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**COMPASSION PRACTICE QUALITY: EXPLORING NEW
FRONTIERS OF SELF-CRITICISM TREATMENT**

TESIS DOCTORAL

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
BETT	Betts' Questionnaire Upon Mental Imagery
BSI-18	Brief Symptom Inventory-18
CBCT	Cognitively-Based Compassion Training
CBI (IBC)	Compassion-based intervention (Intervención/es basada/s en compasión)
CBM (MBC)	Compassion-based meditation (Meditación basada en compasión)
CCT	Compassion Cultivation Training
CFT	Compassion Focused Therapy
CPQS	Compassion Practice Quality Scale
FCS	Fears of Compassion from others Scale
FSCRS	Forms of Self-Criticising/Attacking & Self-Reassuring Scale
FSCRS-SF	Forms of Self-Criticising/Attacking & Self-Reassuring Scale-Short Form
HS	Hated self
IS	Inadequate self
MBSR	Mindfulness-Based Stress Reduction
MCBI (IBMC)	Mindfulness- and compassion-based intervention (Intervención basada en mindfulness y compasión)
PANAS	International Positive and Negative Affect Schedule-Short Form
PIT	Prospective Imagery Test
RS	Reassured Self
SC (AC)	Self-criticism (Autocrítica)
SCRS	Self-Critical Rumination Scale
SCS-SF	Self-Compassion Scale Short-Form
SMS	State of Mindfulness Scale
SOFI	Self-Other Four Immeasurables
VR (RV)	Virtual Reality (Realidad Virtual)

TESIS EN ESPAÑOL

1. Resumen

La autocrítica (AC) consiste en ofrecer a uno mismo un trato hiriente e injustificado ante la adversidad o el fracaso. Su manifestación persistente e intensa acompaña y retroalimenta los síntomas psicopatológicos de diversos trastornos mentales, agravando así su pronóstico. Por ello, distintas corrientes psicoterapéuticas la han tratado de operacionalizar, evaluar y tratar dando como resultado múltiples definiciones, medidas de autoinforme e intervenciones psicológicas. Dentro de los programas de tratamiento desarrollados, las intervenciones basadas en compasión (IBC), tratamientos psicológicos expresamente dirigidos a reducirla, que incorporan como componente principal la autocompasión. Este constructo psicológico, al contrario que la AC, consiste en ser sensible al propio sufrimiento y ofrecerse un trato digno ante la adversidad. Para cultivarla, las IBC incorporan prácticas formales de meditación que implican imaginación guiada y atención plena a los sentimientos emergentes durante la interacción con las imágenes mentales. En definitiva, diferentes meta-análisis han demostrado que las IBC son eficaces en la reducción de AC, pero han señalado importantes carencias metodológicas en los estudios de eficacia llevados a cabo hasta el momento y la ausencia de una explicación acerca de los mecanismos de acción implicados en su funcionamiento.

Teniendo en cuenta todo ello, la presente tesis doctoral tiene como objetivos 1) validar al español la versión abreviada de la *Forms of Self-Criticising/Attacking & Self-Reassuring Scale* (FSCRS); 2) conceptualizar y desarrollar una medida de autoinforme acerca de la calidad de la práctica en compasión, una variable que podría explicar parcialmente el efecto de la práctica formal de meditación en compasión; y 3) estudiar la

eficacia de una micro-intervención de Realidad Virtual (RV) encarnada en la cantidad y calidad de la práctica formal de compasión.

Tres estudios se llevaron a cabo, uno por objetivo. Respectivamente, mostraron que la versión corta y española de la FSCRS fue un cuestionario fiable y válido para la evaluación de AC. Del mismo modo, la Escala de Calidad de la Práctica de Compasión (CPQS) resultó ser un cuestionario de 12 ítems fiable y válido para evaluar en qué medida una persona presenta dificultades en la fase de imaginación guiada y logra experimentar sentimientos compasivos durante la práctica formal de compasión. Finalmente, la micro-intervención de RV encarnada como complemento a una meditación basada en compasión (MBC) incrementó la adherencia a la práctica en casa, aunque no la calidad de dichas prácticas.

Las principales contribuciones de estos resultados son ofrecer por primera vez un instrumento de autoinforme válido y fiable para evaluar AC en población española, la versión corta de la FSCRS, uno de los cuestionarios con mayor evidencia científica en este ámbito. A su vez, el desarrollo de la CPQS y la operacionalización del constructo calidad de la práctica de compasión abre una nueva línea de investigación acerca de cómo explicar parcialmente el funcionamiento de las IBC. Además, se plantea la posibilidad de implementar estrategias que incrementen de forma temprana la calidad de las MBC. En este sentido, futuros estudios podrían complementar la pedagogía de la práctica de compasión con nuevas tecnologías o materiales específicos en formato audiovisual que puedan potenciar la calidad de la práctica.

2. Introducción

En las dos últimas décadas, los tratamientos transdiagnósticos han ido más allá del diagnóstico categorial de los trastornos mentales y se han centrado en la expresión dimensional y la comorbilidad de los trastornos (por ejemplo, Harvey et al., 2004). Este reciente enfoque en investigación y tratamiento ha señalado diferentes procesos cognitivos y conductuales que subyacen a los trastornos mentales, como la autocrítica (AC). La evidencia científica sostiene que la AC supone un factor de vulnerabilidad a la depresión, la ansiedad, los trastornos alimentarios, los síntomas psicóticos y los trastornos de la personalidad (Werner et al., 2019). Por esta razón, los investigadores en psicoterapia han necesitado desarrollar pruebas psicométricas óptimas para evaluar AC y ampliar el conocimiento sobre su tratamiento. Al respecto, el primer objetivo de esta tesis fue la adaptación y validación al español de la versión corta de la *Forms of Self-Criticizing/Attacking and Self-Reassuring Scale* (FSCRS), que es una de las dos medidas de autoinforme de AC con más evidencia empírica (Rose y Rimes, 2018).

Paralelamente, se han desarrollado las intervenciones basadas en compasión (IBC) para el tratamiento de la AC. Aunque tienen un enfoque secular, han sido influenciadas por las tradiciones budistas tibetanas. Ejemplo de ello es la inclusión del entrenamiento en meditación como un ingrediente esencial en las IBC (Kirby, 2017). Sin embargo, a pesar de la evidencia sobre la eficacia de las IBC para mejorar la AC, actualmente existe un desconocimiento sobre sus mecanismos de acción y los procesos implicados en ello (Ferrari et al. 2019; Kirby et al., 2017; Wakelin et al., 2021). En este sentido, la presente tesis doctoral postula que la experiencia de la persona durante una meditación basada en

compasión (MBC) influye en el resultado de la misma. Esta idea se inspira en el trabajo pionero de del Re et al. (2013), quienes enfatizaron la importancia de la calidad, sobre la cantidad, de la práctica de meditación en el contexto del programa *Mindfulness-Based Stress Reduction* (MBSR). Además, esta tesis no solo propone los componentes que podrían explicar la calidad de la práctica de compasión, sino que también estudia la eficacia de un novedoso procedimiento de realidad virtual (RV) encarnada para aumentarla.

La primera parte de la introducción presenta una visión general de las conceptualizaciones, los enfoques psicoterapéuticos y las medidas de autoinforme sobre AC. La segunda parte está destinada a explicar el constructo compasión y a presentar las principales intervenciones específicamente desarrolladas para cultivarlo. La última parte plantea los componentes que podrían definir la calidad de la práctica de compasión, una variable que podría explicar parcialmente cómo funcionan las IBC.

2.1. Autocrítica como un factor transdiagnóstico

El constructo AC ha sido investigado principalmente desde la década de 1970 y explicado desde diferentes perspectivas psicológicas (Kannan y Levitt, 2013). En el marco del *Two Polarities Model of Personality Development and Psychopathology*, Blatt y colaboradores definieron la AC como un sentimiento de culpa, fracaso e inutilidad junto con un constante autoescrutinio (por ejemplo, Blatt y Luyten, 2009). Desde su perspectiva psicodinámica, los individuos que desarrollan su personalidad enfatizando la articulación de sí mismos en contraposición a los demás (organización introyectiva de la personalidad) tienden a adoptar estas preocupaciones autocríticas cuando no se cumplen sus expectativas. Además, según la teoría cognitiva de Beck (Beck et al., 1979), uno de los

tres tipos de patrones cognitivos negativos presentes en la depresión es la visión negativa del yo, es decir, la tendencia a creer que uno mismo es inadecuado y que los fracasos son resultado de los propios defectos.

Por otro lado, el *Axis of Criticism Model* (Shahar, 2015) describe al yo como un conjunto de diferentes aspectos que interactúan y dialogan entre sí. Entonces, la AC es el ataque de uno de esos aspectos a otro, en el que el primero exige un alto rendimiento y muestra hostilidad hacia el segundo cuando inevitablemente no lo cumple. Del mismo modo, el enfoque cognitivo-evolutivo de Paul Gilbert define la AC como un diálogo crítico e interno entre partes del yo, que surge de los sentimientos de fracaso en tareas importantes o cuando las circunstancias se perciben como erróneas (Gilbert, 2010, 2014). Según este autor, existen dos formas de AC, la primera relacionada con la sensación de inadecuación y decepción sobre uno mismo y la segunda, que es más común en poblaciones clínicas, implica un odio absoluto sobre algún aspecto del yo. Además, este autor explica que los individuos desarrollan esta forma de autoevaluación imitando sus competencias para regular las relaciones interpersonales (por ejemplo, las relaciones dominante-subordinado o de estigmatización).

A pesar de las diferencias entre enfoques, la literatura científica coincide en conceptualizar la AC como un factor transdiagnóstico, un factor que subyace tras la sintomatología en múltiples problemas de salud mental (McIntyre et al., 2018; Werner et al., 2019). Concretamente, ese es el caso de los trastornos alimentarios (por ejemplo, Perkins et al., 2020), el suicidio (por ejemplo, O'Neill et al., 2021), las conductas autolesivas (por ejemplo, Zerkowicz y Cole, 2019), la depresión (por ejemplo, Ehret et al., 2015), la ansiedad social (por ejemplo, Iancu et al., 2015) y el trastorno límite de la personalidad (por ejemplo, Vansteelandt et al., 2020).

En lo que respecta a los trastornos alimentarios, Palmeira et al. (2017) encontraron que las mujeres con sobrepeso u obesidad que frecuentemente tienen la percepción de ser un blanco de estigma y sentimientos negativos sobre la obesidad (estigma de peso internalizado) tendían a experimentar AC e incapacidad para calmarse, lo que a su vez aumentaba la gravedad de sus atracones. Así mismo, una reciente revisión sistemática y meta-análisis mostró una asociación positiva significativa entre la AC y el trastorno alimentario y la conducta autolesiva (Zelkowitz y Cole, 2019).

En el caso de la depresión, Joeng y Turner (2015) descubrieron que los altos en AC mostraban niveles más altos de depresión porque tenían miedo a experimentar compasión por sí mismos en circunstancias difíciles, lo que a su vez se asociaba con la percepción de no ser importante para los demás. Igualmente, la capacidad de generar autocompasión medió el efecto de la AC sobre la depresión, lo que sugiere que las personas con un alto nivel de AC podrían beneficiarse del entrenamiento en autocompasión. En consonancia con estos hallazgos, Ehret et al. (2015) encontraron que las personas con depresión, que han estado deprimidas y las nunca deprimidas mostraban un patrón diferente de AC y autocompasión, siendo las primeras el grupo con mayor tendencia a experimentar mayor AC y menor autocompasión.

Por su parte, la AC fue el mejor y único predictor de los síntomas de ansiedad social en comparación a los datos demográficos, la autoestima y la autoeficacia, explicando una proporción sustancial del miedo y la gravedad de la evitación en una muestra de pacientes con trastorno de ansiedad social (Iancu et al., 2015). Además, Vansteelandt et al. (2020) encontraron que los pacientes con trastorno límite de la personalidad con altos niveles de AC mostraban una mayor ansiedad, depresión e ira y un menor nivel de relajación en la vida diaria que aquellos con un bajo nivel de AC.

En cuanto a la evaluación, se han desarrollado diferentes cuestionarios de AC basados en las heterogéneas definiciones y enfoques psicoterapéuticos antes mencionados. Además, no se ha llegado a un consenso sobre qué medidas de AC podrían considerarse como modelos de referencia o más apropiadas para diferentes contextos (por ejemplo, clínico o de investigación). En consecuencia, la AC se ha evaluado con cuestionarios ad hoc o escalas que no fueron diseñadas específicamente para evaluarla (Rose y Rimes, 2018), como la *Dysfunctional Assumptions Scale* (Weissman y Beck, 1978) o el *Depressive Experiences Questionnaire* (Blatt et al., 1976). Por ello, Rose y Rimes (2018) realizaron una revisión sistemática de las medidas de autoinforme de AC existentes y evaluaron sus propiedades psicométricas y la calidad metodológica de los respectivos estudios de validación. Estas autoras identificaron cinco escalas y cinco subescalas que miden la AC. Las escalas eran la FSCRS (Gilbert et al., 2004), la *Self-Critical Rumination Scale* (SCRS; Smart et al., 2016), la *Self-Critical Cognition Scale* (Ishiyama y Munson, 1993), la *Levels of Self-Criticism Scale* (Thompson y Zuroff, 2004) y el *Habit Index of Negative Thinking* (Verplanken y Orbell, 2003). Como conclusión, Rose y Rimes (2018) recomendaron el uso de la FSCRS y la SCRS para realizar investigaciones de alta calidad metodológica en vista de su mayor evidencia científica.

En cuanto a la terapia, las revisiones exhaustivas sobre los tratamientos psicológicos para AC han destacado las contribuciones de las psicoterapias psicodinámicas, cognitivas e integradoras (Kannan y Levitt, 2013; Werner et al., 2019). Según Blatt (1992), el psicoanálisis es especialmente eficaz para los individuos autocríticos, es decir, con personalidad introyectiva, debido al estilo exploratorio e interpretativo de este enfoque terapéutico. Desde la terapia cognitiva tradicional, las dos principales intervenciones para tratar los esquemas maladaptativos autocríticos son la reestructuración cognitiva y la reatribución (Beck et al., 1979). Por otra parte, la Terapia Centrada en la Emoción (por

ejemplo, Greenberg, 2006), que integra las terapias centradas en el cliente y en la experiencia, utiliza principalmente la intervención de la silla vacía para generar un diálogo entre la parte crítica y la parte criticada del yo. Además, en un intento de integrar los desarrollos psicodinámicos, de psicología cognitiva y de neurociencia, Shahar (2013) propuso un enfoque para pacientes autocríticos basado en el análisis de las múltiples dimensiones del yo, la activación conductual y la relación terapéutica. Por último, han surgido las IBC, cuya naturaleza se explica en el siguiente apartado.

2.2. Compasión: un antídoto para la autocrítica

Recientemente, la investigación en psicoterapia se ha interesado por la compasión. De hecho, existe una amplia gama de definiciones sobre la compasión hacia uno mismo y los demás (por ejemplo, Khoury, 2019), aunque se ha propuesto una nueva definición integradora (Gu et al., 2020; Strauss et al., 2016). Según Strauss et al. (2016), la compasión es un proceso cognitivo, afectivo y conductual que consiste en darse cuenta del sufrimiento, ser consciente del principio de humanidad compartida, empatizar, tolerar la angustia causada por la resonancia emocional y generar motivación para actuar o actuar para poner fin al sufrimiento.

En los últimos años se han diseñado intervenciones orientadas a desarrollar la compasión hacia uno mismo. Entre ellas, la *Compassion Focused Therapy* (CFT; Gilbert, 2014) es la más estudiada (Kirby et al., 2017), pero en la actualidad existe una fuerte evidencia sobre la significativa eficacia de una amplia variedad de IBC en la reducción de AC (Wakelin et al., 2021). A parte de la CFT, hay reconocidas cinco IBC diferentes cuyas eficacias ha sido analizada con ensayos controlados aleatorizados (Kirby, 2017): *Mindful Self-Compassion* (Germer y Neff, 2019), *Compassion Cultivation Training*

(CCT; Jazaieri et al., 2013), *Cognitively-Based Compassion Training* (CBCT; Negi, 2013), *Cultivating Emotional Balance* (Kemeny et al., 2012) y *Compassion and Loving-Kindness Meditations* (Hofmann et al., 2011).

En general, todas las IBC asumen que la compasión puede ser cultivada a través del entrenamiento basado en *mindfulness* y diferentes modalidades de MBC en un marco secular (Kirby, 2017). Las MBC no solo están orientadas a nutrir las relaciones armoniosas con los demás, sino también con uno mismo, centrándose en el alivio del sufrimiento (Hofmann et al., 2011).

Las IBC son eficaces para cultivar la compasión y reducir la AC, del mismo modo que para reducir la depresión, la ansiedad, el malestar psicológico, los patrones de pensamiento rumiativo, las dificultades de conducta alimentaria y el afecto negativo (Ferrari et al. 2019; Kirby et al., 2017; Wakelin et al., 2021). Sin embargo, Kirby et al. (2017) concluyeron en su meta-análisis que la evidencia de las IBC era todavía limitada, considerando el pequeño número de ensayos controlados aleatorizados, el uso predominante de población no clínica para los estudios, la gran variabilidad de los cuestionarios para evaluar los resultados y la necesidad de estudios de mayor calidad metodológica. Pero por encima de todas esas limitaciones, la cuestión sobre los mecanismos de eficacia de las IBC sigue abierta.

En este sentido, se requieren más estudios para describir qué procesos y mecanismos de cambio subyacen tras todos sus beneficios. Podrían ser los cambios en los patrones cognitivos, los cambios fisiológicos, la dosis de intervención (duración de la meditación), la adherencia a la práctica en casa, etc. (Ferrari et al. 2019; Kirby et al., 2017; Wakelin et al., 2021). En consecuencia, Skwara et al. (2017) propusieron qué factores teóricamente relacionados con el entrenamiento en compasión podrían influir en los cambios en las IBC: las operaciones cognitivas implícitas de las instrucciones de meditación, las

motivaciones de los meditadores, el formato de la intervención (presencial o no), el contexto de la intervención (por ejemplo, investigación o intervención clínica) y el bienestar resultante de la adherencia a la práctica.

Esta problemática también se ha abordado en la literatura sobre las intervenciones basadas en *mindfulness* (por ejemplo, Gu et al., 2015). En el contexto del MBSR (Kabat-Zinn, 2009) y de la Terapia Cognitiva Basada en *Mindfulness* (Segal et al., 2002), la frecuencia de la práctica formal en casa se considera un factor crucial que determina los resultados, requiriendo 45 minutos, seis días a la semana de la misma. Paradójicamente, la literatura muestra que los participantes practican 29 minutos al día y que la asociación entre la frecuencia de la práctica en casa y los resultados de la intervención es pequeña, incluso insignificante en algunos casos (Berghoff et al., 2017; Lloyd et al., 2018; Parsons et al., 2017).

En respuesta a lo anterior, del Re et al. (2013) se preguntaron si es la calidad, y no la cantidad, de práctica formal de *mindfulness* el factor más importante. Estos autores desarrollaron la escala *Practice Quality - Mindfulness* para evaluar los elementos más relevantes de la experiencia de los usuarios cuando meditan, es decir, la perseverancia en la manipulación de la orientación atencional y la recepción momento a momento con curiosidad y aceptación de cada experiencia. Los estudios sobre la influencia de este nuevo constructo han demostrado que los cambios en la calidad de la práctica de *mindfulness* predicen las mejoras en funcionamiento psicológico del entrenamiento MBSR y median el efecto del tiempo de práctica formal sobre el nivel de *mindfulness*, lo que sugiere que la calidad de la práctica es un ingrediente o mecanismo de acción (del Re et al., 2013; Goldberg et al., 2014; Goldberg et al., 2020). Cabe destacar que la calidad de la práctica de *mindfulness* fue concebida según la experiencia personal de del Re en meditación basada en *mindfulness*, discutida con especialistas en MBSR, y teniendo en

cuenta las características específicas del entrenamiento en *mindfulness* (del Re et al., 2013). Entonces, ¿podría ser también aplicable al entrenamiento en compasión? Además, ¿podrían la atención y la receptividad explicar la calidad de la práctica de compasión? Por un lado, el constructo calidad de la práctica, entendido como el compromiso y la experiencia de los meditadores durante la práctica formal, puede ser aplicable en contextos de entrenamiento de *mindfulness* y de compasión. Por otro lado, los componentes específicos que definen la experiencia durante práctica formal de *mindfulness* y MBC son inherentes a las características de cada una. Por lo tanto, pueden ser diferentes. La siguiente sección aborda esta cuestión.

2.3. Calidad de la práctica en compasión

Las meditaciones de *mindfulness* se clasifican en prácticas de atención focalizada y de monitoreo abierto (Dahl et al., 2015). Entrenan específicamente capacidades de regulación de la atención, como la manipulación de la orientación de la atención y la capacidad cognitiva de ser consciente de los pensamientos, sentimientos y percepciones presentes (Dahl et al., 2015; Wielgosz et al., 2019). En cambio, las meditaciones de la familia constructiva no se limitan a centrarse en las experiencias cognitivas y emocionales presentes, sino que tratan de modificarlas. Su propósito es cultivar cualidades virtuosas, como la compasión, para sustituir los esquemas desadaptativos sobre uno mismo, lo que a su vez fomenta el bienestar (Dahl et al., 2015). En la práctica de compasión, el meditador procede a través de una serie de contemplaciones sobre uno mismo y/o sobre otra persona, a la que se dirigen deseos específicos (por ejemplo, que estés libre de todo sufrimiento). Así, esta práctica implica centrar la atención en una imagen mental y también ser consciente de qué sentimientos aparecen mientras se mantiene una actitud abierta y amable hacia la experiencia (Hofmann et al., 2011). Por tanto, las operaciones cognitivas

implícitas y los propósitos de estos dos tipos de meditaciones (en *mindfulness* y compasión) son totalmente diferentes. En general, la imaginación y la consciencia de los sentimientos compasivos durante la meditación parecen los dos desencadenantes del *insight* dentro de las MBC (Hofmann et al., 2011).

La imaginación es un ingrediente clave en las MBC, y se entiende como la creación de experiencia perceptiva a través de diferentes modalidades sensoriales en ausencia de estímulos sensoriales (Kosslyn et al., 1995). En terapia cognitivo conductual, la imaginación es un factor clave por su asociación con psicopatología, su potencial para la mejora del funcionamiento cognitivo y su aplicación para amplificar la intensidad de la respuesta emocional (Saulsman et al., 2019). De hecho, el propio Gilbert (2009) incluye ejercicios de imaginación compasiva para generar sentimientos compasivos a partir de recuerdos, deseos y fantasías. Sin embargo, a pesar de su potencial, el constructo imaginación no ha recibido gran atención ni en el campo de la psicología clínica (Pearson et al., 2013; Saulsman et al., 2019), ni específicamente en el de las IBC. Algunos estudios acerca de la relación entre imaginación y MBC se presentan a continuación.

En primer lugar, Kelly et al. (2010) desarrollaron una IBC basada en la CFT de Gilbert, probaron su eficacia en la autorregulación del consumo de cigarrillos de una muestra de fumadores e investigaron el papel moderador de la viveza de las imágenes mentales. En este contexto, la viveza es la percepción subjetiva de la similitud de una imagen mental con la experiencia perceptiva real (Pearson et al., 2013), que puede describirse a través de las siguientes modalidades sensoriales (por ejemplo, Pérez-Fabello y Campos, 2020): visual, auditiva, olfativa, gustativa, cutánea, sensación corporal y emociones. El estudio encontró que los individuos con alta viveza al imaginar mostraron reducciones más rápidas en el consumo de tabaco después del entrenamiento en imaginación compasiva, lo que sugiere que es más eficaz cuando los individuos son capaces de generar una imagen

mental vivaz (Kelly et al., 2010). En relación con esto, Kharlas y Frewen (2016) descubrieron que la viveza de las imágenes mentales y las sensaciones corporales durante una meditación guiada de imaginación no solo se asociaban con las experiencias agradables en respuesta a la práctica, sino que también mediaban el efecto de la observación consciente en esas respuestas, siendo las sensaciones corporales el mediador más fuerte.

Por otra parte, se ha descrito que la baja capacidad para imaginar fue un obstáculo en los ejercicios de imaginación compasiva en una muestra de pacientes con trastornos de la personalidad (Naismith et al., 2018, 2019a). En estos estudios, se investigaron cuantitativa y cualitativamente los inhibidores y facilitadores del rendimiento en los ejercicios de imaginación compasiva. Los resultados mostraron que la viveza al imaginar se asoció positivamente con la facilidad para experimentar compasión y que cuanto mayor era la capacidad basal de imaginar con viveza, mayor era la adherencia a la práctica de meditación durante la intervención (Naismith et al., 2018). Posteriormente, el análisis temático de las respuestas de los participantes a las entrevistas semiestructuradas y a los registros escritos identificó la baja capacidad para imaginar como un obstáculo para los ejercicios de imaginación compasiva. En concreto, las dificultades en los procesos de creación y mantenimiento de las imágenes mentales produjeron frustración en los participantes (Naismith et al., 2019a).

Consecuentemente, se han aplicado diferentes enfoques para abordar estas dificultades. Por ejemplo, Naismith et al. (2019b) investigaron si mostrar imágenes que despertaran compasión aumentaría la viveza de las imágenes mentales dentro de un ejercicio de imaginación compasiva y mejoraría su eficacia. Las imágenes eran fotos en color de individuos que cuidaban a alguien necesitado, familia y amigos. Los resultados no mostraron un efecto significativo de las fotos ni en la viveza de las imágenes mentales

ni en la eficacia del ejercicio. Sin embargo, la viveza de las imágenes mentales durante el ejercicio, específicamente a través de las modalidades visual y de sensaciones corporales, predijo el cambio en afecto compasivo. Además, los participantes indicaron que las imágenes eran útiles para generar la imagen mental y para inducir sentimientos compasivos (Naismith et al., 2019b): "*Me dieron sentimientos de calidez y ternura y pude expresar más fácilmente los sentimientos de compasión*". En ese sentido, hay al menos tres posibles razones para explicar cómo la imaginación impacta poderosamente en la emoción (Holmes y Mathews, 2010): una influencia directa de la imaginación en los sistemas emocionales, el solapamiento entre los procesos de imaginación y los perceptivos y las áreas cerebrales implicadas y la capacidad de la imaginación para revivir episodios emocionales relacionados con contenido autobiográfico.

Otros estudios han investigado el efecto de la RV para superar las dificultades en imaginación a través de la experiencia de "ser" otra persona. Falconer et al. (2014) estudiaron la eficacia de encarnar avatares en un entorno de RV en autocompasión con una muestra de participantes con alta AC. Para ello, compararon los niveles de autocompasión, AC y estado de ánimo entre un grupo de participantes que vieron un escenario virtual en una perspectiva de primera persona y los participantes que vieron el escenario en una perspectiva de tercera persona. Su principal hallazgo fue que la RV fue eficaz para mejorar la autocompasión en el grupo de perspectiva en primera persona y reducir los niveles de AC de los participantes en ambas condiciones.

Recientemente, Cebolla et al. (2019) fueron más allá e investigaron la eficacia de una meditación de autocompasión apoyada por un sistema de RV para el "intercambio de cuerpos" o encarnada (*Machine to be Another*; de Oliveira et al., 2016) sobre la compasión, las conductas de autocuidado, el afecto y la adherencia a la práctica de la mediación. En general, los resultados mostraron que los participantes que se sometieron

a la condición de RV mejoraron significativamente las conductas de compasión y autocuidado, al igual que los participantes que solo meditaron (grupo de control). Además, ambos grupos mostraron una adherencia similar a la práctica de la meditación durante las dos semanas siguientes a la experiencia en el laboratorio. El principal hallazgo fue que la viveza en imaginación (modalidad cutánea) moderó el efecto de la condición sobre la frecuencia de la práctica de meditación. Es decir, los individuos con una capacidad media y baja de imaginar con viveza a través de la modalidad táctil que se sometieron a la condición de RV mostraron una mayor adherencia a la práctica de la meditación que los participantes de la condición de control con los mismos niveles de viveza en imaginación.

Teniendo en cuenta todo lo expuesto hasta ahora, la investigación en psicoterapia ha señalado a la AC como un factor de vulnerabilidad común a varios trastornos psicológicos. Durante los últimos cincuenta años se han diseñado diferentes enfoques para tratar la AC, desde las teorías psicodinámicas tradicionales hasta las integradoras más recientes. Por un lado, se han desarrollado diferentes medidas de autoinforme para evaluar la AC, ninguna de las cuales ha sido validada para población española. Por otro lado, las IBC, especialmente la CFT, son una de las últimas intervenciones más prometedoras y con evidencia probada para tratar AC, aunque también con importantes carencias para explicar sus mecanismos de cambio. Estas IBC implican la práctica de la meditación dentro y entre sesiones como una de sus técnicas principales. Al igual que en investigaciones sobre el MBSR, la calidad de la práctica podría explicar parcialmente los efectos de las IBC. Sin embargo, no hay ningún estudio en el campo de las IBC que aborde esta cuestión.

3. Objetivos

Esta tesis tiene como objetivo fundamental definir el constructo calidad de la práctica de compasión e investigar los efectos de la RV para potenciarla durante la MBC, que es la principal técnica dentro de las IBC para tratar AC. Así, los objetivos concretos fueron:

- (1) Traducir y validar la versión corta de la FSCRS en población española.
- (2) Definir con precisión los componentes de calidad de la práctica de compasión y ofrecer una medida de autoinforme para evaluarla.
- (3) Investigar la eficacia de una experiencia de RV encarnada para aumentar la calidad y la cantidad de la práctica de compasión en casa.

Se realizaron tres estudios, uno por cada objetivo. Así, el estudio 1 (ver anexo 1 para la lectura del artículo publicado) buscaba validar una de las dos medidas de autoinforme de AC con más evidencia empírica, la FSCRS (Rose y Rimes, 2018). La ausencia de validaciones españolas de los cuestionarios de AC identificados por Rose y Rimes (2018) explica la necesidad de este estudio. La FSCRS fue desarrollada dentro del paradigma cognitivo-evolutivo de Gilbert (Gilbert et al., 2004) para evaluar dos formas de AC, a saber, el “yo inadecuado” (IS) y el “yo odiado” (HS), y la capacidad de tranquilizarse cuando las cosas van mal (“yo tranquilo”; RS). Concretamente, se eligió la forma corta (FSCRS-SF; Sommer-Spijkerman et al., 2018) porque mostraba propiedades psicométricas similares y era más apropiada para reducir la carga de respuesta en el contexto de investigación, en el que son preferibles escalas cortas debido al uso común de múltiples medidas. Se hipotetizó que el modelo de tres factores mostraría un ajuste

adecuado y que la versión española de la FSCRS-SF mostraría una alta fiabilidad y adecuada validez de constructo, validez de grupo conocido, validez predictiva y sensibilidad al cambio.

El estudio 2 (véase el anexo 2 para la lectura del artículo publicado) tenía como objetivo desarrollar la CPQS y explorar su estructura factorial. La escala se construyó teniendo en cuenta las características clave de las MBC descritas en la literatura: imaginación, conciencia de los sentimientos de compasión y dirigir frases compasivas a una persona imaginada (por ejemplo, Hofmann et al., 2011). Nuestra hipótesis era que la CPQS mostraría una adecuada consistencia interna y validez de constructo.

Por último, el estudio 3 (véase el anexo 3 para la lectura del artículo publicado) abordó si un sistema de RV encarnada llamado *Machine to be Another* como complemento a una MBC no sólo sería eficaz para aumentar la cantidad sino también la calidad de la práctica en casa en comparación con una MBC sin apoyo de RV. Un estudio anterior demostró que una meditación de autocompasión apoyada por este sistema de RV era tan eficaz como la meditación sentada tradicional para aumentar los estados de compasión y *mindfulness* y la adherencia a la práctica en casa (Cebolla et al., 2019). Sin embargo, se reclutó una muestra mayor en base a los tamaños del efecto reportados por Cebolla et al. (2019) para estudiar de nuevo los efectos del sistema de RV encarnada en la adherencia e investigar por primera vez su influencia en la calidad de la práctica de compasión.

