.039-.044]	-	-	-
>30	8490.128 (<.0001)	2.83	.920	.045 [.044-.046]	-	-	-
M0	11896.606 (<.0001)	1.98	.931	.041 [.040-.042]	-	-	-
M1	10505.282 (<.0001)	1.71	.949	.035 [.034-.036]	M1-M0	.018	-006
M2	10777.212 (<.0001)	1.69	.949	.034 [.033-.035]	M2-M1	0	-.001
M3A	11837.982 (<.0001)	1.88	.936	.039 [.038-.040]	-	-	-
M3B	10777.212 (<.0001)	1.69	.949	.034 [.033-.035]	M3B-M3A	.013	-.005

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 4

Measurement Invariance for the BEPE Based on Employment Type

	X^2 (*p*)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
Self-employed	3871.536 (<.0001)	1.29	.925	.044 [.040-.048]	-	-	-
Non Self-employed	9667.237 (<.0001)	3.22	.917	.047 [.046-.048]	-	-	-
M0	11302.247 (<.0001)	1.88	.934	.039 [.038-.040]	-	-	-
M1	10301.201 (<.0001)	1.67	.949	.034 [.033-.035]	M1-M0	.015	-.005
M2	10443.934 (<.0001)	1.64	.950	.033 [.032-.034]	M2-M1	.001	-.001
M3A	11210.061 (<.0001)	1.78	.939	.036 [.035-.038]	-	-	-
M3B	10443.934 (<.0001)	1.64	.950	.033 [.032-.034]	M3B-M3A	.011	-.003

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 5

Differences on Entrepreneurial Personality Depending on Employment Type, Age and Sex

	Employment type					Age (years)					Sex				
	M Self-employed	*M* Non self-employed	F	*p*	*d*	*M* ≤30	*M* >30	F	*p*	*d*	*M* Men	*M* Women	F	*p*	*d*
Self-efficacy	37.55	37.22	0.49	.471	0.07	38.43	36.90	17.27	<.001	0.30	37.90	36.84	9.97	.001	0.21
Autonomy	40.64	38.72	24.85	<.001	0.43	38.79	39.03	0.90	.432	0.05	39.62	38.54	14.13	<.001	0.24
Innovation	38.75	38.24	1.33	.228	0.11	39.20	38.03	12.00	<.001	0.25	38.93	37.89	9.65	<.001	0.22
Internal Locus of Control	39.54	39.37	0.18	.718	0.04	40.61	39.01	21.21	<.001	0.33	39.68	39.20	3.30	.095	0.10
Achievement Motivation	39.91	39.18	3.63	.066	0.16	39.88	39.08	5.93	.012	0.17	39.56	39.08	4.59	.076	0.10
Optimism	38.77	38.14	1.86	.188	0.12	38.51	38.13	0.94	.355	0.07	38.59	37.98	4.36	.064	0.11
Stress Tolerance	32.65	32.46	0.04	.720	0.03	32.69	32.42	0.39	.529	0.04	34.08	31.42	35.01	<.001	0.44
Risk-Taking	36.84	35.92	3.28	.051	0.17	37.33	35.63	19.66	<.001	0.32	37.16	35.29	20.52	<.001	0.35
Entrepreneurial Personality	304.66	299.26	3.67	.051	0.17	305.43	298.24	10.03	.001	0.23	305.53	296.24	19.25	<.001	0.30

Note. M = mean; *F* = Pillai's Trace Statistic; *p* = p-value; *d* = effect size.

3.4. Cuarto Artículo

Postigo, Á., Cuesta, M., García-Cueto, E., Menéndez-Aller, Á., González-Nuevo, C., y Muñiz, J. (2020). Grit assessment: Is one dimension enough? ***Journal of Personality Assessment.*** **Advance online publication.** **https://doi.org/10.1080/00223891.2020.1848853**

El objetivo de este artículo es el desarrollo y validación de un instrumento de medida de grit en población general española. El grit es uno de los rasgos más novedosos que se ha empezado a relacionar con la actividad y éxito empresarial. El presente artículo proporciona un nuevo marco sustantivo para evaluar el grit, considerando las facetas de las que se compone (consistencia del interés y perseverancia del esfuerzo), pero contemplando un acercamiento unidimensional. La principal aportación de este artículo a la Tesis Doctoral es proporcionar un instrumento de medida que evalúe grit en el contexto español, lo que permitirá evaluar este constructo de manera fiable y válida para analizar su influencia en la actividad emprendedora.

Factor de impacto JCR 2020 = 3,777; Q2.

Grit Assessment: Is One Dimension Enough?

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Grit Assessment: Is One Dimension Enough?

Grit is one of the non-cognitive variables that has received the most attention in recent years given its relationship to and influence in various aspects of life. There are very few reliable, valid instruments to evaluate it in Spanish-speaking countries. Because of that, the aim of this study is the development and validation of a new scale to evaluate grit in Spanish-speaking contexts. We used a sample of 531 Spanish participants (60% women) from the general population (M_{years}= 38.60, SD_{years}= 14.90). We examined the structure and measurement invariance of the instrument. We calculated the instrument's reliability and obtained evidence of validity in relation to other variables. We examined the differences in grit as a function of gender and age. The factorial analyses confirmed the unidimensionality of the instrument, along with the measurement invariance of the scores with respect to sex and age. The new grit scale demonstrated excellent reliability (α=.94; ω=.94). We found clear evidence of validity in relation to other variables; the Grit short scale (r= .691), self-control (r=.595), self-efficacy (r=.703), and conscientiousness (r=.661). The new scale for evaluating grit (Oviedo Grit Scale) is essentially unidimensional, and scores produced by it exhibit excellent indicators of reliability and validity.

Keywords: Grit, assessment, scale, reliability, validity

One of the objectives of psychology is to attempt to explain why some people use a small part of their resources in comparison with others who use them to the limit (William James, 1907), or to put it another way, why some people are more successful than others who demonstrate the same aptitudes, talents, and opportunities. One of the possible explanations revolves around non-cognitive variables (Farrington et al., 2012), which have been demonstrated to influence various aspects of life such as education and health (Heckman & Kautz, 2012; Smithers et al., 2018). Among these, grit has been the subject of much attention in the literature since the well-known study from Duckworth, et al. (2007), in which the authors defined it as follows: "Grit entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress. The gritty individual approaches achievement as a marathon; his or her advantage is stamina" (Duckworth et al., 2007, pp. 1087). For this reason, grit is considered a positive trait based on an individual's perseverance combined with their passion for reaching a long term goal (Duckworth, 2016), and according to this author, has two dimensions: perseverance of effort and consistency of interests.

There has been a proliferation of research looking into the relationships between grit and other important aspects of people's daily lives such as education (e.g. Duckworth et al., 2007; Duckworth & Quinn, 2009), health (Datu et al., 2019; Moore et al., 2018; Silvia et al., 2013), marriage (Eskreis-Winkler, Shulman, Beal et al., 2014), and work (Baum & Locke, 2004; Jordan et al., 2019; Vallerand et al., 2014). One of the aspects of grit that has been most widely studied is its relationship to academic performance. High scores in grit have demonstrated relationships with better school grades at all educational levels (Fong & Kim, 2019; Hagger & Hamilton, 2018; Steinmayr et al., 2018). In this educational context there have also been findings that go

beyond school grades such as predicting which students will be more likely to graduate a year later (Eskreis-Winkler, Shulman, Beal et al., 2014), or which new teachers are more likely to continue in the profession, as well as who will be more effective (Duckworth & Quinn, 2009; Robertson-Kraft & Duckworth, 2014). Outside of the academic arena grit has also been shown to be important in other contexts such as the military (Duckworth et al., 2007; Eskreis-Winkler, Shulman, Beal et al., 2014), the workplace (Eskreis-Winkler, Shulman, & Duckworth, 2014; Eskreis-Winkler, Shulman, Beal et al., 2014), and entrepreneurial activity. In the latter, grit has recently been shown to help predict entrepreneurial success (Mooradian et al., 2016; Mueller et al., 2017; Newman et al., 2019), those with higher levels of grit being more likely to become entrepreneurs (Arco-Tirado et al., 2019) and to be more successful in business (Mueller et al., 2017). Grit has also been studied in relation to sociodemographic variables such as sex and age, with contradictory results. In terms of sex, although the meta-analysis by Credé et al. (2017) did not find differences, other studies have shown that women have higher levels of grit (Eskreis-Winkler, Shulman, Beal et al., 2014; Oriol et al., 2017). When it comes to age, Duckworth et al. (2007) showed that grit seemed to be stable over time and context. However, in a longitudinal study West et al. (2016) showed that grit scores decreased over two years, while recent studies have shown that grit increases with age (Cosgrove et al., 2016; Peña & Duckworth, 2018).

Despite the findings about grit, the construct has not been free from controversy, motivated according to some authors by the close statistical relationship and substantial overlap with other, more classical psychological variables: self-control, self-efficacy, conscientiousness, and motivation. Self-control, or the capacity to change oneself to develop a better fit between the person and the world (Mischel et al., 1996), has demonstrated the closest correlations with the grit construct (Duckworth & Gross, 2014;

Muenks et al., 2017; Oriol et al., 2017). However, self-control is a variable that is more related to a person's behaviour in the short term and their capacity to delay gratification (Mischel, 2014), and is considered a facet of conscientiousness. In contrast, grit is more about consistency of interest (in whether interests change over the long term) (Duckworth et al., 2007), so the two constructs differ in the time assigned (short and long term) (Duckworth & Gross, 2014). Self-efficacy, or a person's belief in their ability to employ behaviours that influence the events that affect their lives (Bandura, 1977), has also been shown to be closely correlated to grit (Oriol et al., 2017; Usher et al., 2019). However, whereas self-efficacy as a variable depends on the context in which it is measured, grit can be significant regardless of the domain in which it works (Duckworth et al., 2007). Finally, conscientiousness is understood as the tendency to be self-controlled, responsible in the eyes of others, a planner who is able to delay gratification, hard-working, ordered, and someone who obeys the law (Roberts et al., 2009). This has been the most controversial variable given its close relationship to grit (Credé et al., 2017; Ivcevic & Brackett, 2014; Schmidt et al., 2018). Within the facets making up conscientiousness, the relationship with grit is particularly striking with the facet of industriousness, understood as diligence or the tendency to work hard (Schmidt et al., 2018, 2020), and grit has even been considered as a facet of conscientiousness. In their meta-analysis, Credé et al. (2017) found strong correlations between the two constructs, once they had controlled for sample sizes and the reliability of the instruments used to measure the variable conscientiousness. In this regard, although it is challenging to differentiate between the two constructs, the difference may be due to consistency of interests, with *continuing interest* being a different aspect. In this way, these two traits differ in that people with high levels of grit not only complete tasks on time (which a person with high levels of conscientiousness would also do), but they are

also able to continue to maintain consistency in their objectives for years (Duckworth et al., 2007). Nonetheless, consistency of interests may be attributed to the measure used to evaluate conscientiousness. Finally, grit has also been related to motivation, although this has focused on the educational arena (Muenks et al., 2017; Steinmayr et al., 2018).

Despite the research on grit in recent years, there is no consensus about its evaluation or measurement. The first instrument proposed for measuring grit was the *Grit Scale* (Duckworth et al., 2007), from which Duckworth and Quinn (2009) developed a short version (Grit-S). From that point on, most researchers interested in the construct used this scale, which has been validated in many countries and cultures, including versions in German (Schmidt et al., 2019), Korean (Kim & Lee, 2015), Japanese (Nishikawa et al., 2015), Chinese (Li et al., 2016), Russian (Tyumeneva et al., 2014), and Spanish (Arco-Tirado et al., 2018). The Grit-S scale has two dimensions (with four items each): perseverance of effort and consistency of interests. Despite the boom in grit research, there are various ongoing debates about measuring this construct, including the dimensionality and reliability, two of the most important aspects in the psychometric study of any questionnaire. In terms of dimensionality, the Grit-S scale was initially validated with two first-order factors (perseverance of effort and consistency of interests) and one second-order factor (grit) (Duckworth & Quinn, 2009). However, this higher order view of the structure of grit does not appear to be correct (see, Credé, 2018). In this regard, some recent studies have proposed a unidimensional structure with a single first-order factor (Areepattamannil & Khine, 2017; Gonzalez et al., 2019), or a two-factor structure with independent factors (Abuhassàn & Bates, 2015; Datu et al., 2016; Wolters & Hussain, 2015). The underlying reason for these different results may be due to an overlap of the two dimensions, making it difficult to distinguish which items fit in one or the other. Something to note about the

dimensionality of the test is that one of the two dimensions, consistency of interests, has all of its items in an inverse form, which may have helped the Factorial Analysis fit with two differentiated factors in the initial study in which the instrument was created (Duckworth & Quinn, 2009). This is because human beings tend to respond differently depending on the meaning of the question owing to the cognitive processing of direct and inverse items not necessarily being the same, particularly when reading ability is low (Marsh, 1986; Mestre, 2013). For this reason, inverse items in Likert-type scales, and even including inverse and direct items in the same questionnaire, can have a negative impact on the psychometric properties, and it is advisable to formulate all items in a direct manner (a more positive answer is associated with a higher level of the construct being evaluated) (Suárez-Álvarez et al., 2018; Vigil-Colet et al., 2020). One final aspect of the issues with dimensionality of the Grit-S scale is that authors such as Muenks et al. (2017) and Karaman et al. (2019) found that item 2 of the perseverance of effort dimension ("Setbacks don't discourage me"), had a factorial loading well below the recommended level, affecting the analysis of dimensionality.

