SENTIDO DEL HUMOR: INTERRELACIONES CON PROCESOS AFECTIVOS Y COGNITIVOS

SENSE OF HUMOR: INTERRELATIONS WITH AFFECTIVE AND COGNITIVE PROCESSES

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Granada, a 02 de Marzo de 2017

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Porque no es necesario tocar el cielo

Pero sí tener los pies en el suelo

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Publicaciones de la tesis

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López-Benítez, R., Acosta, A., Lupiáñez, J., & Carretero-Dios, H. (2016a). *High trait cheerfulness individuals are more sensitive to the emotional environment.* Manuscript submitted for publication in Journal of Happiness Studies (4º review, accepted with minor changes).

López-Benítez, R., Acosta, A., Lupiáñez, J., & Carretero-Dios, H. (2016b). *Are You Ready to Have Fun? The Spanish State Form of the State–Trait Cheerfulness–Inventory.* Manuscript submitted for publication in Journal of Personality Assessment (3º review, accepted with minor changes).

López-Benítez, R., Carretero-Dios, H., Acosta, A., & Lupiáñez, J. (2017). *Modulation of cognitive flexibility processes by trait* cheerfulness. Manuscript submitted for publication in Frontiers of Psychology (1º review).

López-Benítez, R., Coll-Martín, T., Carretero-Dios, H., Lupiáñez, J., & Acosta, A. (2017). *Trait cheerfulness sensitivity to positive and negative affective states*. Manuscript submitted for publication in Motivation and Emotion (1º review).

López-Benítez, R., Lupiáñez, J., Carretero-Dios, H., & Acosta, A. (2017). *Influence of Emotion Regulation on Affective State: Moderation by Trait Cheerfulness.* Manuscript submitted for publication in Emotion (1º review).

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Capítulo I: Introducción

"Desconfía de quienes nunca ríen. No son personas serias".

Julio César

"Ríe y el mundo reirá contigo; llora y el mundo, dándote la espalda, te dejará llorar".

Charles Chaplin

"La imaginación consuela al ser humano por lo que no es; el sentido del humor le consuela por lo que es".

Francis Bacon

Las citas anteriores ejemplifican la relevancia y repercusión de la risa, el humor, o el sentido del humor en la construcción de significados sociales y personales. Así, es difícil concebir la vida humana sin sentido del humor: lo empleamos para explicar y comprender conceptos que, de otra manera, nos resultaría difíciles de entender, los medios de comunicación incluyen elementos humorísticos, la comedia es un género cinematográfico y teatral muy popular, los chistes y comentarios divertidos e ingeniosos forman parte de numerosos programas y series de televisión, en las relaciones interpersonales preferimos estar rodeados de personas con actitud positiva, ingeniosas, y divertidas, etc.

A pesar de su aparente utilidad como recurso interpersonal y de afrontamiento personal y de la frecuencia con que lo usamos, hay que tener en cuenta que el humor y el sentido del humor son constructos teóricos complejos y tradicionalmente poco estudiados en psicología, por lo que se considera necesario una delimitación conceptual clara así como un análisis desde una aproximación científica que permita la profundización y desarrollo de esta área.

El objetivo fundamental de esta tesis doctoral es avanzar en su conocimiento. Para ello, vamos a apoyarnos en el modelo de Willibald Ruch y colaboradores (Ruch, 1993; Ruch & Köhler, 2007; Ruch, Köhler, & van Thriel, 1996, 1997), el cual describe las bases afectivas y cognitivas del sentido del humor. Nos centraremos especialmente en uno de sus componentes, denominado en la propuesta original como *cheerfulness*, e intentaremos comprender si esta dimensión modula la flexibilidad cognitiva y los procesos de inducción y regulación emocional.

1.1. Sobre el sentido del humor

No hace mucho tiempo que O'Connell (1976) afirmaba que "quien se embarque en investigar los orígenes y el desarrollo del humor será visto, la mayor parte de las veces, como un ser desviado y extraño, como alguien que no se toma la psicología suficientemente en serio" (p. 316). Probablemente, esta afirmación estaba motivada por el carácter esquivo de este fenómeno (Dixon, 1980; Martin, 2007). También, con el hecho de que el humor y el sentido del humor eran consideradas temáticas poco serias, dadas sus asociaciones con la diversión. Al mismo tiempo, la falta de modelos teóricos que permitieran la contrastación empírica de hipótesis hacía poco atractiva la exploración de dichos constructos.

Sin embargo, en la actualidad, el interés en estas temáticas se ha ampliado y extendido a la comunidad científica, lo que se ha traducido en la obtención de un importante cuerpo de conocimientos sobre el sentido del humor y, por ende, sobre el humor (ver revisiones de Martin, 2007; Papousek & Schulter, 2010; Ruch & Hofmann, 2012). En paralelo con este interés, se ha afianzado una nueva forma de entender la salud, reformulada por la Organización Mundial de la Salud (OMS) en 1946 como un estado completo de bienestar físico, mental, y social, en lugar de con la mera ausencia de malestar o enfermedad. También, sin duda, la expansión de la denominada "psicología positiva" (Cohn, Fredrickson, Brown, Mikels, **&** Conway**,** 2009; Seligman & Csikszentmihalyi, 2000) ha contribuido a considerar su relevancia.

Desviándose de posicionamientos clásicos en psicología, los cuales acumularon fundamentalmente conocimientos sobre las denominadas "emociones negativas" (Beck, Steer, & Carbin, 1988; Eysenck, 1992), especialmente las relacionadas con la ansiedad, la depresión, y otros desórdenes como la psicopatía y el comportamiento antisocial, los teóricos de la psicología positiva (Fredrickson, 2001; Seligman & Csikszentmihalyi, 2000) han potenciado el estudio sistemático de las emociones positivas, tanto a nivel teórico como empírico, con el objetivo último de promover mejoras en la salud física y el bienestar psicológico.

Este renovado interés en el estudio de las emociones positivas, impulsado no sólo por los beneficios que tienen sobre la salud física y el bienestar psicológico (ver Lyubomirsky, King, & Diener, 2005, para una revisión), sino también por su contribución potencial en el conocimiento de las relaciones entre procesos cognitivos y

afectivos, ha configurado un cuerpo de conocimientos importante que, unido a un permanente esfuerzo en las últimas décadas por intentar ofrecer definiciones que delimiten y acoten en mejor medida el constructo del sentido del humor (Ruch & cols., 1996, 1997), por desarrollar instrumentos de suficiente calidad psicométrica para operacionalizarlos (Ruch & Hofmann, 2012), por obtener evidencia empírica sobre su importancia en ámbitos tan diferentes como la emoción (Samson & Gross, 2012), la personalidad (Ruch & Köhler, 2007), o la salud (Hirsch, Junglas, Konradt, & Jonitz, 2010), han propiciado que se haya fortalecido el estudio del sentido del humor y, por ende, del humor, convirtiéndose en un tema de especial relevancia en la actualidad.

1.1.1 Qué entendemos por humor y sentido del humor

Tradicionalmente, el humor y el sentido del humor se han usado como términos vagos, pues no resulta fácil definirlos y diferenciarlos semánticamente. Esta limitación ha dificultado la investigación sobre esta temática (Martin, 2007). Sin embargo, habría que comenzar esta aclaración conceptual preguntándose si es lo mismo *sentido del humor* que *humor*.

El sentido del humor debe entenderse como un constructo de personalidad hipotético-descriptivo creado para explicar las diferencias individuales en la predisposición a los pensamientos, sentimientos, conductas, y procesos asociados al humor (Ruch, 1994), por lo que su campo de actuación queda restringido al estudio de la disposición al mismo (Ruch & Hofmann, 2012). Así, y aludiendo a su propia concepción, el sentido del humor no puede ser observado directamente sino a través de indicadores indirectos.

Por el contrario, cuando en las publicaciones especializadas se habla de humor, se entiende que la aproximación no se circunscribe al estudio de las diferencias individuales. Más bien, se abarca un campo de acción más amplio que alude a todos los aspectos involucrados en este complejo campo de estudio. Así, y siguiendo a Martin (2007), en su libro *La Psicología del Humor, un enfoque integrador*, el humor está presente en humanos y en otros primates (van Hooff & Preuschoft, 2003), tiene su origen en el juego infantil y, fundamentalmente, se manifiesta cuando nos relacionamos e interactuamos con los demás. Además, necesita apoyarse en procesos cognitivos complejos (por ejemplo, comprensión, apreciación) que permiten captar alguna incongruencia en la información que se está procesando (chistes, textos, imágenes,

situaciones, etc.), dentro de un marco lúdico alejado de la seriedad (Gervais & Wilson, 2005). Por otro lado, incluye una respuesta emocional, mediada por valoraciones (*appraisals*), la cual se ha denominado "hilaridad". Por último, incluye elementos expresivos como la sonrisa y la risa, que varían en parámetros como la intensidad y la frecuencia de ocurrencia, las cuales, a su vez, motivan a los demás para que se comporten de una determinada manera (Shiota, Campos, Keltner, & Hertenstein, 2004). Por tanto, el humor tiene una naturaleza social, se asocia con pensamientos, acciones, y sentimientos, y está mediado por numerosos procesos, tanto cognitivos como afectivos.

Las aproximaciones iniciales al estudio de las diferencias individuales que podían observarse en todos los aspectos vinculados con lo humorístico, se caracterizaban por intentar dar respaldo a las implicaciones más importantes de las teorías clásicas del humor (Apter, 2001; Berlyne, 1972; Freud, 1928; Gruner, 1978). Sin embargo, estos acercamientos ofrecían un abordaje muy parcial, sujeto a los presupuestos de cada teoría, y con unos resultados difíciles de integrar. Para intentar paliar estas deficiencias, algunos autores se centraron en el estudio de estas diferencias individuales como si de una variable de personalidad se tratase, teniendo como referencia, en este sentido, los enfoques clásicos (ver Martin, 2007, para una revisión). En este sentido, no se pueden olvidar los primeros acercamientos clásicos dentro de la psicología de la personalidad de autores como Eysenck (1942, 1943) o Cattell y Luborsky (1947), los cuales sirvieron como punto de partida para posteriores modelos basados en múltiples dimensiones (ej., Thorson & Powell, 1993). En este sentido, y a modo de ejemplo, se pueden destacar autores como Svebak (1974, 1996), el cual explicaba las diferencias individuales en el sentido del humor por variaciones en tres dimensiones: a) la habilidad (cognitiva) para tener una perspectiva irracional y alegre sobre las situaciones, observando el mundo como lo que podría ser, en lugar de lo que es; b) el gusto personal por el material humorístico, desde un punto de vista actitudinal; y c) la permisividad emocional, la cual alude al temperamento emocional. De una manera similar, Feingold y Mazzella (1991, 1993) explicaron el sentido del humor (*wittiness* = graciosidad) a partir de las diferencias individuales en tres dimensiones: a) cognición del humor; b) motivación hacia el humor; y c) comunicación del humor. Mientras la primera dimensión se relacionaba con variables intelectuales/cognitivas, las dos últimas lo hacían con variables sociales y temperamentales. El estudio del sentido del humor siguiendo la aproximación multidimensional se considera, por su carácter pionero en este campo,

suficiente para ejemplificar la manera de proceder, así como sirve de introducción al modelo que constituye las bases teóricas sobre las que se asienta la presente tesis doctoral, y que pasa a exponerse a continuación.