4. Metodología y resultados

El Comité de Ética de la Universidad de Valencia aprobó los procedimientos de los tres estudios (H1539699805131). Se obtuvo el consentimiento informado por escrito de todos los participantes. Los estudios se realizaron siguiendo las normas éticas descritas en la Declaración de Helsinki (World Medical Association, 2013).

Las investigaciones que se presentan en esta sección abarcan los principales resultados de los tres estudios publicados. Para facilitar la lectura, la sección se divide en tres subsecciones, una por estudio.

4.1. Estudio 1. La versión española de la FSCRS-SF

Este estudio pretendía validar la forma corta de la FSCRS. Se hipotetizó que el modelo de tres factores (IS, HS y RS) mostraría un ajuste adecuado y que la FSCRS-SF española mostraría una alta fiabilidad y adecuada validez de constructo, validez de grupo conocido, validez predictiva y sensibilidad al cambio.

Se reclutó una muestra de población general española ($n = 499$; 377 mujeres, $M_{\text{edad}} = 31,08$; $DT = 12,55$) y una muestra clínica de pacientes adultos diagnosticados de trastorno límite de la personalidad o trastorno de la conducta alimentaria ($n = 77$; 73 mujeres; $M_{\text{edad}} = 31,03$; $DT = 11,03$) de la Comunidad Valenciana (España) y del *Hospital de la Santa Creu i Sant Pau* (Barcelona, España), respectivamente. Finalmente, hubo una tercera

muestra formada por trabajadores sociales ($n = 20$; todas mujeres; $M_{\text{edad}} = 39,65$; $DT = 8,29$).

Todos ellos fueron evaluados a través de la plataforma online *Lime Survey* de la Universidad de Valencia o con un paquete de cuestionarios de lápiz y papel. Los participantes de población general recibieron un enlace a través del correo electrónico para responder de nuevo a la encuesta a los 3 meses. Los trabajadores sociales se sometieron a una intervención basada en mindfulness y compasión (IBMC) y respondieron la FSCRS-SF antes y después de la intervención.

Los autores originales de la escala dieron permiso para traducir y validar la FSCRS-SF. La versión en inglés fue traducida en primer lugar al español por tres psicólogos españoles independientes con alto dominio de inglés. A continuación, un hablante nativo de inglés independiente la volvió a traducir y se discutieron las discrepancias. Se utilizó para evaluar AC, junto con una versión ad-hoc en español de la SCRS. También se utilizó la *Self-Compassion Scale Short-Form* (SCS-SF; García-Campayo et al., 2014; López et al., 2015) para evaluar autocompasión. Finalmente, los síntomas de depresión, ansiedad y somatización se evaluaron con el *Brief Symptom Inventory-18* (BSI-18; Derogatis, 2000; Galdón et al., 2008).

Estructura factorial. Se realizó un análisis factorial confirmatorio (método de estimación de máxima verosimilitud robusta) con los datos recogidos de la muestra de población general para estimar el modelo de tres factores. Los resultados mostraron que el modelo ajustaba adecuadamente, $\chi^2(74, n = 499) = 238,13, p < 0,001$, SRMR = 0,04, RMSEA = 0,06, CFI = 0,94, y TLI = 0,93.

Consistencia interna. Se utilizó el α de Cronbach (Cronbach, 1951) y el ω de McDonald (McDonald, 1999) para evaluar la consistencia interna de la FSCRS-SF en las

muestras de población general y clínica. Fue adecuada para ambas, con coeficientes α y ω que oscilaron entre 0,79 y 0,82.

Fiabilidad test-retest. De la muestra de población general, 119 participantes respondieron de nuevo la FSCRS-SF a los 3 meses. A continuación, se calcularon las correlaciones de Pearson entre las puntuaciones de ambos momentos. Los resultados apoyaron la estabilidad temporal de las puntuaciones de las subescalas IS ($r = 0,78$), HS ($r = 0,73$) y RS ($r = 0,66$), mostrando todas las correlaciones una $p < 0,01$.

Validez de constructo. La validez convergente y divergente se evaluó correlacionando las puntuaciones de la FSCRS-SF, la SCRS, la SCS-SF y la BSI-18 de la muestra de población general. Como se esperaba, las puntuaciones de IS y HS se asociaron positivamente con las puntuaciones totales de SCRS y BSI-18, así como negativamente con la puntuación total de SCS-SF. Por el contrario, las puntuaciones de RS mostraron una asociación negativa con las puntuaciones totales de SCRS y BSI-18, y una asociación positiva con la puntuación total de SCS-SF. Las correlaciones fueron medianas/grandes y significativas, oscilando entre 0,28 y 0,74 ($p < 0,01$).

Validez de grupo conocido. Se realizó un análisis multivariante de la varianza para investigar las diferencias en las puntuaciones de IS, HS y RS entre las muestras de población general y clínica. La primera se dividió en tres: participantes que eran meditadores activos ($n = 133$), meditadores no activos ($n = 41$) y sin experiencia en meditación ($n = 325$). Hubo una diferencia significativa entre los grupos, $F(9, 1370,35) = 27,24$, $p < 0,001$; Lambda de Wilks = 0,67; $\eta^2 = 0,13$. El análisis post hoc mediante el test HSD de Tukey identificó que los participantes de la muestra clínica tenían puntuaciones medias estadísticamente significativas más altas en IS ($p < 0,001$) y HS ($p < 0,001$) y más bajas en RS ($p < 0,001$) que el resto de los participantes. Asimismo, los

participantes que eran meditadores activos mostraron puntuaciones de IS ($p = 0,013$) más bajas y de RS más altas ($p = 0,050$) que los participantes sin experiencia en meditación.

Validez predictiva. Se utilizó una regresión múltiple jerárquica para evaluar la capacidad de las primeras puntuaciones de la FSCRS-SF para predecir la puntuación total del BSI-18 de 119 participantes de la muestra de población general a los 3 meses. Después de controlar las puntuaciones pre del BSI-18, los resultados mostraron que las puntuaciones del RS eran el único factor del FSCRS-SF que mostraba una contribución única y estadísticamente significativa en el modelo ($\beta = -0,17$; $p = 0,041$).

Sensibilidad al cambio. Se realizó una prueba t para muestras relacionadas para investigar el impacto de la IBMC en las puntuaciones de la FSCRS-SF de la muestra de trabajadores sociales. Los resultados mostraron una disminución estadísticamente significativa en las puntuaciones de IS ($t(19) = 2,20$, $p = 0,04$, $\eta^2 = 0,20$) y un aumento en las puntuaciones de RS ($t(19) = -3,19$, $p = 0,005$, $\eta^2 = 0,35$).

A la vista de estos resultados, la FSCRS-SF es una medida de autoinforme válida y fiable que puede utilizarse en población española para evaluar dos tipos de AC (IS y HS) y RS. La principal contribución de este estudio es la validación al idioma español de una medida de autoinforme de AC por primera vez. Además, esta versión corta es muy adecuada para el contexto de investigación tanto por su brevedad como por su sensibilidad al cambio. Véase el anexo 1 para la lectura del artículo publicado.

4.2. Estudio 2. Escala de Calidad de la Práctica de Compasión (CPQS)

Este estudio tenía como objetivo desarrollar la CPQS y explorar su estructura factorial. La hipótesis era que la CPQS mostraría una buena consistencia interna y validez de constructo.

Para ello, se reclutó una muestra de 205 estudiantes universitarios (126 mujeres; $M_{\text{edad}} = 19,75$; $DT = 2,49$) de la Universidad de las Américas Puebla (México). Los participantes respondieron vía online a una evaluación inicial, luego realizaron una MBC y finalmente completaron otra evaluación.

La práctica de compasión (<https://youtu.be/pLWYj0JvbP0>) era un audio de ocho minutos en el que se pedía a los participantes que centraran la atención en el momento presente, imaginaran a una persona querida y le dirigieran buenos deseos. A continuación, la meditación incluía una fase de generación, mantenimiento, inspección y transformación explícita de imágenes mentales y la instrucción de gestos de compasión (caricias).

Dos psicólogos con experiencia en entrenamientos basados en *mindfulness* y compasión redactaron la primera versión de la CPQS atendiendo a los aspectos clave de las MBC anteriormente comentados. El proceso de desarrollo de la CPQS fue supervisado por meditadores y entrenadores expertos en CBCT, CCT o CFT. La versión final tenía 12 ítems que los participantes puntúan indicando el porcentaje de veces que su experiencia refleja cada afirmación. En el caso de las meditaciones que no incluyen autoinstrucciones o gestos se pueden excluir los dos últimos ítems.

Así, la calidad de la práctica de compasión se evaluó después de la meditación con la CPQS. Además, *mindfulness* estado, afecto y cualidades positivas/negativas hacia uno mismo y hacia los demás se midieron antes y después de la práctica de meditación con la

State of Mindfulness Scale (SMS; Tanay y Bersntein, 2013), la *International Positive and Negative Affect Schedule-Short Form* (PANAS; Thompson, 2007), y la *Self-Other Four Immeasurables* (SOFI; Kraus y Sears, 2009), respectivamente. La AC se midió con la FSCRS-SF (Sommers-Spijkerman et al., 2018), el miedo a la compasión de los demás con la *Fears of Compassion from others Scale* (FCS; Gilbert et al., 2011), y las habilidades de imaginación con el *Betts' Questionnaire Upon Mental Imagery* (BETT; Campos y Pérez-Fabello, 2005) y el *Prospective Imagery Test* (PIT; Stöber, 2000).

Eficacia de la meditación. Se llevó a cabo una prueba t para muestras relacionadas para investigar el impacto de la MBC en las puntuaciones de los participantes en la SMS (puntuación total), PANAS (subescala de afecto positivo) y SOFI (subescala de cualidades positivas hacia los demás). Los resultados mostraron un aumento estadísticamente significativo en las puntuaciones de la SMS ($t(204) = -8,99, p < 0,001$, eta cuadrado = 0,29), del SOFI ($t(204) = -4,92, p < 0,001$, eta cuadrado = 0,11) y del PANAS ($t(204) = -6,14, p < 0,001$, eta cuadrado = 0,16).

Estructura factorial. Un análisis de componentes principales con rotación oblimin reveló la presencia de 2 componentes que explicaron el 41,83% y el 24,13% de la varianza. Este resultado fue apoyado por el criterio de Kaiser (regla del valor propio), la interpretación del scree test de Catell y los resultados del análisis paralelo de Horn. Un componente, que se denominó "imaginación", recogía los ítems sobre la creación, la inspección, el sostenimiento y la transformación de imágenes mentales, la viveza y la AC. Los ítems del otro componente, que se denominó "percepción somática", se referían a la calidez, la presencia, el confort, la simpatía, las autoinstrucciones compasivas y los gestos de auto calma.

Consistencia interna. El α de Cronbach y el ω de McDonald indicaron una buena consistencia interna tanto para el componente de imaginación ($\alpha = 0,90$; $\omega = 0,90$) como para el de percepción somática ($\alpha = 0,88$; $\omega = 0,89$).

Validez de constructo. La validez convergente y divergente se evaluó correlacionando las puntuaciones de CPQS, BETT, PIT, FSCRS-SF y FCS. Las puntuaciones de percepción somática y de imaginación se asociaron positivamente con las puntuaciones del PIT (subescala de imágenes positivas) y de RS, así como negativamente con las puntuaciones del BETT (una puntuación alta en esta escala indica una baja viveza de las imágenes mentales y viceversa), de la HS y de la FCS. Las correlaciones fueron pequeñas/medias y significativas ($p < 0,05$), oscilando entre 0,14 y 0,29.

Validez predictiva. Se utilizó una regresión múltiple jerárquica para evaluar la capacidad de las puntuaciones de la CPQS para predecir las puntuaciones de la SOFI (subescala de cualidades positivas hacia los demás) después de la meditación. Después de controlar las puntuaciones de la SOFI previas a la meditación, los resultados mostraron que los componentes de imaginación ($\beta = 0,17$; $p = 0,002$) y percepción somática ($\beta = 0,25$; $p < 0,001$) mostraron una contribución única y estadísticamente significativa en el modelo.

Sobre la base de estos resultados, se concluyó que la CPQS es una medida de autoinforme fiable de calidad de la práctica de compasión. Así, a mayor facilidad para imaginar y experimentar las señales somatosensoriales de la compasión (por ejemplo, la calidez), mayor calidad de la práctica de compasión. Además, la calidad de la práctica de compasión podría predecir el resultado de la meditación. Otros estudios deberían ampliar este hallazgo analizando la evolución de la calidad de la práctica a través de varias MBC. Véase el anexo 2 para leer el artículo publicado.

4.3. Estudio 3. Realidad virtual encarnada y calidad de la práctica

Este estudio investigó si una MBC apoyada por un sistema de RV encarnada llamado *Machine to be Another* sería eficaz para aumentar la cantidad y la calidad de la meditación en casa en comparación con una MBC sin apoyo de RV.

Se reclutó una muestra de 41 estudiantes o profesionales del área de las ciencias de la salud (33 mujeres; $M_{edad} = 22,85$; $DT = 4,76$). Los participantes fueron asignados aleatoriamente a un grupo en el que realizaron una meditación guiada grabada apoyada por el *Machine to be Another* (condición RV; $n = 21$) o a un grupo en el que meditaron tan solo siguiendo las instrucciones del audio (condición Audio; $n = 20$).

Todos los participantes fueron invitados a una sesión presencial en la Facultad de Psicología de la Universidad de Valencia. A continuación, se les comunicó que iban a conocer la historia personal de un paciente con trastorno de pánico, hacia el que debían generar y dirigir compasión. Por un lado, los participantes de la condición de RV realizaron en primer lugar una inducción de *embodiment* con el *Machine to be Another* para experimentar la ilusión de un intercambio corporal con el paciente con trastorno de pánico. Esta experiencia constó principalmente de una fase de sincronización motora entre el participante y un intérprete, que representaba al paciente. A continuación, se reprodujo a los participantes una narración en primera persona sobre momentos autobiográficos relacionados con el trastorno. Por último, escucharon una MBC grabada dedicada a este paciente. Los participantes en la condición de audio siguieron el mismo procedimiento, excepto por la fase de intercambio de cuerpos.

Se invitó a los participantes a continuar con la práctica de compasión en casa, que se evaluó durante las dos semanas siguientes. Concretamente, se encuestó a los participantes

diariamente para saber si habían meditado. Si lo habían hecho, se evaluó la calidad de la práctica de compasión con la CPQS.

Impacto en la frecuencia de práctica de compasión. Se realizó un análisis de covarianza para comparar la eficacia de las dos micro intervenciones en la práctica media de meditación. La frecuencia de práctica de meditación durante las dos semanas anteriores se utilizó como covariable en este análisis. Hubo una diferencia estadísticamente significativa entre los dos grupos en la práctica media de meditación durante las dos semanas posteriores a la sesión, $F(1, 38) = 5,49, p = 0,024$, eta cuadrado parcial = 0,13.

Impacto en la calidad de la práctica de compasión. Un análisis de covarianza mostró que no había diferencias estadísticamente significativas entre grupos en las puntuaciones medias de la CPQS, ni en el factor imaginación, $F(1, 31) = 0,69, p = 0,413$, eta cuadrado parcial = 0,00, ni en el factor de percepción somática, $F(1, 31) = 2,04, p = 0,163$, eta cuadrado parcial = 0,06, después de controlar la frecuencia de meditación en casa.

Teniendo en cuenta estos resultados, la experiencia de RV encarnada fue eficaz para mejorar la cantidad de práctica de compasión en casa, pero no la calidad. Quizás el procedimiento de RV encarnada (versus audio) fue más eficaz a corto plazo en calidad de la práctica, es decir, para la meditación realizada inmediatamente después de la experiencia de RV. Futuros estudios deberían analizar el efecto de la micro intervención de RV encarnada aumentando el número de sesiones y explorando las diferencias a corto y largo plazo. Véase el anexo 3 para leer el artículo publicado.

5. Discusión general

Como se ha expuesto a lo largo de esta tesis, la AC es un factor transdiagnóstico asociado a niveles más altos de psicopatología en trastornos mentales comunes (por ejemplo, trastornos de la alimentación y depresión). A pesar de su relevancia en psicoterapia, se necesita más investigación para mejorar las herramientas de evaluación y los enfoques de su tratamiento. Recientemente, se ha indicado que la FSCRS y la SCRS son las mejores medidas de autoinforme para evaluar AC, pero no estaban validadas en población española. A su vez, el tratamiento de la AC se ha abordado a través de varios enfoques psicoterapéuticos. Entre ellos, se han desarrollado intervenciones que implican el cultivo de la compasión para abordar la AC. Prometedores estudios de meta-análisis han puesto de manifiesto la eficacia de las IBC en la mejora de AC, entre otros problemas de salud mental y bienestar. Sin embargo, la forma en que logran sus efectos sigue siendo una pregunta sin respuesta.

Las IBC incluyen la práctica de la meditación tanto dentro como entre sus sesiones como una de sus principales técnicas. En este sentido, se ha demostrado en la investigación sobre *mindfulness* que no sólo la frecuencia, sino también la calidad de la práctica de meditación está asociada a mejores resultados en MBSR. No obstante, el constructo calidad de la práctica en las meditaciones basadas en *mindfulness* y en las MBC es diferente, teniendo en cuenta las características implícitas de cada una. Pero ni los aspectos que definen la calidad de la práctica de compasión ni cómo incrementarla han sido estudiados previamente en el campo de las MBC.

Por lo tanto, la presente tesis tuvo como objetivos (1) validar al español la forma corta de la FSCRS; (2) definir el constructo calidad de la práctica de compasión como un posible mecanismo subyacente en las IBC; y (3) probar una micro intervención de RV encarnada para aumentarla en la práctica de la meditación en casa. Para lograr estos objetivos, se llevaron a cabo tres estudios.

Los resultados del primer estudio mostraron que la versión española de la FSCRS-SF era un instrumento válido y fiable. Se encontró evidencia para la estructura de tres factores, es decir, la FSCRS-SF puede utilizarse en la población española para evaluar dos tipos de AC (IS y HS) y la capacidad para auto calmarse (RS). Esto coincide con la versión original de la escala (Gilbert et al., 2004; Sommers-Spijkerman et al., 2018) y con la mayor parte de los estudios sobre las propiedades psicométricas de la FSCRS (por ejemplo, Baião et al., 2015). Sin embargo, un estudio reciente examinó la estructura factorial de la FSCRS en estudios de validación en 8 lenguas distintas con una gran muestra total ($n = 7510$) y concluyó que el uso de dos puntuaciones (IS y HS fusionadas y RS) era tan recomendable como el uso de las tres originales (Halamová et al., 2018). Especialmente, estos autores destacaron que el IS y el HS pueden ser factores indistintos en población no clínica. Por lo tanto, los estudios en esta población podrían beneficiarse de calcular dos puntuaciones en lugar de tres. Esta idea se reflejó en los datos del estudio 1, ya que las tres muestras de población general (meditadores en activo, con experiencia en meditación y sin experiencia en meditación) mostraron bajas y semejantes puntuaciones de HS. Al mismo tiempo, la muestra clínica mostró puntuaciones de HS más altas que todas ellas. En esta línea, la ausencia de diferencias estadísticamente significativas en las puntuaciones de HS en la muestra de trabajadores sociales tras la IBMC podría haberse debido a un efecto suelo provocado por esta infrecuente presencia de HS en las poblaciones no clínicas.

En base a los resultados de este estudio, la FSCRS-SF es adecuada para su uso en psicoterapia e investigación en España. Además, otra de las principales aportaciones de esta tesis ha sido probar por primera vez este cuestionario como instrumento autónomo.

El estudio 2 tenía como objetivo desarrollar la CPQS y explorar su estructura factorial. Los resultados indicaron que la CPQS fue un cuestionario de autoinforme fiable para evaluar "hasta qué punto un meditador es capaz de producir imágenes mentales (en términos de generación, mantenimiento, inspección y transformación/manipulación de las imágenes mentales) y activar el componente somatosensorial de la compasión para evocar y mantener un estado compasivo" (Navarrete et al., 2021). Este constructo aporta información relevante acerca de cómo funciona el entrenamiento en compasión, proporcionando un nuevo posible mecanismo de acción. Como mostraron los resultados, la peor calidad de la práctica de compasión (ambos componentes por igual) se asoció con HS, pero no significativamente con IS. Esto sugiere que los individuos con niveles más graves de AC pueden experimentar mayores dificultades al realizar MBC. En esta línea, Duarte et al. (2015) mostraron que los individuos con alta AC (frente a baja AC) informaron de un aumento significativo de estrés cuando se sometieron tanto a un ejercicio de imaginación compasiva como a una tarea de imaginación sin contenido compasivo. Una posible explicación fue que los individuos con alta AC perciben la MBC como una situación estresante no sólo por el contenido compasivo de la meditación, sino también porque podrían frustrarse a sí mismos al supervisar y criticar en exceso su propia actuación (Duarte et al., 2015).

Además, los resultados mostraron que en la medida en que los participantes eran capaces tanto de imaginar con viveza como de percibir la experiencia somática de compasión obtenían mayor nivel de compasión después de la meditación. Por tanto, fue posible cuantificar la influencia de la calidad de la práctica en el estado de compasión

después de una MBC. Cabe destacar que el componente somático tuvo una mayor contribución como predictor que el componente de imágenes.

Así, esta tesis ofreció por primera vez una definición operativa de calidad de la práctica de compasión y propuso una medida de autoinforme válida y fiable para evaluarla. Además, la calidad de la práctica de compasión predijo el estado de compasión resultante de la MBC. En consecuencia, estos resultados abren un nuevo campo de investigación dentro de las IBC. Por ejemplo, de este estudio surgen algunas preguntas: ¿será suficiente mejorar uno de los componentes de la calidad de la práctica para aumentar el resultado de la compasión? ¿Es posible mejorarlos desde el principio en el contexto de una IBC? ¿Cuáles serían los resultados de la IBC si el instructor realizara un entrenamiento previo para potenciarlos antes de meditar?

El tercer estudio trató de responder parcialmente a esas preguntas probando la eficacia de una MBC apoyada por un sistema de RV encarnada para aumentar la calidad y la cantidad de la meditación en casa. El *Machine to be Another* se utilizó para facilitar la viveza de las imágenes mentales ofreciendo la experiencia de ponerse en el cuerpo de una persona a la que después dirigir compasión durante la meditación. Se planteó que ofrecer una experiencia en primera persona de la persona que sufre y a la que dedicar deseos compasivos mejoraría la calidad de la práctica, ya que el recuerdo y la información visual del ejercicio en sesión aumentaría, al menos, el componente de imaginación. Por un lado, no se encontró este efecto en la calidad media de la práctica en las dos semanas siguientes. Por otro lado, los resultados mostraron que la ilusión de ser otra persona hizo que los participantes meditaran con más frecuencia que los que sólo escucharon la historia de esa persona y meditaron. Una posible explicación basada en la teoría de la espiral ascendente (Van Cappellen et al., 2020) es que la experiencia emocional durante la micro intervención de RV encarnada motivó a los participantes a mantener la práctica de la

compasión en casa. Sin embargo, ni el factor de imaginación ni el somático de la calidad de la práctica de compasión fueron significativamente diferentes entre los grupos. Un resultado similar obtuvieron Naismith et al. (2019b), quienes trataron de aumentar la viveza de las imágenes mentales mostrando imágenes de compasión en un ejercicio de imaginación compasiva (Naismith et al., 2019b). Así pues, ni las imágenes ni la RV encarnada como intervenciones puntuales parecen ser eficaces para disminuir las dificultades en la imaginación en las MBC.

Por lo tanto, esta tesis contribuyó al conocimiento sobre cómo mejorar la práctica de la meditación dentro de las IBC. Hasta el momento, se sabe que una micro intervención inicial de RV encarnada podría aumentar la adherencia a la práctica, aunque se debería hacer una reflexión sobre el coste-utilidad de este procedimiento antes de implementarlo.

La presente tesis tiene varias fortalezas, entre ellas la de validar al español uno de los cuestionarios de AC con mayor evidencia empírica actualmente. Además, la tesis ha abierto una nueva línea de investigación en el campo de los mecanismos de cambio de las IBC al definir y medir el constructo calidad de la práctica de compasión. Este constructo tiene implicaciones para la investigación y la práctica clínica dado que puede ser no sólo un ingrediente que explique la eficacia de las IBC, sino también una forma de mejorar la pedagogía en la formación en compasión. Por último, se ha desarrollado un procedimiento novedoso basado en *embodiment* y en *Machine to be Another* para apoyar la MBC, el cual es efectivo para aumentar la adherencia a la práctica.

No obstante, esta tesis tiene también algunas limitaciones, entre ellas, el reclutamiento de participantes de una sola región de España en el primer y el tercer estudio, que puede no ser representativo de todo el territorio. En esta línea, los participantes del estudio 2 eran estudiantes universitarios de México, lo que compromete de nuevo la generalización de los resultados. Además, el tamaño de la muestra del estudio 3 se calculó teniendo en

cuenta el efecto del *Machine to be Another* sobre la adherencia (Cebolla et al., 2019), por lo que puede haber tenido poca potencia estadística para detectar diferencias en la calidad de la práctica. Además, en el tercer estudio no se evaluaron las habilidades de imaginación ni AC, lo que podría haber ayudado a explicar los resultados. Por último, no se midió la calidad de la práctica compasiva de la meditación realizada en la sesión presencial.

Por lo tanto, en base a estas limitaciones, futuras investigaciones podrían estudiar las propiedades psicométricas de la FSCRS-SF en otras muestras españolas, tanto tratando de replicar el modelo de tres factores como explorando la preliminar evidencia sobre el modelo de dos factores. Asimismo, futuros estudios podrían incluir participantes clínicos con los que comprobar la invariabilidad de la medida. Además, la calidad de la práctica de compasión podría estudiarse en el contexto de una IBC para saber cómo afecta la evolución semana a semana de los meditadores. De hecho, otros estudios podrían describir con precisión la relación entre la calidad de la práctica de compasión y los resultados de las IBC. Además, sería interesante comprobar si facilitar no sólo la imaginación, sino también la percepción somática de las sensaciones, aumentaría la calidad de la práctica de compasión. Al respecto, podrían probarse procedimientos más económicos que la RV, por ejemplo, empleando vídeos. Además, esos enfoques podrían funcionar de forma diferente según los niveles de imaginación y de conciencia corporal. Por lo tanto, las intervenciones dirigidas a mejorar la calidad de la práctica de compasión deberían probarse en personas con dificultades en esos constructos también. En cuanto a la CPQS, se necesitan más estudios sobre sus propiedades psicométricas, especialmente para confirmar su estructura factorial y explorar su validez.

En resumen, esta tesis encontró que la versión española de la FSCRS-SF es un cuestionario de autoinforme válido y fiable para evaluar dos formas de AC y RS en población española. De hecho, es la primera vez que se comprueban las propiedades

psicométricas de la FSCRS-SF administrándolo como un instrumento independiente. Además, un posible mecanismo subyacente a través del cual funcionan las IBC, calidad de la práctica de compasión, se define con precisión y se mide con la CPQS. Concretamente, la imaginación y la percepción somática de la compasión fueron señaladas y preliminarmente estudiadas como componentes de la calidad de la práctica de compasión. En esta línea, se diseñó un procedimiento novedoso basado en RV encarnada para aumentarla, aunque solo fue eficaz para la frecuencia de meditación. Finalmente, cabe destacar que tanto la FSCRS-SF española como la CPQS son de libre acceso y pueden descargarse desde las publicaciones y esta tesis (ver Anexos 5 y 6).

THESIS IN ENGLISH

1. Abstract

Self-criticism (SC) is an unjustified and hurtful way of dealing with yourself in the face of adversity or failure. Its persistent and intense manifestation is related to higher psychopathological symptoms in many mental disorders, thus aggravating their prognosis. For this reason, different psychotherapeutic currents have tried to operationalise, evaluate and treat it, resulting in multiple definitions, self-report measures and psychological interventions. For example, in recent years, compassion-based interventions (CBIs) have been developed to reduce AC. CBIs incorporate self-compassion as a main component, which is defined as being sensitive to oneself's suffering and being kind toward oneself in the face of adversity. To cultivate it, CBIs incorporate formal meditation practices that involve guided imagery and mindfulness of emerging feelings during the interaction with mental imagery. Ultimately, different meta-analyses have shown that CBIs are effective in reducing AC, but have pointed out important methodological limitations in the efficacy studies conducted until now and the absence of an explanation of the involved mechanisms of action.

Taking all this into account, the present doctoral thesis aims to 1) validate the short version of the Forms of Self-Criticising/Attacking & Self-Reassuring Scale (FSCRS-SF) in Spanish; 2) to define and develop a self-report measure of compassion practice quality, a variable that could partially explain the effect of formal meditation practice; and 3) to study the efficacy of an embodied Virtual Reality (VR) micro-intervention on the quantity and quality of formal compassion practice.

Three studies were conducted, one per objective. Respectively, they showed that the Spanish version of the FSCRS-SF was a reliable and valid questionnaire for the assessment of AC. Similarly, the Compassion Practice Quality Scale (CPQS) was found to be a reliable and valid 12-item questionnaire to assess the extent to which a person has difficulties in the guided imagery phase and experiences compassionate feelings during formal compassion practice. Finally, the micro-intervention of embodied VR increased adherence to home practice, but not the quality of such practices.

The main contributions of those results are to offer for the first time a valid and reliable self-report measure of AC in the Spanish population, the short form of the FSCRS, one of the questionnaires with the most scientific evidence in this field. In turn, the development of the CPQS and the operationalisation of the construct compassion practice quality opens up a new line of research about mechanisms of change of CBIs. Furthermore, it raises the possibility of implementing strategies that increase the quality of CBIs early on. In this line, future studies could complement the pedagogy of compassionate practice with new technologies or specific audiovisual materials that could enhance the practice quality.

2. Introduction

In the last two decades, transdiagnostic psychotherapy has gone beyond categorical diagnosis of mental disorders and has focused on disorder dimensionality and comorbidity (e.g., Harvey et al., 2004). This recent approach to research and treatment has pointed out the cognitive and behavioral processes that underly mental disorders, for example self-criticism (SC). There is evidence that SC is a vulnerability factor for depression, anxiety, eating disorders, psychotic symptoms, and personality disorders (Werner et al., 2019). For this reason, psychotherapy researchers need optimal psychometric tests to expand knowledge about SC treatment. In this context, this dissertation presents the Spanish adaptation and validation of the short form of the Forms of Self-Criticizing/Attacking & Self-Reassuring Scale (FSCRS), which is one of the two SC self-report measures with more empirical evidence (Rose & Rimes, 2018).

Simultaneously, a number of interventions have been developed to specifically cultivate compassion, which is understood as the antidote to SC. These compassion-based interventions (CBIs), though secular in approach, have been influenced by Tibetan Buddhist traditions and an example of that is the inclusion of meditation training as an essential ingredient (Kirby, 2017). Despite the evidence about the effectiveness of CBIs at improving SC, there is currently a lack of knowledge about their mechanisms of action and processes involved (Ferrari et al. 2019; Kirby et al., 2017; Wakelin et al., 2021). In this regard, the present dissertation posits that the person's experience during a compassion-based meditation (CBM) influences the outcome of the meditation. This idea was inspired by the pioneering work of del Re et al. (2013), who emphasized the

importance of meditation practice quality over quantity in the context of the Mindfulness-Based Stress Reduction (MBSR) program. Furthermore, this thesis does not only propose the components that might explain compassion practice quality, but also studies the effectiveness of a novel procedure of embodied virtual reality (VR) to increase it.

In order to contextualise this doctoral thesis, the first part of the introduction presents an overview of the conceptualizations, psychotherapy approaches, and self-report measures of SC. The second part is intended to explain the compassion construct and present the main interventions that have been developed to specifically cultivate it. The last part highlights the components that might define compassion practice quality, a variable that could partially explain the action of CBIs.

2.1. Self-criticism as a transdiagnostic factor

The construct of SC has been empirically researched mainly since the 1970s and explained from different psychological perspectives (Kannan & Levitt, 2013). For instance, Blatt and colleagues explained SC within the framework of The Two Polarities Model of Personality Development and Psychopathology as a feeling of guilt, failure, and worthlessness along with constant self-scrutiny (e.g., Blatt & Luyten, 2009). From their psychodynamic perspective, individuals who develop their personality emphasizing the articulation of themselves in difference to others (introjective personality organization) tend to adopt these self-critical concerns when expectations are not met. According to Beck's cognitive theory (Beck et al., 1979), one of the three types of negative cognitive patterns present in depression is a negative view regarding the self, i.e., the tendency to believe that oneself is inadequate or diseased and that failures are result of one's own defects.