The second debate about the Grit-S scale is reliability. Clark and Malecki (2019) found that many of the studies which used the Grit-S scale found it difficult to get a Cronbach α over 0.70, whether in one of the two dimensions noted above or in the overall test score, which would indicate that the Grit-S scale is not very reliable for measuring grit. Lastly, these issues have also been reflected in the validation of the Grit-S scale in Spain (Arco-Tirado et al., 2018), in which the reliability as estimated using the α coefficient for perseverance of effort was below 0.5, and the test demonstrated a better fit when it was taken as unidimensional.

All of this prompted the development of other measuring instruments (Clark & Malecki, 2019; Datu et al., 2017; Sturman & Zappala-Piemme, 2017). This included

identifying the need to develop and validate a new instrument to measure grit in Spanish, incorporating the most recent developments in psychometry, both in terms of Classical Test Theory and Item Response Theory models (AERA, APA, NCME, 2014; Downing & Haladyna, 2006; Haladyna & Rodriguez, 2013; Irwing, 2018; Lane et al., 2016; Muñiz, 2018; Muñiz & Fonseca-Pedrero, 2019; Schmeiser & Welch, 2006). In summary, the objective of this study is the development and validation of the first grit instrument for the Spanish-speaking population. To do that, we will review the evaluation of the grit construct based on the theory from Duckworth et al. (2007), and therefore the Grit-S scale (Duckworth & Quinn, 2009). This will allow us to take a new theoretical approach to the grit construct, considering it as a psychological trait composed of two theoretically different facets, the empirical evaluation of which is tested in a Spanish population.

Materials and method

Participants

The sample was initially made up of 630 participants from the general Spanish population. The sampling type was incidental. The final sample comprised 531 participants after removing 18.3% for responding incorrectly to two or more items in the control scale, which is described in the *instruments* section. The people in the sample came from 15 of the 17 autonomous communities making up Spain, which can be split into six zones (North: 67.4%; South: 5.8%; East: 10.3%; West: 3.9%; Central: 11.1%; and Islands: 1.1%). The members of the sample were aged between 18 and 83 years old, with a mean age of 38.60 and standard deviation 14.90 years. Almost two-thirds (60%) were women, and almost three-quarters (73.8%) were actively employed.

Instruments

Oviedo Grit Scale (EGO; Escala Grit de Oviedo)

In developing the Oviedo Grit Scale (EGO), we followed the criteria laid down by the European Federation of Psychological Associations (EFPA) for test evaluation (Evers et al., 2013) and the Standards for Educational and Psychological Evaluation (AERA, APA, NCME, 2014), along with the recommendations from current psychometric literature (Downing & Haladyna, 2006; Lane et al., 2016; Moreno et al., 2006, 2018; Muñiz & Fonseca-Pedrero, 2019). We constructed a sufficiently broad set of items (50 items) to cover each aspect of the two dimensions that *a priori* made up grit: perseverance of effort and consistency of interests. All of the items were written in a direct form (Suárez-Álvarez et al., 2018; Vigil-Colet et al., 2020). The first phase of the study involved performing quantitative and qualitative analyses to assess how representative the content was (Sireci & Faulkner-Bond, 2014). The first step was for these items to be reviewed by 24 psychologists. We asked them to rate the wording and the vocabulary of items on a scale of 1 to 10 (1 meaning "not suitable at all" and 10 "very suitable"), where the vocabulary had to be understandable to the general population and the wording had to be grammatically correct and clear. The scores the judges assigned were evaluated using Aikens V index, which for vocabulary produced a value of .93 [.87-.96 CI= 95%], and for wording .92 [.86-.95 CI= 95%], indicating excellent agreement (Penfield & Giacobbi, 2004). Nonetheless, two items were eliminated after scoring less than 8 in either vocabulary or wording. In the next step, we asked 57 experts in psychometry or psychological evaluation from various Spanish universities to assign each of the 48 items to one of two dimensions that theoretically make up grit: perseverance of effort and consistency of interests. The level of inter-rater agreement about which dimension items belonged to was examined. In addition, we performed a chi-square test for each of the items to determine whether there were

statistically significant differences between belonging to one or the other dimension. We removed 28 items for one of the following reasons: a) the initial assignment of the item was to a different dimension from the experts' assignment (in the judgement of 20% or more of the experts); b) there were no significant differences between belonging to one dimension or the other, according to the experts ($p>.05$); and c) the item had inter-rater agreement about which dimension it should be in below 80%. This allowed us to construct a preliminary instrument of 20 items (10 per dimension) to be analysed in the quantitative pilot study. The response item was a Likert-type with 5 alternatives (1 completely disagree, 5 completely agree).

Grit Short Scale (Grit-S; Duckworth & Quinn, 2009)

Grit-S is a questionnaire with 8 items evaluating two dimensions (4 items per dimension): perseverance of effort and consistency of interests. The item responses are given on a Likert scale from 1 (completely disagree) to 5 (completely agree). The validated Spanish version (Arco-Tirado et al., 2018), gave reliability coefficients of .75 for the grit construct overall, .77 for the consistency of interests dimension, and .48 for the perseverance of effort dimension. In the current study, the reliability (α) coefficients were: Grit: .73; consistency of interests: .66; and perseverance of effort: .53.

Battery for Enterprising Personality Assessment (BEPE; Cuesta et al., 2018)

The BEPE is questionnaire with 80 items that evaluate the eight personality dimensions that the literature identifies as most closely related to enterprising personality (10 items per dimension): self-efficacy, autonomy, innovativeness, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (see, Muñiz et al., 2014). The items are on a Likert scale from 1 (completely disagree) to 5 (completely agree). The instrument demonstrates good fit to a bifactor model, with

excellent reliability from the classical perspective, α= [.808 - .965] (Cuesta et al., 2018). It also demonstrates adequate precision from the point of view of IRT (Postigo et al., 2020). In the current study, the reliability (α) coefficients were as follows: Entrepreneurial Personality: .97; Self-efficacy: .89; Autonomy: .83: Innovativeness: .87; Internal locus of control: .87; Achievement motivation: .90; Optimism: .91; Stress tolerance: .83; and Risk-taking: .87.

Brief Self-Control Scale (BSCS; Tangney et al., 2004)

The BSCS is a questionnaire with 13 items which evaluates self-control (e.g. "I am good at resisting temptation") on a Likert scale from 1 (completely disagree) to 5 (completely agree). We used a Spanish version (Garrido et al., 2017). In the current study we used the total score as recommended by Lindner et al. (2015), which had a reliability (α) coefficient of .84.

Overall Personality Assessment Scale (OPERAS; Vigil-Colet et al., 2013)

The OPERAS is an instrument which evaluates the five personality traits in the Big Five model (Extraversion, Emotional Stability, Conscientiousness, Agreeableness, and Openness to Experience) (Costa & McCrae, 1992) via 7 items per dimension, using a Likert scale from 1 (completely disagree) to 5 (completely agree). The subscales demonstrate reliability (α) coefficients between .71 and .86, and the instrument has adequate evidence of convergent validity (Vigil-Colet et al., 2013). In the current study the reliability (α) coefficients were as follows: Extraversion: .82; Emotional Stability: .83; Conscientiousness: .72; Agreeableness: .67; Openness to Experience: .70.

Attentional control scale

This scale is made up of 10 Likert-type items with 5 response alternatives. The scale is used to detect participants who respond to the questionnaire randomly. The

items are of the type “In this question, please select option 4”, and were included amongst the items in the various instruments.

Procedure

We made individual contact with potential participants who met the inclusion criteria (being aged 18 or over). They were asked to respond to the questionnaire online, and to provide email addresses for other potential participants. The same process was repeated with these new potential participants. The questionnaire items were applied in a random order together with the attentional control scale items. We carried out the procedure for one month (March 2020). On average, participants took 40 minutes to complete their responses. Participants did not receive any remuneration for participating in the study. The anonymity of each participant was carefully respected, confidentiality was maintained, and we ensured strict compliance with current data protection laws (Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y garantía de los derechos digitales).

Data analyses

Quantitative pilot study

Once we had obtained the 20 items for the questionnaire (10 per dimension), we made a preliminary application of it to a sample of 222 people taken from the general Spanish population (M_{years}= 34.23, SD_{years}= 15.85) for a preliminary evaluation of the quality of the item set. We performed an Exploratory Factor Analysis (EFA) to examine the dimensionality of the instrument. We used KMO and the Bartlett statistic to assess the suitability of the data for factorial analysis. The EFA was performed on the Pearson correlation matrix, using Exploratory Robust Maximum Likelihood (RML) (Ferrando & Lorenzo-Seva, 2017) as the method of estimation. We determined the dimensionality of

the instrument by optimal implementation of parallel analysis (Timmerman & Lorenzo-Seva, 2011) with 1,000 random correlation matrixes. In addition, we used *Unidimensional Congruence* (UniCo), *Explained Common Variance* (ECV), and *Mean of Item REsidual Absolute Loadings* (MIREAL) to examine how well the data fit a single dimension. The following values support treating the data as essentially unidimensional: UniCo>.95; ECV>.85; MIREAL<.30 (Calderón-Garrido et al., 2019). We used the *Comparative Fit Index* (CFI) and the *Root Mean Square Error of Approximation* (RMSEA) as indices of fit, establishing a good fit when CFI>.95 and RMSEA<.06 (Hu & Bentler, 1999).

Following this, we used a mixed statistical-substantive strategy to choose the final 10 items for the questionnaire. The strategy consisted of choosing those items that differed most between each other from those that had a factorial loading over .50. In addition, we kept in mind that there should be at least 3 items from each domain and that there should be items related to perseverance in long term objectives, as well as consistency and passion for interests. Once the 10 final items were chosen, we performed an EFA to assess the dimensionality of the instrument, using all of the indicators and indices described above.

Psychometric assessment of the EGO instrument

Firstly, we examined the descriptive statistics of the 10 items in the new instrument. We analysed the item-test correlations (discrimination index) of each item, with them being considered suitable above .20 (Muñiz et al., 2005; Muñiz & Fonseca-Pedrero, 2019). Using Samejima's graduated model (Samejima, 1969) within the Item Response Theory (IRT) framework, we calculated the *a* parameter of item discrimination, which is adequate for values above 0.64 and very high when above 1.7 (Baker, 1985). We assessed whether items had an impact based on sex. For those items

that did, we examined Differential Item Functioning (DIF) using logistical regression (Gómez-Benito et al., 2013).

Following this, we examined the internal structure of the instrument via Confirmatory Factor Analysis (CFA) in order to confirm the unidimensional factorial structure found in the pilot study EFA. We used Maximum likelihood with robust standard errors (MLM) as the estimation method, and as indices of fit CFI, and RMSEA, with suitable fit indicated when CFI>.95, and RMSEA<.06 (Hu & Bentler, 1999). We also looked at information about X^2, degrees of freedom, and p-values, and the model residuals, as suggested by Kline (2011). In addition, owing to the importance of studying the factorial structure of a construct via different populations (Amérigo et al., 2020), we assessed measurement invariance based on sex and age (≤30 or >30), calculating configural, metric, and scalar invariance via Multi-Group Confirmatory Factor Analysis (MG-CFA). Because we are dealing with added models, to accept measurement invariance we allowed a change in CFI of less than -.01 (ΔCFI<-.01) (Chen, 2007).

We examined the reliability of the instrument via the alpha coefficient for ordinal data (Elosua & Zumbo, 2008) and McDonald's Omega coefficient (McDonald, 1999). We also looked at the precision of the instrument within the framework of IRT via the Test Information Function.

As evidence of validity in relation to other variables (AERA, APA, NCME, 2014), we calculated the Pearson correlation between the new EGO instrument and the Spanish validation of the Grit-S scale (Arco-Tirado et al., 2018; Duckworth & Quinn, 2009). In addition, we calculated the Pearson correlations between the new EGO and the following: a) the big five personality traits; b) self-control; and c) the eight specific dimensions of enterprising personality.

Lastly, we assessed possible differences in the grit construct as a function of sex and age (≤30 or >30 years old). In both cases we performed an independent samples *t* test.

The descriptive statistics, the DIF, the Pearson correlations, and the inter-group differences were calculated using the SPSS 24 statistics package (IBM Corp, 2016). The EFAs and the reliability coefficients were produced using FACTOR 10.5.03 (Lorenzo-Seva & Ferrando, 2013). The various CFAs were carried out using MPlus8 (Muthén & Muthén, 2017). Item Response Theory analyses were done using IRTPro (Cai, Thissen, & Du Toit, 2011).

Results

Quantitative pilot study

In the first EFA, both the KMO (.96) and Bartlett's statistic (<.001) demonstrated that the data was suitable for factorial analysis. With the results we obtained, it seemed wise to reject a bidimensional structure for grit and maintain the hypothesis that a single factor was sufficient to demonstrate the psychological processes that could explain grit (Calderón-Garrido et al., 2019). A single factor explained 52% of the total variance, the optimal implementation of parallel analysis suggested a single dimension, and we found the following indicators for a unidimensional structure, UniCo: .956, ECV: .901, MIREAL: .174, CFI: .988, and RMSEA: 0.057. Following this, and using the mixed statistical-substantive strategy described previously, we selected the 10 final items for the questionnaire.