1.2. Modelo de las bases afectivas y cognitivas del sentido del humor

En la presente tesis doctoral, nos centraremos en uno de los modelos multidimensionales que más repercusión e importancia ha tenido en el campo de la psicología del humor, ya que ha permitido no solo guiar la investigación del sentido del humor sino también situar coherentemente los resultados alcanzados hasta la fecha. Se trata del modelo de las bases temperamentales del sentido del humor (Ruch, 1993, 2008; Ruch & Köhler, 2007; Ruch & cols., 1996, 1997).

1.2.1. Presentación del modelo

El modelo de las bases temperamentales del sentido del humor surgió a partir del estudio de las respuestas emocionales asociadas al humor (Ruch, 1990). Dicha respuesta, denominada hilaridad (de la raíz latina *hilaris* = *cheerful*), ha sido entendida como "un proceso facilitador del buen humor, o el aumento temporal, para a continuación pasar a disminuir lentamente, de un estado de alegría o buen humor" (Ruch & Köhler, 2007 p. 205). La propuesta no pretende ofrecer una respuesta a todas las conductas y procesos asociados con el humor, sino que se centra especialmente en su respuesta emocional. Aunque puede estar mediada culturalmente y ser modificada a través del tiempo, el sustrato afectivo-emocional del humor podría considerarse universal (Ruch & Köhler, 2007).

Los autores de la propuesta (Ruch, 1993; Ruch & cols., 1996, 1997) argumentan que la respuesta emocional asociada al humor está determinada por la influencia y modulación de tres factores inter-relacionados, tanto en su manifestación de estado como de rasgo: el *cheerfulness*, el *seriousness*, y el *bad mood*. El *cheerfulness* es una tendencia afectiva al sentido del humor y a estados afectivos positivos, caracterizada por un interés en querer participar, disfrutar, y promover situaciones en las que el humor está presente. El *bad mood* puede ser considerado su opuesto afectivo. En este sentido, predispone a estados afectivos negativos, a un bajo interés por participar en situaciones en donde el humor está presente, así como a un alto umbral para manifestar risa/sonrisa. Por su parte, el *seriousness* es un factor eminentemente cognitivo, ya que su concepción

alude a una actitud ante la vida, las situaciones, etc. caracterizada por pensamientos, reflexiones, y análisis rigurosos y en profundidad. A su vez, cada uno de estos factores está compuesto por una serie de facetas, tanto en su dimensión de rasgo como de estado (ver Tabla 1 para una breve descripción de las mismas), las cuales han sido extensamente analizadas (Carretero-Dios, Eid, & Ruch, 2011; Ruch & cols., 1996, 1997).

Tabla 1. Breve descripción de las facetas de las bases afectivas y cognitivas del sentido del humor, en su manifestación de rasgo y estado (adaptado de Ruch & Köhler, 2007).

FACETAS	BREVE DESCRIPCIÓN
Cheerfulness **Rasgo**	
CH1	Predominio de una afectividad alegre
CH2	Bajo umbral para la sonrisa y la risa
CH3	Visión sosegada de las adversidades de la vida
CH4	Extenso rango de estímulos que provocan la alegría y la sonrisa/risa
CH5	Estilo de interacción generalmente alegre
Seriousness **Rasgo**	
SE1	Predominio de un estado serio
SE2	Percepción constante de sucesos de la vida diaria como importantes y tendencia a considerarlos minuciosa y cuidadosamente
SE3	Tendencia a planear anticipadamente un amplio rango de objetivos, y alcanzar un estado lo más cercano a la armonía, con las decisiones y acciones que envuelven a esos objetivos
SE4	Tendencia a preferir actividades para las que se puedan dar razones racionales y concretas, y a considerar las actividades que no tienen un objetivo claro, como un desperdicio o sin sentido
SE5	Preferencia por un estilo de comunicación sobrio, orientado al objeto, diciendo lo que exactamente uno quiere decir sin exageraciones o matices sarcásticos o

	irónicos
SE6	Actitud no humorística hacia las personas, comportamientos, situaciones, acciones, roles, etc., que se relacionan con la alegría
Bad mood Rasgo	
BM1	Predomino del mal humor
BM2	Predominio de la tristeza (abatimiento, decaimiento, etc)
BM3	Comportamientos y actitudes tristes ante circunstancias evocadoras de alegría, y hacia las situaciones, personas, objetos, y roles envueltos
BM4	Sentirse frecuentemente malhumorado (gruñón, taciturno, cascarrabias, etc)
BM5	Comportamientos y actitudes malhumoradas ante circunstancias evocadoras de alegría, y hacia las situaciones, personas, objetos, y roles envueltos
Cheerfulness Estado	
Afectividad alegre	Presencia de un estado afectivo alegre, más tranquilo, sosegado
Hilaridad	Presencia de un estado afectivo de alborozo, regocijo, superficial y expresivo
Seriousness Estado	
Seriedad	Presencia de una actitud y visión serias y objetivas de las situaciones, con un estilo orientado a la tarea
Reflexión	Presencia de una actitud pensativa y de reflexión hacia las cosas
Formalidad	Presencia de un estado de ánimo de sobriedad y sosiego
Bad mood Estado	
Tristeza/melancolía	Presencia de un estado de melancolía o tristeza
Mal humor	Presencia de un estado malhumorado, gruñón, quejumbroso, cascarrabias

Según Ruch y colaboradores (1996, 1997), mientras que el *cheerfulness* favorece la respuesta emocional de hilaridad, el *seriousness*, y el *bad mood* contribuyen a

desencadenar una inhibición de dicha respuesta. Adicionalmente, la reacción afectiva puede ser matizada en función de la relación de estos factores. Así, por ejemplo, mientras que altos niveles de *cheerfulness* y *seriousness*, unidos con bajos niveles de *bad mood*, favorecería la emoción de hilaridad asociado con un humor más "elaborado" y "reflexivo", la combinación de una actitud seria (*seriousness*) con una disposición afectiva negativa (*bad mood*), llevaría a la "falta de humor".

Hace ya una década, Ruch y Köhler (2007) presentaron una revisión de los postulados definitorios de esta aproximación, concluyendo que el humor: a) no es un constructo unidimensional, ya que existen diferencias individuales en más de una dimensión del humor, por lo que su estudio debe abordarse desde un punto de vista multidimensional; b) no es unipolar, teniéndose que considerar también la falta de humor; c) necesita cubrir factores afectivos y del estado de ánimo, ya que los estados momentáneos necesitan estar relacionados con disposiciones afectivas y del estado de ánimo de relativa estabilidad; d) Además, habría que reconocer que el sentido del humor como disposición varía intra e interpersonalmente y que la utilización de los mismos conceptos para estado y rasgo nos permitirá estudiar la relevancia de la disposición habitual y actual; e) Por último, es importante definir algunos rasgos que se consideren relevantes para el campo del sentido del humor y que el constructo sentido del humor debería predecir.

1.2.2. Contextualizando el estado-rasgo

¿Es lo mismo la dimensión de rasgo y de estado cuando hacemos referencia a la definición y evaluación de una característica de personalidad concreta o, por el contrario, son dimensiones complementarias pero claramente diferenciadas de un mismo constructo?

Por rasgo, en esencia, se entiende una predisposición relativamente estable a comportarse y reaccionar de una determinada forma ante una variedad de estímulos y situaciones, lo que nos permitiría, por ejemplo, anticipar o predecir la respuesta de una persona ante un contexto específico. Por su parte, el estado se refiere a una reacción momentánea ante un estímulo y situación concretos, por lo que se encuentra limitado temporalmente. En este sentido, el contexto/situación sería fundamental en el estado para predecir y explicar la respuesta dada por una persona ante un estímulo concreto

(véase Hamaker, Nesselroade, & Molanaar, 2007 para una revisión conceptual de estados frente a rasgos)

Desde la perspectiva de la psicología de la personalidad, la diferenciación entre dimensiones de rasgo y de estado ha sido una de las temáticas que más ha interesado a los investigadores (Eysenck, 1992; Spielberger, 1966). Por ejemplo, respecto a la ansiedad, se han estudiado las diferencias en estabilidad temporal, desde un punto de vista psicométrico, de los rasgos *versus* estados (Vautier, 2004), y se ha encontrado que las diferencias en rasgo *versus* estado de ansiedad modulan diferencialmente las redes atencionales (Pacheco-Unguetti, Acosta, Lupiáñez, & Callejas, 2010).

En un sentido similar, y como se apuntó anteriormente, Ruch y colaboradores (Ruch, 1993; Ruch & Köhler, 2007, Ruch & cols., 1996, 1997) proponen que la evaluación de las diferencias individuales en sentido del humor debe tener en cuenta las variaciones inter- e intra- individuos. Los seres humanos podemos ser diferenciados debido al sentido del humor de dos formas diferentes. La primera es la tendencia, inclinación, etc., a apreciar, producir, y manifestar humor de una forma relativamente estable a través del tiempo y de las situaciones (lo que sería un rasgo de humor), mientras que la segunda alude a una disposición momentánea a responder humorísticamente ante una situación y momento determinados (lo que sería un estado de humor). Por ello, en su modelo, las diferencias individuales en sentido del humor (*cheerfulness*, *seriousness*, y *bad mood*) pueden manifestarse tanto en rasgo como en estado (ver Tabla 1 para una revisión de todas las facetas).

1.2.3. Inventario Estado-Rasgo de Cheerfulness (STCI)

En su afán por ofrecer un marco teórico pertinente para el estudio de las diferencias individuales que determinen o expliquen las respuestas emocionales al humor, Ruch y sus colaboradores desarrollaron un inventario que permite evaluar las bases afectivas y cognitivas del sentido del humor, tanto desde una perspectiva de rasgo (Ruch & cols., 1996) como de estado (Ruch & cols., 1997). Dichas escalas fueron desarrolladas inicialmente en alemán y, siguiendo una serie de procesos estandarizados para la traducción y adaptación de las mismas, se construyeron las versiones en inglés, las cuales han sido consideradas como el instrumento de evaluación de referencia de las bases temperamentales del sentido del humor.

La versión rasgo de la escala está compuesta por 106 ítems con el objetivo de evaluar los pensamientos y sentimientos habituales de las personas en relación al *cheerfulness* (38 ítems; por ejemplo: "mi estilo de vida me hace ver lo bueno de los acontecimientos negativos"); el *seriousness* (37 ítems; por ejemplo: "me considero una persona reflexiva"); y el *bad mood* (31 ítems; por ejemplo: "no me gusta estar con la gente que está siempre haciendo tonterías") a través de una escala tipo Likert de cuatro opciones de respuesta (1 = "totalmente en desacuerdo," 2 = "moderadamente en desacuerdo," 3 = "moderadamente de acuerdo," y 4 = "totalmente de acuerdo"). Sus propiedades psicométricas son adecuadas, con valores alfa de Cronbach entre .86 y .96, y una fiabilidad *test-retest* para un intervalo de 4 semanas entre .77 y .86 (Ruch & cols., 1996). Las adaptaciones con muestras independientes de diferentes países también han corroborado sus propiedades (ej., Chen, Ruch, & Li, 2016).