The Axis of Criticism Model (Shahar, 2015) describes the self as a collection of different interacting aspects that dialogue among each other. SC is the attack of one of those aspects to at least one other, in which the former demands high performance and shows hostility toward the latter when it inevitably does not meet it. Similarly, Gilbert's cognitive-evolutionary approach conceptualizes SC as a critical inner dialogue between self-parts that arises from the feelings of failure in important tasks or when circumstances are perceived as wrong (Gilbert, 2010, 2014). According to this author, there are two forms of SC, one is related to a sense of inadequacy and disappointment about oneself. The second one is more common in clinical populations and implies an absolute hatred of some aspect of the self. Furthermore, this author explains that individuals can develop this way of self-evaluation by mirroring their evolved competencies to regulate interpersonal relationships (e.g., dominant-subordinate or stigmatizing relationships).

Despite the differences among approaches, scientific literature agrees on conceptualizing SC as a transdiagnostic process or an underlying factor of symptomatology in multiple mental health problems (McIntyre et al., 2018; Werner et al., 2019). For example, in the case of eating disorders (e.g., Perkins et al., 2020), suicidality (e.g., O'Neill et al., 2021), self-injurious behaviour (e.g., Zelkowitz & Cole, 2019), depression (e.g., Ehret et al., 2015), social anxiety (e.g., Iancu et al., 2015), and borderline personality disorder (e.g., Vansteelandt et al., 2020).

In regard to eating disorders, Palmeira et al. (2017) found that women with overweight or obesity who frequently had negative feelings about obesity and the perception of being a target of stigma (i.e., internalized weight stigma) would tend to experience SC and inability to self-reassure, which in turn increased the severity of their binge eating symptoms. Furthermore, a recent systematic review and meta-analysis showed a

significant positive association between SC and both disorder eating and self-injurious behaviour (Zelkowitz & Cole, 2019).

In the case of depression, Joeng and Turner (2015) found that self-critics showed higher levels of depression partially because they were afraid of experiencing compassion for themselves in difficult circumstances, which in turn was associated with the perception that one is not important to others. In addition, the ability to generate self-compassion when one is suffering mediated the effect of SC on depression, suggesting that people with high levels of SC might benefit from self-compassion training. In line with these findings, Ehret et al. (2015) found that currently depressed, remitted depressed, and never depressed people showed a different pattern of SC and self-compassion, being the first the group with the higher tendency to experience SC and low self-compassion.

In addition, SC was the best and unique predictor of social anxiety symptoms within demographics, self-esteem, and self-efficacy, explaining a substantial proportion of social fear and avoidance severity in a sample of social anxiety disorder patients (Iancu et al., 2015). Moreover, Vansteelandt et al. (2020) found that borderline personality disorder patients with high levels of SC showed higher anxiety, depression, and anger and lower relaxation in daily life than those with low level of SC.

Regarding assessment, different SC questionnaires have been developed based on the previously mentioned heterogeneous conceptualizations and psychotherapeutic approaches. There has been no a consensus about which SC measures could be considered 'gold standards' or more appropriate for different contexts (e.g., clinical or research). Consequently, SC has been measured with ad hoc questionnaires or scales that were not specifically designed to assess SC (Rose & Rimes, 2018), such as the Dysfunctional Assumptions Scale (Weissman & Beck, 1978) or the Depressive Experiences Questionnaire (Blatt et al., 1976). Rose and Rimes (2018) conducted a systematic review

of existing self-report questionnaires of SC and evaluated their psychometric properties and the methodological quality of the respective validation studies. These authors identified five scales and five subscales measuring SC. The scales were the FSCRS (Gilbert et al., 2004), the Self-Critical Rumination Scale (SCRS; Smart et al., 2016), the Self-Critical Cognition Scale (Ishiyama & Munson, 1993), the Levels of Self-Criticism Scale (Thompson & Zuroff, 2004), and the Habit Index of Negative Thinking (Verplanken & Orbell, 2003). Rose and Rimes (2018) recommended the use of FSCRS and SCRS to conduct high methodological quality research in view of their higher positive evidence.

In terms of therapy, comprehensive reviews regarding the psychological treatments of SC have highlighted the main contributions of psychodynamic, cognitive, and integrative psychotherapies (Kannan & Levitt, 2013; Werner et al., 2019). According to Blatt (1992), psychoanalysis is especially effective for self-critical individuals (i.e. with introjective personality) because of the exploratory and interpretative style of this therapeutical approach. In terms of traditional cognitive therapy, cognitive restructuring and reattribution are the two main interventions to treat self-critical maladaptive schemas (Beck et al., 1979). Emotion-Focused Therapy (e.g., Greenberg, 2006), which integrates client-centered and experiential therapies, mainly uses the two-chair dialogue intervention to generate a dialogue between the critic and the criticized parts of the self. In an attempt to integrate psychodynamic, cognitive psychology, and neuroscience developments, Shahar (2013) proposed an approach for self-critical patients based on the analysis of the multiple dimensions of the self, behavioral activation, and therapist's presence. More recently, CBIs have emerged to target SC by cultivating compassion towards the self (Wakelin et al., 2021). This issue is covered in the next section.

2.2. Compassion: an antidote to self-criticism

In recent years, psychotherapy research has been interested in compassion. There is a wide range of conceptualizations about compassion toward the self and others (e.g., Khoury, 2019). However, a new integrative definition of compassion has been recently proposed (Gu et al., 2020; Strauss et al., 2016). According to Strauss et al. (2016), compassion is a three-component process (cognitive, affective, and behavioral) that could refer to both the self and others and consists of taking notice of suffering, being aware of the principle of common humanity, empathizing, tolerating the distress caused by the emotional resonance, and generating motivation to act/acting to end suffering.

Interventions aimed at developing compassion toward the self have been designed in the last years. Among them, Compassion-Focused Therapy (CFT; Gilbert, 2014) is the most studied (Kirby et al., 2017), but there is current strong evidence about the significant effectiveness of a wide variety of CBIs on SC reduction (Wakelin et al., 2021). Besides CFT, there are five different empirically supported CBIs whose effectiveness have been analyzed with randomized controlled trials (Kirby, 2017): Mindful Self-Compassion (Germer & Neff, 2019), Compassion Cultivation Training (CCT; Jazaieri et al., 2013), Cognitively-Based Compassion Training (CBCT; Negi, 2013), Cultivating Emotional Balance (Kemeny et al., 2012), and Compassion and Loving-Kindness Meditations (Hofmann et al., 2011).

Overall, all CBIs assume that compassion can be trained through mindfulness-based training and CBMs within a secular framework (Kirby, 2017). CBMs are not only aimed at nurturing harmonious relations with others but also with oneself by focusing on the alleviation of suffering (Hofmann et al., 2011). Thus, the ability to respond in a self-compassionate way in the face of failure has been described as the antidote to SC.

CBIs are not only effective for cultivating compassion and reducing SC, but also for lessening depression, anxiety, psychological distress, ruminative thought patterns, eating behavior difficulties, and negative affect (Ferrari et al., 2019; Kirby et al., 2017; Wakelin et al., 2021). However, Kirby et al. (2017) concluded in their meta-analysis that the evidence base for CBIs was still limited considering the small number of randomized controlled trials, the predominantly use of nonclinical population for the studies, the great variability of self-report questionnaires to assess outcomes, and the need for higher methodological quality study designs.

Above all, the question regarding how CBIs are working still remains open. Thus, further research is needed to describe precisely which processes and mechanisms of change underly all their benefits, such as changes in cognitive patterns, physiological changes, intervention dosage (meditation lengths), adherence to home practice, etc. (Ferrari et al., 2019; Kirby et al., 2017; Wakelin et al., 2021). In this line, Skwara et al. (2017) theoretically described factors related to compassion training that might influence changes in CBIs, such as the implicit cognitive operations of the meditation instructions, practitioners' motivations, intervention delivery (direct or remote), the context of the intervention (e.g., research or clinical intervention), and the well-being resulting from adherence to practice.

A similar gap in the mindfulness-based interventions literature has tried to be addressed (e.g., Gu et al., 2015). For instance, in the context of MBSR (Kabat-Zinn, 2009) and Mindfulness-Based Cognitive Therapy (Segal et al., 2002), frequency of participants' home formal practice is considered a crucial factor that influences outcomes, requiring 45 minutes, six days per week of it. Ironically, literature shows that participants practice 29 minutes per day and that the association between frequency of home practice and

outcome is small, even insignificant in some cases (Berghoff et al., 2017; Lloyd et al., 2018; Parsons et al., 2017).

In response, del Re et al. (2013) wondered if not the quantity but the quality of formal mindfulness meditation could be more important for cultivating mindfulness. Furthermore, these authors developed the Practice Quality – Mindfulness scale to assess the most relevant elements of practitioners' experience when meditating, i.e., a balanced perseverance in the manipulation of attentional orientation and receptivity to each moment-to-moment experience with curiosity and acceptance. Studies regarding the influence of this new construct have shown that changes in mindfulness practice quality predicts MBSR psychological functioning outcomes and mediates the effect of formal practice time on mindfulness outcome, suggesting practice quality as an ingredient or mechanism of action (del Re et al., 2013; Goldberg et al., 2014; Goldberg et al., 2020). It is worth noting that mindfulness practice quality was conceived according to del Re's personal experience with mindfulness-based meditation, discussed with MBSR specialists, and taking into account the specific features of mindfulness training (del Re et al., 2013). So, could this also be applied to compassion training? Also, could attention and receptivity explain compassion practice quality? On the one hand, the practice quality construct understood as meditators' engagement and experience during formal practice may be interchangeable in mindfulness and compassion training contexts. On the other hand, the specific components that defines the experience during mindfulness-based meditations and CBMs are inherent to the characteristics of each one. So, they may be different. The next section addresses this issue.

2.3. Compassion practice quality

Mindfulness-related meditations are categorized as focused-attention and open-monitoring practices (Dahl et al., 2015). They specifically train attention regulation capacities, such as manipulating the focus of attention and the cognitive capacity to be aware of the present thoughts, feelings, and perceptions (Dahl et al., 2015; Wielgosz et al., 2019). By contrast, constructive family meditations do not merely involve focusing on the present cognitive and emotional experiences, but try to alter them. Their purpose is to cultivate virtuous qualities (e.g., compassion) to replace maladaptive self-conceptions, which in turn fosters well-being (Dahl et al., 2015). In the performance of compassion practices, the meditator proceeds through a series of contemplations about oneself and/or another person to whom specific wishes are directed (e.g., may you be free from suffering). This practice therefore implies focusing attention on a mental image and also being aware of which feelings appear while an open and kind attitude toward the experience is held (Hofmann et al., 2011). Thus, the implicit cognitive operations and purposes of these two types of meditations are utterly different. Overall, mental imagery and awareness of compassionate feelings during the meditation are the presumed triggers of insight within CBMs (Hofmann et al., 2011).

Mental imagery is the generation of perceptual experience through different sensorial modalities in the absence of sensory input (Kosslyn et al., 1995). It has a relevant role in cognitive-behavior therapy because of its association with psychopathology, its potential for cognitive specificity enhancement, and its application to amplify the intensity of emotional response (Saulsman et al., 2019). In fact, Gilbert (2009) himself includes symbolic positive imagery exercises to generate compassionate feelings from memories, desires, and fantasies. However, the mental imagery construct has not received large

attention in either clinical psychology (Pearson et al., 2013; Saulsman et al., 2019), or specifically in CBIs despite of its possible potential.

For example, Kelly et al. (2010) developed a CBI based on Gilbert's CFT, tested its effectiveness on smokers' self-regulation of cigarette consumption, and investigated the moderator role of mental imagery vividness on it. In this context, vividness is the subjective perception of how similar a mental image is from the actual perceptual experience (Pearson et al., 2013), which can be described through a range of sensorial modalities (e.g., Pérez-Fabello & Campos, 2020): visual, auditory, olfactory, gustatory, cutaneous, bodily sensation, and emotions. The study found that individuals with high mental imagery vividness showed a faster decrease in smoking after the self-compassionate imagery training, suggesting that it is effective when individuals are capable of generating a vivid mental image (Kelly et al., 2010). Related to this, Kharlas and Frewen (2016) found that the vividness of visual imagery and embodied imagery during a guided imagery meditation were not only associated with pleasant experiences in response to the practice, but also mediated the effect of the mindful observing trait on that response, being embodied imagery the strongest mediator.

Moreover, poor mental imagery ability has been described as an inhibitor of compassionate imagery exercises in a sample of personality disorder patients (Naismith et al., 2018, 2019a). In these studies, inhibitors and facilitators of performance in compassionate imagery exercises were quantitatively and qualitatively investigated. Results showed that vividness was positively associated with ease of experiencing compassion and that the higher the baseline mental imagery abilities, the higher the adherence to meditation practice during the intervention (Naismith et al., 2018). Therefore, the thematic analysis of participants' answers to semi-structured interviews and written records identified weak imagery ability as a barrier to compassionate imagery

exercises. More specifically, difficulties in the creation and maintenance processes of mental imagery led them to frustration (Naismith et al., 2019a).

Different approaches have been performed to overcome this struggle. For instance, Naismith et al. (2019b) researched whether if increasing mental imagery vividness by showing compassionate pictures within a compassionate imagery exercise would improve its efficacy. Pictures were color photos of individuals caring for someone in need and parent and friend relationships. Results showed no significant effect of pictorial cues to produce differences in imagery vividness and outcomes. However, vividness of mental imagery during the exercise, specifically through visual and bodily sensations modalities, predicted compassionate affect. Besides, participants reported that the pictures were useful for generating the mental image and for inducing compassionate feelings (Naismith et al., 2019b): *“They gave me feelings of warmth and tenderness and I could more easily express the feelings of compassion”*. In this regard, there are at least three possible reasons to explain how imagery powerfully impacts emotion (Holmes & Mathews, 2010): a direct influence of mental imagery on emotional systems, the overlapping between imaginal and perceptual processes and brain areas involved, and the capacity of mental imagery to re-evoke emotional episodes related to autobiographical content.

Other studies have investigated the potential effect of embodied VR to overcome imagery struggles by facilitating the experience of “being” another person. Falconer et al. (2014) evaluated the viability of avatars embodiment in a VR environment to enhance self-compassion in a sample of participants with high SC. They compared levels of self-compassion, SC, and mood between a group of participants who experienced virtual scenario in a first-person perspective and participants who experienced the scenario in a third-person perspective. Their main finding was that VR was effective for improving

self-compassion in the first-person group, and reducing participants' SC levels in both conditions.

Recently, Cebolla et al. (2019) went further and investigated the effectiveness of a self-compassion meditation supported by a body swapping system (the Machine to be Another; de Oliveira et al., 2016) on compassion, self-care behaviors, affect, and adherence to meditation practice. Overall, results showed that participants who underwent the VR condition significantly improved compassion and self-care behaviors, as well as participants who only meditated (control group). Moreover, both groups showed similar adherence to meditation practice during the following two weeks after the experience in the laboratory. The main finding was that vividness through cutaneous modality moderated the effect of condition on frequency of meditation practice. That is, individuals with medium and low ability to vividly imagine through tactile modality who underwent the VR condition showed higher adherence to meditation practice than participants from the control condition with the same levels of mental imagery vividness.

In view of all the above, psychotherapy research has highlighted SC as a common vulnerability factor for several psychological disorders. During the last fifty years, different approaches to treat SC have been designed, from traditional psychodynamic theories to more recent integrative ones. On the one hand, different self-report measures have been developed to assess SC, none of which have been validated in the Spanish population. On the other hand, CBIs, specially CFT, are one of the last promising interventions with proved evidence to treat SC, although with important shortfalls in terms of explaining their mechanisms of change. Those CBIs involve meditation practice both within and between sessions as one of their main techniques. As in MBSR research, practice quality could partially explain the effects of CBIs. However, there is no study in the field of CBIs addressing this issue.

3. Objectives

The present thesis aimed to define the construct of compassion practice quality and investigate the effects of VR to enhance it during a CBM, which is the main technique within CBIs to treat SC. Thus, the main objectives of the present dissertation were:

- (1) To translate and validate the short form of the FSCRS in the Spanish population.
- (2) To accurately define the components of compassion practice quality while offering a self-report measure to assess it.
- (3) To investigate the efficacy of an embodied VR experience to increase quality and quantity of home compassion practice.

Three studies were performed considering these three objectives, respectively. Study 1 (see Annex 1 for reading the published article) sought to validate one of the two SC self-report measures with more empirical evidence, the FSCRS (Rose & Rimes, 2018). The absence of Spanish validations of the SC questionnaires identified by Rose and Rimes (2018) explains the need for this study. The FSCRS was developed within Gilbert's cognitive-evolutionary paradigm (Gilbert et al., 2004), to assess two forms of SC, namely the Inadequate Self (IS) and the Hated Self (HS), and the ability to reassure oneself when things go wrong (Reassured Self; RS). Concretely, the short form (FSCRS-SF; Sommer-Spijkerman et al., 2018) was chosen because it showed similar psychometric properties and it was more appropriate for reducing the response burden in a research context, in which short scales are preferable because of the common use of multiple measures. It was hypothesized that the three-factor model would show adequate fit and that the Spanish

FSCRS-SF would show good reliability, construct validity, known-group validity, predictive validity, and sensitivity to change.

Study 2 (see Annex 2 for reading the published article) aimed to develop the Compassion Practice Quality Scale (CPQS) and explore its factorial structure. The scale was constructed attending to the key features of CBMs that had been described in the literature, i.e., mental imagery, awareness of compassionate feelings, and directing compassionate phrases to an imagined person (e.g., Hofmann et al., 2011). We hypothesized that the CPQS would show good internal consistency and construct validity.

Finally, Study 3 (see Annex 3 for reading the published article) addressed whether a CBM supported by an embodied VR system called the Machine to be Another would not only be effective at increasing quantity but also quality of at-home meditation compared to a CBM without VR support. A previous study demonstrated that a self-compassion meditation supported by this embodied VR system was as effective as traditional sitting meditation to increase compassion and mindfulness states and adherence to home practice (Cebolla et al., 2019). However, in the present study a larger sample was collected based on the effect sizes reported by Cebolla et al. (2019) to study the effects of the embodied VR system on adherence again and to investigate its influence on compassion practice quality for the first time.

4. Method and results

The Ethics Committee of the University of Valencia approved the procedures of the three studies (H1539699805131). Informed and written consent to participate in the studies was obtained from the participants. The studies were performed following the ethical standards described in the Declaration of Helsinki (World Medical Association, 2013).

The research presented in this section covers the key findings of the three published studies. In order to make the reading easier, the section is divided into three subsections, one per study.

4.1. Study 1. The Spanish version of the FSCRS-SF

The study sought to validate the short form of the FSCRS. It was hypothesized that the three-factor model (IS, HS, and RS) would show adequate fit and that the Spanish FSCRS-SF would show good reliability, construct validity, known-group validity, predictive validity, and sensitivity to change.

A general community sample of Spanish individuals ($n = 499$; 377 women, $M_{\text{age}} = 31.08$; $SD = 12.55$) and a clinical sample of adult patients diagnosed with borderline personality disorder or eating disorder ($n = 77$; 73 women; $M_{\text{age}} = 31.03$; $SD = 11.03$) were recruited from the Valencian Community (Spain) and the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain), respectively. Finally, there was a third sample consisting of social workers ($n = 20$; all women; $M_{\text{age}} = 39.65$; $SD = 8.29$).

All of them were surveyed through the online platform Lime Survey of the University of Valencia or with a pen-and-paper questionnaire package. The participants of the general community sample received a link via e-mail to answer the survey again at 3 months. The social workers underwent a mindfulness- and compassion-based intervention (MCBI) and answered the FSCRS-SF before and after the training.

The original authors of the scale gave permission for translating and validating the FSCRS-SF. The English version was firstly translated into Spanish by three independent Spanish psychologists proficient in English. Then, an independent native English speaker translated it back and discrepancies were discussed. It was used to measure SC, along with an ad-hoc Spanish-language version of the SCRS. In addition, the Self-Compassion Scale Short-Form (SCS-SF; García-Campayo et al., 2014; López et al., 2015) was used for self-compassion assessment. Finally, depression, anxiety, and somatization symptoms were assessed with the Brief Symptom Inventory-18 (BSI-18; Derogatis, 2000; Galdón et al., 2008).

Factor structure. A Confirmatory Factor Analysis (Robust Maximum Likelihood method) was conducted with the data collected from the general community sample to estimate the three-factor model. Results showed that it was supported, $\chi^2(74, n = 499) = 238.13, p < .001, SRMR = 0.04, RMSEA = 0.06, CFI = 0.94,$ and $TLI = 0.93.$

Internal consistency. Cronbach's α (Cronbach, 1951) and McDonald's ω (McDonald, 1999) were used to assess internal consistency of the FSCRS-SF in the general community and the clinical samples. It was adequate for both, with α and ω coefficients ranging from .79 to .82.

Test-retest reliability. From the general community sample, 119 participants answered the FSCRS-SF again at 3 months. Then, Pearson's correlations were calculated

for pre- and post-test scores. Results supported temporal stability of IS ($r = .78$), HS ($r = .73$), and RS ($r = .66$) subscale scores, all correlations with $p < .01$.

Construct validity. Convergent and divergent validity were assessed by correlating FSCRS-SF, SCRS, SCS-SF, and BSI-18 scores of the general community sample. As expected, IS and HS scores were positively associated with SCRS and BSI-18 total scores as well as negatively associated with SCS-SF total score. Conversely, RS scores showed a negative association with SCRS and BSI-18 total scores, and a positive association with SCS-SF total score. The correlations were medium/large and significant, ranging from .28 to .74 ($p < .01$).

Known-group validity. A multivariate analysis of variance was performed to investigate differences in IS, HS, and RS scores between the general community and the clinical samples. The former was split in three: participants who were active meditators ($n = 133$), non-active meditators ($n = 41$), and those without meditation experience ($n = 325$). There was a significant difference among groups, $F(9, 1370.35) = 27.24, p < .001$; Wilks' Lambda = 0.67; $\eta^2 = 0.13$. Post hoc analysis using Tukey Honestly Significant Difference test identified that participants from the clinical sample had statistically significant higher IS ($p < .001$) and HS ($p < .001$) and lower RS ($p < .001$) mean scores than the rest of the participants. In addition, participants who were active meditators showed statistically significant lower IS ($p = .013$) scores and higher RS ($p = .050$) scores than participants without meditation experience.

Predictive validity. Hierarchical multiple regression was used to assess the ability of FSCRS-SF pre-test scores to predict BSI-18 post-test total scores of 119 participants from the general community sample at 3 months. After controlling for BSI-18 pre-test scores, results showed that RS scores were the only FSCRS-SF factor that showed a unique statistically significant contribution in the model (beta = $-.17$; $p = .041$).

Sensitivity to change. A paired-samples t-test was conducted to investigate the impact of the MCBI on FSCRS-SF scores of the social workers sample. Results showed a statistically significant decrease in IS scores ($t(19) = 2.20, p = .04, \eta^2 = .20$) and an increase in RS scores ($t(19) = -3.19, p = .005, \eta^2 = .35$).

In light of these results, it can be concluded that the FSCRS-SF is a valid and reliable self-report measure that can be used in Spanish populations to assess two types of SC (IS and HS) and RS. The main contribution of this study has been validating a SC self-report measure in the Spanish language for the first time. Furthermore, this short version is well suited for research contexts due to its shortness and its sensitivity to change. See Annex 1 for reading the published article.

4.2. Study 2. The Compassion Practice Quality Scale (CPQS)

The study 2 aimed to develop the CPQS and explore its factorial structure. We hypothesized that the CPQS would show good internal consistency and construct validity.

For this purpose, a sample of 205 university students (126 women; $M_{\text{age}} = 19.75; SD = 2.49$) was recruited from the Universidad de las Americas Puebla (Mexico). The participants answered a baseline assessment online, then performed a CBM, and finally completed another assessment.

The compassion practice (<https://youtu.be/pLWYj0JvbP0>) was an eight-minutes audio in which participants were asked to focus attention to the present moment, imagine a beloved person, and direct good wishes toward that person. Then, the meditation included a phase of explicit generation, maintenance, inspection, and transformation of mental imagery and the instruction for compassionate gestures (caresses).

Two psychologists with experience in mindfulness- and compassion-based trainings wrote the first version of the CPQS addressing the key aspects of CBMs previously discussed. The development process of the CPQS was supervised by expert meditators and trainers of the CBCT, CCT, or CFT. The final version had 12 items that participants evaluated by indicating the percentage of the time that their experience reflects each statement. For meditations that do not include self-instructions or gestures, the last two items can be excluded.

Thus, compassion practice quality was assessed after the meditation with the CPQS. Furthermore, states of mindfulness, affect, and positive/negative qualities toward oneself and others were measured before and after the meditation practice with the State of Mindfulness Scale (SMS; Tanay & Bersntein, 2013), the International Positive and Negative Affect Schedule-Short Form (PANAS; Thompson, 2007), and the Self-Other Four Immeasurables (SOFI; Kraus & Sears, 2009), respectively. Moreover, self-criticism was measured with the FSCRS-SF (Sommers-Spijkerman et al., 2018), fear of compassion for others with the Fears of Compassion from others Scale (FCS; Gilbert et al., 2011), and imagery skills with the Betts' Questionnaire Upon Mental Imagery (BETT; Campos & Pérez-Fabello, 2005) and the Prospective Imagery Test (PIT; Stöber, 2000).

Efficacy of the meditation. A paired-samples t-test was conducted to investigate the impact of the CBM on participants' SMS (total score), PANAS (positive affect subscale), and SOFI (positive qualities toward others subscale) scores. Results showed a statistically significant increase in SMS ($t(204) = -8.99, p < .001, \eta^2 = .29$), SOFI ($t(204) = -4.92, p < .001, \eta^2 = .11$), and PANAS scores ($t(204) = -6.14, p < .001, \eta^2 = .16$).

Factor structure. A Principal Component Analysis with oblimin rotation revealed the presence of 2 components explaining 41.83% and 24.13% of the variance. This finding

was supported by the Kaiser's criterion (eigenvalue rule), the interpretation of Catell's scree test, and results of Horn's parallel analysis. One component, which was labeled 'imagery', collected the items regarding image creation, image inspection, image transformation, vividness, image sustainment, and self-criticism. The items of the other component, which was labeled 'somatic perception', referred to warmth, presence, comfort, sympathy, compassionate self-instructions, and self-reassurance gestures.

Internal consistency. Cronbach's α and McDonald's ω indicated good internal consistency for both the imagery ($\alpha = 0.90$; $\omega = 0.90$) and the somatic perception ($\alpha = 0.88$; $\omega = 0.89$) components.

Construct validity. Convergent and divergent validity were assessed by correlating CPQS, BETT, PIT, FSCRS-SF, and FCS scores. The imagery and somatic perception scores were positively associated with PIT (positive imagery subscale) and RS scores as well as negatively associated with BETT (high score in this scale indicate low imagery vividness and vice versa), HS, and FCS scores. The correlations were small/medium and significant ($p < .05$), ranging from .14 to .29.

Predictive validity. Hierarchical multiple regression was used to assess the ability of CPQS scores to predict post-meditation SOFI (positive qualities toward others subscale) scores. After controlling for pre-meditation SOFI scores, results showed that imagery (beta = .17; $p = .002$) and somatic perception (beta = .25; $p < .001$) components showed a unique statistically significant contribution in the model.

On the basis of these results, it can be concluded that the CPQS is a reliable two-factor self-report measure of compassion practice quality. Thus, the higher the ease to imagine and experience the somatosensory cues of compassion (e.g., warmth), the higher the quality of compassion practice. In addition, compassion practice quality might predict the

meditation outcome. Further studies should expand this finding by analyzing the evolution of practice quality across several CBMs. See Annex 2 for reading the published article.

4.3. Study 3. Embodied virtual reality and practice quality

The study addressed whether a CBM supported by an embodied VR system called the Machine to be Another would be effective for increasing quantity and quality of at-home meditation compared to a CBM without VR support.

A sample of 41 healthcare students or professionals (33 women; $M_{\text{age}} = 22.85$; $SD = 4.76$) were recruited. Participants were randomly assigned to a group that received a meditation supported by the Machine to be Another (VR condition; $n = 21$) or a group that meditated following audio instructions (Audio condition; $n = 20$).

All participants were invited to an in-person session in the Psychology Department of the University of Valencia. They were then told that they were going to learn about the personal story of a patient with panic disorder, to whom they had to generate and direct compassion. Participants in the VR condition first performed an embodiment induction with the Machine to be Another to experience the illusion of a body swap with the panic disorder patient. This experience was mainly supported by a phase of motor synchronization between the participant and a performer, who represented the patient. After that, a first-person narrative about autobiographical moments related to the disorder was played to the participants. Finally, they listened to a recorded CBM dedicated to this patient. Participants in the Audio condition followed the same procedure, except for the body swap perceptual illusion.

Participants were invited to continue compassion practice at home, which was assessed during the next 2 weeks. More specifically, participants were surveyed daily to know if they had meditated during the day. If they had, compassion practice quality was assessed with the CPQS.

Impact on compassion practice frequency. An analysis of covariance was conducted to compare the effectiveness of the two microinterventions on average meditation practice. Frequency of meditation practice during the previous two weeks was used as the covariate in this analysis. There was a significant difference between the two groups on average meditation practice during the two weeks after the session, $F(1, 38) = 5.49$, $p = .024$, partial eta squared = 0.13.

Impact on compassion practice quality. An analysis of covariance showed that there were no significant differences between groups on average CPQS scores either in the imagery factor, $F(1, 31) = 0.69$, $p = .413$, partial eta squared = 0.00, or the somatic perception factor, $F(1, 31) = 2.04$, $p = .163$, partial eta squared = 0.06, after adjusting for frequency of at-home meditation.

Taking these results into account, it can be concluded that the embodied VR experience was effective to improve quantity of at-home compassion practice but not quality. Maybe the VR procedure was effective in the short term, i.e., for the meditation carried out immediately after the VR experience. Future studies should analyze the effect of the embodied VR micro-intervention by increasing the number of sessions and exploring the differences in the short and long term. See Annex 3 for reading the published article.

5. General discussion

As presented throughout this doctoral dissertation, SC is a transdiagnostic symptom associated with higher levels of psychopathology in common mental disorders (e.g., eating disorders, depression). Despite its relevance for psychotherapy, more research is needed to improve the assessment tools and treatment approaches for SC. Only in recent years were the best self-report measures to assess SC investigated (i.e., FSCRS and SCRS), none of them being validated for the Spanish population.

The treatment of SC has been addressed across several approaches in psychotherapy. In the last years, interventions involving cultivation of compassion have been developed to target SC. Promising meta-analysis studies have highlighted the effectiveness of CBIs on improving SC, among other mental health problems and well-being. However, how they achieve its effects is still a question left unanswered.

CBIs involve meditation practice both within and between sessions as one of their main techniques. In this regard, mindfulness research has shown that not only frequency but also quality of meditation practice is associated with better MBSR outcomes. Practice quality in mindfulness-based meditations and CBMs is supposed to be different taking into account the implicit characteristics of each one. However, the aspects that define compassion practice quality and how to increase it have not been studied previously in the field of CBIs.

Hence, the present dissertation has been aimed at (1) validating the short form of the FSCRS to Spanish; (2) defining the compassion practice quality construct as one possible

underlying mechanism of CBIs; and (3) testing an embodiment VR microintervention to enhance it in at-home meditation practice. To achieve these targets, three studies were carried out.