We performed an EFA with the 10 final items, looking at the dimensionality of the instrument, indicating the data was suitable for factorial analysis (KMO: .96, Bartlett's statistic: <.001). Again, the results pointed towards rejecting a bidimensional

structure for grit, and we maintained the hypothesis that a single factor was sufficient to explain the psychological processes underlying grit (UniCo: .972; ECV: .905; MIREAL: .155; CFI: .999 and RMSEA: .001). From an exploratory perspective, that allowed us to determine the instrument to be essentially unidimensional.

Psychometric assessment of the EGO instrument

Firstly, we assessed the descriptive statistics for the items (Table 1). The values for each item in skewness and kurtosis were appropriate. The discriminatory power for each of the items was very high, both from a Classical Test Theory perspective (D.I: [.629 - .764]) and from IRT (parameter *a* [1.80 - 3.40]). Items 1, 2, 9, and 10 demonstrated an impact depending on sex, but none exhibited DIF.

……. *Insert Table 1 about here*…….……...

In the next step, we assessed the unidimensional factor structure of the instrument via a CFA. As Table 1 shows, the factor loadings were all very high [.536 - .804]. In addition, Table 2 shows the fit of the CFA for the overall sample, which was good (Hu & Bentler, 1999). The correlations between the residual values were adequate, ranging between -0.001 and 0.063 (Kline, 2011). Once the unidimensional factor structure of the EGO was confirmed, we continued with examining measurement invariance in relations to sex and age, the results of which are given in Table 2. Invariance was confirmed at the three levels examined (configural, metric, and scalar) in relation to both sex and age (Chen, 2007).

…….…….……*Insert Table 2 about here*…….……...

We continued by examining the instrument's reliability. From the point of view of the classical model, both Cronbach's alpha and McDonald's Omega demonstrated excellent reliability (α= .94; ω= .94). From an IRT standpoint, Figure 1 shows the

Information Function, where it is clear that the standard error is very low for the ability levels between -3 and +1.5 (S.E.<.50), and shows lower precision for those with ability levels greater than θ=1.5.

…….……*Insert Figure 1 about here*…….……...

With regard to validity evidence in relation to other variables, Table 3 shows the Pearson correlations between grit, measured using the new EGO instrument, and the other variables. The correlation between EGO and Grit-S was high, particularly in the perseverance of effort dimension and in the overall score. In addition, grit demonstrated strong relationships with self-efficacy, self-control, and conscientiousness. This is all evidence of convergent validity, as the new grit test demonstrates a relationship to these external variables but is not reduced to them, it has its own identity. People who are considered *able* to do a task or achieve a long-term goal (self-efficacy), those who have some control over their short-term behavior (self-control), and those who are considered responsible, perfectionist, hard-working, and ordered (conscientiousness), tend to be those who exhibit more passion and perseverance for long-term objectives (EGO). It is worth noting the strong correlation with achievement motivation, and with the overall BEPE scores (Enterprising Personality). As evidence of discriminant validity, the EGO instrument exhibited weak correlations with stress tolerance, extraversion, agreeableness, emotional stability, and openness to experience. Both EGO domains demonstrated very similar correlations with all of the external variables. This is consistent with the hypothesis of the unidimensionality of the grit construct. All of this provides evidence for the validity of the EGO test scores, showing it to be an essentially unidimensional instrument allowing the evaluation of passion and perseverance for long-term objectives in various contexts.

On the other hand, Table 4 gives the correlations between Grit-S and the other variables. Grit-S shows moderate-high correlations with EGO domains items. It is worth calling attention to the weak evidence of validity in relation to other variables shown by the *consistency of interests* dimension, exhibiting very low correlations with all of the external variables except self-control and conscientiousness. In addition the overall Grit-S score has a low-moderate correlation with the various external variables, and it is perseverance of effort that exhibits the highest correlations, particularly with self-efficacy, achievement motivation, conscientiousness, risk-taking, and self-control.

……. *Insert Table 3 about here*……...

……. *Insert Table 4 about here*……...

Lastly, we examined whether there were differences in grit as a function of sex and age. Women (*M*= 40.24) exhibited no statistically significant differences (p=.059) to men (*M*= 39.22), and subjects aged between 18 and 30 (*M*= 39.51) exhibited no statistically significant differences (p= .266) to those over 30 (*M*= 40.10).

Discussion

The aim of this study was the development and validation of the Oviedo Grit Scale. This new instrument, in addition to being in Spanish, is an attempt to overcome some of the psychometric issues found in prior grit scales related to dimensionality as well as reliability and validity (Arco-Tirado et al., 2018; Clark & Malecki, 2019; Gonzalez et al., 2019).

From both exploratory and confirmatory perspectives, the new 10-item EGO demonstrates an essentially unidimensional internal structure (Calderón-Garrido et al., 2019), confirming previous studies that had shown grit to be unidimensional (Areepattamannil & Khine, 2018; Gonzalez et al., 2019). In addition, the new EGO

instrument demonstrated measurement invariance in terms of sex and age, and therefore one could assume that the instrument measures the same construct in all of the groups examined, allowing for non-biased comparisons between these groups (Thompson, 2016), as recommended by the standards for Educational and Psychological Evaluation (AERA, APA, NCME, 2014). Furthermore, none of the items exhibited DIF in terms of sex or age, and the discriminatory power of each item was very high, both discrimination indices and the IRT parameter *a*.

The new EGO instrument has excellent reliability from within the framework of Classical Test Theory (α = .94; ω = .94). From an IRT standpoint, it exhibits adequate precision over all of the ability levels, with the highest errors for ability levels over 1.5. It is important to bear in mind that the precision of EGO is reduced for theta levels over 1.5, therefore caution is advised when evaluating people with very high scores in the EGO scale. In the light of these results, the new EGO scale offers clear advantages over other instruments which have shown lower reliability (Arco-Tirado et al., 2018; Clark & Malecki, 2019).

In terms of evidence of validity in relation to other variables, EGO demonstrated evidence of convergent validity (Evers et al., 2013) with the most well-known, commonly-used instrument for evaluating grit (Grit-S), especially in the correlation with the perseverance of effort dimension (r= .752), and with the overall grit score (r= .691). Considering that the EGO scale items were relevant to the two facets used to construct it, it is notable that both facets correlate more strongly with the Grit-S scale *perseverance of effort* dimension than its *consistency of interests* dimension. One possible explanation is that in the Grit-S scale, all of the items in the *consistency of interests* scale are reversed, which can give rise to problems in interpreting the items, as the cognitive processing would not necessarily be the same (Marsh, 1986; Mestre,

2013), which may have a negative impact on the test's psychometric properties (Suárez-Álvarez et al., 2018; Vigil-Colet et al., 2020). In addition, looking at the correlations of the two EGO domains, we can see that they are similar with all of the external variables, another indication of the unidimensionality of the EGO instrument. Finally, another explanation might be, as Table 4 shows, that the Grit-S dimension *consistency of interests* exhibits very weak relationships with the external variables in general.

Additionally, the EGO test scores demonstrated strong links with conscientiousness from the Big Five (r= .661), as well as with one facet of this construct, self-control (r= .595), as previous research has shown (Duckworth & Gross, 2014; Muenks et al., 2017; Oriol et al., 2017; Schmidt et al., 2018, 2020), providing evidence of convergent validity. This fits with the statement that self-control, conscientiousness, and persistence are the three variables that define performance in a task (Kankaraš & Suárez-Álvarez, 2019). Nonetheless, it is worth stressing that these correlations are somewhat weaker than those between EGO and motivational measures such as self-efficacy (r= .703) and achievement motivation (r= .871) (Steinmayr et al., 2018; Usher et al., 2019). One possible explanation is that conscientiousness, measured via OPERAS (Vigil-Colet et al., 2013), is not focused on any of this construct's facets, the 7 items making it up are centered on being responsible, not avoiding obligations, not leaving things half-done and untidy, and a certain perfectionism without wasting time. This general measure of conscientiousness attempts to address different scenarios in its makeup, but it does not allow sufficient investigation into the facets that make up conscientiousness (and in particular the facet of industriousness), which is why such a general measure can affect the correlation with EGO, although the correlation continues to be medium-high (r= .661).

Despite that, EGO cannot be reduced to a measure of industriousness. This industriousness (or productiveness) facet is defined as diligence and the pursuit of objectives, as well as a work ethic, understood as the belief that working hard deserves reward. Thus the industrious instrument focuses on the person setting tasks and objective and doing them effectively. In contrast the grit construct, underlying the EGO items, adds to that these aspects of passion for reaching long-term objectives, through maximum dedication of time and effort to achieve goals, without concern about how often one fails in the attempt ("fall seven times, get up eight"; Duckworth, 2016). EGO also includes persistence in the face of adversity, in addition to this consistency of interests and clarity in established objectives.

Self-efficacy and achievement motivation are two variables in the BEPE (Cuesta et al., 2018; Muñiz et al., 2014; Postigo et al., 2020), a test battery for evaluating enterprising personality. This approach is a little different to other studies which have used these variables in relation to grit, which have been more academic (Steinmayr et al., 2018; Usher et al., 2019). In this regard, our study used these variables with a more business and work related focus (e.g. Mueller et al., 2017).

As evidence of discriminant validity, the EGO exhibited weak correlations with variables such as extraversion, agreeableness, emotional stability, openness to experience, and stress-tolerance. With regard to this last variable, despite prior studies having shown grit to be negatively correlated with clinical tests of depression and anxiety (e.g. Musumari et al., 2018), the fact of demonstrating high levels of grit does not necessarily mean demonstrating high levels of stress-tolerance, understood as appropriate use of coping strategies. It is logical to think that high tolerance to stress would make it easier to cope with adversity and setbacks one may encounter during the process of reaching long-term objectives. Similarly, the fact of demonstrating passion

and perseverance for long-term objectives would make it easier to maintain one's equilibrium, concentration, and to keep calm in adversity. However, they are two variables that can, to a certain extent, function independently (r= .354).

Given all that, EGO is a useful tool for the evaluation of passion and perseverance for long-term objectives, and can be applied in the various contexts in which grit has been shown to have an influence, such as education (Fong & Kim, 2019), health (Datu et al., 2019), and the workplace (Jordan et al., 2019). Nonetheless, it is worth highlighting that this instrument, and the underlying theory behind it, moves away from the bidimensional theory posed by Duckworth et al. (2007) as we consider that both perseverance of effort and consistency of interests are constructs that are difficult to separate. If a person says that they persevere in a certain objective over the long term, it is reasonable to also think that they are going to have a certain consistency of interest (a passion) for that certain objective. As we noted above, one of the possible reasons for the bidimensionality of the Grit-S scale (Duckworth & Quinn, 2009), is that for one of the dimensions, all of the items are reversed (*inconsistency of interests*). However, we are aware that despite the empirical findings of the present study showing that both passion and perseverance to be two facets of grit that make up an essentially unidimensional structure, from a theoretical and conceptual standpoint it makes a great deal of sense to maintain a distinction between them. This represents a line for future research that would be extremely interesting as it would help lead to a much better understanding of the relationship between the theoretical conceptualization of grit and its empirical evaluation.

We did not find differences in grit between men and women, in line with findings in the meta-analysis by Credé et al. (2017). Nor were there differences in grit between younger and older subjects, as Duckworth et al. (2007) found in their initial

study. However, longitudinal studies are needed with EGO to properly establish whether levels of grit change over time, and to answer questions about considering grit a trait or state. Finally, we must consider future lines of research. Firstly, it would be useful to study the EGO in a school context, in under-18s. This would allow us to study the relationship between grit and academic performance in schoolchildren, as it is a variable that educational policymakers consider to be important for educational evaluation (Kirchgasler, 2018). Secondly, the creation of instruments to measure grit as specific domains, such as academic grit (Clark & Malecki, 2019; Schmidt et al., 2019), may be of great interest. In this way it would be possible to study whether formulating items in grit scales independent of their context or not would have an impact on the construct's predictive validity. In addition, in future studies it would be interesting to study EGO with the nomological network of conscientiousness, for example using BFI-2 (Soto & John, 2017), and examining EGO's different correlational patterns with the different facets of conscientiousness.

Finally, EGO demonstrated a strong relationship to the BEPE (Cuesta et al., 2018), both with the eight specific facets and with the overall dimension of enterprising personality. It would be interesting for future studies to analyse EGO in connection with entrepreneurial activity (Arco-Tirado et al., 2019; Mueller et al., 2017). In conclusion, our current study shows a new 10-item tool (EGO) for assessing grit, with appropriate psychometric properties in terms of reliability and validity. In this manner, the construct of grit can be rigorously, objectively evaluated, as can its impact on significant aspects of life that it has an effect on, such as education (Fong & Kim, 2019), health (Moore et al., 2018), and work (Jordan et al., 2019) to cite just a few. These results should be considered in the light of some limitations that future work should take into account. Firstly, the sampling was not strictly random, which should lead to caution when

generalizing from the results. We did not get any data from under 18s, so the results cannot be arbitrarily extended to these ages. The correlational methodology we used does not allow causal relationships to be established unambiguously, nor does it allow the analysis of the longitudinal behaviour of these variables to be analysed.

Disclosure statement

The authors declare that there are no conflicts of interest.

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Table 1.