Por su parte, la versión estado evalúa *cheerfulness* (ejemplo: "ahora podría reírme de cualquier cosa"), *seriousness* (ejemplo: "me noto predispuesto hacia temas serios"), y *bad mood* (ejemplo: "estoy de un humor pésimo"), mediante 10 ítems por factor, empleando el mismo tipo de opción de respuesta que en el caso de la escala rasgo. La diferencia más importante con respecto a ésta es que se pretende captar las disposiciones momentáneas, por lo que se pregunta por los pensamientos y sentimientos que la persona tiene en el mismo momento de completarla. Como en el caso del inventario rasgo, se han hallado buenas propiedades psicométricas para esta escala. El valor del alfa de Cronbach oscila entre .85 y .94, mientras la correlación *test-retest* es más baja, de .33 a .36 (Ruch & cols., 1997; Ruch & Köhler, 2007). Este último resultado es muy relevante, ya que indica que los ítems son sensibles a las variaciones producidas en el medio ambiente, reflejando, por tanto, las fluctuaciones momentáneas que caracterizan a los estados afectivos.

El STCI, además de situarse coherentemente en un espacio teórico sobre diferencias individuales de personalidad (Ruch & Köhler, 2007), ha permitido predecir las manifestaciones emocionales y conductuales asociadas al humor (Ruch, 1997), así como relacionar las bases temperamentales del sentido del humor con la salud física, el bienestar psicológico, o las interacciones sociales (ver Ruch & Hofmann, 2012, para una revisión).

En la presente tesis doctoral, llevaremos a cabo dos estudios psicométricos con el objetivo de adaptar la STCI a población española, tanto en su versión de rasgo (*Estudio 1*) como de estado (*Estudio 2*), para obtener un punto de partida que nos permita analizar la modulación del *cheerfulness* sobre procesos cognitivos y afectivos.

1.2.4. Algunas notas aclaratorias sobre la dimensión cheerfulness

Dentro del modelo de las bases temperamentales del sentido del humor, el *cheerfulness* ha sido el factor que más atención ha recibido, contándose con una gran cantidad de conocimientos en torno a dicha dimensión (véase, para una revisión, Ruch & Hofmann, 2012). En la presente tesis doctoral, centraremos nuestra atención en el análisis y profundización de esta predisposición afectiva. En el esquema representado en la Figura 1, pueden observarse las principales relaciones que establecen los autores y los planteamientos que han guiado la investigación sobre el factor *cheerfulness* desde sus inicios.

Como puede observarse en la Figura 1, las bases afectivas y cognitivas del sentido del humor, como estado y rasgo, se encuentran estrechamente vinculadas. De hecho, diferentes análisis han mostrado que las dimensiones estado-rasgo correlacionan positivamente con sus homólogos, reflejando que los rasgos representan las disposiciones para sus respectivos estados (Ruch & cols., 1997). En este sentido, y focalizándonos concretamente en el factor *cheerfulness*, se han postulado cinco tipos de relaciones entre el rasgo y el estado (Ruch & Hofmann, 2012; Ruch & Köhler, 2007). De esta manera, las personas con alto *cheerfulness* rasgo, en comparación con las de bajo *cheerfulness* rasgo: 1) tienen una mayor facilidad para mostrar *cheerfulness* estado, necesitando estímulos menos potentes para alcanzar dicho estado (umbral de entrada); 2) muestran una mayor capacidad para mantener un alto nivel de *cheerfulness* estado, incluso ante la presencia de eventos negativos (robustez); 3) tienen una mayor experiencia del *cheerfulness* estado (intensidad); 4) también, mantienen de manera más prolongada el *cheerfulness* estado (duración), hasta que éste disminuye de una forma natural; y 5) ante un descenso del *cheerfulness* estado como consecuencia de una exposición a una estimulación negativa, tienen una mayor habilidad para recuperar el *cheerfulness* estado de una manera más rápida y eficaz (velocidad de recuperación).
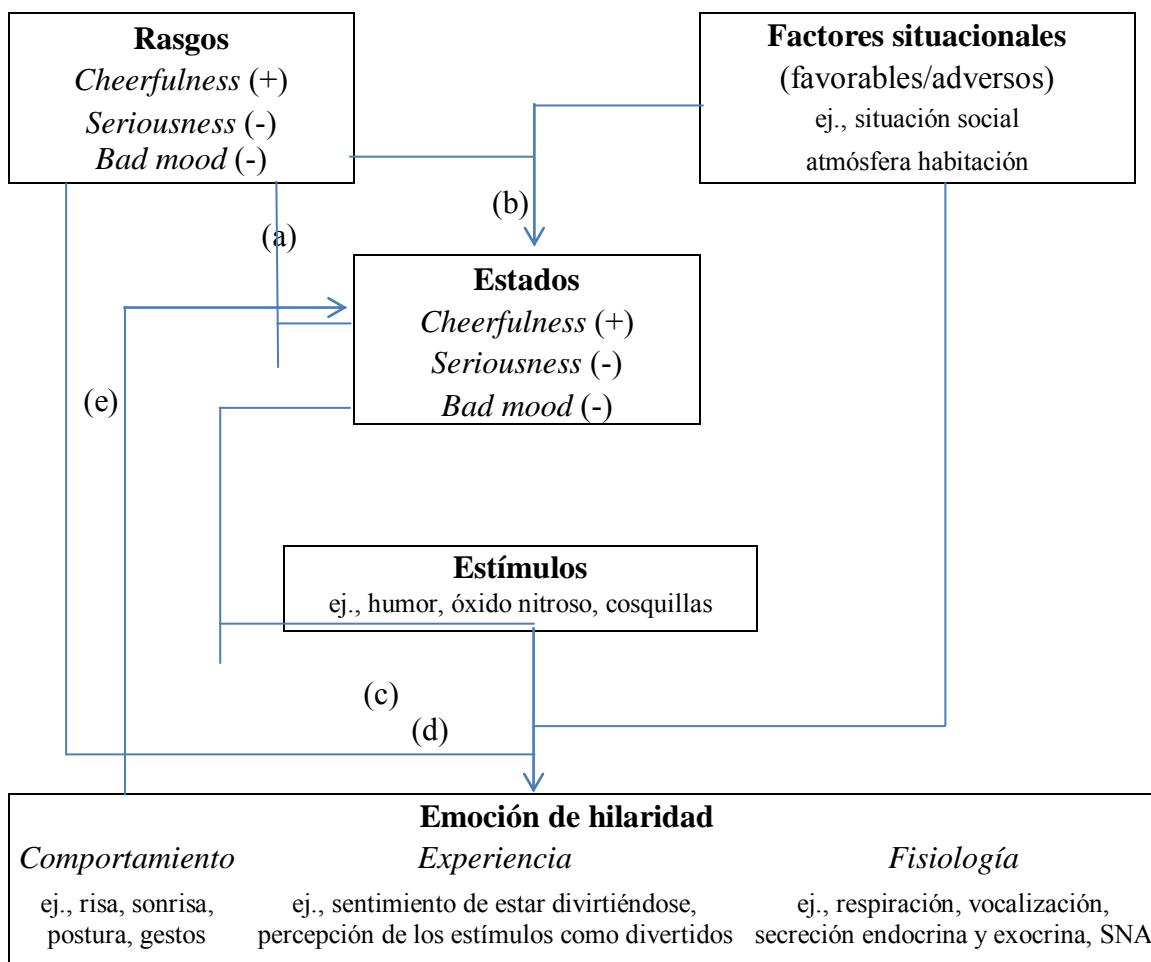
Figura 1. Diagrama de variables y sus relaciones. Las preguntas de investigación hacen referencia a: a) el estudio de las relaciones estado-rasgo, mostrando que los rasgos representan las disposiciones para sus respectivos estados, b) cómo el *cheerfulness* rasgo modera el efecto de la adversidad sobre el estado, minimizando el impacto negativo de la misma, si el *cheerfulness* c) estado y d) rasgo representan las disposiciones para la sonrisa y la risa, y e) el efecto de la sonrisa y la risa en el estado (adaptado de Ruch & Köhler, 2007).

En relación con lo anterior, el modelo también asume que el factor *cheerfulness* rasgo modula el efecto de los factores situacionales sobre las manifestaciones de *cheerfulness* estado. En este sentido, numerosos estudios han reflejado que los individuos caracterizados por un nivel elevado de *cheerfulness* rasgo, en comparación con personas con bajo *cheerfulness* rasgo, muestran un aumento en su *cheerfulness* estado reportado (Ruch, 1997; Ruch & Stevens, 1995; Thompson, Hasenöhrl, & Ruch, 2004). Más importante aún, se postula que, al igual que los factores situacionales y los estímulos humorísticos, la dimensión *cheerfulness,* tanto en sus manifestaciones estado

como rasgo, afectan a las disposiciones habituales y momentáneas, respectivamente, de la emoción de hilaridad (Ruch, 1997), observada a través de la cuantificación de parámetros como la duración, la intensidad, o la frecuencia de respuestas conductuales, experienciales, y fisiológicas. Dado que el estado es una disposición momentánea, también cabría esperar que la propia emoción de hilaridad, mediante un proceso de retroalimentación, produjera cambios en el estado de *cheerfulness* (Ruch 1997; Ruch & Köhler, 2007).

Adicionalmente, se han recabado datos con el objetivo de explorar si el *cheerfulness* rasgo, además de relacionarse con el estado y con la hilaridad, predice (o se relaciona) con otras dimensiones del humor medidas a través de diferentes instrumentos (ej., *Humor Styles Questionnaire*, HSQ; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003; *Humorous Behavior Q-Sort Deck*, HBQD; Craik, Lampert, & Nelson, 1993). En este sentido, los datos apuntan en la dirección de que el *cheerfulness* rasgo predice la mayoría de facetas del sentido del humor, siendo asociado con estilos de humor afiliativos y de auto-mejora, así como con un humor socialmente "cálido" (Ruch, Proyer, Esser, & Mitrache, 2011).

1.3. Correlatos del *cheerfulness* estado y rasgo

Además de los estudios llevados a cabo para testar cómo el *cheerfulness*, tanto en su dimensión rasgo como estado, predice la respuesta de humor, también se ha analizado sus implicaciones en otras áreas, tales como la salud física, psicológica, o las interacciones sociales. A continuación, describiremos los principales correlatos del *cheerfulness*.

1.3.1. Cheerfulness y salud física

Tradicionalmente, la salud física ha sido considerada como un tema de especial relevancia en el ámbito de la psicología. Dicho interés se ha acrecentado, en parte, gracias al nuevo prisma con el que es analizada (tal y como se apuntó más arriba), a través del cual se hace especial hincapié en la promoción del bienestar físico, en lugar de centrarse exclusivamente en la mera ausencia de dolencias y trastornos. En consecuencia, en vez de explorar el impacto negativo de las emociones sobre las enfermedades, actualmente se ha desarrollado una corriente de estudios que van dirigidos a analizar el potencial beneficio de las emociones positivas y, en cuanto al

tema de esta tesis, del *cheerfulness*, en la salud, las quejas somáticas, y los procesos de recuperación (véase, para una revisión, Papousek & Schulter, 2010; Ruch & Hofmann, 2012).

Numerosas investigaciones han puesto de manifiesto que el impacto afectivo producido como consecuencia de ser expuesto a eventos negativos y estresantes es más reducido para las personas bajo un estado afectivo positivo o que tienen una disposición al mismo (Folkman & Moskowitz, 2000; Ruch & Zweyer, 2001). Además, diversos estudios han observado que las constantes psicofisiológicas de este tipo de personas regresan a un estado de línea base anterior a la exposición de un evento negativo con una mayor rapidez y eficiencia (Tugade, Fredrickson, & Barrett, 2004). Por ejemplo, Tugade y Fredrickson (2004) demostraron que las personas que eran capaces de emplear las emociones positivas para recuperarse de eventos negativos, como puede ser la preparación de un discurso, mostraban una recuperación cardiovascular más rápida ante ellos.