The results of the first study showed that the Spanish version of the FSCRS-SF was a valid and reliable instrument. The three-factor solution was supported, i.e., the FSCRS-SF can be used in Spanish populations to assess two types of SC (IS and HS) and self-reassurance (RS). This is in line with the original version of the scale (Gilbert et al., 2004; Sommers-Spijkerman et al., 2018) and most of the studies about FSCRS psychometric properties (e.g., Baião et al., 2015). However, a recent study examined the factor structure of the FSCRS across 8 language versions with a large total sample ($n = 7510$) and concluded that the use of two scores (IS and HS merged and RS) was as recommendable as the use of the three original ones (Halamová et al., 2018). These authors highlighted that IS and HS may not be distinct factors for non-clinical individuals. So, studies involving these populations might benefit from calculating two scores instead of three. This idea was mirrored in the data from Study 1, with the three general community subsamples showing non-significantly different and low HS scores, and the clinical sample showing higher HS scores than all of them. The absence of significant differences in HS scores in the social workers sample after the MCBI might have been due to a floor effect led by the infrequent presence of self-hating in non-clinical populations.

Based on the results derived from this study, it can be concluded that the FSCRS-SF is available and suitable for use in Spanish psychotherapy and research contexts. In addition, another main contribution of this thesis was to test this questionnaire as a stand-alone instrument for the first time.

Study 2 aimed to develop the CPQS and explore its factorial structure. The CPQS was a reliable self-report questionnaire to assess “to what extent a meditator is able to produce

mental imagery (in terms of generation, maintenance, inspection, and transformation/manipulation of the mental images) and activate the somatosensory component of compassion to evoke and sustain a compassionate state” (Navarrete et al., 2021). This construct shed light on how compassion meditation training works by providing a new potential action mechanism of compassion training. As results showed, worse compassion practice quality (both components equally) was associated to self-hatred, but not significantly to the sense of self-inadequacy. This suggests that individuals with more severe levels of SC may experience more difficulties when carrying out CBMs. In this line, Duarte et al. (2015) showed that individuals with high SC (vs. low SC) reported a significant increase in distress when undergoing both a compassion focused imagery exercise and a control imagery task. A possible explanation was that SC individuals perceive CBM as a stressful situation not only because of the compassionate content of meditation, but also because they might frustrate themselves by over-monitoring and criticizing their own performance (Duarte et al., 2015).

Moreover, results showed that the extent to which participants were able to both imagine vividly and perceive a somatic experience of compassion was a predictor of compassion outcome after the meditation. Therefore, it was possible to quantify the influence of compassion practice quality in compassion state after a CBM. It should be noted that the somatic component made a higher contribution as a predictor than the imagery component.

Thus, the present dissertation offered an operational definition of compassion practice quality for the first time and proposed a valid and reliable self-report measure to assess it. Furthermore, compassion practice quality predicted the compassion outcome of the CBM. Consequently, these results open up a new research field within CBIs. For instance, some questions arise from this study: will enhancing one of the practice quality

components be enough for increasing compassion outcome? Is it possible to enhance them from the beginning of a CBI? What would be the outcomes of the CBI if the instructor performed previous training to enhance them before meditating?

The third study tried to partially answer those questions by testing the effectiveness of a CBM supported by an embodied VR system for increasing quality and quantity of at-home meditation. The Machine to be Another was used to facilitate mental imagery vividness by offering the experience of putting oneself into the mind and body of a person to whom one would later direct compassion during meditation. It was hypothesized that offering a first person experience of the person who suffers and who would receive the compassionate wishes would enhance practice quality, given that the memory of the session would at least increase the imagery component. On the one hand, this effect was not found in the average practice quality of the following 2 weeks. On the other hand, results showed that the illusion of being another person made participants meditate more frequently than participants who only heard the story of that person. A possible explanation based on the upward spiral theory (Van Cappellen et al., 2020) is that the emotional experience during the VR microintervention motivated participants to maintain compassion practice at home. However, the imagery factor (either the somatic component) of compassion practice quality was not significantly different between groups. A similar result was obtained by Naismith et al. (2019b), who tried to enhance mental imagery vividness by showing compassionate pictures in a compassion focused imagery exercise (Naismith et al., 2019b). So, neither pictures nor VR embodiment seem to be effective for decreasing difficulties in mental imagery in CBMs.

Hence, the present thesis contributed to understanding how to improve meditation practice within CBIs. So far, it is known that an initial VR micro-intervention might

increase adherence to meditation practice, though a reflection on the cost-utility should be done before implementing this procedure.

The present dissertation has several strengths, including validating one of the SC questionnaires with more empirical evidence in the present moment to Spanish. Moreover, the dissertation has opened up a new line of research in the field of mechanisms of change in CBIs by defining and measuring the compassion practice quality construct. This construct has implications for research and clinical practice given that it may not only be an ingredient that explains CBIs effectiveness, but also a way to improve pedagogy in compassion training. Finally, a novel procedure based on embodiment and *The Machine to be Another* was developed to support CBM.

Nevertheless, this dissertation has also some limitations, including the recruitment of participants from one region of Spain in the first and the third studies, which may not be representative of all the territory. In this line, participants from study 2 were university students from Mexico, thus compromising again the generalization of the results. Moreover, the sample size of Study 3 was calculated taking into account the effect of the *Machine to be Another* on adherence (Cebolla et al., 2019), so it may have been underpowered for detecting differences in practice quality. Also in the third study, SC and imagery skills were not assessed, which might have helped to explain the present results. In addition, compassion practice quality of the meditation performed in the in-person session was not measured.

Therefore, based on these limitations, future research should study the psychometric properties of the FSCRS-SF in other Spanish samples both trying to replicate the three-factor model and exploring the novel evidence about the two-factor model. Also, future studies could include clinical participants to test measurement invariance. Furthermore, compassion practice quality could be studied in the context of a CBI to know exactly how

it is affected by the increasing experience of meditators. In fact, further studies could specifically describe the association between compassion practice quality and CBI outcomes. Moreover, it would be interesting to test whether facilitating not only imagery but also somatic perception of sensations would increase compassion practice quality. In that regard, cheaper procedures (e.g., audiovisual media) than those involving VR could be tested. Furthermore, those approaches might work differently depending on imagery and body awareness levels. Therefore, interventions aimed at improving compassion practice quality should be tested for people with difficulties in those constructs. Regarding CPQS, more studies about its psychometric properties are needed, especially to confirm its factor structure and increase its validity.

To sum up, in light of the above, this dissertation found that the Spanish version of the FSCRS-SF is a valid and reliable self-report questionnaire to assess two forms of SC and RS in Spanish populations. In fact, this is the first time that the psychometric properties of the FSCRS-SF are tested by administering it as a stand-alone instrument. Furthermore, a potential underlying mechanism through which CBIs work is accurately defined and measured with the CPQS. In particular, imagery and somatic perception of compassion were highlighted and studied preliminary as components of compassion practice quality. In this line, a novel procedure was designed to increase the compassion practice quality (through facilitating mental imagery) and frequency of at-home meditation, being effective for the latter. Finally, it should be noted that both the Spanish FSCRS-SF and the CPQS are freely available and can be downloaded from the published papers and this dissertation (see Annexes 5 and 6).

6. References

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ANNEX 1: STUDY 1 ARTICLE

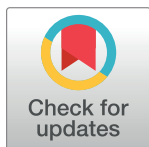
RESEARCH ARTICLE

Assessing self-criticism and self-reassurance: Examining psychometric properties and clinical usefulness of the Short-Form of the Forms of Self-Criticizing/Attacking & Self-Reassuring Scale (FSCRS-SF) in Spanish sample

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Abstract

The Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS) was designed to measure self-criticism (SC) through Inadequate Self (IS) and Hated Self (HS) factors, as well as self-reassurance (RS). However, its long and short forms have yet to be validated in the Spanish Population. The present study examines the psychometric properties of the short form (FSCRS-SF) and its clinical usefulness in a sample of 576 adult individuals, 77 with psychiatric disorders and 499 without. Non-clinical participants were split according to their previous experience with meditation (active meditators, $n = 133$; non-active meditators, $n = 41$; and non-meditators, $n = 325$) and differences between these subgroups were explored. Additionally, a subsample of 20 non-clinical participants took part in a mindfulness- and compassion- based intervention (MCBI) to assess the usefulness of the scale as an outcome measure. Results confirmed the original three-factorial structure, good internal consistency, acceptable test-retest reliability, and a pattern of correlations consistent with previous literature. Regarding differences between groups, the clinical subsample showed significant higher SC and lower RS levels than non-clinical participants and active meditators had significant lower IS and higher RS levels than non-meditators. Participants who participated in the MCBI showed significant RS improvement and a decrease in IS and HS levels. Moreover, a hierarchical multiple regression showed that RS made a significant predictive contribution to distress at three months' time. In conclusion, results show that the Spanish version of the FSCRS-SF is a reliable and valid measure of SC and RS in non-clinical populations and an adequate instrument to detect changes after MCBIs.

Introduction

Motivated by the desire to overcome the limitations of disorder-specific therapies, the transdiagnostic approach is gaining relevance in regard to treating mental health problems [1–4]. According to the transdiagnostic model, emotional disorders (i.e., depressive and anxiety disorders) have common aspects or factors underlying the symptomatology [5]. In this framework, self-criticism (SC) belongs to the family of intrusive or repetitive thoughts, and has been identified as a vulnerability factor for psychopathology and a transdiagnostic process of many mental health problems [6]. It underlies the development and maintenance of depressive [7–11], anxiety [12,13], and psychotic symptoms [14], eating disorders [15–18], non-suicidal self-injury [19], and suicidality [20,21]. Furthermore, SC also interacts with the evolution of the treatment, given that higher levels of baseline patients' SC predict less symptom reduction [22].

The cognitive-evolutionary approach proposed by Gilbert [23] suggests that SC is a form of interaction between self-parts, which involves constantly expressing intense hostility and disrespect from a part of the self towards another. According to this model, SC can take the form of a sense of internal inadequacy because of mistakes (Inadequate Self), or an aggressive/destructive/pathological response to the self after failure (Hated Self). These forms of SC are the result of an apparent desire for self-improvement or the persecution of oneself as a form of personal revenge [24].

Moreover, Gilbert et al. [24] defined self-reassurance as an adaptive self-to-self interaction, specifically as the ability to bring kindness, caring, and peacefulness to the self when things go wrong. This self-reassurance ability is highly correlated to compassion [25], since both are adaptive forms of relating to the self in the context of difficult life struggles. In addition, self-reassurance seems to be an independent factor, instead of the opposite end of a SC dimension, according to several factor-analytic and fMRI studies [19,26,27]. Finally, it is a buffer against the development of psychopathology and fosters well-being [28–31].

Compassion is rooted in a care-giving mentality and is subject to change by mind-training procedures, which in turn reduces SC by developing a compassionate understanding of one's situation [32]. Hence, SC has been used as an outcome for different interventions, especially those that include loving-kindness and compassion meditations [e.g., 33–37]. These meditations are part of the 'relation orientation' constructive family, which aim to strengthen healthy psychological patterns by nurturing prosocial qualities [38]. Similarly, cultivation of attentional regulation mechanisms (mindfulness) improves attention, body awareness (ability to focus on internal sensory experiences), reappraisal (positive reconstruction of stressful events), non-reactivity (non-reactive response to inner experience), and a detached perspective of the self [39,40]. Thus, attentional and constructive meditation practice leads to low levels of SC [23,41], though little is known about the evolution of SC over time, after decreasing or abandoning the meditation practice.

Based on the different models, researchers have developed several self-report questionnaires to assess SC, though to the best of our knowledge none of them have ever been validated to Spanish. Rose and Rimes [42] developed a systematic review to evaluate their measurement properties. These authors only recommended the use of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale [24] and the Self-Critical Rumination Scale [43] in future research taking into account their good psychometric properties and the high methodological quality of their validation studies.

Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS)

Gilbert et al. [24] developed the 22-item FSCRS to focus on the concrete forms in which people engage in self-attacking behaviors when things go wrong for them, which previous

instruments have failed to measure. They confirmed the Inadequate Self (IS) and the Hated Self (HS) factors and included a subscale for measuring the Reassured Self (RS). These three factors showed excellent reliability (IS Cronbach's $\alpha = 0.90$, HS Cronbach's $\alpha = 0.86$, and RS Cronbach's $\alpha = 0.86$).

In subsequent years, FSCRS has shown to be robust and reliable in both clinical and non-clinical populations in a range of different countries [44–48]. For instance, it has been used in the diagnosis of patients with borderline personality disorder (BPD) to examine the potential relationship between SC and recovery [49] and to evaluate the effects of a compassion-based intervention [33]. Furthermore, the FSCRS has been used to explore the phenomenology of SC in patients with eating disorders (ED) [e.g., 50,51] and SC proved to be a strong predictor of eating disorder symptoms [15].

Recently, a 14-item version (FSCRS-SF) was generated to minimize response burden and increase response rates in studies that require multiple assessments [52]. Sommers-Spijkerman et al. [52] tested its psychometric properties in a Dutch community sample and the three-factor model of the full FSCRS was replicated. The short form demonstrated acceptable internal consistency. Nevertheless, test-retest reliability was not acceptable for IS and HS scores, in contrast to the findings of Castilho et al. [44] with the full FSCRS. Moreover, the characteristics of the sample hinder generalization of the findings due to an underrepresentation of males and people with lower educational levels. Finally, the short form was not used as a stand-alone instrument as the extended version was. To this day, the study of Sommers-Spijkerman et al. [52] is the only one that has tested psychometric features of the short form.

Spanish validation of the forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form

In the present moment, neither the full nor the short form of the FSCRS has been validated in the Spanish population. Given that the study of Sommers-Spijkerman et al. [52] shows similar psychometric properties between both forms, the current study aims to translate and validate the 14-items FSCRS into Spanish in a large sample. The main reason to validate the shortened version of the FSCRS is to facilitate the assessment of SC and RS in research contexts, in which multiple measures are commonly used. The validity of the FSCRS-SF for discriminating between non-clinical and clinical samples. Moreover, we aimed to assess the additional utility of using FSCRS-SF for predicting a global mental health index, studying its potential role as a mediator between meditation practice and distress, and its usefulness as an outcome measure after a mindfulness- and compassion- based intervention (MCBI).

We collected data from three samples of participants, including a non-clinical sample composed of frequent meditators, non-active meditators, and non-meditators, a clinical sample of patients with BPD and patients with ED, and a social worker sample. Firstly, factor structure was evaluated in the non-clinical sample; we hypothesized that the three-factor model would show adequate fit as well as it did in the Dutch population. Secondly, we expected similar evidence of its reliability and construct validity in the non-clinical sample compared to both the full and short original versions. That is, SC factors were expected to be positively associated with self-critical thinking, depression, anxiety, and somatization symptoms and negatively associated with self-compassion. Conversely, RS was expected to show a negative association with self-critical thinking and psychopathology symptoms, and a positive association with self-compassion. Reliability was also studied in the clinical sample. The third hypothesis stated that non-clinical participants who meditate will show significantly lower levels of IS and higher RS than both those who have meditation experience but did not practice during the last year and non-meditators. Regarding this hypothesis, we did not expect differences in HS scores among

these non-clinical subgroups because the HS subscale may not distinguish between non-clinical test-takers [45]. However, we expected that the clinical sample of BPD and ED patients would show significantly higher SC, especially HS levels, and lower RS than the non-clinical sample. We expected that the FSCRS-SF factors would significantly predict distress at three months' time in the non-clinical sample, would mediate the effects of meditation practice on non-clinical participants' general distress, and finally that the scale would be able to detect significant improvements in SC and RS after an MCBI in the social worker sample.

Materials and methods

Participants

The Ethics Committee of Research in Humans of the Ethics Commission in Experimental Research of the University of Valencia approved the procedure (H1539699805131). We obtained written consent from all participants involved in this study. The non-clinical sample was composed of 499 adults living in Spain (122 men and 377 women), ranging from 18 to 75 years of age ($M = 31.08$, $SD = 12.55$). From them, 22 males and 97 females, ranging from 18 to 67 years of age ($M = 31.09$; $SD = 12.11$), composed the subsample for the analysis of test-retest reliability. Adult patients diagnosed with BPD ($n = 36$) and ED ($n = 41$) were recruited at the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain) and made up the clinical sample (4 men and 73 women), ranging from 17 to 65 years of age ($M = 31.03$, $SD = 11.03$). Finally, a sample of 20 social workers (all women) took part in a MCBI, their age ranged from 25 to 56 years of age ($M = 39.65$, $SD = 8.29$). Participant characteristics are listed in Table 1.

Regarding the non-clinical sample, 174 reported some kind of previous meditation experience whereas 325 reported no experience at all. More specifically, 133 were 'active meditators' (i.e., they meditate at least 2 or 3 times per month) and 41 'non-active meditators' who had not practiced meditation during the last year.

Procedure

Participants were recruited among undergraduate students at the University of Valencia and Castellón (Spain), and throughout the autonomous community in general. The sample was

Table 1. Sociodemographic characteristics of participants.

Variable	Non-clinical sample		Clinical sample	
	<i>n</i>	%	<i>n</i>	%
Gender				
Female	377	75.55	73	94.8
Male	122	24.45	4	5.2
Marital status				
Single	364	72.95	NA	NA
Married/partnered	99	19.84	NA	NA
Divorced/widowed	36	7.21	NA	NA
Highest educational level				
Middle school	26	5.21	12	15.58
High school/some college	51	10.22	37	48.05
University or post-graduate degree	415	83.17	28	36.36
Other	7	1.40	0	0

NA = Not available.

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recruited through advertisements (online ads in social media sites and internet forums) and flyers announcing the study to university students after their classes. The assessment was conducted between September (2019) and March (2020). Those who were interested in participating received an e-mail with a link to the online survey that was programmed on the LimeSurvey of the University of Valencia or a pen-and-paper questionnaire package. In total, 437 individuals completely filled out the battery and 62 filled it out partially (only the FSCRS-SF). Moreover, all of them received a second link to answer the FSCRS-SF (and psychopathology symptoms with BSI-18) 3 months after the assessment (119 participants). Additionally, BPD and ED outpatients from the Hospital de la Santa Creu i Sant Pau (Barcelona, Spain) were invited to voluntarily participate in the present study. Those who agreed answered the pen-and-paper survey *in situ*. Finally, a sample of 20 social workers participated in a blended-internet MCBI intervention and the FSCRS-SF was administered before and after this intervention. These participants were recruited from the College of Social Workers of Valencia. The MCBI was an 8-week program called Well-being training based on contemplative practices (WTCP; [53]). Based on contemplative positive psychology, understood as an “area of positive psychology that includes a range of techniques and conceptualizations developed by the contemplative sciences for the promotion of well-being through evidence-based strategies” [53] this training was developed to train skills that predict well-being supported by contemplative practices. The premise of the WTCP program is twofold: a) it is possible to train the skills and abilities to achieve a balanced and virtuous mind through the mental training involved in the practice of meditation and b) this process, in turn, will increase the probability of increasing one’s levels of psychological well-being. Each of these skills, based on Richard Davidson and Schuyler’s work [54], is developed throughout the WTCP program, generating different practices, tasks, and meditations.

Measures

Forms of Self-Criticizing/Attacking and Self-Reassuring Scale—Short Form (FSCRS-SF). Sommers-Spijkerman et al. [52] proposed a short version of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale (FSCRS). Permission from the original authors of the FSCRS-SF and The Compassionate Mind Foundation was obtained to reproduce and validate the FSCRS-SF into Spanish. Three independent English/Spanish speakers translated this 14-item short form to Spanish, and subsequently an independent native English speaker translated it back to English. After discussing the discrepancies, the Spanish-language version was adapted until it was equivalent to the original FSCRS-SF. It comprises three independent scales (IS, HS, and RS) with five, four, and five items, respectively. Participants respond to statements, which ask about how they react ‘when things go wrong’, on a 5-point Likert scale ranging from 0 (Not at all like me) to 4 (Extremely like me). Higher scores indicate a greater sense of inadequacy (score 0–20), self-hate (score 0–16), and self-reassurance (score 0–20). See final Spanish version of the questionnaire in the online supporting information section (S1 File).

Self-Critical Rumination Scale (SCRS). The SCRS comprises 10 items and a 4-point Likert scale ranging from 1 (not at all) to 4 (very well) to assess SC [43]. We used an ad hoc Spanish-language version of the SCRS, which is in process of validation in a parallel study. The scale has a single-factor structure and showed excellent internal consistency [43]. Higher scores indicate a greater negative thinking that devaluates the self (score 10–40). The SCRS demonstrated excellent internal consistency (Cronbach’s $\alpha = 0.91$; McDonald’s $\omega = 0.91$) in the present sample.

Self-Compassion Scale Short-Form (SCS-SF). The SCS-SF is a 12-item measure assessing self-compassion [55]. We used the Spanish validated version, which reported good internal

consistency [56]. Items are scored on a 5-point Likert scale from 1 (Almost never) to 5 (Almost always), and all scores are added to form a total score. We also calculated separate scores for the Positive (Self-Kindness, Common Humanity, and Mindfulness) and Negative (Self-Judgment, Isolation, and Over-identified) subscales following recent recommendations about the interpretation and scoring of the scale [57,58]. The SCS-SF demonstrated good internal consistency (Total score Cronbach's $\alpha = 0.86$, McDonald's $\omega = 0.86$; Positive Subscale Cronbach's $\alpha = 0.78$, McDonald's $\omega = 0.79$; Negative Subscale Cronbach's $\alpha = 0.83$, McDonald's $\omega = 0.83$) in the present sample.

The Brief Symptom Inventory-18 (BSI-18). Depression, anxiety, and somatization symptoms were assessed using the 18-item version of the BSI [59]. Participants rate the frequency of depressive symptoms (BSI-D, 6 items, score 0–24), anxiety symptoms (BSI-A, 6 items, score 0–24), and somatization (BSI-S, 6 items, score 0–24) over the past week on a 5-point Likert scale from 0 (Not at all) to 4 (Always). Moreover, the questionnaire offers a global scale of general distress (BSI-T) ranging from 0 to 108. The BSI-18 has good dimensional structure and reliability in the Spanish population [60]. The internal consistency of the subscales (BSI-D Cronbach's $\alpha = 0.88$, McDonald's $\omega = 0.89$; BSI-A Cronbach's $\alpha = 0.81$, McDonald's $\omega = 0.82$; BSI-S Cronbach's $\alpha = 0.83$, McDonald's $\omega = 0.83$) and the global index (BSI-T Cronbach's $\alpha = 0.93$, McDonald's $\omega = 0.93$) have been found to be good.

Data analysis

Descriptive statistics, Confirmatory Factor Analysis (CFA), internal consistency, intercorrelations between FSCRS-SF subscale scores, test-retest reliability, convergent and divergent validity, a one-way between-groups multivariate analysis (MANOVA), a paired-samples t-test, a hierarchical multiple regression, and mediation analyses were all calculated starting with the descriptive statistics of the items in the non-clinical and clinical samples (see Table 2). CFA and internal consistency were computed using JASP (Version 0.12.1) while test-retest, validity

Table 2. Descriptive statistics of the FSCRS-SF items.

Items	Non-clinical sample (<i>n</i> = 499)						Clinical sample (<i>n</i> = 77)					
	<i>M</i>	<i>Mdn</i>	<i>Md</i>	<i>SD</i>	Skew	Kurt	<i>M</i>	<i>Mdn</i>	<i>Md</i>	<i>SD</i>	Skew	Kurt
1	2.16	2	3	1.01	-0.20	-0.65	1.79	2	1	1.06	0.36	-0.55
2	1.27	1	1	1.11	0.57	-0.54	3.04	3	4	1.08	-1.10	0.71
3	2.05	2	3	1.12	-0.24	-0.81	1.45	1	1	1.12	0.52	-0.40
4	1.58	1	1	1.23	0.31	-1.01	3.13	4	4	1.06	-1.02	0.36
5	2.95	3	4	1.07	-0.90	0.06	1.32	1	0	1.14	0.42	-0.63
6	0.62	0	0	1.13	1.78	1.95	1.81	1	0	1.57	0.23	-1.52
7	0.46	0	0	0.90	2.02	3.33	2.23	2	4	1.44	-0.21	-1.35
8	3.10	3	4	1.07	-1.21	0.83	1.81	2	3	1.29	0.07	-1.19
9	0.91	1	0	1.11	1.15	0.48	2.16	2	2	1.38	-0.23	-1.07
10	1.09	1	0	1.13	0.92	0.06	2.58	3	3	1.20	-0.51	-0.57
11	0.70	0	0	1.01	1.51	1.60	2.21	2	4	1.54	-0.18	-1.46
12	1.19	1	1	1.07	0.69	-0.26	2.88	3	4	1.20	-0.70	-0.59
13	1.60	1	1	1.31	0.42	-1.01	3.47	4	4	0.82	-1.53	1.57
14	2.71	3	3	1.09	-0.55	-0.55	2.04	2	2	1.28	0.04	-1.02

FSCRS-SF = Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form. *M* = mean; *Mdn* = median; *Md* = mode; Skew = Skewness; Kurt = Kurtosis. Items scores ranging from 0 (not at all like me) to 4 (extremely like me).

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analysis, MANOVA, multiple regression, and mediation analysis were conducted in IBM SPSS Statistics for Windows (Version 26).

Factor structure. Factor structure was assessed with the data collected from the non-clinical sample. Regarding CFA, preliminary analysis was conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and absence of outliers and residuals. Distribution of some item scores were significantly skewed or highly kurtotic, therefore the robust maximum likelihood method was employed to estimate the three-factor model that had been hypothesized. Several fit criteria were computed such as the χ^2 statistic, the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Fit Index (TLI) to determine the good fit between the model and the data. Following Hu and Bentler's [61] recommendations regarding cut-off criteria, we used the combination of the $SRMR \leq 0.08$, $RMSEA \leq 0.06$, and CFI and TLI close to 0.95 to determine good fit between the model and the data. Standardized factor loadings $\geq .50$ were considered acceptable and $\geq .70$ were considered strong [62].

Internal consistency and intercorrelations between FSCRS-SF subscale scores. To assess subscale reliability, internal consistency was assessed using Cronbach's α [63] and McDonald's ω [64]. Additionally, we calculated intercorrelations between the FSCRS-SF subscale scores using Pearson's correlation coefficient. Both of them were assessed with the data collected from the non-clinical and clinical samples.

Test-retest reliability and convergent and divergent validity. Test-retest reliability and convergent and divergent validity were assessed with the data collected from the non-clinical sample. Pearson's correlation was used by correlating the FSCRS-SF scores with the SCRS, SCS-SF, BSI-18, and post-FSCRS-SF ones. Effect size guideline for interpreting small, medium, and large correlations were 0.15, 0.25, and 0.35, respectively [65].

Known-groups validity. A MANOVA was performed to investigate clinical differences in SC and RS. FSCRS-SF factors were the dependent variables. Data from the non-clinical and clinical samples were used. The independent variable had four levels: active meditators, non-active meditators, participants without meditation experience, and clinical participants. We conducted post hoc analyses using Tukey Honestly Significant Difference (HSD) test to identify where the potential significant differences lie. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no serious violations noted.

Sensitivity to change. A paired-samples t-test was conducted to evaluate the impact of the MCBI intervention on social workers' scores. Eta squared was the effect size statistical measure calculated for both MANOVA and t-test. It was interpreted following Cohen's [66] guidelines: .01 (small effect), .06 (moderate effect), and .14 (large effect).

Predictive validity. Hierarchical multiple regression was used to assess the ability of the FSCRS-SF measure to predict levels of non-clinical participants' general distress (BSI-T), after controlling for the influence of baseline distress. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity.

Mediation analysis. Multiple mediation analyses, or simultaneous mediation by multiple mediators, were carried out with the data collected from the non-clinical sample following the methodology described by Hayes [67] from the PROCESS macro (version 3.4.1), choosing model 4. Thus, we studied the FSCRS-SF factors role as mediators between meditation practice and BSI-T scores at baseline. The confidence interval (CI) for the indirect effect was a percentile bootstrap 95% interval based on 5000 samples. CI that did not contain the zero-value indicated a significant indirect effect.

Results

Factor structure

The hypothesized model with coefficients presented in standardized form is shown in Fig 1. It was tested and support was found for the three-factor model, $\chi^2(74, N = 499) = 238.13, p < .001$, SRMR = 0.04, RMSEA = 0.06, CFI = 0.94, and TLI = 0.93. Factor loadings were acceptable, ranging from .56 to 1.03.

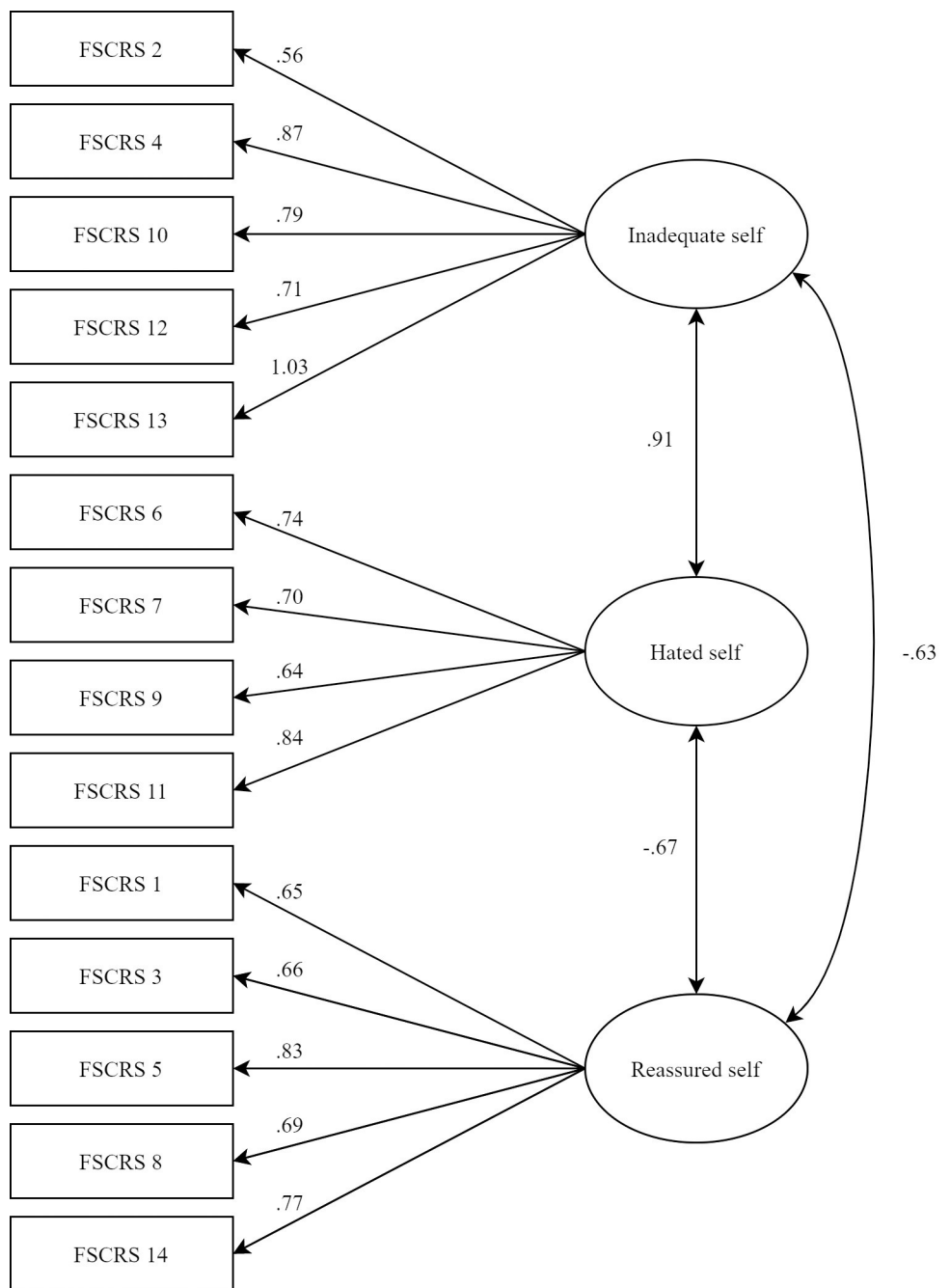


Fig 1. Confirmatory factor analysis model of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form.

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Table 3. Pearson intercorrelations and internal consistency of the FSCRS-SF subscales in clinical and non-clinical samples.