Descriptive statistics of the items in the Oviedo Grit Scale

Domain	Item	Mean	SD	Sk	K	D.I	*a*	F.L
Consistency of interests	1. When I set myself an objective, I continue until I achieve it. [Cuando me planteo un objetivo persisto en él hasta conseguirlo]	4.10	.758	-.634	.244	.752	3.06	.789
	2. I do what I set out to do. [Cumplo lo que me propongo]	3.99	.720	-.448	.194	.720	2.62	.536
	3. I am consistent in my interests. [Soy constante en mis intereses]	4.06	.775	-.569	.155	.687	2.30	.725
	4. I am clear about my objectives. [Tengo mis objetivos claros]	4.12	.799	-.733	.428	.729	2.69	.768
	5. Even though the results seem far off, I persist in the task. [Aunque los resultados se vean muy lejos, persisto en la tarea]	3.96	.798	-.665	.630	.669	2.16	.698
Perseverance of effort	6. I work hard every day to get closer to my goals. [Cada día trabajo duro para acercarme más a mis objetivos]	3.97	.823	-.540	-.051	.660	1.99	.688
	7. When I have a project in mind I do everything possible to get it done. [Cuando tengo un proyecto en mente hago todo lo posible por llevarlo a cabo]	4.04	.805	-.599	.078	.735	2.73	.766
	8. I spend as much time and energy as I can on reaching my goals. [Dedico el máximo de mi tiempo y energía a lograr mis metas]	3.60	.904	-.351	-.112	.629	1.80	.660
	9. If I set myself something to do, I will work on it until I achieve it. [Si me propongo algo, trabajaré en ello hasta conseguirlo]	4.08	.701	-.440	.135	.764	3.40	.804
	10. I finish what I start. [Termino lo que empiezo]	3.93	.826	-.700	.614	.675	2.14	.699
	Total. Grit score	39.86	6.04	-.500	.106	-	-	-

Note. SD= standard deviation; Sk= skewness; K= kurtosis; D.I= discrimination index; *a*= discrimination index from Item Response Theory; F.L= factor loading

Table 2.

Fit indices for the one-factor model of the Oviedo Grit Scale.

		X^2/df (p-value)	CFI	RMSEA [90% CI]	ΔCFI
Total		2.43 (<.001)	.980	.050 [.038-.066]	-
Women		2.26 (<.001)	.994	.062 [.043-.081]	-
Men		1.96 (<.001)	.990	.069 [.044-.094]	-
	Configural Invariance	1.99 (<.001)	.994	-	-
	Metric Invariance	1.70 (<.001)	.995	-	.001
	Scalar Invariance	1.55 (<.001)	.994	-	-.001
≤30 years		1.74 (<.001)	.994	.058 [.032-.083]	-
>30 years		2.56 (<.001)	.992	.071 [.052-.089]	-
	Configural Invariance	2.00 (<.001)	.993	-	-
	Metric Invariance	1.12 (<.001)	.999	-	.006
	Scalar Invariance	1.10 (<.001)	.999	-	0

Note. N= 531; Women, n= 329; Men, n= 202; ≤30 years, n= 219; >30 years, n= 312; X^2= Satorra-Bentler chi-square; df= degrees of freedom; CFI= comparative fit index; RMSEA= root mean square error of approximation with 90% confidence interval; ΔCFI= CFI change.

Table 3.

Pearson correlations between EGO and GRIT-S, BEPE, BSCS and OPERAS tests

	EGO Total	EGO Perseverance of effort	EGO Consistency of interests
Grit-S			
Grit-S Perseverance of effort	.752	.744	.704
Grit-S Consistency of interests	.479	.458	.465
Grit-S Total	.691	.674	.657
BEPE			
Self-efficacy	.703	.663	.693
Autonomy	.473	.452	.460
Innovativeness	.532	.515	.510
Internal Locus of Control	.525	.512	.499
Achievement motivation	.871	.836	.842
Optimism	.417	.386	.419
Stress Tolerance	.354	.326	.356
Risk-Taking	.625	.608	.597
BEPE Total	.728	.694	.709
OPERAS			
Extraversion	.183	.177	.175
Emotional Stability	.289	.260	.298
Conscientiousness	.661	.647	.627
Agreeableness	.158	.161	.144
Openness to Experience	.095	.107	.076
BSCS			
Self-Control	.595	.561	.586

Note. EGO= Oviedo Grit Scale; Grit-S= Grit Short Scale; BEPE= Battery for Enterprising Personality Assessment; BSCS= Brief Self-control Scale; OPERAS= Overall Personality Assessment.

Table 4.

Pearson correlations between GRIT-S and BEPE, BSCS, OPERAS tests and EGO items.

	GRIT-S Total	GRIT-S Consistency of interests	GRIT-S Perseverance of effort
BEPE			
Self-efficacy	.454	.235	.595
Autonomy	.299	.120	.436
Innovativeness	.303	.098	.472
Internal Locus of Control	.305	.149	.411
Achievement motivation	.590	.362	.702
Optimism	.278	.098	.422
Stress Tolerance	.330	.175	.428
Risk-Taking	.366	.165	.510
BEPE Total	.477	.228	.649
OPERAS			
Extraversion	.152	.087	.190
Emotional Stability	.387	.290	.394
Conscientiousness	.722	.547	.728
Agreeableness	.202	.161	.193
Openness to Experience	.118	.108	.095
BSCS			
Self-Control	.709	.615	.615
EGO items			
Consistency of interests 1		.364	
Consistency of interests 2		.370	
Consistency of interests 3		.375	
Consistency of interests 4		.348	
Consistency of interests 5		.404	
Perseverance of effort 1			.582
Perseverance of effort 2			.554
Perseverance of effort 3			.513
Perseverance of effort 4			.570
Perseverance of effort 5			.704

Note. Grit-S= Grit Short Scale; BEPE= Battery for Enterprising Personality Assessment; BSCS= Brief Self-control Scale; OPERAS= Overall Personality Assessment; EGO= Oviedo Grit Scale.

Figure 1. Information Function of the Oviedo Grit Scale.

3.5. Quinto Artículo

Postigo, Á., Cuesta, M., y García-Cueto, E. (2021). Entrepreneurial personality, conscientiousness, self-control, and grit: The psychological side of self-employment. ***Anales de Psicología, 27*****(2), 361-370.**

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El objetivo de este artículo es analizar grupos latentes en torno a la personalidad emprendedora y estudiar posibles diferencias en otros rasgos de personalidad. Además, este artículo somete a prueba un modelo que trata de predecir cuáles son las características de personalidad que llevan a una persona a emprender (o no) un negocio. La principal aportación de este artículo a la Tesis Doctoral es el estudio de posibles perfiles de personalidad emprendedora, así como el desarrollo y comprobación de un modelo donde se analizan las características de personalidad que llevan a una persona a convertirse en trabajadora por cuenta propia.

Factor de impacto JCR 2020 = 2,046; Q3.

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Entrepreneurial Personality, Conscientiousness, Self-control, and Grit: The Psychological Side of Self-employment

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Título: Personalidad emprendedora, responsabilidad, autocontrol y grit: El lado psicológico del autoempleo.

Resumen: El enfoque psicológico en torno a la actividad emprendedora contribuye a explicar por qué las personas deciden o no emprender. El objetivo del presente estudio es analizar diferentes perfiles de personalidad emprendedora, así como identificar las variables de personalidad que puedan explicar el convertirse en trabajador por cuenta propia. Empleando una muestra de 586 participantes (M_{edad} = 39.31; DT_{edad} = 14.66), se analizaron diferentes perfiles de personalidad emprendedora mediante técnicas de análisis de perfiles latentes. Además, se analizó si había diferencias en otras variables psicológicas en función del perfil de personalidad emprendedora. Finalmente, se estudió, mediante un modelo de ecuaciones estructurales, si la responsabilidad, el autocontrol, el *grit* y la personalidad emprendedora ayudan a explicar que las personas se conviertan en trabajadores por cuenta propia. Los resultados apoyan la existencia de tres perfiles latentes de personalidad emprendedora (baja, media y alta), siendo el perfil alta personalidad emprendedora el que muestra mayores puntuaciones en otras variables psicológicas, así como mayor proporción de trabajadores por cuenta propia. El modelo de ecuaciones estructurales planteado explica un 2.6% de la varianza de la variable ser trabajador autónomo, por lo que las variables de personalidad ayudan a explicar una pequeña parte de la actividad emprendedora.

Palabras clave: Personalidad emprendedora. Autocontrol. Responsabilidad. *Grit.* Autoempleo. Emprendimiento.

Abstract: The psychological approach to entrepreneurial activity helps to explain why people decide or not to undertake. The objective of this study is to analyze different entrepreneurial personality profiles, as well as to identify the personality variables that can explain becoming a self-employed. Using a sample of 586 participants (M_{age} = 39.31; SD_{age} = 14.66), different entrepreneurial personality profiles were analyzed using latent profile analysis techniques. In addition, it was analyzed whether there were differences in other psychological variables based on the entrepreneurial personality profile. Finally, it was studied, using a structural equation model, if conscientiousness, self-control, grit and entrepreneurial personality help to explain why people become self-employed. The results support the existence of three latent profiles of entrepreneurial personality (low, medium and high), being high entrepreneurial personality the one profile that shows higher scores in other psychological variables, as well as a higher proportion of self-employed. The proposed structural equation model explains 2.6% of the variance of the variable being self-employed, so the personality variables help to explain a small part of entrepreneurial activity.

Keywords: Entrepreneurial personality. Self-control. Conscientiousness. Grit. Self-employment. Entrepreneurship.

Introduction

Why people become self-employed is an important question given that entrepreneurial activity is an essential part of the functioning of any economy (OECD, 2014). In addition, small and medium-sized business enterprises (SMEs) make up 99% of all businesses (OECD, 2019), representing a significant source of employment and productivity, and contributing to the social and economic growth of each country (Van Praag & Versloot, 2007).

The study of entrepreneurial activity has taken different approaches, such as the sociological, which aims to study the different social structures or levels that influence entrepreneurs (Chell, 2008), the economic, which places more stress on aspects such as resources, capital, and business opportunities, and finally the psychological, which examines the individuals' personal characteristics related to entrepreneurial activity (Frese & Gielnik, 2014).

Within the psychological approach, the study of entrepreneurial personality has grown exponentially in the last decade (Chandra, 2018; Gao et al., 2020; Kerr et al., 2018), giving particular importance to the psychological component of entrepreneurialism (Baum et al., 2007; Frese et al., 2016). This emphasis on researching entrepreneurial personality has been encouraged by its capacity in predicting business creation and success (Rauch & Frese, 2007b). As Rauch and Frese put it, "research about entrepreneurial activity cannot develop a coherent theory if it does not consider personality variables" (Rauch & Frese, 2007a, p. 375). In addition, this research focus has also been because of the possible malleability of peoples personalities, recent studies in the organizational arena have shown the possible fluctuation of personality traits (Li et al., 2019, 2020). For example, in a longitudinal study, Li et al. (2020) recently demonstrated how workers who were promoted as leaders ten years previously had increased their levels of conscientiousness.

In the context of entrepreneurial activity, the first line of personality research centered on the general Big Five model, finding that conscientiousness was what demonstrated the strongest relationship with entrepreneurial intention, activity, and success (Ahmed et al., 2020; Brandstätter, 2011; Farrington, 2012; Hachana et al., 2018; López-Núñez et al., 2020; Zhao & Seibert, 2006). The personality factors making up the Big Five model have been shown to explain 13% of the variance in entrepreneurial activity and 10% of the variance in the success of those who start a business (Zhao et al., 2010). The second line of research is a deeper examination

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of which specific personality traits are related to entrepreneurial behavior (Rauch & Frese, 2007a; Shane & Nicolaou, 2015). Within this second line, various personality traits have been related with entrepreneurial behavior, including self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (Cuesta et al., 2018; Muñiz et al., 2014; Postigo, García-Cueto, et al., 2020; Rauch & Frese, 2007a; Suárez-Álvarez et al., 2014), with entrepreneurs exhibiting higher scores in these traits than those who do not start businesses (Rauch & Frese, 2007b; Stewart & Roth, 2015; Zhao et al., 2010). The use of specific personality traits also provides more predictive validity than the use of the Big Five model (Leutner et al., 2014).

Nonetheless, in recent years, researchers have begun to examine other psychological traits related to entrepreneurial activity. These include grit, which is understood as the passion and perseverance for achieving long-term goals (Leutner et al., 2014). It is worth noting other psychological variables related to but different from grit, such as persistence. Both variables share the idea of effort through which obstacles are overcome (Baum & Locke, 2004), however, grit would add the passionate focus on something specific in order to achieve long-term objectives (Cardon et al., 2009; Duckworth, 2016). Grit is a variable that positively affects both the fact of starting a business, and the subsequent success (Mooradian et al., 2016; Mueller et al., 2017), particularly when people have sufficient financial resources and are dissatisfied with their current jobs (Arco-Tirado et al., 2019; Wolfe & Patel, 2016). In general, there are two components supporting the idea that grit is a variable that positively influences entrepreneurial behavior. On the one hand, it is the focus on something specific in order to achieve long-term objectives (Duckworth, 2016; Eskreis-Winkler et al., 2014), and on the other, the passion for those objectives (Hubner et al., 2019; Newman et al., 2019). These two components make grit an important variable in entrepreneurship because entrepreneurs often have to make considerable efforts and overcome adversity and setbacks in order to achieve success with their businesses (Foo et al., 2009). One clear, recent example of adversity and setback is the COVID-19 pandemic (JHCRC, 2020), where many enterprises have had to act and adapt extremely quickly in order to save their businesses (Kuckertz et al., 2020).