También se ha demostrado que los individuos caracterizados por mostrar disposiciones afectivas positivas, los cuales suelen analizar las situaciones adversas de la vida desde un punto de vista menos amenazante y con una mayor serenidad, tienden a tener menor riesgo de padecer enfermedades cardiovasculares (Kucharska-Newton & cols., 2014), así como una mejor recuperación tras períodos de dolor (Finan & Garland, 2015). Por otro lado, algunos autores han señalado que el *cheerfulness*, junto con la producción de humor, son factores que ayudan a la tolerancia al dolor. Por ejemplo, Zweyer, Velker, y Ruch (2004) hicieron que un grupo de participantes vieran una película divertida mientras realizaban una de las siguientes tareas: a) ver la película sin reír ni sonreír; b) reír y sonreír a carcajadas; y c) elaborar un comentario humorístico sobre la misma. Además, los participantes rellenaron la STCI-T y fueron sometidos a la prueba de "resistencia al frío" --en la que tenían que meter la mano en un cubo con agua helada y aguantar todo lo posible-- antes, inmediatamente después y transcurridos 20 minutos del visionado del *film*. Los resultados mostraron que las personas caracterizadas por un mayor *cheerfulness* rasgo que habían tenido que hacer un comentario humorístico fueron los que mostraron una mayor tolerancia al dolor.

En una línea reciente de estudio, algunos trabajos han puesto de relieve que los individuos que suelen experimentar más emociones positivas y/o *cheerfulness*, no

solamente no muestran más síntomas físicos ante eventos de la vida negativos (Ruch & Köhler, 1999; Ruch & Zweyer, 2001), sino que reportan más salud y bienestar físico, así como menor gravedad percibida de enfermedad, quejas somáticas, y dolor crónico, incluso cuando su estado de salud físico es similar al de otras personas, independientemente de su edad (Delgado-Domínguez, Font-Ugalde, Ruiz-Vílchez, Carretero-Dios, & Collantes-Estévez, 2014; Pressman & Cohen, 2005; Thomsen & cols., 2004). Por ejemplo, Delgado-Domínguez, Escudero-Contreras, Font-Ugalde, Ruiz-Vílchez, Collantes-Estévez, y Carretero-Dios (2016) exploraron si el *cheerfulness* estado se asociaba con indicadores relacionados con la actividad de la artritis reumatoide, encontrando que las personas con un alto nivel de *cheerfulness* estado en el momento de la evaluación no solo reportaban menor actividad percibida de dicha enfermedad, sino menores valores de la proteína C-reactiva, como un parámetro complementario "objetivo" ligado al desarrollo de la enfermedad.

1.3.2. Cheerfulness y bienestar psicológico y social

Tal y como se acaba de describir en el apartado anterior, la disposición a mostrar emociones positivas produce, en general, toda una serie de mejoras en la salud. No obstante, tan importante es para los seres humanos tener un estado físico saludable como un bienestar psicológico y social adecuado. Generalmente, queremos sentirnos bien, estar a gusto, ser felices y, al mismo tiempo, interactuar y sentirnos apoyados por las demás personas. En este apartado, repasaremos el estudio de las relaciones entre el *cheerfulness* y el bienestar socio-emocional.

Actualmente, existe bastante consenso en la modulación que ejerce el *cheerfulness*, como disposición afectiva positiva al sentido del humor, sobre el bienestar psicológico. Así, una gran cantidad de estudios han puesto de manifiesto que las personas caracterizadas por un mayor *cheerfulness* rasgo: a) reportan una mayor calidad y satisfacción subjetiva con la vida (Gorovoy, 2009; Schimmack, Oishi, & Funder, 2004), lo que les lleva a una valoración de la vida como más bella (Bastian, Kuppens, De Roover, & Diener, 2014); b) se caracterizan por rasgos de personalidad relacionados con la promoción de la salud, como la extroversión, la apertura a la experiencia, y la agradabilidad, al mismo tiempo que no suelen adolecer de problemas físicos y psicológicos (Ruch & Köhler, 2007; Wrench & McCroskey, 2001); y c) suelen reportar

y expresar más afecto positivo y menos negativo (Köhler & Ruch, 1996; Ruch, 1997), promoviendo, por tanto, una mejor resiliencia y afrontamiento ante la adversidad.

Dado que el *cheerfulness* promueve la mejora de la salud de los individuos, tanto desde un punto de vista físico como psicológico, no es de extrañar que, paralelamente, también tenga repercusiones positivas en cuanto a interacciones sociales se refiere. En este sentido, las personas que reflejan una mayor tendencia a las emociones positivas suelen mostrar una mayor predisposición a tener cercanía y contacto social con los demás (Ruch & Köhler, 2007), lo que se traduce en un mayor apoyo social, así como en un desarrollo de lazos afectivos y sociales de alta calidad, percibiendo las interacciones, por tanto, como más gratificantes y reforzadoras que las personas con bajo *cheerfulness* rasgo (Berry, Willingham, & Thayer, 2000; Steptoe, O'Donnell, Marmot, & Wardle, 2008). Además, y al mismo tiempo que están más dispuestos a tener más interacciones sociales, muestran mayores habilidades socio-emocionales para llevarlas a cabo (Machell, Kashdan, Short, & Nezlek, 2015). Por ejemplo, Yip y Martin (2006) observaron que el *cheerfulness* rasgo correlacionaba positivamente con el factor manejo emocional del *Mayer-Salovey-Caruso Emotional Intelligence Test* (MSCEIT; Mayer, Salovey, & Caruso, 2002a). En línea con este resultado, se ha postulado también que las personas con alta disposición a las emociones positivas muestran una mayor inteligencia emocional (Wrench & McCroskey, 2001), se relacionan con fortalezas que hacen referencia a interacciones sociales de una manera empática (Beermann & Ruch, 2009a), y emplean estilos humorísticos afiliativos, sociales, y positivos (Martin & cols., 2003).

1.3.3. Cheerfulness y procesos cognitivos

Durante mucho tiempo, desde que Platón postuló que el alma podía estudiarse de manera independiente en torno a los ámbitos de la cognición, la emoción, y la motivación, se han investigado de manera aislada los procesos cognitivos y los procesos afectivos. Sólo desde el final del siglo pasado y tras importantes debates (Lazarus, 1984; Leventhal & Scherer, 1987; Zajonc, 1980), se ha afianzado el estudio de las interrelaciones entre lo cognitivo y lo afectivo, no solamente a nivel comportamental sino también neurobiológico (LeDoux, 2000; Pessoa, 2008).

No obstante, y a pesar de que se ha descrito en la literatura la relevancia que el *cheerfulness* ha mostrado en relación a procesos tales como el humor o la salud, tanto física como psicológica (Papousek & Schulter, 2010; Ruch & Hofmann, 2012), hasta la

fecha no han sido abordadas, de una manera sistemática, las potenciales fortalezas que este factor puede desempeñar en procesos de índole cognitiva. No obstante, cabe esperar que sus efectos sean semejantes a los de otras emociones positivas, los cuales se exponen a continuación.

Una de las propuestas teóricas que goza de gran aceptación por parte de la comunidad científica y que ha servido de marco de estudio del efecto de las emociones positivas sobre los procesos cognitivos ha sido la denominada *broaden-and-build* (véase, por ejemplo, Fredrickson, 1998, 2001), la cual se encuentra enmarcada dentro de la psicología positiva. La idea principal que sustenta esta teoría es que las emociones positivas y negativas no son isomórficas, sino que son distintas y complementarias, persiguiendo ambas objetivos adaptativos a través de diferentes "vías de actuación". Esto es, mientras que las emociones negativas estrecharían el repertorio comportamental y de pensamiento para dirigir los esfuerzos al foco aversivo, las emociones positivas producirían lo contrario, es decir, una ampliación del repertorio conductual y de los pensamientos, lo cual estaría ligado a una mayor consideración y percepción de los aspectos presentes en el medio ambiente. Esto, a su vez, produciría toda una serie de resultados positivos tanto a corto como a largo plazo.

De esta manera, a corto plazo, un estado afectivo positivo (o la disposición al mismo), estaría asociado con una mayor flexibilidad cognitiva, medida como una mayor facilidad para cambiar la atención de unas demandas a otras, con una mayor creatividad, con mejoras para planificar y resolver problemas, así como con una mejor interacción con el medio ambiente, produciendo una mejor adaptación a los cambios presentes en el mismo (Compton, Wirtz, Pajoumand, Claus, & Heller, 2004; Derryberry & Tucker, 1994; Isen, 2003; Rowe, Hirsh, & Anderson, 2007; Wadlinger & Isaacowitz, 2006). A su vez, dichas "ventajas" producirían mejoras a largo plazo a la hora de construir toda una serie de refuerzos personales (Fredrickson, 1998, 2001), los cuales pueden ser psicológicos (Folkman & Moskowitz, 2000), sociales (Lee, 1983), intelectuales (Lesley, 1987), y/o físicos (Boulton & Smith, 1992).

En la presente tesis doctoral, llevaremos a cabo dos estudios (*Serie Experimental I*), con el objetivo de analizar si el *cheerfulness* rasgo ejerce una modulación sobre los procesos de flexibilidad cognitiva en un paradigma de cambio de tarea.

1.4. *Cheerfulness* y emociones

Hasta aquí, se ha ofrecido una visión de los principales postulados del modelo de las bases afectivas y cognitivas del sentido del humor, al mismo tiempo que se ha revisado la relevancia y repercusión que el *cheerfulness* ha tenido sobre ámbitos tan diferenciados como el humor, y la salud, tanto física como psicológica, así como sus posibles relaciones con procesos de índole cognitiva. Mención aparte merece su relación con las emociones.

Como se ha ido desgranando a lo largo de la presente introducción, el *cheerfulness* es una disposición al sentido del humor inherentemente ligada a estados afectivos positivos, así como a su experimentación, manifestación, potenciación, y disfrute (Ruch & Köhler, 2007). Además, se ha descrito anteriormente que el *cheerfulness* rasgo tiene bondades equivalentes a las observadas para las emociones positivas, como un mejor y más estable bienestar psicológico, menor reporte de enfermedades, quejas, y dolor crónico, así como unas interacciones sociales de mayor calidad (Papousek & Schulter, 2010). Por otra parte, se ha puesto de manifiesto cómo el *cheerfulness* estado es modificado cuando los individuos son expuestos a estimulación afectiva de diversión (Ruch & cols., 1997). De manera importante, también se ha subrayado que las diferencias individuales en *cheerfulness* rasgo predicen y modulan la respuesta afectiva de la hilaridad, como emoción positiva asociada al humor, así como del *cheerfulness* estado, ante exposiciones a material afectivo divertido (Ruch & Hofmann, 2012). Por ejemplo, Ruch (1997) indujo en su estudio estados afectivos de diversión o neutral a través de la conducta que el experimentador mostraba hacia los participantes. Los resultados indicaron que las personas caracterizadas por un nivel elevado de *cheerfulness* rasgo mostraban un mayor incremento en la manifestación experiencial y conductual de la inducción de diversión en comparación con un grupo de personas con bajo *cheerfulness* rasgo.