FSCRS-SF subscales	Non-clinical sample (n = 499)			Clinical sample (n = 77)		
	Inadequate self	Hated self	Reassured self	Inadequate self	Hated self	Reassured self
Inadequate self	-.73	-.52	-.81	-.69	-.67	-.80
Hated self		-.52	-.81		-.67	-.80
Reassured self			-.81			-.80
Cronbach's α	.80	.80	.81	.79	.82	.80
McDonald's ω	.81	.81	.81	.80	.82	.82

FSCRS-SF = Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form. All correlations were significant at $p < .01$.

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Internal consistency and intercorrelations between FSCRS-SF subscale scores

Regarding reliability, the internal consistency of the FSCRS-SF subscales was adequate for both clinical and non-clinical samples (see Table 3). The intercorrelation of the three FSCRS-SF subscales were large for both non-clinical ($|r| \geq .52$) and clinical samples ($|r| \geq .63$). Table 3 shows Cronbach's α , McDonald's ω , and intercorrelations of the FSCRS-SF subscales.

Test-retest reliability and convergent and divergent validity

Test-retest reliability at 3 months was $r = .78$ for IS subscale, $r = .73$ for HS subscale, and $r = .66$ for RS subscale (all with $p < .01$), which supports temporal stability of FSCRS-SF scores. Table 4 shows correlations between FSCRS-SF with SCRS, SCS-SF, and BSI-18. All correlations were large, significant, and in the expected direction, supporting the convergent and divergent validity of the FSCRS-SF.

Known-groups validity

With the use of Wilks' criterion, the combined FSCRS-SF factors were significantly affected by group condition, $F(9, 1370.35) = 27.24, p < .001$; Wilks' Lambda = 0.67; $\eta^2 = 0.13$. When the

Table 4. Convergent and divergent validity of the FSCRS-SF scales.

Measure	M	SD	FSCRS-SF		
			Inadequate self	Hated self	Reassured self
SCRS					
Total score	20.94	7.23	.74**	.60**	-.43**
SCS-SF					
Positive subscale	18.26	5.01	-.49**	-.45**	.61**
Negative subscale	15.39	5.50	.78**	.60**	-.46**
Total score	38.88	9.14	-.74**	-.61**	.61**
BSI-18					
Depressive symptoms	5.55	5.48	.60**	.59**	-.48**
Anxiety symptoms	5.01	4.62	.47**	.38**	-.35**
Somatization	3.86	4.62	.36**	.35**	-.28**
General distress	14.43	13.10	.55**	.51**	-.43**

N = 499. FSCRS-SF = Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form; SCRS = Self-Critical Rumination Scale; SCS-SF = Self-Compassion Scale Short-Form; BSI-18 = The Brief Symptom Inventory-18.

** $p < .01$.

<https://doi.org/10.1371/journal.pone.0252089.t004>

Table 5. Means, standard deviations, and one-way analyses of variance in FSCRS-SF subscales.

Measure	Active meditators (<i>n</i> = 133)	Non-active meditators (<i>n</i> = 41)	Non-meditators (<i>n</i> = 325)	Clinical sample (<i>n</i> = 77)	<i>F</i> (3, 565)	η^2
FSCRS-SF						
Inadequate self	6.08 (4.07)	5.61 (3.77)	7.15 (4.52)	15.17 (3.99)	87.49***	.32
Hated self	2.47 (3.30)	2.02 (2.82)	2.88 (3.30)	8.47 (4.77)	60.68***	.24
Reassured self	13.71 (4.01)	13.83 (3.47)	12.59 (4.03)	8.39 (4.42)	31.49***	.14

All values represent mean scores (standard deviations in parenthesis); FSCRS-SF = Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form. For non-clinical sample (i.e., active, non-active, and non-meditators): IS ($M = 6.73$; $SD = 4.37$); HS ($M = 2.70$; $SD = 3.27$); RS ($M = 12.97$; $SD = 4.01$).

*** $p < .001$.

<https://doi.org/10.1371/journal.pone.0252089.t005>

results for the dependent variables were considered separately, there were statistically significant differences in IS, HS, and RS (see Table 4). Post hoc comparisons using the Tukey HSD test indicated that the clinical sample had statistically significant higher IS ($p < .001$) and HS ($p < .001$) and lower RS ($p < .001$) mean scores than all non-clinical subgroups. Moreover, there were statistically significant differences in IS ($p = .013$) and marginally significant differences in RS ($p = .050$) between the mean scores of active meditators and participants without meditation experience. Table 5 shows means, standard deviations, and one-way analyses of variance in FSCRS-SF factors.

Sensitivity to change

Regarding the subsample ($n = 20$) that underwent the MCBI, there was a statistically significant decrease in IS scores from Time 1 ($M = 7.40$, $SD = 3.57$) to Time 2 ($M = 5.80$, $SD = 2.48$), $t(19) = 2.20$, $p = .04$ (two-tailed) with eta squared (.20) indicating a large effect size. In terms of HS, there was no statistically significant decrease in scores from Time 1 ($M = 1.75$, $SD = 1.48$) to Time 2 ($M = 1.25$, $SD = 1.16$), $t(19) = 1.75$, $p = .096$ (two-tailed) and eta squared (.14) indicated a large effect size. Finally, there was a statistically significant increase in RS scores from Time 1 ($M = 13.50$, $SD = 3.28$) to Time 2 ($M = 15.80$, $SD = 2.91$), $t(19) = -3.19$, $p = .005$ (two-tailed) with eta squared (.35) indicating a large effect size.

Predictive validity

Table 6 shows the regression coefficients for the hierarchical multiple regression. BSI-T baseline scores were entered during Step 1, explaining 49.5% of the variance in general distress

Table 6. Hierarchical regression results for global index of general distress at three months' time.

Scales	Model				
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
Step 1					
Constant	4.65	1.35		3.44	.001
BSI-T (baseline)	0.73	0.07	0.70	10.47	.000
Step 2					
Constant	12.47	4.72		2.64	.009
BSI-T (baseline)	0.73	0.08	0.62	7.61	.000
FSCRS-SF (Inadequate self)	0.19	0.32	0.06	0.59	.560
FSCRS-SF (Hated self)	-0.19	0.42	-0.05	-0.46	.650
FSCRS-SF (Reassured self)	-0.58	0.27	-0.17	-2.07	.041

BSI-T = Brief Symptom Inventory Total Score; FSCRS-SF = Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form.

<https://doi.org/10.1371/journal.pone.0252089.t006>

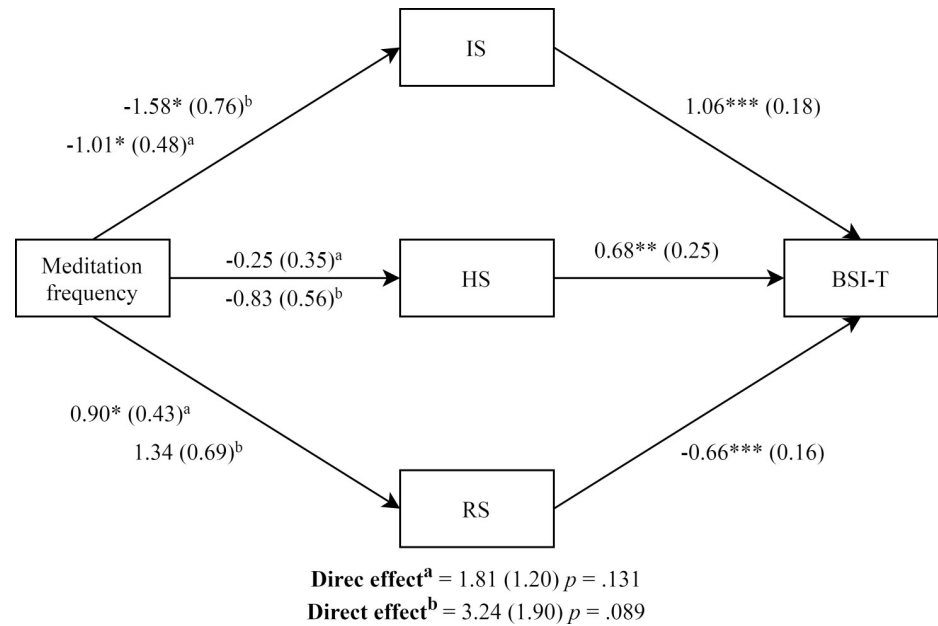


Fig 2. Influence of meditation practice on general distress through self-criticism. IS = Inadequate self; HS = Hated self; RS = Reassured self. a = Meditators vs. non-meditators. b = Non-active Meditators vs. non-meditators * $p < .05$. ** $p < .01$. *** $p < .001$.

<https://doi.org/10.1371/journal.pone.0252089.g002>

scores at three months' time. After entering the IS, HS, and RS factors, the total variance explained by the model as a whole was 52% $F(4, 109) = 29.55, p < .001$. The SC measures explained an additional 2.6%, after controlling for baseline scores, R squared change = .026, F change (3, 109) = 1.95, $p = .126$. In the final model, RS was the only FSCRS-SF factor to reach statistical significance with a beta = $-.17 (p = .041)$.

Mediation analysis

As can be seen in Fig 2 and Table 7, participants who actively meditate, even those who did not practice during the last year, reported a lower distress level than participants without meditation experience, mediated by IS and RS levels. There was no evidence that active/non-active meditators and those without meditation experience influenced baseline BSI-T scores independent of its effect on IS and RS.

Table 7. Mediation analysis: Indirect effects of meditation on distress through self-criticism and self-reassuring.

Antecedent	Mediator	Coeff.	SE	95% CI	
				LL	UL
Active meditators	IS	-1.07	0.54	-2.23	-0.09
vs	HS	-0.17	0.27	-0.76	0.33
Non-meditators	RS	-0.59	0.33	-1.33	-0.02
Non-active meditators	IS	-1.67	0.72	-3.19	-0.34
vs	HS	-0.57	0.37	-1.39	0.03
Non-meditators	RS	-0.88	0.47	-1.94	-0.09

IS = Inadequate self; HS = Hated self; RS = Reassured self; SE = standard error; CI = confidence interval; LL = lower limit; UL = upper limit.

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Discussion

To our knowledge, the current study is the first validation study of the FSCRS-SF for the Spanish population and the second that validates it after the original work of Sommers-Spijkerman et al. [52]. Our main contribution was to test the FSCRS-SF as a stand-alone instrument for the first time, i.e., to directly administer the FSCRS as short form. Furthermore, it was assessed in a clinical sample composed of BPD and ED patients, for whom measurement and treatment of SC is essential. The aim was to examine the psychometric properties of the Spanish validation of the short form of the FSCRS, to explore differences in SC and RS among the general population with different levels of meditation experience and clinical patients, to assess its usefulness as an outcome measure after an MCBI, and to explore the mediator and predictive role of SC and RS on psychopathology symptoms. Its factorial structure, internal consistency, convergent, divergent, known-group, and predictive validity were examined.

The three-dimensional factor structure provided a very good fit in the non-clinical sample. This result supports the previous findings of Sommers-Spijkerman et al. [52] regarding the three-factor solution and rationale of the cognitive-evolutionary model [68]. In addition, the three-dimensional model provides a better fit than the unidimensional and bifactorial ones according to the results of the confirmatory factor analyses of the FSCRS in clinical and non-clinical samples [44,45,48,69–71]. This is in contrast with a large intercultural study which has shown that a two-factor model of RS and SC (combining IS and HS) had a superior fit, although the three-factor one was acceptable too [46]. Then, following the parsimony principle in factor analysis, it seems that professionals should choose the simpler model. However, Gilbert's [23] theoretical understanding of SC has important implications for clinical practice, since it offers a more accurate description of SC manifestation in non-clinical and clinical samples. So, to the extent that both factor structures are acceptable, researchers and clinicians should choose those most relevant to their context.

Regarding reliability, internal consistency analyses showed the FSCRS-SF as a reliable self-report measure. Reliability coefficients are higher than those obtained in the Dutch version ([52]; $\alpha = .52-.72$; $\omega = .49-.72$) and these results are in line with previous studies of the long form [44,46]. Furthermore, the test-retest reliability was acceptable for IS and HS scores and questionable for RS scores, which means that these subscales are reasonably stable considering the three-month interval. It allows the assessment of the effectiveness of interventions aimed at reducing SC. As proof of this, participants who participated in the MCBI showed significant improvements in RS and a decrease in IS and HS levels. Along this line, the FSCRS has been able to detect SC and RS changes in a variety of interventions, such as compassion-based interventions [e.g., 33,72] and mindfulness-based interventions [e.g., 34].

Our results indicate a clear relationship between SC facets and negative psychological health. These correlation patterns are consistent with previous findings regarding IS and HS factors, which have been associated with high levels of depression, anxiety, stress, pessimism, isolation, shame, eating-related difficulties, body mass index, and facial-emotion recognition difficulties [44,48,72–75]. Along these lines, RS has been associated with high levels of self-compassion [76], dispositional optimism [44], weight-related positive affect, and overall mental well-being [77]. Furthermore, BPD and ED patients showed significant higher SC and lower RS levels than non-clinical participants, thus indicating that the FSCRS-SF is able to discriminate between clinical groups that are known to differ in these two variables. A range of disorders, which include BPD and ED, are associated with high SC and low RS [69], though further studies are needed to describe mechanisms through which SC works in these pathologies [6]. In the case of BPD, SC and self-invalidation [78] are terms that, without having the exact same meaning, have huge overlap. Moreover, the roles of invalidation and self-

invalidation in the development of BPD have been already studied [79,80]. In this regard, Perkins et al. [81] have recently described how SC predicts nonsuicidal self-injury behaviors at two months' time in an ED sample. In addition, high SC has been associated with affective variability in BPD patients [82].

As mentioned previously, SC is sensitive to meditation training (e.g., WTCP [53]), in particular to meditation-based interventions that foster compassion, which is the theoretically proposed change mechanism underlying the decreasing of SC [e.g., 23,37,83]. In this regard, a recent meta-analysis has shown that self-compassion interventions are effective for decreasing self-criticism [84]. For instance, Compassion-Focused Therapy (CFT) focus on cultivating feelings of safeness and reassurance toward oneself in order to reduce SC [23]. As well, the Mindful Self-Compassion (MSC; [83]) and Loving-Kindness Meditation (LKM; [37]) programs teach people to be kinder and more compassionate toward themselves through meditation. However, not only interventions that explicitly teach compassion (e.g., CFT, MSC, and LKM) are effective to enhance it, but also mindfulness-based interventions, which teach compassion implicitly (e.g., Mindfulness-based Stress Reduction program) are effective too [85,86]. Although the implicit teaching of self-compassion might have a lower impact on it [87]. In fact, meditation experience (time of regular practice) was associated with lower levels of repetitive negative thinking, a similar psychological process to SC, being this association mediated by both self-compassion and mindfulness [88]. However, differences in SC between active meditators and meditators who abandoned the practice have not been previously investigated. We hypothesized that participants who usually meditate will show significant lower levels of IS and higher RS than both those who have meditation experience but did not practice during the last year and non-meditators. Our findings show that individuals who usually meditate and non-active meditators had no significantly different IS and RS levels. However, active meditators had significantly lower IS and higher RS levels than non-meditators. Interestingly, mediation analysis showed that both subsamples had less internal inadequacy by mistakes and more self-reassuring responses than participants without meditation experience, which in turn led them to feel less distress than non-meditators. Altogether, these results suggest that some mechanisms that could be learnt and developed through meditation [39] are temporally stable and may protect from SC, even for those who stopped meditating a year ago. Further studies should be designed to analyze this interesting result. In this line, Sommers-Spijkerman et al. [31] examined the potential mediator role of RS and IS in explaining the underlying mechanisms through Compassion-Focused Therapy (CFT). Their results showed that participants who received CFT intervention (compared to wait-list participants) had more RS and less IS after the intervention, in turn leading to more well-being.

Our findings also show that RS was the only FSCRS-SF factor that made a significant predictive contribution to distress at three months' time. This result suggests that the ability to self-reassurance when things go wrong is better predicting psychopathology than SC. This supports the idea that RS is an independent factor for self-defense against SC [e.g., 89], meaning that its presence (or lack) determines the effect of SC. In this regard, RS was found to be a buffer of IS on depressive symptomatology [30]. That is, IS was weakly associated to depressive symptoms in individuals with high RS while this relationship was stronger and significant for low-RS ones.

Limitations and future research

Regarding the present study, some limitations deserve to be addressed. First of all, the combination of online and in-person recruitment might have biased the results. In addition, the design of the present study is mainly cross-sectional, so the causality suggested by the

mediation analysis should be complemented with future longitudinal studies. Third, participants were classified in the levels of the independent variable 'meditation experience' according to brief reported information of their previous practice. Finally, sample size could be larger and subsamples more balanced to increase the power of the analysis and to conduct measurement invariance evaluation, although ours was above the minimum for the implemented psychometric techniques. Also connected to this issue, it is worth noting that the R squared change in the hierarchical multiple regression was small, although the predictive model including baseline distress and FSCRS-SF subscales was statistically significant.

Likewise, future research could test measurement invariance of FSCRS-SF subscales across non-clinical and clinical samples. In addition, other Spanish-speaking countries should evaluate our Spanish language version taking into account expressions that may have a different meaning. Finally, interventions with control condition to treat SC should confirm the usefulness of this short form to measure pre-post changes.

Conclusions

In summary, the Spanish version of the FSCRS-SF is a valid and reliable instrument to measure IS, HS, and RS in non-clinical samples. The findings also show that the FSCRS-SF subscales distinguish between clinical and non-clinical individuals and predict distress at three months' time. Moreover, IS and RS mediate distress among individuals with different frequency of meditation practice and this short form is an adequate outcome instrument to detect changes after an MCBI.

An implication for practice is thus offering the possibility to assess SC and RS with a shortened version of the FSCRS with all psychometric guarantees, which is especially useful in the research context. Moreover, our results add information about the maintenance of the effects of meditation practice on people's ability to reassure themselves and be less self-critical. This gives hints about the planning of follow-up sessions in the context of compassion-based interventions, for instance.

Supporting information

S1 File. Spanish translation of the Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form.
(DOCX)

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ANNEX 2: STUDY 2 ARTICLE



Compassion-Based Meditation Quality Practice and Its Impact on the Positive Attitudes Toward Others

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Abstract

Objectives The authors report on the initial development and validation of the Compassion Practice Quality Scale (CPQS), a measure to assess the quality of compassion-based meditation (CBM). It is conceptualized and operationalized via two factors measuring mental imagery and somatic perception/response.

Methods The total sample was composed of 205 university students who underwent a CBM and completed pre-test/post-test assessment of compassion and related constructs. Results from a series of preliminary psychometric analyses of the CPQS were examined, including factor analysis, internal consistency, and convergent/discriminant validity.

Results The data supported a 12-item and 10-item (without reference to gestures and self-instructions) CPQS of which imagery and somatic perception emerged as two significant reliable subscales, with Cronbach's alpha values of .90 and .88 respectively. Practice quality factors assessed by the CPQS correlated in expected ways with fear of compassion, imagery variables, and self-criticism, as well as predicted compassion outcome (i.e., feeling positive attitudes toward others).

Conclusions Our findings contribute to identifying two key components of high-quality meditation in CBM (i.e., mental imagery and somatic perception/response) for use in pedagogical development and further research and to offer a reliable self-report measure to assess them for the first time.

Keyword Quality practice · Compassion · Meditation · Reliability · Assessment

Compassion-based interventions (CBI) have received increasing interest in the last years (Ferrari et al., 2019; Kirby et al., 2017; Wilson et al., 2019). Evidence has shown that these interventions increase well-being and decrease psychological distress (Wilson et al., 2019), anxiety, and depressive symptoms (Kirby et al., 2017).

Different CBIs have been developed to train compassion and self-compassion to treat, for instance, fear of cancer recurrence (González-Hernández, 2018), fibromyalgia (Montero-Marín et al., 2017), paranoid ideation (Ascone et al., 2017), body dissatisfaction (Albertson et al., 2015), or borderline personality disorder (Feliu-Soler et al., 2017).

Although CBI has been intensively researched in the last years, some key aspects remain unclear. According to Kirby et al. (2017), it is still necessary to gain a deeper understanding of how these interventions function and the underlying processes that make them work (Kirschner et al., 2019). Furthermore, little is known about which facets of the interventions are producing positive outcomes. For example, the type of meditations taught or the quality of the practice are important research topics that have received an increased focus in the research of meditation (Cebolla et al., 2017; Del Re et al., 2013; Goldberg et al., 2020). In the case of mindfulness meditation, Del Re et al. (2013) pointed out that the quality of mindfulness practice defined as a balanced perseverance/resolve in (a) receptive (b) present moment

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attention, during the act of formally practicing mindfulness meditation, maybe as important as the quantity and offered a tool to help clinicians instruct their patients. These authors developed a two-factor measure of mindfulness practice quality to evaluate the impact of high/low-quality meditations on cultivating mindfulness. However, few studies have focused on the importance of practice quality and most of the mindfulness-based intervention (MBIs) studies have prioritized quantitative monitoring rather than the specific way in which meditation should be conducted, which is essential to home-practice adherence and positive outcomes (e.g., Lloyd et al., 2018). To date, despite the high amount of research developed in the last years regarding CBI, there are no available measures to assess the quality of compassion-based meditations (CBMs) and the difficulties or barriers that can arise during its practice.

The family of meditations used in CBIs is different than the one used in MBIs. According to the system developed by Dahl et al. (2015), there are three different families of meditations, based on their primary cognitive mechanisms: attentional (“practices that strengthen the self-regulation of various attentional processes, especially the ability to initiate and sustain meta-awareness”), deconstructive (“practices that use self-inquiry to foster insight into the processes of perception, emotion, and cognition”), and constructive (“strengthen cognitive and affective patterns that foster well-being, promote healthy interpersonal dynamics, strengthen a commitment to ethical values, and nurture habits of perception”) (Dahl et al., 2015). CBIs are mainly based on constructive meditations. This family of meditations uses strategies based on mental imagery, self-instructions, and gestures, aspects that should be included in the assessment of CBM quality practice. That is, meditators are usually asked to imagine and thinking of love ones, neutral people, and someone who they hate. Then, they are invited to send them good wishes repeating phrases such as “may you be free of suffering” or “may you be peaceful.” Finally, many meditations suggest to perform compassionate gestures, for example, putting the hands on the chest, to enhance physical sensations.

Mental imagery is the simulation of mental representations that subjectively have sensory properties but have no basis in current sensory stimuli (Kosslyn et al., 2001). It has been a topic of interest in the last years (Saulsman et al., 2019) and has been found to play an important role in the development and treatment of emotional disorders (Holmes et al., 2016).

Some authors have hypothesized that weak mental imagery can lead to poor compassionate imagery outcomes and can be a cause for CBI dropout (Naismith et al., 2018). In a study regarding training predictors in self-compassionate self-regulation interventions for smoking cessation, the intervention was found to reduce

smoking more rapidly in those who showed more vivid imagery during the intervention exercises (Kelly et al., 2010). Naismith et al. (2018) found that low mental imagery ability was a significant inhibitor of the generation of compassionate images and positive affect in a sample of patients diagnosed with personality disorders, and participants pointed out weak imagery ability as one of the main barriers in the CBI (Naismith et al., 2019). In another study, imagery vividness in visual and bodily sensation modalities was shown to predict compassionate affect (Naismith et al., 2019).

In terms of mental imagery and understanding its impact on CBM quality, it is interesting to consider the four different processes described by Pearson et al. (2013) and based on Kosslyn’s theory. This model provides the processes and subsystems that underlie the functioning of mental imagery following the computational approach: generation, maintenance, inspection, and transformation/manipulation of the mental images. These domains require different skills and different cognitive processes (Pearson et al., 2013). Regarding image generation, two processes have been identified: an image can be created directly from immediate perceptual information (e.g., using a mirror before doing a self-compassion meditation or observing an image before doing the compassion practice) or can be created from information previously stored in long-term memory (Pearson & Logie, 2004). In this step, the importance of the factor in CBM could be related to the lack of information to design the image to be used in the meditation. In terms of image maintenance, this is accomplished by reactivating perceptual memory representations in an object property processing subsystem (Kosslyn, 1980). Naïve meditators can show difficulties in maintaining a clear mental image for more than a few seconds (Kosslyn, 1994). The third process, image inspection, involves the ability to observe the spatial properties of a mental image. The fourth process, the transformation, and manipulation of the image (such as rotation, restructuring, or synthesis) have not been thoroughly investigated. In the case of CBM, it could be related to instructions regarding how to transform an image (imagining the person who suffers free from suffering, experiencing well-being).

Another important aspect to assess is the perspective used in mental imagery. Imagining in a first-person perspective, compared to a third-person perspective, has been shown to have a positive impact on affect (Holmes et al., 2008). The use of first-person imagery, as opposed to third-person, is related to the coherence of the image with the self, and the change of perspective (e.g., in a self-compassion meditation) could be determined by a difficulty in the construction and maintenance of the temporally extended self, like a compassionate self (Libby & Eibach, 2011). However, there is no

research regarding the perspective effect on mental imagery in CBMs.

The impact of compassionate self-instructions is also an important topic in the study of the quality of CBM practice. Luo et al. (2020) reported on the effectiveness of compassionate self-talk in generating a compassionate state and lowering pain in an experimental setting. Arimitsu and Hofmann (2015) described how compassionate thinking, compared to other cognitive strategies, was effective in the regulation of negative emotions.

Another outstanding factor is the somatosensory properties of compassion. As previously explained, compassionate affect is predicted by imagery vividness in both visual and bodily sensation modalities (Naismith et al., 2019). Mok et al. (2020) identified the importance of physical sensations on the cultivation of soothing. Przyrembel and Singer (2018) found that during CBM, participants reported feeling warmth and warm sensations in the chest and heart. We suggest that this aspect also be assessed in the quality of CBM. However, although compassionate self-touch is included in CBIs (Kirby et al., 2017), its impact has not yet been extensively researched. All these factors (i.e., mental imagery domains, compassionate self-instructions, and somatosensory properties of compassion) should be included together to study the quality of the compassion practice.

The main objective of the present preliminary study was to develop and analyze the reliability of a new measure to assess the quality of a CBM called the Compassion Practice Quality Scale (CPQS) and explore its underlying factors in a sample of university students. Two versions (12-item and 10-item) of this scale were tested; the short one did not include items referred to gestures and sentences made in specific compassion meditations. We decided to explore the structure of the CPQS without these items to facilitate the utilization of the scale in those cases in which compassion meditation does not include this performance. The investigation was designed to firstly check the efficacy of the CBM. If the underwent meditation had not been effective to enhance positive qualities toward others, state mindfulness, and positive affect, the analysis of the compassion practice quality would have been precluded. Secondly, convergent and discriminant validity was examined through the association between CPQS scores and mental imagery abilities, prospective imagery skills, self-criticism, and fear of compassion for others. Then, in given of the above-revised literature about mental imagery as a potential predictor of CBM outcomes (e.g., Naismith et al., 2018), we investigated to which extent mental imagery abilities and prospective imagery skills were significant predictors of compassion practice quality. Finally, the predictive validity of CPQS was studied.

Method

Participants

The total sample was composed of 205 participants who completed an online experimental task. Participants were university students from the Universidad de las Americas Puebla (México) with an average age of 19.75 ($SD=2.49$), age range of 17 to 42 years. They were primarily women (61.46%) and single (93.66%). All participants were Spanish speakers, able to understand, read, and write Spanish. Participants did not present any chronic mental or psychological disorder. The minimum sample size needed ($N=144$) was computed considering the rule of thumb 10:1 (participants x items) ratio plus the 20% dropout rate (Kline, 2011).

Descriptive statistics of sociodemographic characteristics of participants are shown in Table 1. Out of all the participants, 45 participants had previous meditation experience while 160 had not.

Procedure

Students were invited to participate in an online study to assess their experiences with CBM. Those willing to participate voluntarily signed an online informed consent and accessed the online experimental task via a link. Each participant completed a baseline assessment and then accessed a guided CBM audio (8 min). After listening to the audio, they completed the post-intervention assessment (see Fig. 1).

Table 1 Sociodemographic characteristics of participants at baseline

Baseline characteristic	Full sample	
	<i>n</i>	%
Gender		
Female	126	61.46
Male	79	38.54
Marital status		
Single	192	93.66
Married/partnered	11	5.37
Divorced/widowed	2	0.98
Highest educational level		
Middle school	2	0.98
High school/some college	43	20.98
University or post-graduate degree	157	76.59
Other	3	1.46
Employment		
Student	198	96.59
Employed	7	3.41

$N=205$. Participants were on average 19.75 years old ($SD=2.49$)

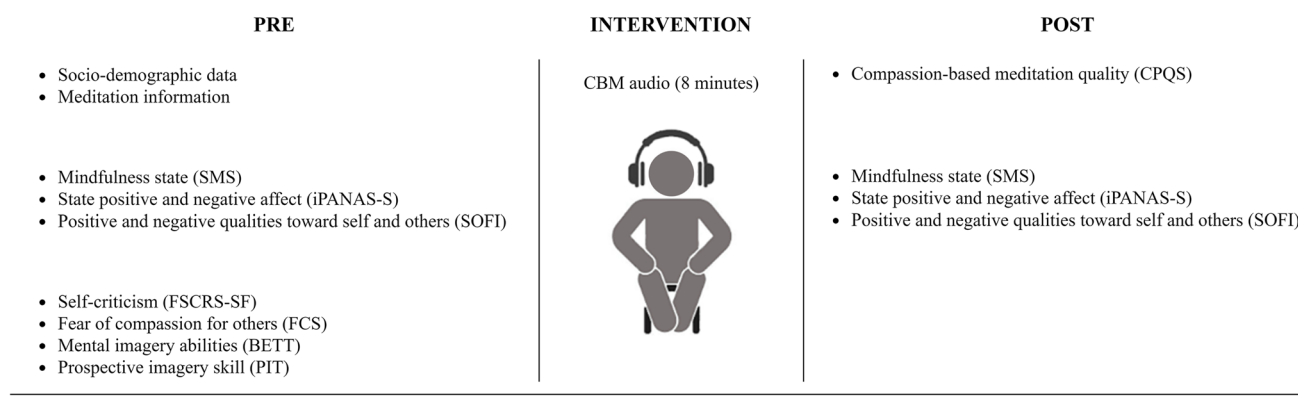


Fig. 1 Study design

CBM instruction was developed to generate compassion feelings toward the suffering of others using an image of compassion (i.e., an imaginary figure that generates genuine and clear feelings of tenderness and compassion). The CBM was composed of three phases: First, instructions focused on body awareness and mental calmness (i.e., attention to the body and breath, and breath counting). Second, instructions were aimed to (1) generate and select, (2) maintain, (3) inspect, and (4) transform and manipulate mental imagery. Concretely, participants were asked to imagine a beloved person who makes them feel a desire to take care of him/her and tenderness. Third, compassionate self-instructions and gesture indications were provided. That is, participants generated compassion for this person through wishes such as “May you be free of suffering,” “May you be well,” “May you be happy,” and “May you be in peace.” At the same time, they were asked to caress themselves, for instance touching kindly their chests. At the end of the study, a permanent link to the compassion practice was provided to the participants (<https://youtu.be/pLWYj0JvbP0>).

The current study has been approved by the Ethics Committee of the University of Valencia (Spain) and has therefore been performed following the ethical standards (World Medical Association, 2013).

Measures

Sociodemographic data on age, gender, marital status, educational level, employment, religious affiliation, presence of chronic physical and/or psychological disease, and use of drugs was collected.

Meditation information was obtained regarding experience in meditation (yes/no question), frequency of practice (every day, three or four times a week, once a week, or less than four times per month), years of experience, and minutes on average in each practice.

Self-criticism was measured at baseline with the *Forms of Self-Criticizing/Attacking and Self-Reassuring Scale-Short Form* (FSCRS-SF) (Sommers-Spijkerman et al., 2018), which contains 14 items that assess two forms of self-criticism: inadequate self (IS) and hated self (HS) and the ability to self-reassure (RS). Participants respond to a selection of statements, which seek to understand how one thinks and reacts in the face of failures or setbacks, on a 5-point Likert scale ranging from 0 (“not like me at all”) to 4 (“extremely like me”). Higher scores indicate a greater sense of inadequacy, self-hate, or self-reassurance. The FSCRS-SF had adequate test–retest reliability and satisfactory convergent validity estimates with theoretically related constructs (Sommers-Spijkerman et al., 2018). Cronbach’s α in the present sample was 0.74 for IS, 0.78 for HS, and 0.71 for RS.