Despite this, grit may be considered a necessary but not sufficient condition for business success (Clark & Clark, 2019). Other psychological variables must be considered in this regard such as conscientiousness and self-control. Conscientiousness is focused on completing tasks, something that is very important in achieving long-term goals, and it has been shown to be very strongly related to grit (Schmidt et al., 2018, 2020). Self-control, or the regulation of thoughts, feelings and actions when goals that are considered permanent come into conflict with goals that are more gratifying at that moment (Duckworth et al., 2019), is also related to grit (Duckworth & Gross, 2014), as it is logical to think that someone who is passionate and perseveres towards long-term objectives must be capable of rejecting short-term temptations that could interfere with the objectives. This is related to delayed gratification (Mischel, 2014). Thus, these variables are related to the intention and action of starting a business (Butz et al., 2018; Van Gelderen et al., 2015).

In this context, our study focuses on three specific objectives. The first is to determine latent profiles for people according to the specific traits identified in the literature as most closely related to entrepreneurial personality (self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking). The second objective is to examine the possible differences between the profiles of entrepreneurial personality in other psychological constructs related to entrepreneurship such as conscientiousness, self-control, and grit, as well as the differences in the profiles between people who work for themselves and people who work for others. Lastly, the final objective is to test a mathematical model, via structural equations, that would help to explain the relationship between conscientiousness, self-control, grit, specific traits of entrepreneurial personality, and being self-employed or not.

Method

Participants

The sample was initially composed of 720 participants drawn from the general Spanish population. The sampling was incidental. The final sample comprised 586 participants, following the elimination of 18.6% for responding incorrectly to two or more items in the control scale, described in the *instruments* section. Members of the sample came from 15 of the 17 Spanish autonomous communities, divided as follows according to six regions (North: 69.9%; South: 5.5%; East: 9.1%; West: 3.7%; Central: 10.7%; and Islands: 1.1%). The participants were aged between 18 and 83 years old, with a mean of 39.31 and standard deviation of 14.66. Almost two-thirds (64.2%) were women and 15% of the sample were self-employed.

Instruments

Oviedo Grit Scale (Escala Grit de Oviedo, EGO; Postigo, Cuesta, García-Cueto, et al., 2020).

The EGO is a unidimensional questionnaire with 10 items that evaluates grit ("Although the results seem very far off, I persist in the task"). The items use a Likert-type response from 1 (completely disagree) to 5 (completely agree). The instrument has excellent reliability (α = .94), as well as good evidence of convergent validity (Postigo, Cuesta, García-Cueto, et al., 2020). In this study, the EGO demonstrated excellent reliability (α = .92).

Battery for the Assessment of the Enterprising Personality (BEPE; Cuesta et al., 2018).

The BEPE is a questionnaire with 80 items which evaluates the eight dimensions of personality that have been identified in the literature as most closely related to entrepreneurial personality (10 items per dimension): Self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking (see, Muñiz et al., 2014). The items use a Likert-type response from 1 (completely disagree) to 5 (completely agree). The instrument demonstrates a good fit to a bifactor model, exhibiting excellent reliability in terms of internal consistency α = [.81 - .97] (Cuesta et al., 2018). The Information Function (Item Response Theory Models) also exhibits adequate values for precision (Postigo, Cuesta, Pedrosa, et al., 2020). All of the items are worded positively to reduce response bias (Vigil-Colet et al., 2020). In the current study, the reliability via the α coefficient was: Entrepreneurial personality: .97; self-efficacy: .89; autonomy: .83: innovation: .87; internal locus of control: .87; achievement motivation: .90; optimism: .91; stress tolerance: .83; and risk-taking: .87.

Brief Self-Control Scale (BSCS; Tangney et al., 2004).

The BSCS is a questionnaire with 13 items that assesses self-control (e.g., "I am good at resisting temptation"). We used the Spanish adaptation from Garrido et al. (2017). As recommended by Lindner et al. (2015), in this study we used the total score for the scale, with a reliability (α) of .84.

Overall Personality Assessment Scale (OPERAS; Vigil-Colet et al., 2013).

OPERAS is an instrument that assesses the Big Five personality traits (extraversion, emotional stability, conscientiousness, agreeableness, and openness to experience) via 7 items per dimension, using a Likert-type response from 1 (completely disagree) to 5 (completely agree). The subscales exhibit α coefficients between .71 and .86, and the instrument has suitable evidence of convergent validity (Vigil-Colet et al., 2013). In the present study, the α coefficients were: Conscientiousness: .72; extraversion: .83; agreeableness: .67; emotional stability: .83; openness to experience: .70.

Attentional control scale

This is a 10-item scale with 5-point Likert-type responses. The aim of this scale is to detect participants who answer the questions carelessly. Items are of the type "In this question, please select option 4". These items were interspersed between the items in the different scales.

Procedure

We began by contacting potential participants who met our inclusion criteria. These were, to be over 18 years old and to be actively employed/working, regardless of age, salary, or employment sector, including whether private, public, or non-profit. Potential participants were contacted through social networks close to the study authors and through professional social networks. We asked the potential participants to complete the online questionnaire, to provide contact details for other potential participants, and to publicize the online questionnaire to other potential participants (who met the inclusion criteria). We repeated the same request with these new participants. This procedure lasted a month (March 2020). The mean time taken for respondents to complete the questionnaire was 40 minutes. The items from each scale were randomly applied, along with the items from the attentional control scale, with the condition that items measuring the same trait could not follow each other. The participants received no remuneration for their participation. Participation was anonymous and confidentiality was maintained in accordance with relevant data protection and privacy laws (Organic Law 3/2018, 5 December, on Protection of Personal Data and Assurance of Digital Rights).

Data analysis

We performed a Latent Profile Analysis (LPA), which is a technique within the person-centered approach, in which a sample is assumed to contain various subsamples with different scores. The aim of using this technique was to identify profiles through the eight specific traits of entrepreneurial personality in the BEPE (Cuesta et al., 2018): Self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress tolerance, and risk-taking. First, we explored different models of latent profiles to determine which best represented the data. The idea was to group people together who had similar profiles of the eight specific traits (Vermunt & Magidson, 2002). We specified models with between 2 and 8 latent profiles, and to choose the number of profiles in the model we considered various indices of parsimony: the Bayesian Information Criterion (BIC) and its sample-adjusted version (ABIC) to correct for the possible effects of large sample sizes, and the Akaike Information Criterion (AIC). Lower values of these three indices indicate more parsimonious models. We also used the entropy indicator, which is between 0 and 1. A higher value for entropy indicates better separation between the latent profiles (Lanza & Cooper, 2016). The final criterion, and necessary condition, was that each profile must represent at least 5% of the sample, otherwise the model would be rejected for having non-representative profiles. The selected model would demonstrate the best parsimony from among those in which all of the profiles represented at least 5% of the total sample. The recommendation for entropy is that it is greater than .70. Once we selected the model, we defined each of

the latent profiles according to the scores in each of the specific traits of entrepreneurial personality. The direct scores were converted into standardized scores to make interpretation easier.

Once the latent profiles were defined, we compared the percentage of self-employed and non-self-employed workers in each latent profile. We did this using a chi-square test of independence.

To determine whether there were differences between the profiles of entrepreneurial personality according to the scores in grit, self-control, and the Big Five variables we performed successive ANOVAs, using Cohen's *d* to measure the effect size, with values between 0.2 and 0.4 being a small effect size, between 0.5 and 0.7, a medium effect size, and over 0.7, a large effect size (Cohen, 1988). As we were analyzing 7 variables about the same groups, we corrected for Type I error using Bonferroni correction $\alpha = .05/7$, giving a significance level of .0071. We used Bonferroni's test to determine differences between the different groups.

Lastly, we specified a structural equation model (path analysis) to try and model the relationships between the different psychological variables (conscientiousness, self-control, grit, and entrepreneurial personality) and being self-employed or not. We used Robust Maximum Likelihood (MLR) as the method of estimation, and the indices of fit we used were the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA), with CFI > .95 and RMSEA < .06 indicating good fit (Hu & Bentler, 1999).

The LPA and the structural equation model were produced using MPlus8 (Muthén & Muthén, 2017). The various ANOVAs and the chi-square test were done using SPSS 24 (IBM Corp, 2016).

Results

We produced models with between 2 and 8 latent profiles (Table 1). Although the model with 8 profiles had the best fit (albeit not the best entropy), we chose the model with 3 latent profiles because the subsequent models had profiles that represented less than 5% of the sample and so were not representative.

Table 1
Fit of the different latent profile models.

	Profiles						
	2	**3**	4	5	6	7	8
AIC	28,199.612	**27,541.589**	27,269.370	27,130.387	27,052.775	26,998.328	26,946.906
BIC	28,308.945	**27,690.282**	27,457.423	27,357.799	27,319.547	27,304.461	27,292.399
ABIC	28,229.579	**27,582.344**	27,320.913	27,192.718	27,125.894	27,082.235	27,041.601
Number of groups <5% of the sample	0	**0**	1	1	1	2	3
Entropy	.831	**.885**	.910	.850	.855	.877	.855

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; ABIC = Adjusted BIC

We used the scores in the eight specific traits defining entrepreneurial personality to characterize each profile (Figure 1). The first profile, called *low entrepreneurial personality,* demonstrated low scores in all of the variables, around one standard deviation below the mean in each variable, and represented 17% of the sample. The second profile, *moderate entrepreneurial personality,* had moderate scores in each variable, and represented 56% of the sample. The final profile, *high entrepreneurial personality*, had high scores in each variable (around one standard deviation above the mean), and represented 27% of the sample. The traits which differed most between the profiles were self-efficacy, innovation, achievement motivation, and risk-taking.

We compared the percentages of self-employed and non-self-employed workers in each latent profile of entrepreneurial personality. Table 2 gives the different percentages. There were only statistically significant differences ($p < .05$) in the *high entrepreneurial personality* profile, with more self-employed than non-self-employed, indicating a relationship between the *high entrepreneurial personality* profile and the number of self-employed.

Figure 1
Mean scores of the latent profiles in the BEPE variables.

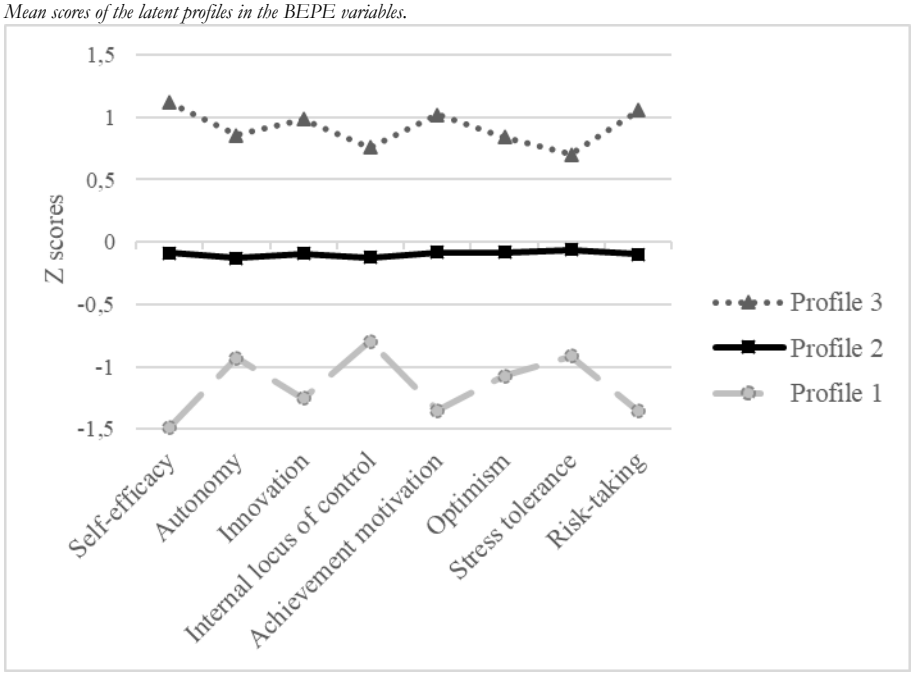


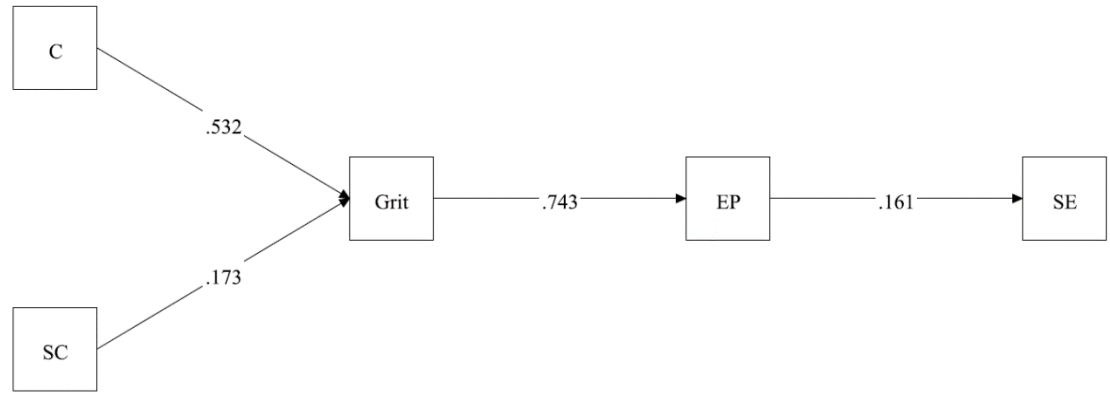
Table 2
Percentage of self-employed and non-self-employed according to latent profiles.