A continuación, se intentará ofrecer un marco de referencia de las emociones, que nos ayude a comprender la relevancia de los estudios de la presente tesis doctoral, en la que utilizamos procedimientos de inducción y de regulación emocional.

1.4.1. Sobre las emociones

Las emociones están presentes en nuestra vida diaria. De hecho, estamos continuamente expuestos a estímulos afectivos que desencadenan en nosotros experiencias emocionales. Así, nos alegramos cuando alguien nos da una buena noticia, nos enfadamos y nos ponemos tristes cuando las cosas no resultan como habíamos esperado, etc. Pero, ¿qué se entiende cuando nos referimos a la emoción?

En la actualidad, la mayoría de los teóricos la han abordado a partir de los componentes que la forman (Scherer, 2005). En este sentido, la emoción se caracteriza por ser un estado afectivo breve (episódico) e intenso que facilita la adaptación al medio, está mediada por procesos de *appraisal*, y se acompaña por cambios en los componentes que la forman, entre los que se destacan la experiencia emocional, los elementos motivacionales-instrumentales, los cambios corporales, tanto centrales como autonómicos/periféricos, y las manifestaciones comportamentales-expresivas.

Adicionalmente, han surgido importantes debates en torno a la convergencia de dichos componentes y a si su estudio debe abordarse a partir de una determinada combinación de los mismos. Siguiendo a Scherer (2005), los diferentes componentes que forman una emoción convergen y son desencadenados de un modo sincronizado. En línea con esta idea, algunos planteamientos han señalado que las emociones, o algunas de ellas, pueden ser observadas y analizadas en términos de un patrón específico de combinación de sus componentes (Ekman & Cordano, 2011). Sin embargo, desde una perspectiva constructivista (Rusell, 2003; Russell & Feldman Barrett, 1999), se postula que los componentes que construyen y dan significado a la emoción pueden ser observados con independencia de la co-ocurrencia de los demás, hecho que parece respaldar la mayoría de los estudios (ver Mauss & Robinson, 2009, para una revisión), así como que su análisis debe realizarse en relación a su ubicación en dimensiones globales, como valencia o activación.

1.4.2. Procedimientos y medidas de inducción emocional

Un aspecto relevante en las investigaciones sobre las emociones hace referencia a la importancia de emplear procedimientos de inducción afectiva que garanticen que los datos observados/registrados están vinculados con el procesamiento afectivo. Por tanto, es crucial el desarrollo y uso de procedimientos eficaces y estandarizados en un

contexto de laboratorio. En este sentido, desde hace unos años se ha producido la creación de diferentes instrumentos estandarizados (*International Affective Picture System*, IAPS; Lang, Bradley, & Cuthbert, 1999; *Affective norms for English Words*, ANEW; Bradley & Lang, 1999; *International Affective Digitized Sound System-2*, IADS-2; Bradley & Lang, 2007; Samson, Kreibig, Soderstrom, Wade, & Gross, 2015).

Los procedimientos de inducción afectiva han sido muy variados (Lench, Flores, & Bench, 2011). Algunos de ellos han pretendido inducir estados afectivos distintivos (Fernández, Pascual, Soler, & Fernández-Abascal, 2011) mientras que otros se han centrado en las características que definen la emoción desde un punto de vista dimensional (Lang & cols., 1999). A continuación, se describen los procedimientos y medidas de inducción emocional especialmente relacionados con los que utilizamos en nuestras investigaciones.

Una de las manipulaciones experimentales para inducir estados afectivos que más se ha empleado han sido los *clips* de películas, los cuales son animaciones breves y dinámicas (Fernández & cols., 2011). Poseen una alta validez ecológica integrando, además, diferentes modalidades sensoriales, y permiten una estandarización tanto de los estímulos como del procedimiento (Rottenberg, Ray, & Gross, 2007). Sin embargo, se consideran estímulos complejos en donde los aspectos cognitivos de la propia persona juegan un rol relevante, además de que no se produce una implicación en primera persona, lo que puede afectar a los matices propios de la inducción emocional (Lench & cols., 2011).

Otros procedimientos han consistido en las afirmaciones auto-referentes (Velten, 1968). En este caso, se instruye a los individuos para que experimenten un determinado estado y, posteriormente, deben leer una serie de afirmaciones relacionadas con dicho estado afectivo. Aunque originalmente se desarrolló para inducir el estado afectivo desde un punto de vista dimensional, se han llevado a cabo algunos intentos para evaluar emociones discretas (Carter & cols., 2002). Por otro lado, algunos autores han combinado este método con otros procedimientos, como el IAPS (Lang & cols., 1999), el cual consiste en la presentación de estímulos pictóricos de corta duración (validados en las dimensiones de valencia, activación, y dominancia), para reforzar la inducción afectiva objetivo así como para ayudar a crear estados afectivos más distintivos (Pacheco-Unguetti & cols., 2010; Pérez-Dueñas, Acosta, & Lupiáñez, 2014).

Dentro de las medidas empleadas para evaluar los diferentes sistemas de respuesta que componen la emoción, una de las más utilizadas ha sido el auto-informe, el cual permite captar el grado de la experiencia "subjetiva" reportada que tiene un individuo a través de escalas (generalmente de tipo Likert). Algunos autores han señalado que son más eficaces cuando se refieren a experiencias emocionales momentáneas, en comparación con aquellas que son generales o pasadas (Robinson & Clore, 2002). Aunque es una medida estandarizada, rápida, y fácil de aplicar, adolece de algunas limitaciones, como que es sencillo falsearlo (Paulhus & John, 1998) y que puede que no recoja fielmente la experiencia afectiva debido a aspectos como la incapacidad para describirlo por parte del individuo (Lane, Ahern, Schwartz, & Kaszniak, 1997).

Por otro lado, existe una amplia gama de instrumentos "objetivos" para operacionalizar otros componentes de la emoción, como el fisiológico (ver Mauss & Robinson, 2009, para una revisión). Dentro del espectro de manifestaciones fisiológicas que covarían con los estados afectivos (ver Kreibig, 2010, para una revisión), los parámetros más comunes se han centrado en el análisis de la respuesta electrodermal, como la conductancia eléctrica de la piel, la cual está ligada a la activación (Bradley & Lang, 2000b), y cardiovascular, como la tasa cardíaca, la cual se halla asociada a la valencia del estímulo (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000). Por tanto, las medidas del Sistema Nervioso Autónomo (SNA) parecen ser más sensibles a la emoción desde un punto de vista dimensional, en lugar de mostrar un patrón específico distintivo para cada una de ellas (Mauss & Robinson, 2009).

Finalmente, otras medidas se han focalizado en los componentes comportamentales, como expresión vocal (Bachorowski, 1999), movimientos corporales (Van den Stock, Righart, & de Gelder, 2007) y, especialmente, expresión facial (Ekman, Friesen, & Hager, 2002), ya que se considera un indicador fiable del estado emocional de una persona, especialmente desde una construcción dimensional (Russell, 1994), o aquellas que se centran en los cambios del Sistema Nervioso Central (SNC), las cuales contribuyen indudablemente a la comprensión de las zonas cerebrales, así como a las interacciones y conexiones entre ellas, implicadas en el procesamiento emocional y afectivo (ej., Harmon-Jones, Lueck, Fearn, & Harmon-Jones, 2006; Leppänen & Nelson, 2009; Murphy, Nimmo-Smith, & Lawrence, 2003; Silvers, Buhle, & Ochsner, 2013).

Uno de los objetivos de la presente tesis doctoral será evaluar las potenciales relaciones entre el *cheerfulness* rasgo-estado y los procesos de inducción emocional. Para ello, pretendemos inducir estados afectivos de diversión, neutrales, y de tristeza (*Serie Experimental II* y *IV*) por medio de una base de datos validada de *films* (Fernández, Pascual, Soler, Elices, Portella, & Fernández-Abascal, 2012; Fernández & cols., 2011), así como estados de alegría y ansiedad empleando un procedimiento que combina afirmaciones auto-referentes con fotografías del IAPS (*Serie Experimental III*). En todos los estudios llevados a cabo, además del *cheerfulness* estado (STCI-S), se recogerán medidas de auto-informe tanto discretas (Escala de Valoración del Estado de Ánimo, EVEA; Sanz, Gutiérrez, & García-Vera, 2014; *Discrete Emotions Scale,* DES; Izard, Dougherty, Bloxom, & Kotsch, 1974) como dimensionales (*Self-Assessment Manikins*, SAM; Bradley & Lang, 1994), y medidas psicofisiológicas, como la tasa cardíaca y la conductancia eléctrica de la piel (Estudio 2 de la *Serie Experimental II*).

1.4.3. Regulación emocional y cheerfulness

Un tema de gran interés en la psicología y la neurociencia es cómo regulan las personas sus propias emociones. La regulación emocional alude a los procesos, ya sean automáticos e involuntarios o controlados y reflexivos, a través de los cuales los individuos influencian sus emociones, cómo y cuándo las sienten así como en qué medida las expresan (Gross, 1998a).

James Gross desarrolló hace ahora ya casi dos décadas un modelo teórico centrado en procesos que generan la emoción para describir diversas estrategias de regulación (Gross, 1998b). En la Figura 2 se ilustra su modelo. De acuerdo con el autor, existen cinco fases o pasos que guían el proceso de generación de una emoción: a) selección de la situación, la cual se refiere a la elección inicial por parte de un individuo de una determinada situación frente a otra; b) modificación de la situación con el objetivo de alterar el impacto afectivo que genera; c) despliegue atencional, el cual alude a la importancia de seleccionar aquellos aspectos de la situación sobre los que la persona se va a centrar; d) cambio cognitivo, que se refiere al significado personal que se atribuye a un aspecto de la situación previamente elegido; y e) modulación de las respuestas afectivas en todos o en algunos de sus componentes (experienciales, comportamentales, y/o fisiológicas). En el modelo, tiene especial relevancia el momento de la secuencia de acontecimientos en el que se utiliza cada estrategia. En este sentido, se diferencian las

que intervienen en el proceso de generación de la emoción (centradas en el antecedente) de las que modulan la emoción ya generada (centradas en la respuesta).
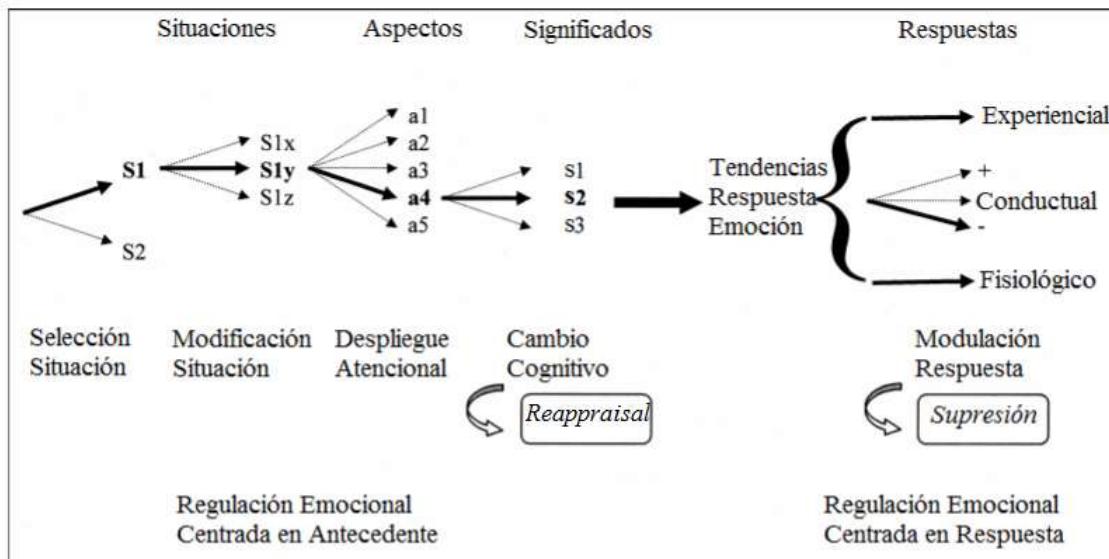
Figura 2. Modelo de regulación emocional propuesto por James Gross. En él, se representan dos estrategias específicas de regulación emocional – *reappraisal* y supresión –. La emoción puede ser regulada en cinco momentos del proceso de generación de la emoción: (a) selección de la situación, (b) modificación de la situación, (c) despliegue atencional, (d) cambio cognitivo, y (e) modulación de respuestas experienciales, conductuales, o fisiológicas. Las estrategias que inciden en los primeros cuatro momentos están centradas en los antecedentes. Si la emoción ya se ha generado, es posible utilizar estrategias que se centran en la respuesta. Las líneas más marcadas indican las opciones particulares seleccionadas (adaptado de Gross, 1998b).