Fear of compassion for others was assessed at baseline using the subscale of fear of compassion for others (FCF-O) (10 items) from the Fear of Compassion Scale (FCS) (Gilbert et al., 2011). The items are rated on a five-point Likert scale (0 = don’t agree at all, 4 = completely agree). The FCF-O showed high internal consistency in student ($\alpha=0.84$) and therapist ($\alpha=0.78$) samples. Cronbach’s α in the present sample was 0.79.

Mental imagery abilities were measured at baseline with Betts’ Questionnaire Upon Mental Imagery (BETT; Campos & Pérez-Fabello, 2005). The BETT is a 35-item self-reported questionnaire rating the vividness with which the subject can imagine an experience, with five items for each of seven sensory modalities: visual, auditory, cutaneous, kinesthetic, gustatory, olfactory, and organic. Each item is scored on a 7-point scale from 1 (“Perfectly clear and as vivid as the actual experience”) to 7 (“No image present at all; you only know that you are thinking of the object”). High scores indicate low imagery. Cronbach’s α for this study was 0.86 for the gustatory and olfactory subscale, 0.71 for the kinesthetic subscale, 0.77 for the

organic subscale, 0.81 for the visual subscale, 0.73 for the auditory subscale, 0.66 for the cutaneous subscale, and 0.49 for vividness.

Prospective imagery skill was assessed at baseline using the Prospective Imagery Test (PIT; Stöber, 2000). The PIT is a 20-item measure of the ability to generate mental images about future events. Participants are asked to rate the vividness of prospective positive events (e.g., “You will have lots of energy and enthusiasm”) or negative events (e.g., “Someone close to you will reject you”) on a 5-point scale (1 = no image at all; 5 = very vivid). High internal consistency has been shown in previous studies for both the positive ($\alpha=0.89$) and negative ($\alpha=0.83$) events scales (41). In this study, Cronbach’s α was 0.89 for the positive events subscale and 0.84 for the negative events subscale.

Mindfulness state was assessed at baseline and after the CBM using the State of Mindfulness Scale (SMS) (Tanay & Bernstein, 2013). The SMS is a 21-item self-reported measure that asks to what extent each sentence reflects one’s experience in the last 15 min. The SMS is composed of two factors, state mindfulness of bodily sensations ($\alpha=0.90$), and mental events ($\alpha=0.90$). Cronbach’s α in the present sample was 0.88 and 0.96, respectively.

State positive and negative affect was measured using the International Positive and Negative Affect Schedule-Short Form (I-PANAS-SF; Thompson, 2007) at baseline and after the compassion meditation. The I-PANAS-SF—a brief version of the PANAS—is composed of 10 items, 5 items for each Positive and Negative Affect subscale. I-PANAS-SF showed acceptable psychometric properties. Cronbach’s α for this study was 0.88 (positive affect) and 0.79 (negative affect).

Positive and negative qualities toward self and others were assessed using an adaptation of the Self-Other Four Immeasurables (SOFI) scale (Kraus & Sears, 2009) at baseline and after the compassion meditation. The SOFI is a 16-item questionnaire in which participants are asked to indicate to what extent they have thought, felt, or acted a certain way toward themselves and others during the past week on a 5-point Likert scale from “very slightly or not at all” to “extremely.” It aims to measure the application of the four immeasurable qualities based on Buddhist teachings: loving-kindness, compassion, joy, and acceptance toward both self and others. Findings supported four distinct subscales (i.e., positive qualities toward self (SOFI-PS), positive qualities toward others (SOFI-PO), negative qualities toward self (SOFI-NS), and negative qualities toward others (SOFI-NO)) with high internal consistency (α -values from 0.80 to 0.86). The instructions of the SOFI were adapted from the original SOFI to focus more on the state of positive and negative qualities toward self and others in a particular moment rather than the trait or dispositional tendency to capture possible changes caused by the compassion meditation.

Cronbach’s α for this study was 0.83 for SOFI-PS, 0.77 for SOFI-PO, 0.80 for SOFI-NS, and 0.72 for SOFI-NO.

Compassion-based meditation quality was assessed after participants completed the compassion meditation using the Compassion Practice Quality Scale (CPQS). CPQS was designed to assess the key aspects of compassion practices (e.g., mental imagery, sense of connection and warmth, compassionate phrases, and compassionate gestures). The selection of items was made by the authors (AC and DC) and reviewed by 5 meditation experts. The experts were experienced meditators and trainers of different CBIs, like Cognitive-based Compassion Training (CBCT; González-Hernández, 2018), Compassion Cultivation Training (Britton et al., 2018), or Compassion-Focused Therapy (CFT; Gilbert, 2014). After a first selection of items, a small sample of naïve CBI meditators answered the items and made suggestions; the scale was revised and presented again to the group of experts, for the final version. The final version of CPQS includes 12 items that participants score on a scale ranging between 0 and 100 indicating the percentage of the time that their experience reflects each statement (see Supplementary file 1). Higher scores indicate higher quality of practice (i.e., less practice difficulties) except for negative items (i.e., items 1, 2, 3, 4, 6, and 8). A ten-item version of the scale was also developed, excluding the items referred to compassionate self-instructions or gestures to adapt the scale to meditation instructions that do not include them (i.e., items 11 and 12).

Data Analyses

SPSS v.26 was used for statistical analyses. Descriptive statistical analyses were performed (mean, standard deviation, and percentages) for sociodemographic data.

A paired-samples t-test was conducted to evaluate the efficacy of the compassion meditation comparing pre-test/post-test SOFI, SMS, and PANAS mean scores. Eta squared effect size was used, with cutoff values of 0.01, 0.06, and 0.14 for small, medium, and large effect sizes, respectively (Cohen, 1988). At least, a statistically significant increase in positive qualities toward others (SOFI-PO), state mindfulness (SMS), and positive affect (PANAS) with medium effect sizes would mean that the CBM was effective.

Regarding factor analysis, a principal component analysis (PCA) with oblimin rotation was used to determine the number of factors that best describes the underlying relationship between the CPQS items. Kaiser’s criterion (eigenvalue rule), Catell’s scree test (Cattell, 1966), and Horn’s parallel analysis (Horn, 1965) were checked to assist the decision concerning the number of factors to retain. To assess subscales reliability, internal consistency was assessed using Cronbach’s α (Cronbach, 1951) and McDonald’s ω (McDonald, 1999).

Pearson correlation coefficients were used to investigate convergent and discriminant validity through the relationship among BETT, PIT, FSCRS, FCF-O, and CPQS scores. Normality, linearity, and homoscedasticity assumptions were checked as preliminary analyses. Then, hierarchical multiple regression was conducted to assess the ability of the mental imagery measures (BETT, PIT) to predict factors of compassion practice quality (CPQS) after controlling for the influence of gender (0 = female; 1 = male), age, previous meditation experience (0 = no; 1 = yes), state mindfulness during the CBM (SMS post-test), self-criticism (FSCRS), and fear of compassion (FCF-O). Finally, two hierarchical multiple regressions were used to assess the validity of CPQS scores to predict positive qualities toward others (SOFI-PO post-test) after controlling for gender, age, previous meditation experience, and baseline levels (SOFI-PO pre-test). The first one included all items as independent variables in order to know which ones were the best predictors of SOFI-PO scores after the compassion-based meditation. The second multiple regression included the components of the CPQS as independent variables.

Results

Paired-samples *t*-test results are shown in Table 2. There was a statistically significant increase in scores of positive qualities toward self and others (SOFI), state mindfulness (SMS), and PANAS-positive affect subscale. The eta squared statistic indicated moderate and large effect sizes. These results suggested that the CBM was effective.

Table 3 shows the pattern and structure matrix for PCA with oblimin rotation of two-factor solutions of the CPQS items. Upon close inspection, the correlation revealed the

presence of many coefficients of 0.3 and above. The Kaiser–Meyer–Olkin value was 0.88, exceeding the recommended value of 0.6 (Kaiser, 1974) and Bartlett’s Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix ($p < 0.001$).

PCA revealed the presence of 2 components with eigenvalues exceeding 1, explaining 41.83% and 24.13% of the variance. An inspection of the scree plot revealed a clear break after the second component. Using the scree test, it was decided to retain two components for further investigation. This was further supported by the results of parallel analysis, which showed only two components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (12 variables \times 205 respondents). There was a weak negative correlation between the two factors ($r = -0.24$). According to these results and the content of the items, the two factors can be used as separate scales and were labeled “imagery” and “somatic perception” of compassion. The imagery and somatic scales had Cronbach’s alpha values of 0.90 and 0.88 and McDonald’s ω values of 0.90 and 0.89 respectively, indicating good internal consistency.

Two items (item 11 and item 12) of the somatic factor referred to gestures and sentences made in specific compassion meditations, such as the ones used in this study. PCA with oblimin rotation was repeated without items 11 and 12. This resulted in a 10-item scale with six imagery items and four somatic items. The pattern matrix (Table 3) showed a separation of the imagery and somatic subscales. All items scored above 0.68 on their respective factors. The somatic scale (without items 11 and 12) had a Cronbach alpha value of 0.82 and a McDonald ω value of 0.83, indicating good internal consistency.

Table 2 Results of paired-samples *t*-test examining differences between pre-test/post-test

	Pre-test		Post-test		<i>t</i> ₍₂₀₄₎	<i>p</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
SOFI							
Positive self	13.46	3.43	14.72	3.71	−6.85	.000	0.19
Positive other	14.18	3.09	15.19	3.60	−4.92	.000	0.11
Negative self	6.79	3.14	6.29	3.24	2.61	.010	0.03
Negative other	5.92	2.39	5.76	2.87	0.89	.376	0.00
SMS							
Mindfulness of mind	45.23	13.75	55.76	13.49	−9.61	.000	0.31
Mindfulness of body	18.51	5.79	21.71	5.65	−6.58	.000	0.18
Total	63.74	18.79	77.47	18.64	−8.99	.000	0.29
PANAS							
Positive affect	14.43	4.76	16.04	4.94	−6.14	.000	0.16
Negative affect	8.49	3.60	7.96	3.93	2.07	.040	0.02

SOFI, Self-Other Four Immeasurables; SMS, State Mindfulness Scale; PANAS, Positive and Negative Affect Schedule

Table 3 Results from a principal components analysis of the compassion meditation perceived quality scale

12-item CPQS	Component matrix		Pattern coefficients		Structure coefficients		Communalities	Item-total correlation
	1	2	1	2	1	2		
Factor 1: Imagery								
Item 2: Image creation	.72	.50	.88		.01	.88	-.20	.77
Item 1: Image inspection	.58	.58	.85		.15	.81	-.05	.68
Item 4: Image transformation	.72	.46	.85		-.03	.85	-.23	.73
Item 6: Vividness	.69	.46	.83		-.01	.83	-.21	.69
Item 3: Image sustainment	.74	.41	.82		-.09	.84	-.29	.71
Item 8: Self-criticism	.62	.33	.68		-.08	.70	-.25	.49
Factor 2: Somatic								
Item 12: Self-reassurance gestures	-.65	.54	-.02		.84	-.22	.85	.72
Item 5: Warmth	-.61	.54	.00		.81	-.22	.81	.66
Item 11: Compassionate self-instructions	-.65	.50	-.06		.80	-.26	.82	.67
Item 9: Comfort	-.58	.53	.01		.79	-.18	.79	.62
Item 10: Sympathy	-.70	.43	-.14		.78	-.33	.81	.68
Item 7: Presence	-.45	.55	.12		.73	-.06	.70	.50
10-item CPQS								
10-item CPQS	Component matrix		Pattern coefficients		Structure coefficients		Communalities	Item-total correlation
	1	2	1	2	1	2		
Factor 1: Imagery								
Item 2: Image creation	.83	.28	.88		.01	.88	-.19	.77
Item 4: Image transformation	.82	.25	.85		-.02	.85	-.20	.73
Item 1: Image inspection	.73	.38	.84		.14	.81	-.05	.68
Item 3: Image sustainment	.82	.19	.83		-.07	.84	-.26	.71
Item 6: Vividness	.80	.23	.83		-.03	.83	-.21	.69
Item 8: Self-criticism	.68	.16	.69		-.06	.70	-.22	.49
Factor 2: Somatic								
Item 9: Somatic	-.43	.72	.00		.84	-.19	.84	.70
Item 5: Warmth	-.44	.71	-.02		.83	-.20	.84	.70
Item 7: Presence	-.29	.71	.11		.78	-.06	.76	.59
Item 10: Sympathy	-.55	.60	-.17		.76	-.34	.80	.68

$N=205$. The extraction method was principal components with an oblique (direct oblimin) rotation. Factors loadings above .30 are in bold emphasis. For 12-item CPQS, factors mean scores were 403.94 ($SD=137.49$) and 402.57 ($SD=133.52$) respectively. For 10-item CPQS, factor 2 mean score was 262.80 ($SD=92.19$)

Table 4 Correlations for CPQS, BETT, PIT, FSCRS, and FCS subscales

Variable	BETT ^a							PIT		FSCRS			FCS
	Gustatory and olfactory	Kinesthetic	Organic modality	Visual	Auditory	Cutaneous	Vividness	Positive imagery	Negative imagery	IS	HS	RS	FCF-O
CPQS													
1. Image inspection	-0.18**	-0.16*	-0.09	-0.17*	-0.14*	-0.19**	-0.22**	0.15*	-0.10	-0.03	-0.12	0.05	-0.12
2. Image creation	-0.14	-0.14*	-0.16*	0.19**	-0.13	-0.12	-0.18**	0.22**	0.04	0.03	-0.08	0.13	-0.14*
3. Image sustainment	-0.27**	-0.14*	-0.17*	-0.27**	-0.19**	-0.21**	-0.24**	0.21**	-0.12	-0.10	-0.20**	0.16*	-0.13
4. Image transformation	-0.11	-0.09	-0.14*	-0.22**	-0.06	-0.12	-0.19**	0.22**	-0.07	-0.07	-0.13	0.14	-0.21**
5. Warmth	-0.13	-0.16*	-0.17*	-0.24**	-0.25**	-0.11	-0.20**	0.26**	-0.02	-0.10	-0.20**	0.32**	0.02
6. Vividness	-0.20**	-0.12	-0.16*	-0.19**	-0.11	-0.18**	-0.19**	0.20**	-0.04	-0.09	-0.19**	0.18**	-0.17*
7. Presence	-0.16*	-0.08	-0.09	-0.17*	-0.25**	-0.17*	-0.10	0.11	-0.01	-0.05	-0.11	0.12	0.01
8. Self-criticism	-0.06	-0.07	-0.14*	-0.13	-0.07	-0.04	-0.07	0.13	-0.07	-0.15*	-0.14*	0.07	-0.26**
9. Comfort	0.01	-0.05	-0.06	-0.18**	-0.13	-0.05	-0.10	0.15*	-0.06	-0.07	-0.12	0.20**	-0.07
10. Sympathy	-0.22**	-0.18**	-0.23**	-0.26**	-0.29**	-0.13	-0.23**	0.18*	0.04	0.03	-0.05	0.08	-0.09
11. Compassionate self-instructions	-0.16*	-0.14*	-0.09	-0.26**	-0.27**	-0.12	-0.21**	0.18*	-0.10	-0.10	-0.18**	0.19**	-0.07
12. Self-reassurance gestures	-0.13	-0.13	-0.08	-0.28**	-0.23**	-0.14*	-0.17*	0.23**	-0.05	-0.10	-0.18**	0.22**	-0.09
Factor 1: Imagery	-0.19**	-0.15*	-0.18*	-0.24**	-0.14*	-0.15*	-0.22**	0.23**	-0.07	-0.08	-0.18*	0.15*	-0.21**
Factor 2: Somatic	-0.17*	-0.15*	-0.15*	-0.29**	-0.29**	-0.16*	-0.21**	0.23**	-0.04	-0.08	-0.18*	0.24**	-0.06

MQP, Meditation Practice Quality; *BETT*, Betts' Questionnaire Upon Mental Imagery; *PIT*, Prospective Imagery Task; *FSCRS*, Forms of Self-Criticizing/Attacking & Self-Reassuring Scale; *IS*, Inadequate Self; *HS*, Hated Self; *RS*, Reassured Self; *FCS*, Fear of Compassion Scale; *FCF-O*, fear of compassion for others

* $p < .05$ (2-tailed)

** $p < .01$ (2-tailed)

^aHigh score indicate low imagery vividness and vice versa

Pearson product-moment correlations are shown in Table 4. There was a medium negative correlation between all mental imagery abilities (BETT) scores and the CPQS image sustainment item, with high levels of vividness through all sensory modalities being associated with high perceived ease to sustain the mental image during the meditation. Moreover, there was a medium negative correlation between the BETT-visual subscale scores and the CPQS items and factors (except for the self-criticism one), with high levels of vividness through the visual sensory modality being associated with high levels of perceived quality of the self-compassion meditation in both imagery and somatic perception.

Table 5 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, fear of compassion for others, self-criticism, state mindfulness (post-test score), mental imagery abilities, and prospective imagery skill scores on the imagery subscale

Table 5 Regression coefficients of socio-demographics, FCF-O, FSCRS, SMS, BETT, and PIT scores on the image factor of CPQS

Scales	Model				
	β	<i>t</i>	<i>p</i>	R ²	ΔR^2
Step 1				.09	.09**
Constant		1.99	.047		
Gender	-0.15	-2.19	.030		
Age	-0.02	-0.29	.775		
Previous meditation experience	0.05	0.66	.508		
Step 2				.23	.14***
SMS-mind	0.47	3.41	.001		
SMS-body	-0.19	-1.38	.169		
FSCRS-hated self	-0.04	-0.38	.706		
FSCRS-inadequate self	0.08	0.83	.409		
FSCRS-reassured self	-0.07	-0.83	.407		
FCF-O	-0.19	-2.68	.008		
Step 3				.29	.05
BETT-gustatory and olfactory	-0.10	-1.12	.265		
BETT-kinesthetic	0.07	0.71	.476		
BETT-organic modality	-0.08	-0.90	.371		
BETT-visual	-0.06	-0.78	.436		
BETT-auditory	0.06	0.69	.491		
BETT-cutaneous	0.03	0.36	.723		
BETT-vividness	-0.07	-0.92	.361		
PIT-positive imagery	0.22	2.52	.013		
PIT-negative imagery	-0.14	-1.77	.078		

FCF-O, fear of compassion for others; FSCRS, Forms of Self-Criticizing/Attacking and Self-Reassuring Scale; SMS, State Mindfulness Scale; BETT, Betts' Questionnaire Upon Mental Imagery; PIT, Prospective Imagery Task

** *p* < .01

*** *p* < .001

(factor 1) of CPQS. Gender, age, and previous meditation experience were entered at step 1, explaining 8.8% of the variance in perceived quality of compassion meditation practice, $F(3, 188) = 6.08, p = 0.001$. At step 2, state mindfulness (mind and body subscales), self-criticism, and fear of compassion for other scores were entered and explained 14.4% of the variance, $F(9, 182) = 6.14, p < 0.001$. Finally, after entering the mental imagery abilities and prospective imagery skill scores at step 3, the total variance explained by the model as a whole was 28.7%, $F(18, 173) = 3.87, p < 0.001$. In the final model, gender ($\beta = -0.15, p = 0.030$), fear of compassion ($\beta = -0.19, p = 0.008$), state mindfulness (mind; $\beta = 0.47, p = 0.001$), and positive prospective imagery ($\beta = 0.22, p = 0.013$) measures were statistically significant.

Table 6 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, fear of compassion for others, self-criticism,

Table 6 Regression coefficients of socio-demographics, FCF-O, FSCRS, SMS, BETT, and PIT scores on the somatic factor of CPQS

Scales	Model				
	β	<i>t</i>	<i>p</i>	R ²	ΔR^2
Step 1				.02	.02
Constant			0.59	.551	
Gender	0.06	0.88	.379		
Age	0.02	0.23	.816		
Previous meditation experience	-0.07	-1.12	.264		
Step 2				.34	.32***
SMS-mind	0.55	4.38	.000		
SMS-body	-0.05	-0.43	.669		
FSCRS-hated self	0.03	0.31	.754		
FSCRS-inadequate self	0.04	0.46	.643		
FSCRS-reassured self	0.04	0.48	.629		
FCF-O	-0.09	-1.06	.289		
Step 3				.40	.06*
BETT-gustatory and olfactory	-0.02	-0.23	.822		
BETT-kinesthetic	0.13	1.38	.169		
BETT-organic modality	-0.07	-0.88	.380		
BETT-visual	-0.11	-1.61	.109		
BETT-auditory	-0.15	-1.81	.072		
BETT-cutaneous	0.14	1.63	.104		
BETT-vividness	-0.14	-1.83	.069		
PIT-positive imagery	0.16	2.09	.038		
PIT-negative imagery	-0.10	-1.34	.183		

FCF-O, fear of compassion for others; FSCRS, Forms of Self-Criticizing/Attacking and Self-Reassuring Scale; SMS, State Mindfulness Scale; BETT, Betts' Questionnaire Upon Mental Imagery; PIT, Prospective Imagery Task

* *p* < .05

** *p* < .01

*** *p* < .001

state mindfulness (post-test score), mental imagery abilities, and prospective imagery skill scores on the somatic subscale (factor 2) of CPQS. Gender, age, and previous meditation experience were entered at step 1, explaining 2.2% of the variance in perceived quality of compassion meditation practice, $F(3, 188) = 1.39, p = 0.246$. At step 2, state mindfulness (mind and body subscales), self-criticism, and fear of compassion for others scores were entered and explained 31.8% of the variance, $F(9, 182) = 10.41, p < 0.001$. Finally, after entering the mental imagery abilities and prospective imagery skill scores at step 3, the total variance explained by the model as a whole was 40.3%, $F(18, 173) = 6.48, p < 0.001$. In the final model, the factor mind of the SMS ($\beta = 0.52, p < 0.001$) and positive prospective imagery ($\beta = 0.16, p = 0.038$) were statistically significant.

Table 7 shows the regression coefficients for the hierarchical multiple regression of gender, age, previous meditation experience, pre-test positive qualities toward others subscale, and CPQS items scores on post-test positive qualities toward others subscale. Socio-demographics and pre-test positive qualities toward others scores were entered at step 1, explaining 39% of the post-test positive qualities toward others scores. After entering the CPQS items in step 2, the total variance explained by the model was 54.70%, $F(16, 188) = 14.20, p < 0.001$. Thus, CPQS items explained an additional 15.7% of the variance in post-test positive qualities toward others scores after controlling for

gender, age, previous meditation experience, and pre-test scores, R squared change = 0.157, F change (12, 188) = 5.43, $p < 0.001$. In the final model, the warmth item ($\beta = 0.19, p = 0.012$), self-criticism item ($\beta = 0.18, p = 0.009$), and self-reassurance gestures item ($\beta = 0.22, p = 0.009$) made a unique statistically significant contribution.

In a parallel hierarchical multiple regression, CPQS subscale scores were included at step 2 instead of single items. After entering the imagery and somatic perception factors at step 2, the total variance explained by the model was 47.60%, $F(6, 198) = 31.84, p < 0.001$. Thus, CPQS factors explained an additional 10.1% of the variance in post-test positive qualities toward others scores after controlling for pre-test scores, R squared change = 0.10, F change (2, 201) = 18.63, $p < 0.001$. In the final model, imagery ($\beta = 0.17, p = 0.002$) and somatic perception factors ($\beta = 0.25, p < 0.001$) made a unique statistically significant contribution.

Discussion

The current study analyzed a scale to measure the quality of compassion-based meditations (CBM) operationalized via two factors measuring imagery and somatic perception/response in a sample of university students. The impact of this construct on the efficacy of CBM to promote changes of positive attitudes toward others and its relationship with the

Table 7 Regression coefficients of socio-demographics, pre-test SOFI-PO, and CPQS items scores on post-test SOFI-PO

Scales	Model			R ²	ΔR ²
	β	t	p		
Step 1				.39	.39***
Constant		2.32	.021		
Gender	0.06	1.17	.243		
Age	-0.09	-1.77	.079		
Previous meditation experience	-0.01	-0.22	.830		
Pre-test SOFI-PO	0.52	9.52	.000		
Step 2				.55	.16***
1. Image inspection	0.10	1.24	.217		
2. Image creation	0.04	0.55	.581		
3. Image sustainment	0.01	0.16	.876		
4. Image transformation	0.06	0.72	.473		
5. Warmth	0.19	2.54	.012		
6. Vividness	-0.15	-1.93	.055		
7. Presence	-0.05	-0.73	.465		
8. Self-criticism	0.18	2.63	.009		
9. Comfort	0.01	0.14	.890		
10. Sympathy	-0.13	-1.65	.101		
11. Compassionate self-instructions	0.06	0.75	.453		
12. Self-reassurance gestures	0.22	2.64	.009		

SOFI, Self-Other Four Immeasurables. Items 1, 2, 3, 4, 6, and 8 have been reversed

*** $p < .001$

ability to imagine vividly, fear of compassion, state mindfulness, and dispositional self-criticism were investigated too.

Concerning the developed measure of CBM quality, the Compassion Practice Quality Scale (CPQS), the data support its reliability and confirm a two-factor structure solution for both 12- and 10-item versions. Thus, these factors constitute independent subscales which preclude the calculation of a CPQS total score. Both are separate components of compassion practice quality. The first of the two underlying components was labeled “imagery.” It captured the ability of participants to create, inspect, sustain, and transform a vivid mental image of a person they would take care of and for whom they desire well-being and non-suffering, which is consistent with the domains for mental imagery of Pearson et al. (2013). Moreover, it contains a self-criticism aspect which reflects judgment because of the difficulty to feel compassion for this person.

The second component was labeled “somatic perception” and included compassion phenomena referred to warmth, comfort, sympathy, presence, self-reassurance gestures, and compassionate self-instructions. This factor captures the somatosensory component of compassion practice and is also in line with previous studies which gave importance to the somatic aspects of compassion (Jakubiak & Feeney, 2016; Mok et al., 2020; Naismith, Kerr, et al., 2019; Przyrembel & Singer, 2018).

Together, these factors give hints regarding what intervenes in the generation process of a compassionate state during meditation. They involve the essence of CBM given how it is linked to mental imagery and a self-focused kindness and warmth experience (Gilbert, 2009a). Therefore, we suggest that these factors be used as key components to define and understand the compassion practice quality. We proposed that compassion practice quality is related to the person’s experience during the compassion meditation and, specifically, it refers “to what extent a meditator is able to produce mental imagery (in terms of generation, maintenance, inspection, and transformation/manipulation of the mental images) and activate the somatosensory component of compassion to evoke and sustain a compassionate state.” It is important to note that, according to this, low compassion practice quality may be linked to difficulties in these two factors, which should be considered during the pedagogy of compassion in the context of CBI.

Mental imagery is the backbone of CBM techniques, which harnesses its cognitive and physiological influence to help patients stimulate affiliative emotions (Gilbert, 2009b). In CBI exercises such as the ones used in this study, the practitioner must generate compassion feelings by imagining a person and wishing that positive events occur to him/her (Gilbert, 2014). Thus, the found relationship between the practice’s high quality and high vividness of the positive future events image for this person makes great sense. Besides, feeling

fear of compassion for others is directly correlated with low quality in meditation, especially with the imagery component, which suggests that this variable challenges the mental imagery process as well as self-criticism does (Gilbert et al., 2006). Furthermore, there was an association between high self-criticism and low meditation quality. Gilbert et al. (2006) found that there was a self-criticism tendency related to difficulties in the generation of soothing mental images. This is in line with previous findings which showed that high self-critics report negative experiences and respond negatively to CBIs due to the difficulty to attribute positive characteristics to the compassionate image (Duarte et al., 2015). Self-criticism and fear of compassion are two related constructs (Gilbert et al., 2012) which seem to inhibit compassion-focused imagery outcomes, as Naismith et al. (2018) described in a borderline personality disorder sample.

Furthermore, the ability to imagine vividly, self-criticism, fear of expressing compassion for others, and state of mindfulness predicted a great part of the CBM quality. Previous findings regarding meditators’ experience show that compassion practitioners struggle with imagery experience during meditation due to the difficulty to generate and focus on clear images, which, in turn, lead them to feel negative affect (McEwan & Gilbert, 2016). Fear of compassion for others also independently predicts the imagery component. Considering that mental images are generated by memories (Pearson & Logie, 2004), this result could be related to the concept that individuals who fear compassion could perceive it as a threat source by remembering aversive emotional past situations (Kirby et al., 2019). Finally, results suggest that women are more likely to experience a good quality of practice, attending to the imagery component. Future studies are needed to explore gender differences in compassion practice quality.

Mindfulness is part of the first steps in CBIs to enhance attention and insights in the following stages (Gilbert, 2014). Experienced CBM practitioners show high levels of image maintenance and visuospatial performance, thus suggesting mindfulness training as the way to improve these cognitive processes (Kozhevnikov et al., 2009). Concretely, state mindfulness predicts reappraisal (Garland et al., 2015), which is one of the main processes in constructive meditations, such as CBM (Dahl et al., 2015). In the present study, mindful attention to mental events independently predicted practice quality related to imagination and somatic processes. It seems that the deliberate attention to the present moment mental events helps the practitioner to visualize/imagine a person. Meanwhile, paying attention to mental events in this way may induce reappraisal too, which is associated with an emotional response perceived in the body and is in consonance with top-down emotion generation (McRae et al., 2012).

Practice quality assessed by the CPQS significantly explained the increase in compassion outcome (i.e., positive qualities toward others) after the compassion meditation. Concretely, two independent predictors of this outcome were the warmth and kind sensations toward the object of compassion and the performance of caresses during the CBM. The model pointed out that induction of warmth is an independent and significant predictor of compassion state at the end of the meditation, even more than sympathy. Compassion is a multi-component process which consists of recognizing, empathizing, and tolerating the suffering of others while the observer feels motivated to act and alleviate it, understanding that it is universal and shared by all human beings (Strauss et al., 2016). Thus, empathy, i.e., feeling a shared emotion with someone, or rather emotional contagion is essential in the process to achieve compassion and the associated positive feelings, such as kindness and warmth (Singer & Klimecki, 2014). These results highlight the incorporation of gestures (i.e., caresses) in the compassion meditations as a useful stimulus which may participate in the tolerating/reassuring component of the compassion process.

Limitations and Future Research

Our preliminary findings offer a reliable self-report measure for the quality of CBMs, the CPQS, which require further testing. First, although several constructs related to compassion have been explored in this study (e.g., positive and negative attitudes toward others, self-criticism, and fear of compassion for others), additional well-established compassion-specific measures, such as the Sussex-Oxford Compassion Scales (Gu et al., 2020), should be included in the future to deepen understanding of the impact of the current quality components on compassion outcomes. Related to this, the high number of questionnaires answered by the participants might have been a confounding variable. Moreover, further research on other aspects or constructs related to compassion that may explain compassion practice quality such as attachment styles (Montero-Marín et al., 2017), empathy (Davis, 1980), body awareness (Price & Thompson, 2007), or decentering skills (Soler et al., 2014) is needed. Second, findings from this study should be interpreted with caution and concerning to the sample studied (i.e., Mexican university students). Although the sample provided statistical power and reduced bias, its homogeneity compromises the generalization of the results. Further studies with other samples and contexts are needed to confirm these encouraging and exploratory findings, especially to check if the constructs are comparable across groups (e.g., between meditators and non-meditators or high and low self-critical participants) and to confirm the factor structure of the scale, meanwhile, investigating the potential presence of an overarching latent

construct. Third, meditation experience and frequency of practice were not included in the analysis due to the reduced size of the meditator sample ($N=45$) which may bias results by not considering meditation information. Given the number of studies highlighting the potential of mediation indicators such as experience and frequency of practice on meditation outcomes (e.g., Campos et al., 2016; Cebolla et al., 2017; Soler et al., 2014), it is important to explore its possible influence in the compassion practice quality. Little is known about how practice dosage influences the quality of meditation (Del Re et al., 2013), and even less is known in this regard in terms of compassion practice quality. Fourth, the type of compassion practice (i.e., self-compassion or compassion for others) and its impact on quality of practice was not explored in this study which was based on a compassion for others meditation. Finally, the lack of the control group and the small time frame between measures compromise results about the impact of meditation over the pre-post scores and, therefore, findings should be interpreted with caution for state outcomes (i.e., mindfulness and SOFI) due to possible overlapping between the “state” across the two time points.