	Non-self-employed (%)	Self-employed (%)
Low Entrepreneurial Personality	86 (17.27)	12 (13.63)
Medium Entrepreneurial Personality	287 (57.63)	44 (50.00)
High Entrepreneurial Personality	125 (25.10)	32 (36.37)

We then performed successive ANOVAs to determine whether there were statistically significant differences between the entrepreneurial personality profiles in grit, self-control, and the Big Five variables. With the exception of openness to experience, we found differences in all of the variables, and apart from agreeableness, the differences all had large effect sizes according to Cohen's (1988) general criteria (> 0.7), in favor of the profile with the highest entrepreneurial personality.

Finally, the structural equation model demonstrated excellent fit (CFI = .991; RMSEA = .032 [.001 - .072 90% CI]), and there were no modification indices that would indicate areas of poor local fit. Conscientiousness and self-control help to explain grit (r^2 = .448). Grit, in turn, explains entrepreneurial personality (r^2 = .552), which helps to explain being self-employed (r^2 = .026).

Figure 2
Standardized coefficients of the proposed structural equation model explaining self-employment based on the psychological variables studied.



Note. SC = self-control; C = conscientiousness; EP = entrepreneurial personality; SE = self-employed.

Discussion and conclusions

The psychological approach is an important part of the study of entrepreneurial activity (Chandra, 2018; Frese et al., 2016; Frese & Gielnik, 2014; Gao et al., 2020), and within this approach, one of the lines of study is about discovering which psychological variables help to predict someone becoming self-employed. Our study had three specific objectives. The first focused on detecting different latent profiles of entrepreneurial personality. We identified three profiles: *low, medium, and high entrepreneurial personality*. Our second objective was to examine the differences between these profiles of entrepreneurial personality in grit, self-control, and the Big Five variables, and to look at the percentages of self-employed workers in each profile. The *high entrepreneurial personality* profile was the only one to exhibit a significantly higher percentage of self-employed than non-self-employed, as well as having higher scores in variables such as grit, self-control, and conscientiousness. The third and final objective was to create a structural equation model to help explain entrepreneurial activity. The psychological variables included in the model due to their influence on entrepreneurial activity were: conscientiousness, self-control, grit, and entrepreneurial personality, made up of eight specific traits (self-efficacy, autonomy, innovation, internal locus of control, achievement motivation, optimism, stress-tolerance, and risk-taking ; Cuesta et al., 2018; Muñiz et al., 2014; Postigo, García-Cueto, et al., 2020).

We first examined different models to identify latent profiles of entrepreneurial personality. Based on the scores in the different traits making up entrepreneurial personality, we identified three latent profiles: *Low, Medium, and High entrepreneurial personality*. The *low entrepreneurial personality* profile stands out as a profile of people with low perceptions of their capabilities, without the desire to achieve excellence, or motivation by new ideas, they are people who take few work-related risks, ascribing the chance ups and downs of life to external events, and not accepting responsibility for the consequences of their actions. In contrast, the *medium entrepreneurial personality* profile is one in which none of the psychological traits stands out particularly, with the set of variables as a whole having scores around the mean. It is a profile of people that tend to see themselves as moderately capable, and therefore unafraid to make an effort and take risks, although always cautiously, they have some tolerance to stressful events albeit with weaknesses in certain situations, they are dependent in some contexts and autonomous in others, without notable optimism or pessimism, ascribing their successes and failures at times to themselves and other times to factors outside of their control. Lastly, the *high entrepreneurial personality* profile stands out as a profile of people with an ambitious perception of their capabilities, who work hard and come up with new ideas and projects, people who are autonomous and independent, capable of taking on risks and stressful situations, always with considerable optimism, people with an internal attribution of successes and failures who consider themselves responsible for what happens. This is the only profile that had a higher proportion of self-employed than non-self-employed. Like other studies that have demonstrated profiles of the self-employed based on their wellbeing (Bujacz et al., 2020), or based on emotional aspects (Zampetakis et al., 2016), we also used a person-centered approach in our study into organizational behavior (Meyer & Morin, 2016), and identified three profiles of entrepreneurial personality based on the scores in the eight specific traits that make it up (Cuesta et al., 2018; Muñiz et al., 2014; Rauch & Frese, 2007a).

Table 3
Differences in entrepreneurial personality profiles according to grit, self-control, and the five variables from the Big Five model.

	M (*SD*) High EP [a]	*M* (*SD*) Average EP [b]	*M* (*SD*) Low EP [c]	F (*p*)	*d*	Post-hoc
Grit	45.25 (4.34)	39.49 (3.99)	32.64 (5.50)	254.47 (<.001)	3.15	a with b a with c b with c
Self-control	48.79 (8.62)	44.58 (7.53)	40.60 (8.82)	32.39 (<.001)	1.02	a with b a with c b with c
Conscientiousness	29.47 (4.12)	26.95 (3.87)	23.87 (3.89)	61.65 (<.001)	1.40	a with b a with c b with c
Openness to experience	29.28 (4.55)	28.68 (4.02)	27.97 (4.36)	2.94 (.054)	0.33	-
Emotional Stability	27.71 (4.73)	25.48 (4.73)	21.33 (5.58)	51.73 (<.001)	1.28	a with b a with c b with c
Agreebleaness	28.23 (3.36)	26.86 (3.64)	26.53 (3.47)	9.89 (<.001)	0.52	a with b a with c
Extraversion	24.38 (4.90)	22.81 (4.92)	19.24 (5.17)	32.83 (<.001)	1.03	a with b a with c b with c

Note. *M* = mean; *SD* = standard deviation; EP = entrepreneurial personality; *p* = p-value; *d* = effect size

The *high entrepreneurial personality* profile was the only one to have a significantly higher proportion of self-employed workers than non-self-employed workers. This did not mean that this only occurred in the *high entrepreneurial personality* profile, but rather that there was a general pattern of a higher entrepreneurial personality profile exhibiting a greater proportion of self-employed. From this, it seems clear that higher scores in entrepreneurial personality are related to some extent to starting a business. In addition, the profiles of entrepreneurial personality also exhibited differences in the Big Five personality variables, with the highest scores in the *high entrepreneurial personality* profile. The most notable differences were in grit, which is evidence of the importance of these profiles of entrepreneurial personality, as in recent years, grit has been a noteworthy variable in business creation and success (Arco-Tirado et al., 2019; Mooradian et al., 2016; Mueller et al., 2017; Wolfe & Patel, 2016).

We also created a structural equation model to try to model the relationships between the different psychological variables (conscientiousness, self-control, grit, and the eight specific traits defining entrepreneurial personality) and being self-employed or not. We included the variable conscientiousness in the model because, on the one hand, it is one of the variables within the general model of personality that most helps to explain entrepreneurial activity (Zhao et al., 2010), and on the other, it is one of the variables most closely related to grit (Schmidt et al., 2018, 2020). We also included self-control (short term) as an explanatory precursor of grit (long term), because having a certain amount of self-control helps one have high levels of grit (Duckworth & Gross, 2014). Lastly, we included entrepreneurial personality, made up of the eight specific traits noted above, because of its capacity to explain part of entrepreneurial activity within a general model of that activity (Rauch & Frese, 2007b), with the aim of examining whether this predicts becoming self-employed.

We found that conscientiousness and self-control influenced grit, explaining 44.8% of its variance, as someone with passion and perseverance for long-term objectives must be able to control their actions in the short term so that they do not interfere with long-term plans (Duckworth et al., 2019). This result is in line with Butz et al. (2018), who concluded that grit acted as a mediating variable in the association between conscientiousness and entrepreneurial intention. In addition, grit, influenced by people's levels of conscientiousness and self-control, explains 55.2% of entrepreneurial personality. This is understandable because those who start a business have to face unexpected changes, great uncertainty, and often little resources, which means that entrepreneurs have to demonstrate tenacity and perseverance, as well as working with objectives (Baum & Locke, 2004; Locke & Latham, 2019; Mooradian et al., 2016), explaining part of the entrepreneurial personality. This leads to the conclusion that entrepreneurial personality explains 2.6% of the variance of being self-employed.

One of the important implications of these results is the connection between different psychological variables when explaining a single fact: becoming self-employed or not. One positive point is that there are studies showing that non-cognitive and personality variables can be malleable (Mueller et al., 2017; Peña & Duckworth, 2018; Postigo et al., 2021; Tough, 2012), even in organizational settings (Li et al., 2019, 2020). This raises the idea that one might intervene in personal characteristics so that people have more tools and strategies, improving their perceptions of their abilities to start a business. All of this should be considered by those responsible for policy, in order to invest in psychological training programs which help to mitigate the negative effects caused by restricted capital for entrepreneurs (Bischoff et al., 2020), as well as helping develop a proactive, persevering, future-oriented mentality (Alan et al., 2019; Campos et al., 2017; Frese et al., 2016; Gielnik et al., 2016; Glaub et al., 2014; Ubfal et al., 2019) which would help people move from being "subsistence entrepreneurs" to innovator entrepreneurs (Global Entrepreneurship Monitor [GEM], 2020a). Currently, in the time of COVID-19, experts are stressing the particular importance of "intrapreneurship" and re-entrepreneurship, because the pandemic has meant that many businesses have had to reinvent themselves, which has encouraged taking better advantage of their *intra*preneurial skills (GEM, 2020b).

Nonetheless, we can consider various aspects of why the psychological variables in this study help to explain only a small part of being self-employed. In the first place, in our theoretical model in this study we considered non-cognitive and personality variables, but other variables should be considered in future studies, using broader models that include the different types of entrepreneurial passion (Cardon et al., 2017; Lee, 2020; Newman et al., 2019), which have been shown to be related to business activity and success (Hubner et al., 2019; Lex et al., 2020; Mueller et al., 2017). On the same point, cognitive variables such as intelligence and creativity are also important for future studies to consider (Suárez-Álvarez & Pedrosa, 2016). Secondly, the psychological or personal part of a person only explains a small part of the process of entrepreneurial activity. It is important for future studies to consider the individual's context and culture, as well as their income and satisfaction with previous work (Arco-Tirado et al., 2019). They should also consider the country where the person wants to start a business, as there are very different government facilities for doing so (GEM, 2020a; OECD, 2019). Finally, there is a problem in differentiating between someone who works for themselves and a true entrepreneur (Henrekson & Sanandaji, 2014), making it difficult to contrast those who start businesses because they want to (innovator entrepreneurs) and those who start businesses because they need to ("subsistence entrepreneurs") (GEM, 2019, 2020a).

In summary, our study gives rise to a number of practical conclusions. Firstly, we identified three latent profiles according to scores in the eight specific traits making up entrepreneurial personality (Cuesta et al., 2018; Muñiz et al., 2014;

Postigo, García-Cueto, et al., 2020; Rauch & Frese, 2007a). These results may be useful for providing a picture of the possible profiles of entrepreneurial personality, with the *high entrepreneurial personality* (in which there was the highest proportion of self-employed) demonstrating the most suitable personal factors for starting a business, with higher scores in psychological variables directly related to entrepreneurial activity. Finally, we conclude that conscientiousness, self-control, grit, and entrepreneurial personality help to explain being self-employed or not, albeit to a small extent. This study is a good starting point, but the need remains to develop broader models that cover different contexts people may be in. Future studies should also consider looking at the possible differences in entrepreneurial personality profiles by sociodemographic variables such as age, sex, and whether one lives in an urban or rural environment.

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4. Discusión

Nadie duda de la importancia de la actividad emprendedora para el desarrollo y crecimiento de un país. El emprendimiento es fuente de innovación, productividad y riqueza lo que hace que sea un tema que está *a la orden del día* y, con ello, el hecho de averiguar los factores que llevan a las personas a ser emprendedoras ya sea a nivel empresarial, intraempresarial, social o personal.

Dentro de los factores que influyen en el proceso de emprender, se encuentran los contextuales (factores socioeconómicos principalmente) y los personales (aptitudinales y de personalidad). Estos últimos, englobados en la Psicología del Emprendimiento (Baum et al., 2007; Gielnik et al., 2021), han ganado relevancia durante el siglo XXI, siendo la personalidad uno de los temas que más atención ha recibido de las personas expertas (véase, Rauch y Gielnik, 2021). En este sentido, la presente Tesis Doctoral puede encuadrarse dentro de la Psicología del Emprendedor y concretamente, en la evaluación de la Personalidad del Emprendedor.