En los últimos años se han realizado abundantes investigaciones sobre regulación emocional, lo que ha permitido desarrollar un importante cuerpo de conocimientos en áreas muy diversas (ver Gross, 2015, para una revisión). Dentro de esta exhaustiva investigación, dos estrategias han sido las más exploradas: el *reappraisal* y la supresión expresiva.

Como se puede apreciar en la Figura 2, el *reappraisal* es una estrategia de regulación emocional centrada en el antecedente, ya que incide en el significado de la situación. En este sentido, su objetivo principal es la reevaluación, desde un punto de vista cognitivo, de una situación o aspecto de la misma que produce un estado afectivo determinado para alterar o modificar (incrementando o disminuyendo) el impacto emocional que tiene sobre un individuo (Gross, 1998b). Por otra parte, la supresión expresiva es una estrategia de regulación emocional centrada en la respuesta, esto es, pretende modificar

una respuesta emocional ya provocada, en alguna de sus manifestaciones (experiencial, comportamental-expresivas, y/o fisiológicas). Por tanto, y aunque ambas comparten ciertos procesos cognitivos, como la auto-monitorización o la memoria de trabajo (Goldin, McRae, Ramel, & Gross, 2008), se aplican en momentos temporales claramente diferenciados.

Durante los últimos años, se han investigado los efectos del uso habitual de estas dos estrategias de regulación emocional en la vida diaria mediante el uso de cuestionarios como el *Emotion Regulation Questionnaire* (ERQ; Gross & John, 2003) y de su uso instruido en situaciones controladas de inducción emocional (ej., Ehring, Tuschen-Caffier, Schnülle, Fisher, & Gross, 2010). En general, se ha constatado que el *reappraisal* tiende a emplearse para minimizar el impacto de las emociones negativas (Feinberg, Willer, Antonenko, & John, 2012; Kross & Ayduk, 2011), el cual se asocia también con decrementos en el SNA y en áreas cerebrales asociadas con la activación de la emoción, así como para aumentar el impacto afectivo de las emociones positivas (ver Quoidbach, Mikolajczak, & Gross, 2015, para una revisión), provocando, en este caso, una activación del SNA. Por su parte, la supresión expresiva, tradicionalmente estudiada para explorar su efecto en la reducción de las emociones negativas, no solo no suele disminuir la intensidad de las experiencias emocionales, sino que además reduce la de las emociones positivas. Este hecho suele acompañarse con una disminución de la expresión facial, así como de un incremento en activación simpática (Gross & Levenson, 1993). Estos resultados han llevado a considerar el *reappraisal*, comparado con la supresión, una estrategia de regulación emocional asociada al bienestar físico y de la salud, a un mejor funcionamiento afectivo, a mejores interacciones sociales, así como a un mejor rendimiento en tareas de memoria o ante un examen (ver Gross, 2015, para una revisión).

No se han realizado hasta el momento investigaciones que relacionen de modo directo las estrategias de regulación emocional descritas en el modelo de James Gross y el *cheerfulness*. Sin embargo, cabe anticipar una estrecha vinculación. En este sentido, y como se apuntó en anteriores apartados cuando se conceptualizó el modelo de las bases afectivas y cognitivas del sentido del humor, el *cheerfulness* rasgo es una disposición afectiva que facilita la respuesta positiva de hilaridad, al mismo tiempo que promueve el mantenimiento y potenciación de estados afectivos positivos (Ruch & Hofmann, 2012). Este hecho podría estar ligado con un uso habitual de estrategias de *reappraisal* para

incrementar la intensidad y frecuencia de emociones positivas (Quoidbach & cols., 2015), lo cual produciría toda una serie de beneficios en áreas como el bienestar psicológico o la salud física (revisar apartados anteriores). De manera importante, uno de los pilares del modelo de las bases temperamentales del sentido del humor se centra en la robustez del *cheerfulness* estado cuando los individuos con un elevado nivel de *cheerfulness* rasgo se enfrentan a eventos negativos. Por ejemplo, se ha puesto de manifiesto que las personas con niveles elevados en *cheerfulness* rasgo, en comparación con quienes los tienen reducidos, muestran más emociones positivas así como más sonrisas de *Duchènne* cuando ven fotografías de ellas mismas con el rostro distorsionado (Hofmann, Beermann, & Ruch, 2010), tienen un mejor afrontamiento y resiliencia ante situaciones y eventos adversos (Ruch & Köhler, 1999), así como una mejor recuperación psicológica y física más rápida del impacto negativo que les genera (Papousek & Schulter, 2010). Desde este punto de vista, es posible que las personas con alto *cheerfulness* rasgo utilicen, en su vida diaria, estrategias de *reappraisal* para disminuir la frecuencia e intensidad de emociones negativas en mayor medida que los individuos con bajo *cheerfulness*, con el objetivo de minimizar el impacto afectivo de las emociones negativas (Gross, 2015).

En la presente tesis doctoral, se incluye una investigación (*Serie Experimental IV*), con el objetivo de explorar de manera sistemática las relaciones entre el *cheerfulness* y las estrategias de regulación emocional, tanto en su uso diario como instruidas, en un contexto de inducción de diversión, neutral, y de tristeza.

Capítulo II: Motivación y Objetivos de la investigación

2.1. Aims of the present thesis

The World Health Organization (WHO) has promoted a new concept of health, emphasizing a complete state of physical, mental, and social well-being instead of the absence of disease. This, together with the development of positive psychology (e.g., Cohn et al., 2009; Seligman & Csikszentmihalyi, 2000), has led to a renewed interest in positive emotions during the last three decades, which has greatly contributed to the scientific analysis and development of constructs such as sense of humor.

As we pointed out in the introduction section, correlational and experimental studies have revealed the applicability, usefulness, and relevance of affective and cognitive basis of sense of humor concepts for different areas of Psychology, such as, for example, health, emotion, and personality (Beermann & Ruch, 2011; Delgado-Domínguez et al., 2016; Delgado-Domínguez et al., 2014; Papousek & Schulter, 2010; Rapp, Wild, Erb, Rodden, Ruch, & Grodd, 2008; Ruch, 1997; Ruch & Hofmann, 2012; Ruch et al., 1996, 1997). However, from a theoretical and empirical point of view, still today there are many intriguing questions that remain unanswered in this field.

Advances in the understanding of these questions will suppose an inflection point in the development and understanding of sense of humor, and the main goal of the present doctoral thesis was to travel in this direction. Thus, the ***general aim of the thesis*** was to study the relationships between cheerfulness, described as an affective predisposition to sense of humor, in its trait and state manifestations, and cognitive and emotional processes. Before investigating the modulation that trait cheerfulness might exert on cognitive and emotional processes, we adapted and validated to the Spanish population the instrument of reference used to assess the temperamental basis of sense of humor, both as trait (State-Trait Cheerfulness Inventory-Trait version, STCI-T, Ruch et al., 1996) and state (State-Trait Cheerfulness Inventory-State version, STCI-S, Ruch et al., 1997).

Therefore, with the general aim of investigating the relationship between cheerfulness and cognitive and emotional processes, the current thesis had the following specific objectives:

1. In order to corroborate the psychometric properties of the scales in the population that would participate in our studies, as well as to get a starting point that would allow

the finding of new empirical evidence regarding the affective and cognitive basis of sense of humor, we first were interested in adapting and validating the STCI, as trait and state, to the Spanish population. Numerous studies have collected an extensive body of knowledge on STCI, confirming its usefulness and psychometric properties (Carretero-Dios et al., 2011; Ruch & Köhler, 2007; Ruch et al., 1996, 1997). Importantly, the evaluation of the temperamental basis of sense of humor by means of these inventories has been considered a fundamental step in the development and research of new knowledge in the field of sense of humor (Ruch & Hofmann, 2012). However, when this doctoral thesis started, there were no Spanish versions of the STCI, neither the trait nor the state version. Therefore, we wanted to cover these objectives in the two studies (STCI-T, *Study 1*; STCI-S, *Study 2*) that conform the first part of this thesis. Moreover, in the *Study 2*, we also wanted to confirm the theoretical differentiation between traits and states through the exploration of its temporal stability as well as their interactions using Latent State-Trait (LST) models.

2. Once we had a Spanish version of the STCI-T and the STCI-S, we were interested at studying the role of trait cheerfulness on flexibility in cognitive and emotional tasks. Some authors have established a connection between positive emotions and greater cognitive abilities, such as flexibility, problem-solving, and creativity (e.g., Derryberry & Tucker, 1994; Isen, 2003; Wadlinger & Isaacowitz, 2006). From Fredrickson's broaden-and-build theory (2001), it is suggested that positive emotions expand our mental and behavioral repertoire. As a consequence, abilities such as flexibility would be increased, thus promoting a "broaden cognition" (see, for example, Johnson, Waugh, & Fredrickson, 2010). In this sense, and given the reported relationships between cheerfulness and positive emotions (e.g., Papousek & Schulter, 2010), we thought that this factor could play a relevant role in the study of flexibility. To do so, we carried out two studies that conformed the *Experimental Series I*, in which high versus low trait cheerfulness participants had to perform a "task switching" paradigm.

3. Subsequently, we focused in the role of trait cheerfulness on emotional induction processes. Specifically, we wanted to analyze the state-trait cheerfulness relationships in affective induction contexts. As we pointed out in the introduction section, it has been shown that there is a close relationship between state-trait cheerfulness manifestations, emphasizing the idea that traits represent dispositions for their respective states (Ruch, 1997; Ruch & Köhler, 2007; Ruch et al., 1997). Moreover, and from a theoretical point

of view, cheerfulness is considered a positive affective tendency to sense of humor (see Ruch & Hofmann, 2012, for a review), which has allowed to establish a parallelism between cheerfulness and some properties of positive emotions, as a higher psychological well-being, a greater resilience to negative situations as well as a larger affective induction effect to amusement stimuli (Papousek & Schulter, 2010; Ruch, 1997; Ruch & Hofmann, 2012; Ruch & Stevens, 1995). Taking previous results into account, intriguing questions arised: could the larger affective change experienced for high versus low trait cheerfulness individuals be interpreted as a selective bias toward positive events or as a larger sensitivity to the emotional environment, regardless the affective quality of the stimulus? (Studies 1 and 2 of the *Experimental Series II*). Furthermore, if high trait cheerfulness people show a larger emotional sensitivity, could it be possible to replicate and expand these results to other affective states by using a different procedure and complementary affective self-report measures? (*Experimental Series III*).