Thus, future studies should explore whether compassion practice quality is affected by a CBI, and how the variability predicts the response and efficacy of the intervention. Another interesting topic could be to study whether compassion practice quality is affected depending on whom is directed toward (i.e., toward oneself or toward others)—and what happens if the other who suffers is a relative, a stranger, or an enemy. In this line, confirmatory factor analysis to test measurement invariance across meditators and non-meditators is needed. Furthermore, some authors have made the distinction between implicit and explicit compassion practices. Even though they show similar efficacy, this distinction should be considered given that implicit compassion does not use mental imagery (Brito-Pons et al., 2018).

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Author Contributions A.C. and D.C. developed the Compassion Practice Quality Scale and designed the study. A.C. and D.C. developed the compassion-based meditation which was recorded by A.C. E.G-H. and R.D-P. performed the recruitment. J.N. conducted the formal analyses and wrote the results section. A.C., J.N., and D.C. wrote the original draft. E.G-H., R.D-P., R.H., and R.B. collaborated in the writing and editing of the final manuscript.

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Data Availability The data that support the findings of this study are available on request from the corresponding author.

Declarations

Ethics Statement The current study has been approved by the Ethics Committee of the University of Valencia (Spain).

Informed Consent Statement Freely given, informed consent to participate in the study was obtained from participants.

Conflict of Interest The authors declare no competing interests.

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ANNEX 3: STUDY 3 ARTICLE

Article

Compassionate Embodied Virtual Experience Increases the Adherence to Meditation Practice

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Abstract: Virtual Reality (VR) could be useful to overcome imagery and somatosensory difficulties of compassion-based meditations given that it helps generate empathy by facilitating the possibility of putting oneself into the mind of others. Thus, the aim of this study was to evaluate the effectiveness of an embodied-VR system in generating a compassionate response and increasing the quality and adherence to meditation practice. Health professionals or healthcare students (n = 41) were randomly assigned to a regular audio guided meditation or to a meditation supported by an embodied-VR system, “The machine to be another”. In both conditions, there was an initial in-person session and two weeks of meditation practice at home. An implicit measure was used to measure prosocial behavior, and self-report questionnaires were administered to assess compassion related constructs, quality of meditation, and frequency of meditation. Results revealed that participants from the embodied-VR condition meditated for double the amount of time at home than participants who only listened to the usual guided meditation. However, there were no significant differences in the overall quality of at-home meditation. In conclusion, this study confirms that embodied-VR systems are useful for increasing adherence to meditation practice.

Keywords: virtual reality; compassion; the machine to be another; adherence; meditation



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1. Introduction

Virtual reality (VR) has been shown to be an interesting and promising tool to generate empathy, especially the component regarding viewing others' perspectives [1], showing that it can facilitate the possibility of putting oneself into the mind of others. It has been shown to be effective in changing attitudes, beliefs, and affect [2–4]. In fact, VR has been defined as the ultimate empathy machine [5]. Furthermore, the appearance of embodied-VR systems, which include all the theories about how we represent the body to generate a full body illusion or body swap [6], are opening new pathways to better understand the role of VR in empathy, making it possible to not only put one's mind but also to put oneself as a whole into the mind of others.

Moreover, in recent years there have been some interesting studies about the effects of VR on related concepts, such as compassion and self-compassion. Compassion meditations are Buddhism-derived practices aimed at developing affective positive states of kindness and a sincere sympathy for those stricken by misfortune, together with an earnest wish to ease this suffering [7]. Compassion has been a focus of great interest in recent years, leading to theoretical and efficacy studies which have shown that the training of this factor through compassion-based interventions (CBIs) has an impact on the improvement of mental health [8], positive attitudes toward others [9] and stress management [10]. In compassion-based meditations, the meditator purposefully strengthens his/her natural capacity for

loving-kindness and compassion by intentionally generating compassionate thoughts, feelings, and motivations toward different objects, including him/herself [11]. This is a type of constructive meditation [12] in which mental imagery plays an essential role, given that one must create a clear compassionate image (oneself or others), sustain it, and manage it [13]. However, previous studies have shown how barriers and difficulties can arise during these types of practices [14], such as difficulties regarding mental imagery. These difficulties are understood as problems to generate, maintain, inspect and/or transform the mental image of the person to whom one generates compassion toward, and, in regard to somatosensory experiences, which is related to the warmth, comfort, and sympathy felt during compassion meditation. Furthermore, these difficulties can generate a lack of practice quality and thus be barriers for the adherence to the practice of meditation [14].

VR, specifically embodied-VR, can be a helpful tool to manage these difficulties [15] and could be a useful tool to increase the positive affect response and meditation quality practice. Few studies have been developed the use of embodied VR to generate a compassionate response toward oneself or others. For example, Falconer et al. [16] found how a VR experience was able to generate a self-compassionate response reducing self-criticism and increasing self-compassion and positive affect states.

In a previous study, our research group tested how an embodied-VR system, called the machine to be another (TMTBA), was able to generate a compassionate response toward the self and a greater self-care response [15,17]. In addition, those who had worse imaginative abilities were the ones that benefited the most, opening the door for their use in patients with imagination difficulties. One of the hypotheses we considered was that perhaps meditative experience supported by embodied VR could increase the quality of compassionate practice or greater adherences; however, we could not find differences between conditions.

Current research on maintaining positive health behaviors, such as meditation, shows that people fail to sustain them in the months after the initiation [18,19]. Although more research on adherence to health behaviors is needed, it has been recently shown that positive affect experienced in the initiation of prosocial behavior [20] and physical activity [21] predicts their maintenance. Cappellen et al. [22] theoretically supported these findings from the upward spiral theory of lifestyle change [23]. Further, they hypothesized that the more positive affect experienced during initial phases in the learning process of meditation, the more impact in long-term behavioral maintenance through nonconscious motives for meditation. Finally, they reported that positive emotions experienced by first-time participants performing a loving-kindness meditation predicted a higher frequency and longer duration of home practice [22].

In this study, analogous to our prior work that used compassion toward self-approach [15], we sought to test the efficacy of a compassion-based meditation supported by an embodied-VR microintervention to increase the quality and adherence to the practice of compassion-based meditation in a population that is particularly used to showing compassion toward others—healthcare professionals. Thus, in contrast to our previous study, the meditation supported by the TMTBA was aimed at enhancing compassion toward others in a bigger and specific sample. For this purpose, participants took over the body of a patient suffering a panic disorder and then directed their compassionate responses toward him. Moreover, an ecological momentary assessment of both frequency and quality of meditation practice was carried out, and an implicit task of prosocial behavior was used to complement self-reported measures.

2. Materials and Methods

2.1. Participants

The study was approved by the Ethics Committee of Research in Humans of the Ethics Commission in Experimental Research of University of Valencia (H1513592028862). The size of the sample was calculated with the G-Power program, taking 0.33 as a measure of effect size (probability of alpha = 0.05 for the desired power of 95%) from the results on the effect of TMTBA on adherence values obtained in a previous pilot study [15]. Thus, we

estimated the need to include 32 participants in the sample. However, we increased the sample size to compensate for potential alterations in the significance of the results as a result of possible dropouts. Participants were randomly allocated to one of two conditions: guided compassion-based meditation or guided meditation supported by TMTBA-VR. The screening was completed with 81 participants, but only 44 met the criteria (see Figure 1). The inclusion criteria were: (a) being older than 18 years; (b) being a healthcare professional or student in recent years; (c) having a good level of Spanish or Valencian. The exclusion criteria were: (a) having a current diagnosis of a psychological/neurological/psychiatric disorder; (b) currently undergoing psychological treatment; (c) substance use or abuse; (d) being a regular practitioner of any meditation practice (more than 5–6 times per week; this criterion is based on mindfulness-based stress reduction [24] and mindfulness-based cognitive therapy [25] curriculum guides.

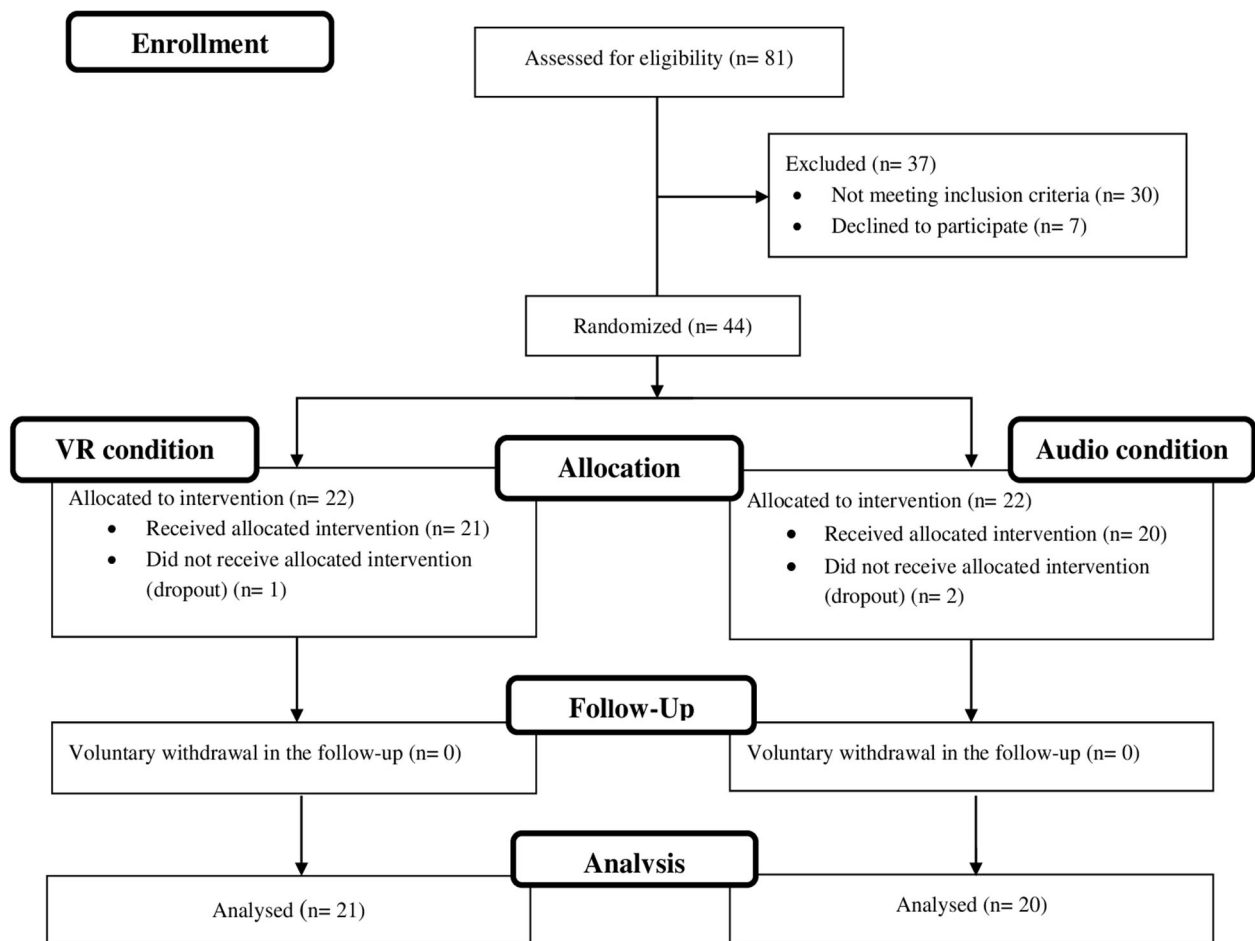


Figure 1. Participants’ flow diagram.

2.2. Measures

2.2.1. Pre- and Postintervention Measures

Sociodemographic data on age, gender, highest educational level attained, history of mental or chronic illness, use or abuse of drugs, current psychological treatments, and experience with meditation were collected as part of the screening process for the study with an ad-hoc questionnaire.

Affect was measured using the Positive and Negative Affect Schedule (PANAS; [26,27]). It includes 20 items that evaluate positive affect (10 items) and negative affect (10 items). Internal consistency was adequate for negative PANAS (Cronbach’s $\alpha = 0.88–0.90$) and positive PANAS (Cronbach’s $\alpha = 0.74–0.90$).

Compassionate or altruistic love for others was assessed using the Compassion Love Scale (CLS; [28]). It includes 21 items with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A global factor can be calculated (Cronbach's $\alpha = 0.90$ – 0.92).

2.2.2. Pre- and Post-In-Person Session Measures

Mindfulness state was assessed before and after the in-person session using the State Mindfulness Scale (SMS; [29]). The scale is composed of 21 items and includes two subscales: state mindfulness of bodily sensations ($\alpha = 0.90$) and mental events ($\alpha = 0.90$). A Spanish adaptation performed by the authors was used and showed adequate internal consistency for the bodily sensations subscale (Cronbach's $\alpha = 0.78$ – 0.79) and the mental events subscale (Cronbach's $\alpha = 0.89$ – 0.91).

State self-compassion, positive affiliative affect, self-criticism, and feeling energized levels were assessed with the Visual analogue scales for state changes (VAS-SC; ranging from 0 to 100; [30]). Three questions were used to measure participants' affiliative affect states (Cronbach's $\alpha = 0.77$ – 0.76). Two questions asked about participants' self-compassion states (Cronbach's $\alpha = 0.75$ – 0.81), one about their self-criticism states, and one about how energized they felt.

2.2.3. Post-In-Person Session Measures

Prosocial behavior was assessed using the Dictator's Game based on the procedure by Brocklebank et al. [31]. It is a multiple-decision tree format task in which participants have to allocate money between the person they are embodying and themselves. Participants have the choice to allocate the money in a compassionate or prosocial manner. Programming and administration of the task was accomplished with the Inquisit software [32].

Embodiment experience of VR participants was measured using an ad-hoc version of Longo et al.'s [6] questionnaire to assess the Rubber Hand Illusion experience. The scale is composed of 10 items rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The scale contains 3 subscales: 5 items assess body-ownership (Cronbach's $\alpha = 0.91$), 3 items assess location (Cronbach's $\alpha = 0.61$), and the remaining 2 items assess agency (Cronbach's $\alpha = 0.84$).

2.2.4. Daily Follow-Up after the In-Person Session

Frequency of meditation was obtained in the 2 weeks following the in-person session with daily questions (i.e., have you meditated today?).

Compassion-based meditation quality was assessed after every meditation at home using the Compassion Practice Quality Scale (CPQS, [14]). This includes 10 items that participants score on a scale ranging between 0 and 100, indicating the percentage of the time that their experience reflects each statement. The scale is composed of an imagery factor (Cronbach's $\alpha = 0.80$ – 0.93 in this sample) and a somatic factor (Cronbach's $\alpha = 0.70$ – 0.90).

2.3. Procedure

Professionals from healthcare institutions or healthcare students were invited to participate in a study aimed at increasing their compassionate skills toward their patients. The study was advertised online (social networks such as Instagram) and via flyers and posters in the faculties of psychology, medicine, and nursing of the University of Valencia. Potential participants contacted researchers via email and received access to the informed consent. Then, the screening/baseline assessment was performed (sociodemographic ad-hoc questionnaire, PANAS, and CLS). Participants who met the inclusion and exclusion criteria were randomly assigned to one of the two study conditions: regular audio guided meditation (audio condition) or meditation supported by an embodied-VR system "The machine to be another (TMTBA; VR condition)", using Random Allocation Software 2.0. Participants were invited to an in-person laboratory session and filled out the preassessment materials (SMS and VAS-SC). Once they had finished, participants in the Audio condition were seated in a quiet room and listened to a recorded "inner dialogue" audio with the description of

the situation and feelings of a patient suffering severe anxiety disorder (with panic attacks), followed by instructions to perform a traditional compassion meditation. Participants in the VR condition followed the steps explained in the section below. For both conditions, the same patient's narrative (Appendix A) and meditation audio (Appendix B) were used. The meditation focused on generating compassion for the presented case, inviting participants to connect with the suffering of another (panic patient) and activate the desire and willingness to alleviate this suffering. At the end, a compassionate mantra was used. Once participants finished the meditation, they completed the postassessment measures (SMS, VAS-SC, embodiment experience ad-hoc questionnaire, and the Dictator's Game). Over the following period of 14 days, participants were asked to meditate using an audio track with the meditation performed in the laboratory session and report their frequency of meditation and compassion-based meditation quality (CPQS) on a daily basis (minimum of one meditation a day, about 15–20 min per day). At the end of the two-week period, participants completed the follow-up assessment (PANAS and CLS).

2.3.1. The VR Condition

The VR condition used an embodied system so participants could experience the perceptual illusion of a body swap with a person with a panic disorder. The required hardware for this experiment is a vest with a camera, a head-mounted display (VR Oculus Rift), earphones, and a computer with the TMTBA software. The vest was connected to the head-mounted display, and the performer's first-person perspective was captured by the camera controlled by the participants' head movements, revealing the torso, legs, and arms of the performer's body, as well as the room. Through the Oculus, the user saw the image captured by the camera, creating the illusion of being another person. Two researchers were present in all sessions to run the experiment: the performer and an assistant. The performer was a person who was trained to synchronously mimic the user's movements to induce the embodied illusion. The assistant was responsible for setting up the hardware and the software.

Before participants arrived, the system was tested and calibrated. In the calibration process, the performer wore both the head-mounted display and the vest, and then he stretched both arms in front of the head. Finally, the assistant had to calibrate the camera and the Oculus through the software, so the image was centered and consistent with the performer's usual point of view. That is, the assistant ensured that the camera pointed in the same direction as the Oculus. Despite this procedure, a slight desynchronization was expected in the synchrony of interactions due to human factors, such as latency or eventual imprecisions of the performer. Hence, to control the user's movements, the audio recordings requested precise and slow movements.

Once participants arrived and filled out the questionnaires, they were told that they were going to embody a person diagnosed with panic attack disorder, and the performer was going to help in that process with his body. Participants were asked to sit on a chair and wear the head-mounted display and earphones. The assistant helped them remove rings, bracelets, clocks, and to wear the gear, ensuring they felt comfortable. At this moment, the image was turned off (they saw a black screen), and participants listened to a greeting message that explained the three phases in which the experiment was divided (Figure 2). Meanwhile, the performer quickly changed his shirt to short or long sleeved, depending on the participants' clothes. The performer quietly wore the vest and was seated two meters to the right and one meter in front of the participant, in parallel, and looking in the same direction. This location was previously chosen to ensure that participants could not see themselves from the performer's position and the performer could see them by turning his neck without discomfort.

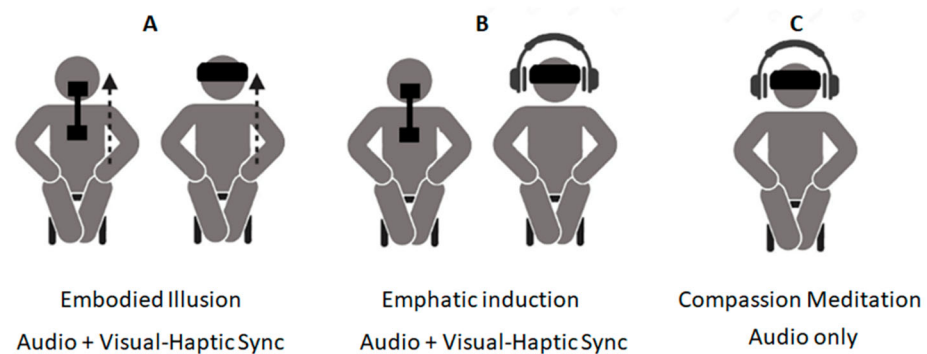


Figure 2. Phases of the virtual reality (VR) condition. (A) Body swap illusion phase: the participant takes over the body of the performer/person with panic disorder; (B) the participant listens to the story of the person with panic disorder; (C) the participant performs a compassion-based meditation to enhance the desire to alleviate the embodied person’s suffering.

The purpose of the first phase was to generate a body swap illusion, allowing the participant to take over the body of another person (the performer/person with panic disorder) (Figure 2A). To do so, an embodied induction was performed. In this phase, the image was turned on, thus revealing the performer’s first-person perspective. A prerecorded instruction to perform specific movements was played to the participant (e.g., “Put your right hand on your right knee, and then slowly move it up to your lap, as if you were caressing it”). All the movements selected followed two principles: (1) movements that require a combination of visual and haptic senses, in order to increase the embodied illusion; (2) movements that ensure the synchronization between the participant’s and performer’s movements. This phase lasted 5 min. Later (Figure 2B), the participant listened to an “inner dialogue” narrative of a patient with panic disorder who describes their day-to-day suffering experiences related to their symptomatology. At the same time, the performer continues to mirror the participant’s free movements. This phase of emphatic induction lasted 4 min and 30 s. At the end of the patient’s narrative, the participant was still wearing the VR Oculus Rift, but it was turned off and the third phase began (Figure 2C). A compassion-based meditation was played to the participant for 3 min. At the same time, the performer took off the vest and put it in place. The meditation aimed to enhance the desire to alleviate the patient’s suffering after participants had embodied him during the experiment.

2.3.2. The Audio Condition

The audio condition was divided into two phases. First, the participant was instructed to wear sight-blocking glasses in order to reduce the potential distraction of external stimuli and to generate a condition as similar as possible to the VR condition. Afterwards, the participant listened to the story of a patient with a panic disorder who described their day-to-day suffering experiences related to their symptomatology (empathic induction). At the end, a compassion-based meditation was played to the participant (Figure 3).

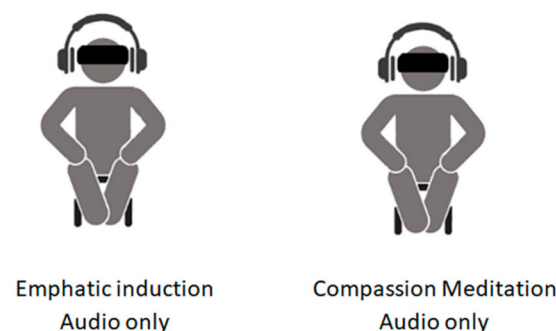


Figure 3. Phases of the audio condition.

2.4. Data Analyses

Data were statistically evaluated using IBM SPSS for Windows, version 26. To check that no baseline differences existed between the two conditions, a Chi-Square Test was performed for sex, Mann–Whitney U Test for age, and independent-sample *t*-test for outcomes.

Regarding the efficacy of the in-person session practices, we examined the within-subjects differences for the SMS and VAS-SC scores comparing pretest/post-test scores with paired-sample *t*-tests. Additionally, we performed a one-sample *t*-test for the VR condition to investigate the effect of TMTBA on the embodiment scores. A significantly greater score than 1 meant that participants experienced location, ownership, or agency of the performer's body. The score of 1 is equivalent to the nonexperience of location, ownership, or agency of the performer's body. Then, SMS and VAS-SC scores were analyzed using analysis of covariance (ANCOVA) with the between-subjects factor as condition, and baseline scores as covariates. Moreover, independent *t*-tests were performed on the amount of participants' money in the Dictator's Game.

Regarding the efficacy of the intervention, we conducted paired-sample *t*-tests to examine within-subjects' differences for PANAS and CLS scores. Moreover, PANAS and CLS scores were analyzed using ANCOVA with the between-subjects factor as condition, and the baseline scores as covariates. Finally, an ANCOVA was used to explore differences between groups in meditation practice frequency while statistically controlling for participants' ordinary weekly practice.

For the ANCOVAs, preliminary checks were conducted to ensure no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate.

3. Results

The sociodemographic characteristics of all participants at baseline are shown in Table 1. All participants reported no use of drugs and an absence of mental or chronic illness. There were no significant differences between conditions according to sex (*chi-square* (2, $n = 41$) = 0.01, $p = 0.940$, $\phi = 0.01$ or age $U = 240$, $z = 0.79$, $p = 0.429$) and age ($U = 240$, $z = 0.79$, $p = 0.429$). Mean age of VR participants was 23.52 ($SD = 5.42$), while audio participants were on average 22.15 years old ($SD = 3.96$). Moreover, there was no significant difference regarding habitual meditation practice frequency between VR participants ($M = 0.86$; $SD = 2.41$) and audio participants ($M = 0$; $SD = 0$; $t(20) = -1.63$, $p = 0.119$, two-tailed, $\eta^2 = 0.06$). Finally, most of the sample was composed of students of psychology, except for five participants, of which were a doctor, a physiotherapist, a dentist, a nurse, and a pharmacist. The last three professionals were in the audio condition.

3.1. Efficacy of the In-Person Session Practices

Descriptive statistics, independent-sample *t*-test for baseline scores, and ANCOVA results are shown in Tables 2 and 3. VR and audio participants had no significantly different baseline scores in SMS and VAS-SC.

Regarding the body swap induction, scores in the embodiment experience questionnaire were significantly greater than 1 [(location ($M = 5.29$; $SD = 1.11$; $t(20) = 17.66$, $p < 0.001$), ownership ($M = 4.69$; $SD = 1.40$; $t(20) = 12.11$, $p < 0.001$), and agency ($M = 5.81$; $SD = 0.90$; $t(20) = 24.46$, $p < 0.001$)]. That is, the induction was effective in generating the body swap and creating a feeling of being located in, having agency over, and owning the performer's body.

In both conditions, there was a statistically significant increase in SMS scores from the previous moment to the in-person session and after it. Moreover, audio participants had significant low levels of energy after the session. However, after adjusting for pretest scores, differences in these outcomes between the two groups were not found.

Finally, independent-samples *t*-tests were conducted to compare the Dictator's Game scores for TMTBA and audio conditions. There was a significant difference in the Dictator's Game between money that VR participants decided to retain ($M = 2134.52$; $SD = 122.60$)

and money they decided to give to the embodied patient ($M = 3053.57$; $SD = 390.38$; $t(20) = 10.29$, $p > 0.001$, two-tailed, $\eta^2 = 0.84$), with audio participants gaining an inferior quantity of money ($M = 2121.25$; $SD = 117.90$) than the patient ($M = 2932.5052$; $SD = 406.62$; $t(19) = 8.57$, $p < 0.001$, two-tailed, $\eta^2 = 0.79$). Nevertheless, there was no significant effect for condition on the amount that the patient received, $t(39) = -0.97$, $p = 0.337$, two-tailed, $\eta^2 = 0.02$), nor on the money that participants retained, $t(39) = -0.35$, $p = 0.726$, two-tailed, $\eta^2 = 0.00$), despite VR participants giving more money to the patient than audio participants.

Table 1. Sociodemographic characteristics of participants at baseline.

Baseline Characteristic	VR		Audio		Full Sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	17	81	16	80	33	80.5
Male	4	19	4	20	8	19.5
Highest educational level						
Middle school	2	9.5	4	20	6	14.6
High school/some college	13	61.9	13	65	26	63.4
University or postgraduate degree	6	28.6	3	15	9	22
Previous experience ^a						
Meditation practice	5	23.8	5	25	10	24.4
Compassion practice	4	19.05	2	10	6	14.63
Meditation practice frequency						
Never	18	85.71	20	100	38	92.68
1 time per week	1	4.76	0	0	1	2.44
4 times per week	2	9.53	0	0	2	4.88

Note. $N = 41$ ($n = 21$ for participants of VR condition and $n = 20$ for participants of audio condition). Participants were on average 22.85 years old ($SD = 4.76$). ^a Reflects the number and percentage of participants answering “yes” to this question.

Table 2. Descriptive statistics and independent-samples *t*-test results of baseline data.

Variables	VR ($n = 21$) ^a		Audio ($n = 20$) ^a		<i>t</i> -Student		
	Pre	Post	Pre	Post	<i>t</i>	<i>p</i>	η^2
SMS (Total Score)	74.65 (14.28)	85.29 (11.73)	67.30 (13.34)	82.68 (11.29)	$t(38) = -1.68$	0.101	0.07
SMS (Body subscale)	20.86 (4.70)	22.43 (4.14)	18.05 (4.65)	21.30 (5.30)	$t(39) = -1.92$	0.062	0.09
SMS (Mind subscale)	53.80 (10.22)	62.86 (9.10)	49.25 (10.17)	61.16 (7.48)	$t(38) = -1.41$	0.166	0.05
VAS-SC (Self-compassion)	11.93 (4.36)	11.71 (4.58)	11 (3.52)	11.48 (3.86)	$t(39) = -0.80$	0.429	0.02
VAS-SC (Positive affiliative affect)	23.44 (3.14)	23.33 (3.74)	21.85 (5.72)	20.90 (5.21)	$t(39) = -1.00$	0.324	0.03
VAS-SC (Self-criticism)	7.40 (1.76)	7.05 (1.95)	7.53 (1.73)	7.08 (1.76)	$t(39) = 0.18$	0.859	0
VAS-SC (Energized level)	6.70 (1.77)	6.10 (1.37)	7.00 (2.18)	5.83 (1.66)	$t(39) = 0.31$	0.761	0
PANAS (Positive Affect)	32.14 (5.58)	32.53 (7.33)	30.20 (7.54)	32.56 (5.60)	$t(39) = -0.94$	0.353	0.02
PANAS (Negative Affect)	16.52 (3.39)	17.79 (7.49)	16.75 (4.58)	17.06 (4.95)	$t(39) = 0.18$	0.858	0
CLS	118.52 (16.54)	117.63 (16.87)	122.80 (9.75)	121.47 (14.82)	$t(39) = 1.00$	0.322	0.03

Note. PANAS = Positive and Negative Affect Scale; CLS = Compassion Love Scale; SMS = State Mindfulness Scale; VAS-SC = Visual Analogic States for State Changes. ^a All values represent the means (and standard deviations in parenthesis).

Table 3. Paired-samples *t*-tests and analyses of covariance (ANCOVAs) results for PANAS, CLS, SMS, and VAS-SC scores.

Variables	VR (<i>n</i> = 21)			Audio (<i>n</i> = 20)			ANCOVA		
	<i>t</i> -Student			<i>t</i> -Student					
	<i>t</i>	<i>p</i>	η^2	<i>t</i>	<i>p</i>	η^2	<i>F</i>	<i>p</i>	η_p^2
Pre- and post-in-person session assessment									
SMS (Total Score)	<i>t</i> (19) = −3.17	0.005	0.35	<i>t</i> (18) = −3.94	0.001	0.46	<i>F</i> (1, 36) = 0.01	0.924	0.00
SMS (Body subscale)	<i>t</i> (20) = 1.76	0.093	0.13	<i>t</i> (19) = 1.93	0.068	0.16	<i>F</i> (1, 38) = 0.15	0.700	0.00
SMS (Mind subscale)	<i>t</i> (19) = 3.47	0.003	0.39	<i>t</i> (18) = 4.67	0.000	0.55	<i>F</i> (1, 36) = 0.00	0.952	0.00
VAS-SC (Self-compassion)	<i>t</i> (20) = 0.21	0.838	0.00	<i>t</i> (19) = −1.02	0.320	0.05	<i>F</i> (1, 38) = 0.35	0.556	0.00
VAS-SC (Positive affiliative affect)	<i>t</i> (20) = 0.29	0.775	0.00	<i>t</i> (19) = 1.50	0.150	0.11	<i>F</i> (1, 37) = 1.37	0.248	0.04
VAS-SC (Self-criticism)	<i>t</i> (19) = 1.85	0.079	0.15	<i>t</i> (19) = 1.16	0.261	0.07	<i>F</i> (1, 37) = 0.03	0.868	0.00
VAS-SC (Energized level)	<i>t</i> (20) = 1.78	0.090	0.14	<i>t</i> (19) = 2.63	0.017	0.27	<i>F</i> (1, 37) = 1.39	0.245	0.04
Pre- and postintervention assessment									
PANAS (Positive Affect)	<i>t</i> (18) = −0.05	0.962	0.00	<i>t</i> (15) = −0.86	0.405	0.05	<i>F</i> (1, 32) = 0.23	0.633	0.01
PANAS (Negative Affect)	<i>t</i> (18) = −0.90	0.378	0.04	<i>t</i> (15) = −0.95	0.358	0.06	<i>F</i> (1, 32) = 0.00	0.947	0.00
CLS	<i>t</i> (18) = 0.25	0.809	0.00	<i>t</i> (14) = 0.15	0.883	0.00	<i>F</i> (1, 31) = 0.07	0.797	0.00

Note. PANAS = Positive and Negative Affect Scale; CLS = Compassion Love Scale; SMS = State Mindfulness Scale; VAS-SC = Visual Analogic States for State Changes.