Como se ha señalado con anterioridad, el número de instrumentos que se emplean para evaluar la personalidad emprendedora de manera integrada ha crecido exponencialmente en la última década. Sin embargo, a pesar de este incremento, hay diversos aspectos psicométricos sobre los que no se ha profundizado. En primer lugar, la primera aportación de esta Tesis Doctoral es un TAI para evaluar la personalidad emprendedora de manera adaptativa (Postigo, Cuesta, Pedrosa, et al., 2020). Ninguno de los instrumentos para evaluar la personalidad emprendedora en población adulta ha sido evaluado mediante los avances psicométricos que ofrecen los modelos del marco de la TRI. Se ofrece un banco de 120 ítems adecuadamente calibrado para evaluar la personalidad emprendedora en torno a las ocho dimensiones específicas que evalúa el BEPE (Cuesta et al., 2018; Muñiz et al., 2014): Autoeficacia, autonomía, innovación,

locus de control interno, motivación de logro, optimismo, tolerancia al estrés y toma de riesgos. Este banco, junto al nuevo procedimiento informático, permitirá que el TAI ofrezca una evaluación de la personalidad emprendedora adaptada a la persona, mucho más rápida, eficaz y rigurosa. Cabe recordar que son tan sólo 16 ítems de media los que se necesitan para realizar la evaluación del constructo. De este modo, el TAI permitirá identificar con precisión y rapidez a las personas con una alta propensión al emprendimiento.

Esta evaluación rápida y fiable también será posible gracias al desarrollo y validación del BEPE-16, segunda aportación del presente trabajo. A pesar del elevado número de ítems de los instrumentos de la personalidad emprendedora, dada su naturaleza compleja, llama la atención que no hubiera ningún intento de desarrollar una versión corta de evaluación de la personalidad emprendedora. El BEPE ha sido validado bajo un modelo bifactor (Cuesta et al., 2018), ofreciendo un factor general de personalidad emprendedora y ocho factores específicos, mencionados anteriormente. Esta aproximación metodológica permite que fuesen seleccionados dos ítems por faceta específica, aquellos que muestran un peso factorial más alto en el factor general de personalidad emprendedora, desarrollando el BEPE-16 (Postigo, García-Cueto, et al., 2020). El BEPE-16 muestra una estructura esencialmente unidimensional (personalidad emprendedora), una fiabilidad excelente ($\omega = 0{,}94$) y una precisión adecuada a lo largo de todo el continuo de habilidad desde el marco de la TRI. Cabe decir que tanto el TAI como el BEPE-16 aportan adecuadas evidencias en relación con otras variables, ya que aportan correlaciones elevadas con el instrumento META (Ahmetoglu, Leutner, y Chamorro-Premuzic, 2011; Ahmetoglu y Chamorro-Premuzic, 2013), uno de los instrumentos más conocidos internacionalmente para evaluar la personalidad emprendedora.

Con todo ello, tanto el TAI (Postigo, Cuesta, Pedrosa, et al., 2020) como el BEPE-16 (Postigo, García-Cueto, et al., 2020) permiten, de dos maneras muy diferentes, una evaluación válida, fiable y rápida tanto en el contexto aplicado como de investigación. El contexto aplicado se puede beneficiar de ambas herramientas como soporte para la toma de decisiones. Las entidades que ofrecen financiación para las personas que tienen una idea de negocio y quieren ponerla en marcha, pueden emplear ambas herramientas para tomar decisiones y así, seleccionar o descartar candidatos para las siguientes fases de selección. Por parte de las organizaciones, se pueden emplear estas herramientas en los procesos de selección, que suelen ser procesos largos y tediosos, donde una primera criba puede ser realizada por el TAI o el BEPE-16. De este modo, evaluar a aquellas personas más emprendedoras e innovadoras con tan sólo 16 ítems es un beneficio importante, donde las empresas tienen que evaluar muchos aspectos de las personas, lo que conlleva que el número de ítems y tiempo empleado tiendan a ser muy elevados. El contexto organizacional también puede emplear estas herramientas a nivel interno. El intraemprendimiento, conocido como la toma de responsabilidad para innovar dentro de una empresa sobre proyectos que ya están en marcha (Lumpkin, 2007; Mumford et al., 2021), es cada vez un mayor valor añadido para las empresas. La idea es clara, y es que de qué sirven los conocimientos si estos no son renovados continuamente en el mundo líquido actual (Bauman, 2017). En esta línea, empiezan a obtenerse datos sobre los beneficios de aplicar intervenciones en los rasgos específicos de la personalidad emprendedora, los cuales se caracterizan por una mayor maleabilidad (Blume et al., 2010; Martin et al., 2013; Ubfal et al., 2019; Weers y Gielnik, 2021). Como estas intervenciones no serán cosa de un día, el BEPE-16, y especialmente el TAI, aportan una posibilidad de evaluación de estas intervenciones a lo largo del tiempo, dada la rapidez en su aplicación (y el carácter adaptativo del TAI).

Una de las conclusiones del informe GEM sobre los efectos de la pandemia por la COVID-19 en el mundo empresarial tiene que ver con estas ideas que se acaban de reflejar: *"La recuperación demandará más personas emprendedoras con capacidad organizativa e innovadora para generar innovación colaborativa y abierta en un marco de innovación social. Se requieren nuevas sinergias entre el ecosistema emprendedor, el corporativo y el académico, promoviendo más spin-offs y spin-ins. El COVID-19 ha provocado el cierre de empresas, lo que obliga a muchas a reinventarse. Ello invita a un mejor aprovechamiento de las habilidades (intra) emprendedoras y al reemprendimiento."* (GEM, 2020a, p. 49). Todo ello enfatiza (aún más) la importancia sobre el aprovechamiento (y mejora) de las habilidades emprendedoras, entre las que se encuentran los rasgos específicos de la personalidad. Esto comienza por una evaluación rigurosa a través del BEPE (Cuesta et al., 2018) y sus diferentes versiones, adaptativa informatizada (Postigo, Cuesta, Pedrosa, et al., 2020) y corta (Postigo, García-Cueto, et al., 2020). Otro contexto en el que el TAI y el BEPE-16 tienen algo que decir es en el de la investigación. La personalidad emprendedora no está aislada en el mundo y, en muchas ocasiones, hay que tener en cuenta otras variables para obtener conclusiones en torno a la personalidad y actividad emprendedoras. Emplear 16 ítems frente a los 80 de la versión original del BEPE (Cuesta et al., 2018), o frente a otros instrumentos de la personalidad emprendedora que se caracterizan por una gran cantidad de ítems (véase Tabla 2 de la introducción), facilita la evaluación de la personalidad emprendedora en relación con otras variables sin que la persona llegue muy fatigada a contestar los últimos ítems (Glover y Albers, 2007; Kubinger, 2016; Smith et al., 2000).

Los datos obtenidos en esta Tesis Doctoral apuntan a una convergencia moderada con los rasgos generales del modelo *Big Five.* Las puntuaciones estimadas con el TAI, así como las puntuaciones empíricas con el BEPE-16, muestran

correlaciones moderadas con los cinco grandes rasgos, yendo desde correlaciones en torno a 0,10 con la amabilidad hasta correlaciones en torno a 0,50 con la extraversión. La balanza parece inclinarse hacia el uso de los rasgos específicos de la personalidad por tener una mayor capacidad predictiva del comportamiento emprendedor (Leutner et al., 2014; Postigo, Cuesta, García-Cueto, et al., 2021). Específicamente, el BEPE (rasgos específicos) predice la actividad emprendedora en mayor medida que el OPERAS (rasgos generales) por captar ciertos aspectos que no es posible abarcar desde el modelo del *Big Five,* como puede ser la ambición (Jones et al., 2017). A pesar de ello, ambos enfoques están correlacionados moderadamente, no teniendo por qué uno ser sustitutivo del otro, sino más bien complementarios en función de la fidelidad y amplitud con la que se desee medir (John et al., 2008; Soto y John, 2017b). La presente Tesis Doctoral también ha identificado diferentes perfiles de personalidad emprendedora en torno a los ocho rasgos específicos que evalúa el BEPE: Alta, media y baja personalidad emprendedora, siendo el perfil *alta personalidad emprendedora* el único que presenta significativamente mayor porcentaje de trabajadores por cuenta propia que por cuenta ajena (Postigo, Cuesta, y García-Cueto, 2021). Además, este perfil muestra diferencias en el modelo *Big Five* respecto a los otros perfiles de menor personalidad emprendedora, puntuando significativamente más alto en todos los rasgos del modelo *Big Five*, salvo en apertura a la experiencia.

Por otra parte, tanto el TAI como el BEPE-16 no muestran diferencias entre los trabajadores por cuenta propia y por cuenta ajena, aunque sí se observa una tendencia hacia mayores niveles de personalidad emprendedora por parte de los que han emprendido un negocio. Esta tendencia también es observada en la versión original del BEPE (Postigo, García-Cueto, et al., 2021), encontrando diferencias reseñables en autonomía a favor de los emprendedores. Esto se puede deber a que disfrutar de una

autonomía plena en cuanto a objetivos y líneas de trabajo es la primera de las razones dadas por fundadores de negocios para crear sus empresas, buscando una toma de decisiones en ausencia de supervisores (Baum et al., 2007; Van Gelderen y Jansen, 2006). En esta línea, el estudio de la invarianza de medida del BEPE es un hallazgo novedoso al demostrar que la estructura factorial y la interpretación de los ítems del BEPE es similar entre los que emprenden y los que optan por trabajar por cuenta ajena (Postigo, García-Cueto, et al., 2021).

También se demostró la invarianza de medida en el BEPE en función de variables sociodemográficas de interés como el sexo y la edad. Así, el BEPE es invariante entre los hombres y las mujeres y entre los adultos más jóvenes (menores de 30 años) y los adultos mayores (mayores de 30 años). De esta manera, el BEPE parece cumplir uno de los requisitos establecidos por los Estándares para la Evaluación Psicológica y Educativa como es la ecuanimidad (APA, AERA, NCME, 2014). Esto ayuda a concluir que las diferencias que se encuentran en la personalidad emprendedora en función del sexo o de la edad se deben a diferencias *reales* y no a que ambas poblaciones interpretan de manera diferente los ítems del BEPE (Dong y Dumas, 2020; Millsap, 2011; Sass y Schmitt, 2013; Thompson, 2016). La presente Tesis Doctoral muestra cómo los hombres tienen mayores niveles de personalidad emprendedora que las mujeres, especialmente en tolerancia al estrés (v.g., Falavarjani y Yeh, 2019). Las mujeres son más realistas, valoran más el apoyo externo y cuentan con más barreras socioculturales para emprender que los hombres (Dheer et al., 2019; Foss et al., 2019; Molino et al., 2018; Niederle y Vesterlund, 2007). Referido a la edad, la presente Tesis Doctoral muestra cómo los jóvenes menores de 30 años tienen mayor autoeficacia, innovación, locus de control interno y toma de riesgos. Esto va en relación con los datos del informe GEM (2020b) donde los más jóvenes (de 18 a 34 años) tienden a presentar

mayores tasas de actividad emprendedora que los más mayores. Otra de las posibles razones es que los jóvenes españoles no les queda otra que percibirse como *capaces* para el emprendimiento, dado los récords que se están obteniendo en la tasa de desempleo juvenil en España, superando el 40% (OIT, 2020).

Más allá de los rasgos clásicos de la Psicología, como la autoeficacia, el presente trabajo introduce un término novedoso en la literatura: el grit. Este rasgo ha sido relacionado con la actividad emprendedora y la creación empresarial (Mooradian et al., 2016; Mueller et al., 2017; Southwick et al., 2020). Sin embargo, la evaluación del grit ha sido un campo de numerosos debates a lo largo de la última década, ya que el instrumento más conocido y empleado presenta serias dudas acerca de sus propiedades psicométricas (Clark y Malecki, 2019; Credé, 2018; Tynan, 2021), incluida su validación española (Arco-Tirado et al., 2018). La presente Tesis Doctoral presenta el desarrollo y la validación de un nuevo instrumento de grit en el contexto español. Este nuevo instrumento (Escala de Grit de Oviedo, EGO; Postigo, Cuesta, García-Cueto, et al., 2020) muestra evidencias adecuadas de validez de contenido, siendo sometidos los ítems a dos juicios diferentes de expertos que garantizasen la definición del dominio y su representatividad (Sireci y Faulkner-Bond, 2014). Respecto a su estructura factorial, los acercamientos exploratorios y confirmatorios llevan a rechazar la bidimensionalidad del grit y a mantener la hipótesis de que un único rasgo es suficiente para explicar las conductas que subyacen al grit. La unidimensionalidad del grit es un tema que está en boga (Areepattamannil y Khine, 2018; Gonzalez et al., 2020; Vazsonyi et al., 2019) y los resultados de la presente Tesis Doctoral así lo apoyan. La bidimensionalidad del grit con la escala Grit-S (Duckworth y Quinn, 2009) puede deberse al hecho de que todos los ítems de una dimensión (perseverancia en el esfuerzo) están redactados en forma directa o positiva, mientras que todos los ítems de otra dimensión (consistencia del

interés) están redactados de forma inversa o negativa. Este hecho puede llevar a una aparente bidimensionalidad en constructos unidimensionales (Kam et al., (2021). La escala EGO muestra adecuadas evidencias de validez en relación con otras variables, como el grit, medido a través de la escala Grit-S (r = 0,691), el autocontrol (r = 0,595) y la responsabilidad del modelo *Big Five* (r = 0,661). Sin embargo, el grit correlaciona de manera muy elevada (r = 0,871) con la motivación de logro, compartiendo ambos constructos más de un 75% de la varianza. Esto es un claro síntoma del trabajo que queda por hacer para clarificar la red nomológica que gira en torno al grit, donde el análisis de redes (v.g., Fonseca-Pedrero, 2018) podría clarificar donde se sitúa el grit en el marco de la personalidad.