4. Finally, once we found that high trait cheerfulness people were more sensitive to the emotional environment than low trait cheerfulness individuals, we were interested at exploring the underlying nature of such phenomenon, analyzing the relationships between cheerfulness and emotion regulation strategies. From theoretical and empirical point of views, it seems that there is a connection between trait cheerfulness and the use of reappraisal strategies (e.g., Papousek & Schulter, 2010; Ruch & Hofmann, 2012; Ruch et al., 1996). In this sense, emotion regulation strategies, which alter the affective impact of stimuli, could play an important role in this context, helping to explain the larger affective permeability observed in high versus low trait cheerfulness individuals (*Experimental Series IV*).

In sum, in order to shed light on these goals, we carried out two psychometric studies and four experimental series, which are described below.

2.2. Psychometric studies

In the *Study 1*, we carried out a comprehensive assessment of the long form of the STCI-T (Ruch et al., 1996) in independent large samples of Spanish adults. Depending on the evaluation objective, each sample completed a specific booklet of questionnaires. In order to obtain a satisfactory validation of this instrument, we followed an exhaustive analysis strategy of the scale. In this sense, we explored the psychometric properties of

the items that composed each of the factors, we checked the reliability of the scale employing internal consistency and test-retest analyses, we examined the STCI-T factor structure using exploratory and confirmatory approaches and we explored the external validity evidence at investigating the relationship patterns among cheerfulness, seriousness, and bad mood, personality characteristics (e.g., extraversion, neuroticism, openness), and psychological well-being variables (e.g., happiness, depression, anxiety). Taking results from previous studies into account (Ruch & Köhler, 2007; Ruch et al., 1996), we expected to replicate the suitability of the scale and the three-dimensional definition of the attitudinal basis of sense of humor as well as to offer new empirical evidence, supporting the theoretical model. All the findings provided validity evidence for applying the Spanish version of the STCI-T to assess the temperamental basis of sense of humor in Spanish samples.

In the *Study 2*, we presented an assessment of the state form of the STCI-S (Ruch et al., 1997) in independent samples of Spanish adults. In this case, we followed a similar strategy as in the *Study 1* to collect and analyze data. Assuming that Ruch and colleagues (1997) have demonstrated the adequate psychometric properties of cheerfulness, seriousness, and bad mood, as state manifestation, we expected to replicate these results in Spanish populations.

To carry out the adaptation, we: a) analyzed the internal structure of the facets, testing three different models through confirmatory factor analyses; b) studied the invariance of the STCI-S across gender; c) checked the psychometric properties and the reliability of the items as well as the relationships between the state dimensions (among them) and demographic characteristics, such as age and gender; d) created prototypical affective scenarios, which participants had to read and imagine, to evaluate the items' sensitivity to affective changes in the environment; e) checked the relationships between the state and trait factors; f) examined new relationship patterns between cheerfulness, seriousness, and bad mood, and state well-being dimensions, such as depression, anxiety, and anger.

Additionally, to date, there are no studies that explore the temporal stability of traits versus states as well as their interactions. To bridge this gap and offer empirical support to the model, we also incorporated in the *Study 2* a six-month longitudinal study by using psychometric models and analysis strategies that allow assessing different

variance sources (e.g., Geiser et al., 2015; Vautier, 2004). In this case, our prediction was that trait factors would be described by a larger temporal stability over time, situations, and individual's personality characteristics compared to state factors. We corroborated our predictions and, as in the *Study 1*, our results converged to indicate the adequacy of applying the scale in Spanish samples.

2.3. Experimental Series

In order to study the role of trait cheerfulness on cognitive flexibility, we developed the *Experimental Series I*, which was composed by two studies. In both, participants, who were selected depending on their high versus low scores on trait cheerfulness (assessed by the STCI-T), performed a "task switching" paradigm. According to the demand of the trial, they had to respond either to the emotion (joy or anger) or to the gender (man or woman) of a face that was displayed in the center of the screen. The same task could be repeated or not between two consecutive trials. This combination of trials allowed us to analyze the "switching cost" effect, measured as the difference between trials in which the task was different from the previous trial and those in which it repeated. In this type of experiments, we expected a larger "switching cost" effect when the task differs in two consecutive trials but the stimulus is the same, given that in these cases the individual must reconfigure the task set but the repetition of stimuli prepares the system to respond similarly (see, for example, Rogers & Monsell, 1995, for a review).

In the Study 1 of the *Experimental Series I*, we analyzed this effect as a function of trait cheerfulness. In addition, we manipulated the moment in which participants knew what task they had to perform. In this sense, in the half of the trials participants received a cue that allowed them to prepare prior to the presentation of the stimuli. In the Study 2, we introduced a small modification. In this case, while half of the blocks of trials followed the same logic as in the Study 1, in the other half of the blocks of trials participants received no cue to know the task to be performed in advance (i.e., preparation was not possible). In general, we predicted that high trait cheerfulness people would be more cognitively flexible than low trait cheerfulness individuals. Therefore, the "switch cost" effect should be lower in the first group, especially for conditions where a greater cognitive effort was required to change the mental set, as for example when the attributes of the stimuli were repeated in two consecutive trials and

the task was different or there was no previous preparation of the task to be performed. In general, we did not confirm our hypotheses. That is, we did not observe that high versus low trait cheerfulness people had more cognitive flexibility, as measured by a lower "switch cost" effect. However, in general we found that high trait cheerfulness individuals had a larger "facilitation" effect than low trait cheerfulness participants when the attributes of the stimuli repeated and when a cue to anticipate the task demand was provided. In general, these results led to the consideration that maybe trait cheerfulness, as an affective factor, was more linked to affective processes rather than cognitive processes.

Therefore, in the following *Experimental Series* we focused in the role of trait cheerfulness on emotional induction processes. Four studies conducted composing three *Experimental Series* were conducted. While in the first three studies we selected participants depending on their high versus low scores on the STCI-T (Ruch et al., 1996), in the last study, in order to get a more extensive sample and given the characteristics of the experiment, we did not apply any selection strategy but considered scores on the STCI-T as a continuous variable.

In the Study 1 of the *Experimental Series II*, we were interested at investigating whether, compared to low trait cheerfulness people, high trait cheerfulness individuals were more sensitive to the emotional environment. Participants watched amusing, neutral, and sad film clips selected from a Spanish validated database (Fernández, Pascual, Soler, Elices, Portella, & Fernández-Abascal, 2012; Fernández et al., 2011) and reported their affective states before and after viewing them. Taking into account the emotional nature as a fundamental feature in the conception of cheerfulness (Ruch et al., 1996, 1997), we hypothesized that high versus low trait cheerfulness individuals would experience a larger change in affective state after facing both amusing and sad stimuli. Results from this study showed that, compared to low trait cheerfulness individuals, high trait cheerfulness people were more sensitive to the emotional environment, as they experienced a larger change in cheerfulness state after watching amusing (i.e., a larger increase) and sad (i.e., a larger decrease) clips. In the Study 2 of the *Experimental Series II*, we wanted to replicate the results obtained in the Study 1 as well as to analyze whether such pattern of results could be found using psychophysiological measures. To replicate the pattern of data, we employed the same structure and materials as in the Study 1. Additionally, we explore the participants' heart rate and skin conductance

level, which have been the most commonly measures in psychophysiological research (see Kreibig, 2010, for a review). In line with the self-report measures, we expected that changes in heart rate and skin conductance level were larger for participants with high trait cheerfulness versus low trait cheerfulness. Again, we replicated the pattern of behavioural results observed in the Study 1. Moreover, in contrast to self-report measures, now low rather than high trait cheerfulness individuals showed a larger heart rate deceleration during the visioning of the clips, especially in an amusing scene with high emotional load. No modulation on trait cheerfulness was found for skin conductance level.

In the *Experimental Series III*, we carried out a study to replicate and expand the previous results found in self-report measures. Participants visualized positive and negative pictures selected from the International Affective Picture System (IAPS; Lang et al., 1999), which were accompanied by statements (e.g., Pérez-Dueñas, Acosta, & Lupiáñez, 2014). They also had to report their affective states before and after facing them. While in the *Experimental Series II*, we focused on the state cheerfulness measure (Ruch et al., 1997), here we also used complementary affective self-report measures, such as the Self-Assessment Manikins (SAM; Bradley & Lang, 1994) and the Scale for Mood Assessment (EVEA; Sanz, Gutiérrez, & García-Vera, 2014). In general, we expected to find a larger affective state change for high versus low trait cheerfulness people to both positive and negative states. The results showed that, compared to low trait cheerfulness participants, high trait cheerfulness participants reported a larger increase in state cheerfulness, valence, and joy measures after the positive induction and a larger decrease in state cheerfulness after the negative induction. In that latter condition, although the differences were not significant, we observed the same tendency for the rest of the measures. In general, we replicated and expanded previous results.

Additionally, as a complementary goal, in this study we also were interested at analyzing whether trait cheerfulness influenced the effects of affective states induced on attentional networks. To investigate this issue, participants performed the Attentional Network Test-Interactions task (ANT-I; Callejas, Lupiáñez, & Tudela, 2004) after the affective inductions. In this task, five arrows appeared in the center of the screen and participants had to respond to the direction of the central arrow, which is flanked by either congruent or incongruent distractors, and preceded by alerting and/or orienting cues. The task is suitable to measure the functioning of the alerting, orienting, and

cognitive control attentional networks (see Callejas et al., 2004, for a full explanation). Previous research has shown a modulation of negative state over the alerting and orienting networks (Pacheco-Unguetti et al., 2010). Therefore, as high versus low trait cheerfulness people report a greater affective induction effect, we would expect the influence of a negative state on attentional processing (i.e., larger effects in alerting and orienting networks) to be larger in participants with high trait cheerfulness scores. However, no effects of affective induction or trait cheerfulness on the attentional task were found.

Finally, in the *Experimental Series IV*, we carried out a study to explore the pattern of relationships between trait cheerfulness and emotion regulation strategies. With this purpose, participants were exposed to amusing, neutral, and sad clips (Fernández et al., 2012; Fernández et al., 2011) while different groups of participants applied one of the following strategies: up-regulation reappraisal, down-regulation reappraisal, suppression, or control (for a total *N* of 248 participants). Later, they had to report their affective state. Assuming previous data that trait cheerfulness is related to emotional management, positive emotions, and psychological well-being (Ruch & Hofmann, 2012), and taking into account research showing that the increment of emotions could be related to positive dimensions of well-being (e.g., Quoidbach et al., 2015) and emotional intelligence (e.g., Ford & Tamir, 2012), we hypothesized that, compared to low trait cheerfulness, high trait cheerfulness would only moderate the relationships between the up-regulation reappraisal strategy and participants' affective state changes when facing amusing and sad stimuli. Briefly, our data reflected that trait cheerfulness, which was associated to the use of the reappraisal measure in daily life, moderated the relationships between the up-regulation reappraisal strategy and the participants' affective state change for the amusing induction but no for the sadness condition.