3.2. Efficacy of the Intervention

Descriptive statistics, independent-sample *t*-test for baseline scores, and ANCOVA results are shown in Tables 2 and 3. VR and audio participants had no significantly different baseline scores in PANAS and CLS. After adjusting for PANAS and CLS pretest scores, there were no significant differences in these outcomes between the two groups. However, comparing average meditation practice during the previous two weeks to the average frequency during the two weeks after the session (paired-samples *t*-test), VR participants' day-to-day practice increased significantly ($M = 6.52$; $SD = 4.08$; $t(20) = -6.79$, $p < 0.001$, two-tailed, $\eta^2 = 0.70$), as did audio participants' practice ($M = 3.30$; $SD = 3.13$; $t(19) = -4.71$, $p < 0.001$, two-tailed, $\eta^2 = 0.54$). Moreover, after adjusting for previous meditation practice frequency (ANCOVA), the difference between the two groups in average meditation practice during the two weeks after the session was significant— $F(1, 38) = 5.49$, $p = 0.024$, $\eta^2 = 0.13$. Regarding the overall quality of at-home compassion-based meditations, there was no significant effect of condition on the imagery component of quality nor the somatic one after adjusting for frequency of at-home meditation. See Table 4 for means, standard deviations, and ANCOVAs of participants' scores in CPQS factors.

Table 4. Means and standard deviations of scores on compassion practice quality.

Variable	VR (<i>n</i> = 21)		Audio (<i>n</i> = 20)		ANCOVA ^a		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	η_p^2
Imagery Factor (CPQS) ^b	60.69	13.57	64.31	15.96	<i>F</i> (1, 31) = 0.69	0.413	0.00
Somatic Factor (CPQS) ^b	52.41	11.73	57.11	16.31	<i>F</i> (1, 31) = 2.04	0.163	0.06

Note. ES = Emotions Scale; CPQS = Compassion Practice Quality Scale. ^a ANCOVAs were adjusted for frequency of at-home meditation. ^b CPQS average scores for the two weeks of at-home meditations.

4. Discussion

The aim of the present paper was to evaluate the efficacy of a meditation supported by an embodied-VR experience to increase the quality and adherence to the practice of meditation, compassionate response to suffering of oneself and others, motivation to help others, and an altruistic response. Within this objective, two groups of healthcare professionals received a recorded “inner-dialogue” narrative of a person who suffers

panic attacks, and a compassion meditation for that person. Furthermore, both groups were randomized into two conditions—the experimental one received an embodied-VR experience inviting them to “put themselves into the body of the person whose narrative was being heard” followed by the meditation, and the control, who just received the audio and the meditation. Afterwards, both groups were invited to practice the same meditation for two weeks.

The results confirm that both conditions (audio + embodied-VR and only audio) were effective in increasing state mindfulness, empathy, compassionate states, motivation to help, and altruism. However, interventions were not effective in reducing negative affect, and increasing positive affect, self-compassion, or dispositional compassion. The embodied-VR condition was not more effective than only the audio one in creating a compassionate experience or increasing practice quality. In this sense, data showed that the audio condition was very effective, showing that listening to the patient’s “inner dialogue” narrative generated a very intense experience. In this sense, a potential explanation lies in the nature of the selected sample, given that healthcare professionals may already have high levels of empathy and compassion [33], having possibly reached a ceiling effect.

In accordance with our hypothesis, results suggest that an embodied-VR experience increases adherence to meditation practice for the following two weeks. In this line, Cappellen et al. [22] carried out a psychoeducational microintervention based on the upward spiral theory of lifestyle change to test if experiencing positive affect during first-time loving-kindness meditation experience predicts subsequent frequency and duration of meditation over the following 3 weeks. The results showed that the more positive affect during the meditation in the in-person session, the more frequent and longer the meditations were at home. However, the difference in average meditation practice during the three weeks after the session was not significant between the experimental and control groups. Thus, different factors could explain our result—it could be due to the potential activation of compassion and related positive emotions by complementing it with imagery skills [34] with the support of VR, which may lead to a greater adherence to meditation practice on a daily basis. Another explanation could be that the experience impacts the motivation to practice (but we have not evaluated this), and the motivation to alleviate others’ suffering (although we have not seen differences in altruism measured by the Dictator’s Game).

Therefore, these unclear results open the door to carry out new studies that expand these hypotheses. For instance, future studies should test this microintervention in participants from different professions and thus test the hypothesis of the compassion ceiling effect in healthcare professionals. Additionally, a better understanding of cognitive control processes associated with meditation practice [35] might be achieved with the use of TMTBA.

Limitations of the current study should be pointed out. The first is that well-established compassion questionnaires were not included in the study, such as the Sussex-Oxford compassion scale [36]. Moreover, imagery skills were not evaluated despite these variables being helpful to explain the effects of the intervention. In addition, most of the sample was composed of students of psychology, which hinders the generalizability of the findings. Finally, the size of the sample was calculated according to the effect of TMTBA on adherence reported in a previous study; thus, it might have been underpowered for the rest of variables. Related to this, we performed multiple statistical tests to compare groups failing to correct for multiple comparisons in order to avoid inflating type II error.

5. Conclusions

The results of this article could be interesting on several levels. On the one hand, we sought to refine the quality and frequency of compassion-based meditation practice at home and the use of TMTBA allowed us to discover that embodying the person to whom one generates compassion toward significantly increases the adherence to formal meditation practice at home. On the other hand, this technology can be used to generate

a compassionate response for people who suffer from mental disorders, which suggests that it could be used in students pursuing a healthcare degree. More studies are needed to determine if there is a specific population with specific characteristics that may benefit from the use of VR for meditation training. However, the time, personnel, null results in terms of differences with traditional meditation practice in many measured dependent variables, and financial costs of TMTBA have to be taken into account when implementing this microintervention as a first contact for individuals who are going to undergo a compassion-based intervention.

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Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to a privacy issue.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Transcript of Patient's narrative

Mi vida básicamente se puede dividir en dos partes muy claras. La primera abarca hasta mis 25 años. Tuve una infancia normal, con bastantes amigos en el colegio. Recuerdo que lo pasaba muy mal cuando me tocaba salir a la pizarra, y como algunos niños del colegio se burlaban porque llevaba gafas. *[My life can basically be divided into two very clear parts. The first part covers up to my 25th birthday. I had a normal childhood, with quite a few friends at school. I remember that I had a very bad time when it was my turn to go out to the blackboard, and how some children at school made fun of me because I was wearing glasses.]*

Tuve la adolescencia normal, en la que casi siempre prefería ir de excursión con mis amigos antes que salir por las noches. Aunque sí que recuerdo pasarlo mal y ponerme super nervioso al hablar con chicas. *[I had a normal teenage years, when I almost always preferred to go on excursions with my friends rather than go out in the evenings. Although I do remember having a hard time and getting super nervous talking to girls.]*

Básicamente ha sido una vida normal, sin grandes sobresaltos, a los 25 estaba con un trabajo y una pareja estable, y con muchos planes de futuro. *[Basically, it has been a normal life, without big shocks, at 25 I was with a job and a stable partner, and with many plans for the future.]*

Hasta que llegó aquel fatídico día del mes de mayo de 2010. *[Until that fateful day in May 2010.]*

Ese día empezó la segunda parte de mi vida: de vacaciones, descansando de un año muy estresante y lleno de altibajos. Estaba viendo la televisión y sentado al lado de mi pareja, super a gusto, y no sé porque, o no recuerdo porque, mi corazón empezó a latir desbocado. Empecé a sentir como latía, parecía que se me salía del pecho, me dolía y no podía hacer nada para parar ese dolor. *[That day began the second part of my life: on holiday, resting from a very stressful year full of ups and downs. I was watching TV and sitting next to my*

partner, super comfortable, and I don't know why, or I don't remember why, my heart started to beat wildly. I started to feel it beating, it seemed to be coming out of my chest, it hurt and I couldn't do anything to stop that pain.]

Me empecé a asustar, así que me marché al dormitorio sin decir nada y, me tumbé en la cama y me dije: “Tranquilo, relájate, que todo esto pasará”. Pero mi corazón seguía por su cuenta. *[I started to get scared, so I went to the bedroom without saying anything and, I lay down on the bed and I said to myself: “Calm down, relax, all this will pass”. But my heart was still on its own.]*

Mi pareja y una amiga me llevaron al centro de salud, donde me rodearon los médicos: en ningún otro lugar del mundo habría podido sentirme más seguro. Pero mi corazón seguía sin atender a razones. Finalmente, los médicos me dijeron que no era nada orgánico, que era psicológico. *[My partner and a friend took me to the health centre, where I was surrounded by doctors: nowhere else in the world could I have felt safer. But my heart still didn't listen to reason. Finally, the doctors told me that it was nothing organic, that it was psychological.]*

Aquel día sufrí el primer ataque de ansiedad de mi vida. Y, aunque logré reponerme, me pidieron que descansara durante una temporada. No lo hice. Pensé que se trataría de una cosa puntual, que no tendría mayor repercusión. Ahora arrastro ocho años de ataques continuos. Con mayor o menor intensidad, pero continuos. *[That day I suffered the first panic attack of my life. And although I recovered, I was asked to rest for a while. I did not. I thought that it would be a one-off, that it wouldn't have a major impact. Now I have eight years of continuous panic attacks. With more or less intensity, but continuous.]*

Resulta bastante complicado describir un ataque. En mi caso, quizás sea como un alud de nieve. Empiezo a notar los primeros síntomas y en un instante ya no hay refugio que valga. *[It is quite complicated to describe a panic attack. In my case, perhaps it's like a snow avalanche. I begin to notice the first symptoms and, in an instant, there is no longer any shelter.]*

En el momento en el que me ocurren los ataques, que pueden ser en cualquier momento, especialmente en los lugares con mucha gente, todo se suspende de repente. Trato de ser consciente de la realidad e intento cambiar el rumbo de mis pensamientos, pero entonces no existe nada más que ese presente angustioso. Por mucho que lo intente, ya no tengo el control de mi cuerpo. Siento que me ahogo, la taquicardia, el temor a morir, porque no sé lo que me está pasando. *[The moment the attack happens to me, which can be at any time, especially in crowded places, everything suddenly stops. I try to be aware of reality and I try to change the course of my thoughts, but then there is nothing but this distressing present. No matter how hard I try, I am no longer in control of my body. I feel like I'm drowning, I'm tachy, I'm afraid of dying, because I don't know what's happening to me.]*

Durante todo este tiempo, no he dejado de preguntarme si volveré a ser el de antes. Mi mente ha luchado sin tregua para retornar a la primera parte de mi biografía. Pero no ha habido manera. *[During all this time, I haven't stopped wondering if I'll ever be the same again. My mind has fought relentlessly to return to the first part of my biography. But there has been no way.]*

Si una persona se cruzase conmigo, podría reconocerme porque siempre tengo las manos ocupadas, a veces llevo una pelota de estas blandas y la apreto incesantemente buscando una calma que nunca llega. Noto la presión de la pelota, y como por más que la apriete siempre vuelve a su forma original. Esto me permite sentirme como si alguien me llevara de la mano. Logré calmarme un poco con ella, pero llega un momento en que todas estas herramientas no sirven de nada: los ataques, en mi caso, siempre regresan y son implacables. *[If a person crossed me, he would recognize me because my hands are always busy, sometimes I carry one of these soft balls and I squeeze it incessantly looking for a calm that never comes. I feel the pressure of the ball, and as much as I squeeze it, it always returns to its original shape. This allows me to feel as if someone is holding my hand. I manage to calm down a bit with it, but there comes a time when all these tools are useless: the attacks, in my case, always come back and are relentless.]*

Como ésta, he desarrollado otras estrategias que me hacen sentir más tranquilo. Por ejemplo, siempre llevo una caja de ansiolíticos en el bolsillo. Todos los días antes de salir

de casa compruebo que los llevo, es la única forma de saber que si me pasa algo por la calle tendré una salida. Si lo necesitase, podría coger o una pastilla, y ponerla debajo de la lengua para tranquilizarme. *[Like this one, I have developed other strategies that make me feel more at ease. For example, I always carry a box of anxiolytics in my pocket. Every day before I leave home, I check that I have them with me, it's the only way to know that if something happens to me on the street, I will have a way out. If I need to, I could take a pill and put it under my tongue to calm down.]*

Es difícil, en estas condiciones cuesta conocer gente. Cada vez que hablo con alguien, siento la amenaza de que me sobrevenga un nuevo ataque. Me he convertido en una persona huidiza, así que me he aferrado con fuerza a quienes ya conocía. *[It is difficult, in these conditions it is hard to meet people. Every time I talk to someone, I feel the threat of another attack. I have become a person on the run, so I have held on tightly to those I already knew.]*

Y más allá de nuestras relaciones personales, en la esfera social, el estigma es muy fuerte. A mí me duele cada vez que escucho la palabra “loco”. Es una etiqueta estéril e hiriente que no sirve para nada. *[And beyond our personal relationships, in the social sphere, the stigma is very strong. It hurts me every time I hear the word “crazy”. It is a sterile and hurtful label that serves no purpose.]*

Ahora tengo 32 años y ya han pasado 8 desde que empezaron los ataques. Mi vida dio un vuelco. Ni un solo día de mi vida he dejado de luchar por aceptar mi situación, por encontrar las herramientas que hagan más llevadera mi existencia. *[I am now 32 years old and it has been 8 years since the attacks began. My life has been turned upside down. Not one day of my life has I stopped struggling to accept my situation, to find the tools to make my existence more bearable.]*

Pero tampoco ha pasado un solo día, en los últimos 8 años, en los que me haya preguntado si volveré a ser ese chico apacible, sociable y ligeramente nervioso que era. *[But there hasn't been a day in the last 8 years when I've wondered if I'll ever be that gentle, sociable, slightly nervous boy again.]*

Appendix B

Transcript of guided meditation track

Después de colocarse en su postura escogida para meditar, tómate un momento para detenerte en las ventajas de usar este tiempo para cultivar la compasión para ti y los demás. Con tanto sufrimiento en el mundo, ¿puedes imaginarte superando esa indiferencia y e imaginarte despertando una compasión ilimitada? ¿Imaginas esta compasión beneficiando al mundo? *[After placing yourself in your chosen meditation posture, take a moment to dwell on the advantages of using this time to cultivate compassion for yourself and others. With so much suffering in the world, can you imagine overcoming that indifference and imagine awakening unlimited compassion? Can you imagine this compassion benefiting the world?]*

Lleva tu conciencia a todo el campo de las sensaciones táctiles en el cuerpo. Como si te encontraras a un viejo amigo, dale a tu cuerpo toda tu atención sin ningún tipo de crítica. Simplemente busca estar presente, con tu cuerpo tal como es. *[Take your consciousness into the whole realm of tactile sensations in the body. As if you were meeting an old friend, give your body your full attention without any criticism. Simply seek to be present, with your body as it is.]*

Mientras descansas en el flujo de sensaciones en el cuerpo, puede notar áreas de tensión. Normalmente, podemos sentirnos tentados a rechazar o ignorar estas áreas de incomodidad y malestar. Pero hoy con un espíritu compasivo, tómate tiempo para posar tu atención en estas áreas y liberar la tensión con cada exhalación. *[As you rest on the flow of sensations in the body, you may notice areas of tension. Normally, we may be tempted to reject or ignore these areas of discomfort and uneasiness. But today, in a spirit of compassion, take time to focus your attention on these areas and release the tension with each exhalation.]*

A medida que continúas calmando tu cuerpo a través de la relajación, invítalo también a permanecer en quietud. Date un descanso del agotamiento de estar constantemente en movimiento. *[As you continue to calm your body through relaxation, invite it to remain still as well. Give yourself a break from the exhaustion of being constantly on the move.]*

Ahora, complementa las cualidades de relajación y quietud con el elemento de vigilancia. Si está sentado, deje que el esternón se levante ligeramente, de modo que al respirar su abdomen naturalmente pueda expandirse y liberarse. Si estás acostado, en posición supina sobre la espalda, recuerda usar esta postura como una plataforma para el cultivo meditativo de la compasión. *[Now, complement the qualities of relaxation and stillness with the element of vigilance. If you're sitting, let your sternum rise slightly, so that as you breathe your abdomen can naturally expand and release. If you are lying down, in a supine position on your back, remember to use this posture as a platform for meditative cultivation of compassion.]*

Lentamente, deja que tu respiración se establezca a su propio ritmo natural. Con cada exhalación liberar completamente cualquier esfuerzo por controlar la respiración y dejar que cada inhalación surja espontáneamente sin forzarla. *[Slowly, let your breathing settle into its own natural rhythm. With each exhalation release completely any effort to control the breath and let each inhalation come in spontaneously without forcing it.]*

Relaja la mente liberando todas las preocupaciones sobre el pasado y el futuro y deja que tu conciencia descanse en la simplicidad del momento presente. Deja descansar tu atención sobre las sensaciones de la respiración. *[Relax the mind by releasing all concerns about the past and the future and let your consciousness rest in the simplicity of the present moment. Let your attention rest on the sensations of the breath.]*

Comienza a conectar con la intención del cultivo meditativo de la compasión, donde deliberadamente despertamos la mente y traemos la valiente aspiración de aliviar el sufrimiento en nosotros mismos y en los demás. *[Begin to connect with the intention of meditative cultivation of compassion, where we deliberately awaken the mind and bring the courageous aspiration to alleviate suffering in ourselves and others.]*

Amablemente, dirige tu atención a la narrativa que acabas de escuchar. Trae sin temor a la mente el sufrimiento que esta persona está experimentando. Puedes pensar en su ansiedad, sus inseguridades, en todas las limitaciones que este sufrimiento le impone. Intenta conectar con esta experiencia, sin huir o suprimirla. Es probable que la experiencia te genere inquietudes e insatisfacción. En lugar de suprimir o evitar la experiencia, valientemente reconócela. Luego, permite que tu mente profundice en el sufrimiento y observa cómo naturalmente surge el deseo de aliviar este sufrimiento. Siente este impulso compasivo que todos llevamos dentro de nosotros mismos. *[Kindly direct your attention to the patient's narrative that you have just listened. Fearlessly bring to mind the suffering that this person is experiencing. You can think of their anxiety, their insecurities, all the limitations that this suffering imposes on them. Try to connect with this experience, without running away or suppressing it. It is likely that the experience will cause you to be restless and dissatisfied. Instead of suppressing or avoiding the experience, courageously acknowledge it. Then allow your mind to go deeper into the suffering and observe how the desire to relieve this suffering naturally arises. Feel this compassionate impulse that we all carry within us.]*

Comienza a despertar la virtud de la compasión. Con un espíritu de coraje inagotable, al respirar, genera el deseo sincero: "Que esté libre del sufrimiento y de sus causas". Mientras continúas extendiendo este deseo sincero con cada inhalación, imagina la carga de sufrimiento que se levanta lejos de su cuerpo y mente e imagina que experimenta gran satisfacción y alivio. Imagínate a esta persona libre del sufrimiento y de las causas que lo provocan. *[With a spirit of inexhaustible courage breathe and generate the sincere desire: "May he be free from suffering and its causes". As you continue to extend this sincere desire with each breath, imagine the burden of suffering that rises away from your body and mind and imagine that you experience great satisfaction and relief. Imagine this person free from suffering and the causes of suffering.]*

Ahora trae a la mente a una persona que te importa profundamente y que sabes que está sufriendo. El sufrimiento de esta persona puede ser desencadenado por una enfermedad grave, angustia psicológica, conflictos interpersonales o problemas profesionales. Hay tantas maneras de que el sufrimiento puede ser provocado. Invoca la presencia de esta persona y la realidad de su sufrimiento en tu mente a través de una imagen mental o por lo que sientes por esta persona. *[Now bring to mind a person that you care deeply about and*

that you know is suffering. This person's suffering can be triggered by serious illness, psychological distress, interpersonal conflicts or professional problems. There are so many ways that suffering can be triggered. Invoke the presence of this person and the reality of their suffering in your mind through a mental image or through what you feel for this person.]

Mientras sostienes a esta persona en tu mente, mira si puedes sentir que esta persona un ser vivo que se preocupa por estar libre de la experiencia del sufrimiento. *[As you hold this person in your mind, see if you can feel that this person is a living being who cares about being free from the experience of suffering.]*

Una vez que hayas establecido esta conexión con esta persona, con un espíritu de coraje inagotable, con cada inhalación despierta el anhelo sincero de compasión, “Que esté libre del sufrimiento y de sus causas”. Continúa extendiendo este deseo compasivo con cada inhalación. *[Once you have established this connection with this person, with a spirit of inexhaustible courage, with every breath awaken the sincere desire for compassion, “May he be free from suffering and its causes”. Continue to extend this compassionate desire with each breath.]*

Imagínate la carga del sufrimiento de esta persona siendo llevada lejos de su cuerpo y mente e imagínalo experimentando la satisfacción del alivio. Imagine a esta persona libre de sufrimiento y sus causas. *[Imagine the burden of this person's suffering being carried away from his body and mind and imagine him experiencing the satisfaction of relief. Imagine this person free from suffering and its causes.]*

Una vez más, extiende tu conciencia a otro individuo, una comunidad o una región del mundo donde hay mucho sufrimiento y haz esta práctica como hemos hecho antes. *[Once again, extend your awareness to another individual, a community or a region of the world where there is much suffering and do this practice as we have done before.]*

Y, por último, permite que tu corazón se expanda en todas las direcciones y toma conciencia del impulso natural que todos compartimos, una preocupación genuina por estar libres del sufrimiento. Con un espíritu de coraje inagotable, con cada inhalación extiende el deseo de compasión universal: “Que todos estemos libres del sufrimiento y de sus causas”. *[And finally, allow your heart to expand in all directions and become aware of the natural impulse that we all share, a genuine concern to be free from suffering. In a spirit of unending courage, with every breath extend the desire for universal compassion: “May we all be free from suffering and its causes”.]*

Imagínate el sufrimiento del mundo siendo izado y viviendo con alegría esa experiencia de alivio. *[Imagine the suffering of the world being lifted up and living with joy that experience of relief.]*

Libera todas las construcciones mentales y por un momento descansa en la luminosa pureza de la conciencia. Simplemente sé consciente de ser consciente. Lentamente, termina esta sesión. *[Release all mental constructs and for a moment rest in the luminous purity of consciousness. Simply be aware of being aware. Slowly, end this session.]*

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**ANNEX 4: Certificate of the Ethics Committee of Research in Humans of the
Ethics Commission in Experimental Research of University of Valencia**

D. José María Montiel Company, Profesor Contratado Doctor del departamento de Estomatología, y Secretario del Comité Ético de Investigación en Humanos de la Comisión de Ética en Investigación Experimental de la Universitat de València,

CERTIFICA:

Que el Comité Ético de Investigación en Humanos, en la reunión celebrada el día 13 de diciembre de 2018, una vez estudiado el proyecto de investigación titulado:

“Eficacia de un programa de intervención para el tratamiento de la auto-crítica apoyado por un sistema de Realidad virtual (AMABLE-VR)”

número de procedimiento H1539699805131,

cuyo responsable es D. Ausiàs Cebolla i Martí,

ha acordado informar favorablemente el mismo dado que se respetan los principios fundamentales establecidos en la Declaración de Helsinki, en el Convenio del Consejo de Europa relativo a los derechos humanos y cumple los requisitos establecidos en la legislación española en el ámbito de la investigación biomédica, la protección de datos de carácter personal y la bioética.

Y para que conste, se firma el presente certificado en Valencia, a diecinueve de diciembre de dos mil dieciocho.



ANNEX 5: Spanish version of the Forms of Self-Criticizing/Attacking & Self-Reassuring Scale – Short Form (FSCRS-SF)

FSCRS-SF

A continuación, hay una serie de pensamientos y sentimientos que la gente a veces tiene. Lee cada afirmación cuidadosamente y rodea el número que mejor describa cómo de cierta es cada afirmación para ti. Por favor utiliza la siguiente escala:

En absoluto como yo	Un poco como yo	Moderadamente como yo	Bastante como yo	Extremadamente como yo
0	1	2	3	4

Cuando las cosas me van mal:

1 Soy capaz de recordar cosas positivas sobre mí mismo/a.	0	1	2	3	4
2 Me resulta difícil controlar la ira y la frustración hacia mí mismo/a.	0	1	2	3	4
3 Me resulta fácil perdonarme.	0	1	2	3	4
4 Una parte de mí siente que no soy lo suficientemente bueno/a.	0	1	2	3	4
5 A pesar de todo me gusta ser yo.	0	1	2	3	4
6 He llegado a estar tan enfadado/a conmigo mismo/a que he querido dañarme o herirme.	0	1	2	3	4
7 Tengo una sensación de repulsión hacia mí mismo/a.	0	1	2	3	4
8 A pesar de todo siento que soy digno/a de ser amado/a y aceptado/a.	0	1	2	3	4
9 Dejo de cuidarme.	0	1	2	3	4
10 Me regodeo en mis errores.	0	1	2	3	4
11 Me insulto a mí mismo/a.	0	1	2	3	4
12 Creo que merezco mis pensamientos críticos hacia mí mismo.	0	1	2	3	4
13 Hay una parte de mí mismo/a que quiere deshacerse de las partes de mí que no me gustan.	0	1	2	3	4
14 Me animo de cara al futuro.	0	1	2	3	4

CORRECCIÓN E INTEPRETACIÓN

Yo inadecuado (IS):	Sensación de inadecuación y decepción sobre uno mismo.	2 + 4 + 10 + 12 + 13
Yo odiado (HS):	Odio absoluto hacia algún aspecto del yo.	6 + 7 + 9 + 11
Yo tranquilo (RS):	Capacidad para tranquilizarse cuando las cosas van mal.	1 + 3 + 5 + 8 + 14

A mayor puntuación, mayor sensación de inadecuación con uno mismo (puntuación de 0 a 20), odio hacia uno mismo (puntuación de 0 a 16) o auto calma (puntuación de 0 a 20), respectivamente.

ANNEX 6: Compassion Practice Quality Scale

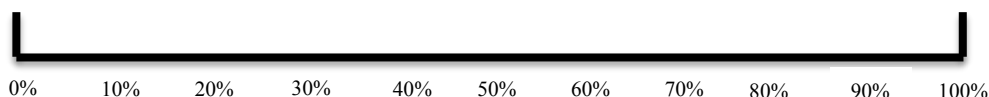
CALIDAD EN LA PRÁCTICA DE COMPASIÓN

Respecto a la sesión de hoy, por favor haz una marca vertical en la línea debajo de cada pregunta para indicar el porcentaje aproximado de tiempo que tu experiencia reflejó cada uno de los enunciados que encontrarás a continuación:

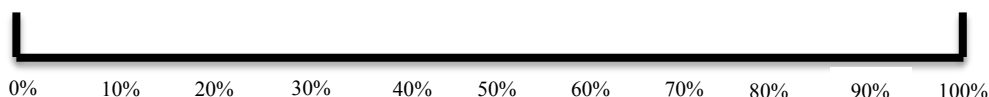
¿Cuándo hiciste la meditación?

- Hoy.
- Ayer.
- Anteayer.
- Hace tres días.
- Hace cuatro días
- Hace cinco días
- La semana pasada
- Hace más de una semana

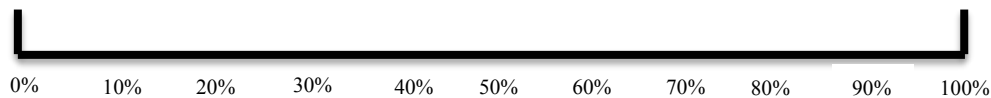
1. Durante la práctica, tuve muchas dificultades para escoger los elementos que conformaban la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión.



2. Durante la práctica, tuve muchas dificultades para construir la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión.



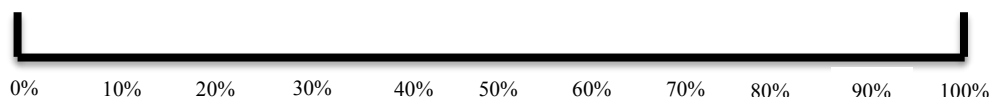
3. Durante la práctica, tuve muchas dificultades para sostener la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión.



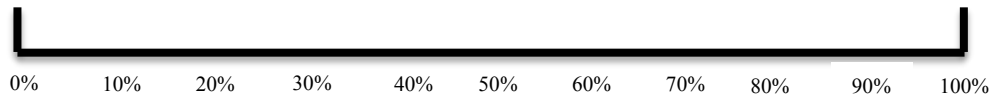
4. Durante la práctica, tuve muchas dificultades para realizar cambios/transformaciones a la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión



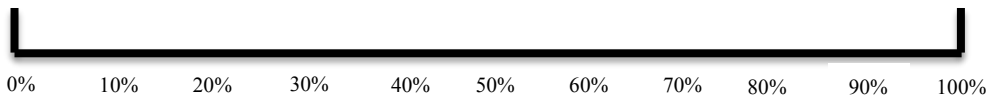
5. Durante la práctica, logré activar una sensación de calidez y afecto hacia mi/hacia los demás.



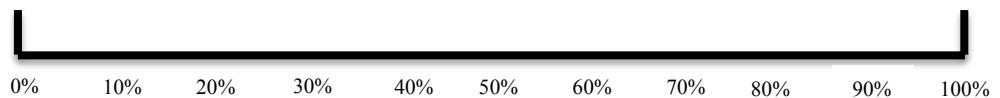
6. Durante la práctica, tuve muchas dificultades para ver con claridad y detalle la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión.



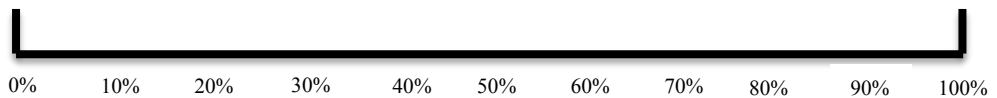
7. Durante la práctica, no sentí que estaba completamente dentro de la visualización, olvidándome que estaba en esta sala



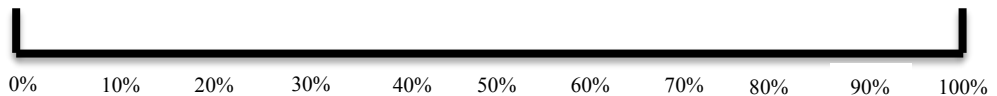
8. Durante la práctica, me juzgué por no ser capaz de sentir compasión.



9. Durante la práctica, noté en mi cuerpo una sensación de calidez y confort.

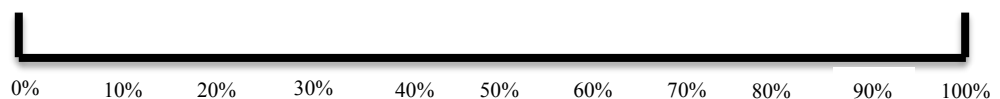


10. Durante la práctica percibí una gran conexión y cercanía afectiva con la imagen mental que estaba utilizando para generar un estado de compasión/autocompasión.



Contesta a este ítem si has incluido frases compasivas en tu práctica meditativa.

11. Durante la práctica, noté cómo las frases que realizaba (que sea feliz, etc...) tenían un efecto positivo en mí cuerpo como sensaciones agradables de calidez y confort.



Contesta a este ítem si has incluido gestos compasivos en tu práctica meditativa.

12. Durante la práctica, noté cómo los gestos compasivos que realizaba tenían un efecto positivo en mi cuerpo como sensaciones agradables de calidez y confort.



CORRECCIÓN

Factor Imaginación (ítems 1, 2, 3, 4, 6, 8): Facilidad para producir imágenes mentales en términos de generación, mantenimiento, inspección y transformación/manipulación de las imágenes mentales.

Factor Somático (ítems 5, 7, 9, 10, 11, 12): Facilidad para experimentar los aspectos somatosensoriales propios de la generación y mantenimiento de un estado compasivo (por ejemplo, calidez).

Las puntuaciones de las subescalas se obtienen haciendo la media de los ítems de cada una. Los ítems de la subescala de imaginación hay que invertirlos primero. Así, a mayor puntuación, mayor calidad habrá tenido la meditación en compasión.