Las elevadas correlaciones de la escala EGO con los ocho rasgos específicos del BEPE (r = 0,354 – 0,871), así como con el factor general de personalidad emprendedora (r = 0,728), llevaron al estudio de un modelo teórico en el que se integran los rasgos de personalidad (generales, específicos, clásicos y novedosos) para intentar explicar el hecho de convertirse en trabajador por cuenta propia. De esta manera, la presente Tesis Doctoral tiene en cuenta la responsabilidad del modelo *Big Five* (Zhao et al., 2010) y el autocontrol (Duckworth et al., 2019) como predictores del grit. La idea es que la responsabilidad y el autocontrol tienen que ver más con las tareas en el corto plazo, lo que puede influir en la perseverancia y consistencia de los objetivos empresariales más a largo plazo (grit). A su vez, la consistencia y perseverancia en el camino emprendedor influye en los rasgos psicológicos más clásicos relacionados con la personalidad emprendedora (BEPE; Cuesta et al., 2018), lo que predice el convertirse o no en trabajador por cuenta propia, explicando un 2,6% de su varianza. La idea central del modelo es que rasgos más generalistas, como la responsabilidad, influyen en rasgos más

específicos, como el grit y las variables del BEPE, que se caracterizan por una mayor maleabilidad y posible intervención (Soto et al., 2021).

En suma, se ha desarrollado una versión adaptativa informatizada y una versión corta en base al BEPE (Cuesta et al., 2018; Muñiz et al., 2014; Suárez-Álvarez et al., 2014) y al modelo integral del espíritu emprendedor (Suárez-Álvarez y Pedrosa, 2016), permitiendo evaluar la personalidad emprendedora de manera precisa, válida y rápida, en un mundo tan complejo y acelerado como es el organizacional. A su vez, se ha demostrado la invarianza de medida del instrumento BEPE en función de ser o no emprendedor y de variables sociodemográficas relevantes en la actividad emprendedora como es el sexo y la edad. En línea con ello, se ha demostrado el influjo de estas variables sociodemográficas en la personalidad emprendedora. Finalmente, se presenta un nuevo instrumento para evaluar el grit que, junto con el resto de las variables que conforman la personalidad emprendedora, ayudan a predecir el hecho de haber emprendido un negocio.

Todo lo dicho anteriormente hay que valorarlo a la luz de algunas limitaciones y líneas futuras. La primera limitación es la dificultad para diferenciar una persona que emprende porque quiere de la persona que emprende porque lo necesita, ya que los resultados pueden ser (y son) muy diferentes (Henrekson y Sanandaji, 2014). Futuros estudios deberían de diferenciar aquellos emprendedores innovadores, los que tienen una idea de negocio y la ponen en marcha, de aquellos emprendedores *por subsistencia,* donde ven el emprendimiento como única vía posible para reincorporarse al mundo laboral (GEM, 2020b, 2021; OCDE, 2019). Se recuerda que más del 70% de los españoles emprendió durante el 2020 por la falta de oportunidades de empleo (GEM, 2021). También, el presente estudio se centró únicamente en el conocido como extraemprendedor (Rauch y Frese, 2007b) o “emprendedor general” (Salmony y

Kanbach, 2021), alguien que elige trabajar para sí mismo en lugar de trabajar para otros. Sin embargo, como se ha visto, la propia definición de persona emprendedora incluye otro tipo de emprendedores (e.g. intraemprendedor). Por lo que una persona puede estar declarándose trabajadora por cuenta ajena, pero en realidad es la encargada de emprender e innovar dentro de su empresa. A su vez, no se ha hecho ninguna distinción entre las personas extraemprendedoras, empleando indistintamente los términos "emprendedor" y "trabajador por cuenta propia". Trabajos futuros deberán de diferenciar emprendedores como el tipo de negocio (v.g., tecnológico vs franquicia) y la motivación para emprender (las personas que han tenido que emprender por situación de desempleo o inmigración frente a las que no).

Segundo, los datos recogidos sobre las diferentes muestras de la presente Tesis Doctoral se obtuvieron mediante autoinformes. Al emplear esta metodología, se asume que puede haber ciertos sesgos por parte de los participantes a la hora de responder a los ítems. Dos ejemplos de estos sesgos serían la aquiescencia (mostrarse de acuerdo con el enunciado de los ítems) y la deseabilidad social (querer dar una imagen positiva sobre sí misma), los cuales han demostrado tener cierta influencia en los test de personalidad (Ferrando y Navarro-González, 2021; Navarro-González et al., 2016; Vigil-Colet et al., 2013). Se han intentado proponer soluciones como los test de asociación implícita, quienes permiten evaluar actitudes y creencias mediante la fuerza de la asociación automática entre las representaciones mentales de los conceptos en la memoria (Greenwald et al., 2009). Sin embargo, estos intentos parecen no haber funcionado en el campo de la personalidad emprendedora (Martínez-Loredo et al., 2018). Una posible línea futura en la evaluación de la personalidad emprendedora es el uso de los test de juicio situacional y de elección forzada (Kyllonen, 2015; Murano et al., 2021), los cuales pueden llegar a ser muy útiles en los contextos complejos en los que se evalúa la

personalidad emprendedora (entidades que otorgan subvenciones, empresas de selección de personal, etc.) donde la influencia de la deseabilidad social es evidente.

En tercer lugar, los datos del banco de ítems del BEPE para la versión adaptativa informatizada fueron analizados desde modelos unidimensionales de TRI. Líneas futuras deberían de encaminarse a los modelos multidimensionales de Teoría de Respuesta a los Ítems (MIRT) y desarrollar una versión adaptativa informatizada multidimensional, que posibilite un perfil adaptativo de personalidad emprendedora desde la aproximación de la TRI. La evaluación adaptativa multidimensional lleva unos años recibiendo especial atención (Frey y Seitz, 2009; Reckase, 2009), por lo que la generación de un algoritmo que evalúe todos los rasgos específicos de manera adaptativa es una línea futura interesante.

En cuarto lugar, el BEPE debería de someterse a la comprobación de otros modelos bifactor que están empezando a tener repercusión en la literatura, dada su coherencia sustantiva y metodológica. Uno de estos modelos es el modelo bifactor-(S-1), donde no es necesario asumir que todas las dimensiones tienen la misma relevancia para explicar la personalidad emprendedora y, por tanto, una de ellas actúa como factor general del instrumento (Bornovalova et al., 2020; Eid et al., 2017; Heinrich et al., 2020; Markon, 2019), dándole un significado *más realista* al factor general.

En quinto lugar, la invarianza de medida del BEPE fue estudiada para dos grupos en relación con la edad y con ser o no emprendedor. En cuanto a la edad, el hecho de que sólo se cuenten con dos grupos limita las interpretaciones, ya que sólo se hace distinción tomando el punto de corte de los 30 años. Esto fue debido principalmente por no disponer de suficiente variabilidad que permitiera conformar grupos de edad que aportasen suficiente potencia a la prueba estadística. Futuras recogidas de datos deberían de tener en cuenta este aspecto, estudiando la invarianza de

medida y las diferencias en la personalidad emprendedora a lo largo de las diferentes etapas de la vida (Zacher et al., 2019; Zhao et al., 2021) o, al menos, contemplando los puntos de corte de edad que establecen los importantes informes internacionales como el informe GEM (18-24; 25-34; 35-44; 45-54; 55-64 años, (GEM, 2020b, 2021). Además, si se hace de forma longitudinal se puede analizar cómo evoluciona la personalidad emprendedora a lo largo de diferentes experiencias vitales (Mensmann y Zacher, 2021). Referido a ser o no emprendedor, una agrupación más detallada es necesaria. Por ejemplo, futuros estudios deberían de tener en cuenta a los emprendedores *potenciales* (personas que quieren emprender en los próximos tres meses). De hecho, la presente Tesis Doctoral muestra cómo el BEPE-16 muestra diferencias a favor de los que tienen intención de emprender en los próximos tres meses frente a los que no. También cabría dividir a los autónomos en emprendedores *nacientes* (empresas que se encuentran en fase de despegue y no han pagado salarios por más de tres meses), emprendedores *nuevos* (empresas que se encuentran en fase de consolidación [entre tres y 42 meses de actividad económica]), y emprendedores *consolidados,* aquellas personas que han superado las fases previas y, por tanto, llevan más de tres años y medio de actividad económica. Estas sugerencias son aplicables tanto con el BEPE como con su versión adaptativa y su versión corta, analizando la invarianza de medida y las posibles diferencias en la personalidad emprendedora entre los diferentes tipos de emprendedores.

Finalmente, los resultados de la presente Tesis Doctoral son una pequeña parte de lo que engloba a la actividad emprendedora (véase, Figura 4 de la introducción). A nivel más personal, la personalidad juega un papel relevante como han demostrado múltiples investigaciones (Leutner et al., 2014; López-Núñez et al., 2020; Muñiz et al., 2014; Rauch y Frese, 2007a; Suárez-Álvarez et al., 2014), incluidas las de la presente

Tesis Doctoral (v.g., Postigo, Cuesta, y García-Cueto, 2021). No obstante, a pesar de la búsqueda de constructos novedosos que pudieran formar parte de la persona emprendedora como el grit (Duckworth, 2016; Postigo, Cuesta, García-Cueto, et al., 2020), futuros estudios tienen que contar con otras características personales abordando otros enfoques como el aptitudinal o cognitivo (Mitchell et al., 2021; Sternberg, 2004) y el afectivo (Baron y Branscombe, 2017; Baron et al., 2012). Por otro lado, las variables de carácter contextual y biográfico juegan un papel fundamental en la actividad emprendedora. Contemplar los mares en los que navega el emprendedor se hace una tarea fundamental para comprender bien qué lleva a las personas emprendedoras a lanzarse a emprender un negocio. Hay que prestar atención a factores como las oportunidades y recursos con los que cuente la persona. De hecho, los jóvenes españoles aumentarían su intención emprendedora si tuvieran la oportunidad y los recursos para ello (GUESS, 2019). También la cultura, las leyes, e incluso la influencia familiar son aspectos esenciales en el estudio de la persona emprendedora, siendo aspectos muy importantes que contemplar para entender qué lleva a una persona a emprender un negocio. Finalmente, dentro de los *tópicos emergentes* en alas del emprendimiento (Cardon et al., 2021) se encuentran los equipos emprendedores. La investigación del emprendimiento ha implicado tradicionalmente que una nueva empresa es fundada por una única persona, empezando a tener conocimiento de que muchas empresas son fundadas por equipos emprendedores, formados por dos o más individuos que buscan la misma idea de negocio (Breugst y Preller, 2021; Jin et al., 2017; Lazar et al., 2020).

5. Conclusiones

Las principales conclusiones obtenidas a partir del conjunto de publicaciones incluidas en esta Tesis Doctoral son:

- Se ha desarrollado una versión adaptativa informatizada de la Batería para la Evaluación de la Personalidad Emprendedora, partiendo de un banco adecuadamente calibrado de 120 ítems. Esta versión evalúa la personalidad emprendedora de manera adaptada a la persona con tan sólo 16 ítems de media, sin perder apenas precisión de medida.
- Se ha desarrollado una versión corta de la Batería para la Evaluación de la Personalidad Emprendedora. La versión corta (BEPE-16) se compone de 16 ítems, teniendo en cuenta los dos ítems de cada faceta específica más importantes para explicar el factor general de la personalidad emprendedora. El BEPE-16 muestra unas excelentes propiedades psicométricas, tanto desde la Teoría Clásica de los Test como desde la Teoría de Respuesta a los Ítems.
- Se ha demostrado la invarianza de medida (en todos los niveles; configural, métrico, escalar y residual) de la Batería para la Evaluación de la Personalidad Emprendedora en función del sexo, de la edad y de ser emprendedor o no.
- Se ha desarrollado un nuevo instrumento de medida de grit (EGO; Escala de Grit de Oviedo), el cual muestra unas excelentes propiedades psicométricas.
- Se ha desarrollado un modelo integrador contemplando diferentes variables de personalidad que componen el espíritu emprendedor.

5. Conclusions (bis)

The main conclusions obtained from the set of publications included in this Doctoral Thesis are:

- A computerized adaptive version of the Battery for the Assessment of the Entrepreneurial Personality has been developed, starting from a properly calibrated bank of 120 items. This version assesses the entrepreneurial personality in an individually adapted way, with only 16 items on average, hardly losing any precision in measurement.
- A short version of the Battery for the Assessment of Entrepreneurial Personality has been developed. The short version (BEPE-16) is made up of 16 items, taking into account the two items of each specific facet that are most important to explain the general factor of entrepreneurial personality. The BEPE-16 shows excellent psychometric properties, both from the Classical Test Theory and from the Item Response Theory.
- Measurement invariance (at all levels; configural, metric, scalar, and residual) of the Battery for the Assessment of Entrepreneurial Personality has been demonstrated based on sex, age, and whether the person is an entrepreneur or not.
- A new grit measurement instrument (EGO; Oviedo Grit Scale) has been developed, which shows excellent psychometric properties.
- An integrative model has been developed considering different personality variables that make up the entrepreneurial mindset.

6. Referencias

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