In the following sections, we will describe each experimental series of the current doctoral thesis. Additionally, we will discuss the main results obtained in the General Discussion section.

Capítulo III-Estudio Psicométrico I: Temperamental basis of sense of humor: The Spanish long form of the trait version of the State-Trait-Cheerfulness-Inventory

3.1. Abstract

Despite the numerous definitions and dimensions proposed to explain the sense of humor and the variety of instruments developed for its assessment, little attention has been paid to its affective and attitudinal basis in the models developed so far. The long form of the trait version of the State-Trait-Cheerfulness-Inventory (STCI-T; Ruch, Köhler, & van Thriel, 1996) was developed using a facet approach to measure the temperamental basis of sense of humor using three theoretically-derived concepts: cheerfulness, seriousness, and bad mood. This paper presents the psychometric analysis of the Spanish long form of the trait version of the STCI-T. We assessed the dimensionality of the instrument, the internal consistency and test-retest reliability of its facets and scales and the relationships between STCI-T domains and other variables. We assessed four independent samples comprised of 1,049 participants in total with ages ranging between 18 and 94 years. The psychometric characteristics appeared to be satisfactory and proved to be replicable. Moreover, relationships between (a) the temperamental basis of sense of humor and (b) personality and well-being were also replicated. Results provide validity evidence for using the Spanish version of the STCI-T to assess the temperamental basis of sense of humor in the Spanish population.

Keywords: Humor, STCI-T, Test Adaptation, Cheerfulness, Seriousness, Bad Mood

3.2. Introduction

Although the construct "sense of humor" has been widely described, its definition has traditionally focused on local aspects, disregarding its temperamental basis. Ruch, Köhler, and van Thriel (1996) developed one of the few theoretical models in which the affective and attitudinal basis of sense of humor has been granted considerable importance. In this model, sense of humor is defined using three dimensions: cheerfulness, seriousness, and bad mood. The detailed definitions and description of these three dimensions made it possible to develop the State-Trait-Cheerfulness-Inventory (STCI), which assesses cheerfulness, seriousness, and bad mood both as states (STCI-S; Ruch, Köhler, & van Thriel, 1997) and traits (STCI-T; Ruch et al., 1996).

Factor analyses of STCI scores compared the trait facets proposed in the model with their representation in other instruments assessing sense of humor. Results of such analyses have shown that cheerfulness, seriousness, and bad mood account for much of the variance of such instruments (Köhler & Ruch, 1996; Ruch & Carrell, 1998). Moreover, the three trait dimensions have been: (a) associated with relevant health and well-being variables (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003; Yip & Martin, 2006); (b) included in comprehensive models of personality (Ruch, 1994; Ruch & Köhler, 2007); (c) used for predicting behaviors in experiments (Thompson, Ruch & Hasenöhrl, 2004; Zweyer, Velker & Ruch, 2004); and (d) considered to influence the outcome of humor treatment (Hirsch, Junglas, Konradt & Jonitz, 2010).

The long form of the trait version of the STCI (STCI-T; Ruch et al., 1996) assesses the theoretical facets of the temperamental basis of sense of humor with 106 items. Trait cheerfulness is considered to be an enduring disposition. It has been defined using five facets: a prevalence of cheerful mood (CH1), a low threshold for smiling and laughter (CH2), a composed view of adverse life circumstances (CH3), a broad range of active elicitors of cheerfulness and smiling/laughter (CH4), and a generally cheerful interaction style (CH5). Trait seriousness is considered to be an attitude toward the world and a habitual frame of mind. It is considered to be made up of the following elements: a prevalence of serious states (SE1), a perception that even everyday happenings are important and deserving of thorough and intensive consideration (SE2), the tendency to plan ahead and set long-range goals (SE3), the tendency to prefer

activities for which concrete, rational reasons can be produced (SE4), the preference for a sober, object-oriented communication style (SE5), and a humorless attitude about cheerfulness-related matters (SE6). Finally, trait bad mood, also a habitual affect, has been defined as the predominance of three mood states and their respective behaviors. Such components are a generally bad mood (BM1), sadness (i.e., despondent and distressed mood; BM2), and ill-humoredness (i.e., sullen and grumpy or grouchy feelings; BM4). Two further facets are specifically related to a sad (BM3) and ill-humored (BM5) behavior of individuals in cheerfulness-evoking situations (see Ruch et al., 1996; Ruch & Köhler, 2007).

The STCI-T has been assessed in various studies, which have confirmed its usefulness and psychometric properties (Ruch & Köhler, 2007). In a recent study, Carretero-Dios, Eid, and Ruch (2011) analyzed the convergent and discriminant validity of the trait factors of the STCI-T through a multilevel confirmatory factor analysis of multitrait-multimethod data. They found high convergent validities using self-reported trait measures and their corresponding peer reports. Convergent validity was also considerably high regarding the latent correlations between trait and state self-report measures. These authors also found strong evidence of discriminant validity. Specifically, the correlations observed between cheerfulness, seriousness, and bad mood confirmed the hypothesized associations. The trait factors cheerfulness and bad mood were highly negatively correlated with each other, while the correlations between these two factors and seriousness were moderate. The authors also reported a positive correlation between seriousness and bad mood and a negative correlation between seriousness and cheerfulness. This pattern of correlations was observed for peer and state ratings as well. As in previous studies (Ruch & Köhler, 2007), Carretero-Dios et al. (2011) showed that the traits cheerfulness, seriousness, and bad mood can be reliably assessed using the STCI-T, with Cronbach alpha values between .75 and .91.

The aim of the present study was to conduct a comprehensive assessment of the STCI-T in independent large samples of Spanish adults. As the STCI-T has broad empirical support in research on sense of humor, we aimed at obtaining evidence of its power with Spanish samples. In the present study, we conducted traditional psychometric analyses and explored the reliability of the STCI-T using internal consistency and test-retest approaches. In addition, we examined the factor structure of the STCI-T using exploratory and confirmatory analyses. Furthermore, we obtained

external validity evidence by studying the relationship between the temperamental basis of sense of humor and other related variables such as personality and well-being.

3.2.1. Development of the Spanish trait form of the STCI: initial stages

The 106 original items of the STCI-T (cheerfulness: 38 items; bad mood: 31 items; seriousness: 37 items) underwent a back-translation process (Hambleton & de Jong, 2003) involving four bilingual specialists. In addition, a new set of extra items was developed considering the conceptualization of each facet (AERA, APA, & NCME, 1999). This process led to an initial version of the STCI-T composed of 188 items (cheerfulness: 66 items; bad mood: 53 items; seriousness: 69 items).

These 188 items were evaluated by six experts in test construction to obtain validity evidence based on test content (Delgado-Rico, Carretero-Dios, & Ruch, 2012). The evaluation focused on determining to what extent the items created were representative of the target dimension and relevant to the facet for which they were developed. As regards formal aspects, the classic criteria set by Angleitner, John, and Löhr (1986) served as a reference. Specifically, the items were assessed on the basis of the following features: comprehension (i.e., whether the item was properly understood), ambiguity (i.e., the chances that the item would be interpreted in different ways), and clarity (i.e., whether the item was concise/accurate/direct).

Of the 188 items assessed, 60 were considered to have insufficient content validity (content validity index, CVI < 0.70; interjudge agreement Kappa index, Kappa < 0.40 in representativeness and/or relevance). After removing these 60 items, we proposed an experimental Spanish version of the STCI-T that included 128 items (cheerfulness: 50 items; seriousness: 45 items; bad mood:33 items). The present study describes the analyses of this version and their main results.

3.3. Materials and methods

3.3.1. Sample

Data from four different samples were collected in order to implement all the intended analyses.

Sample 1 (the *construction sample*) included 276 adults (18-94 years; *M* = 44.53, *SD* = 17.94), of whom133 were males and 143 were females. Slightly more than half were

married or lived with a partner (55.8%) and 44.2% were single or unmarried. More than a quarter held a university degree (28.6%), 24.2% were undergraduate university students, 22.7% held a school-leaving diploma qualifying for university entrance, and the rest had vocational training education (25.5%).

Sample 2 (the *test-retest sample)* consisted of 150 undergraduate psychology students (41 male and 109 female) aged between 17 and 54 years ($M = 21.31$, $SD = 5.50$).

Sample 3 (*replication sample I)* consisted of 423 undergraduate students of different academic areas (323 female and 100 male) aged between 17 and 59 years ($M = 20.29$, $SD = 4.76$).

Sample 4 *(replication sample II)* consisted of 200 adults aged between 18 and 87 years ($M = 36.24$, $SD = 19.60$) of which about 44.5% were male ($n = 89$), 15.4% held a university degree, and 83% ($n = 166$) held a school-leaving diploma qualifying for university entrance (five did not indicate their education level).

3.3.2. Instruments

3.3.2.1. Experimental trait form of the State-Trait-Cheerfulness-Inventory

The 128-item were initially used to assess the temperamental basis of sense of humor. Their psychometric characteristics were studied in the construction sample. Items were rated on a 4-point Likert scale ranging from 1 (*"strongly disagree"*) to 4 (*"strongly agree"*).

3.3.2.2. Spanish trait form of the State-Trait-Cheerfulness-Inventory (STCI-T)

This version derived from the construction sample was used in the test-retest sample and the replication samples. It consisted of 104 items rated on a 4-point Likert scale ranging from 1 (*"strongly disagree"*) to 4 (*"strongly agree"*).

3.3.2.3. NEO-FFI

The NEO Five-Factor Inventory (NEO-FFI), a short version of the NEO Personality Inventory-Revised (NEO-PI-R), was administered to Sample 4. The NEO-FFI (Costa & McCrae, 1992) is an instrument that uses 60 items (12 per scale) to measure the five major domains of personality: neuroticism, extraversion, openness to experience,

agreeableness, and conscientiousness. Responses are provided on a 5-point Likert scale ranging from 0 ("*strongly disagree*") to 4 ("*strongly agree*").

3.3.2.4. Psychological Well-being Scale

Psychological well-being was measured with the subjective Psychological Well-being Scale (Sánchez-Cánovas, 1994) in Sample 3. This instrument, based on previous findings and scales pertaining to well-being, is a reliable and valid 30-item questionnaire developed to measure five well-being factors: (1) life satisfaction (11 items); (2) happiness (6 items); (3) sociability (4 items); (4) health (4 items); (5) and hope (5 items). Answers are scored on a 6-point Likert scale (from "*never*" to "*always*").

3.3.2.5. Beck Depression Inventory (BDI-IA)

Sample 3 also completed the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979). This self-report questionnaire was developed to measure the severity of depression with 21 multiple-choice questions rated on a 4-point scale indicating the degree of severity "over the past week, including today" (from 0 = "*not at all*" to 3 = "*extreme form of each symptom*").

3.3.2.6. Trait items of the State-Trait Anxiety Inventory

Finally, Sample 3 completed the trait form of the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983). This 20-item self-report questionnaire assesses trait anxiety using a 4-point Likert scale (from "*never*" to "*always*").

3.3.3. Procedure

Two trained evaluators made individual contact with the adult participants and the undergraduate students, who were assessed in small groups in public places of the university campus. Individuals who accepted to cooperate received a booklet that included the standard instructions and the consent form. The construction and test-retest samples (i.e., Samples 1 and 2) were only administered the STCI-T scale. In the replication samples (i.e., Samples 3 and 4), the booklet of questionnaires included the STCI-T, the instruments aimed at obtaining validity evidence based on relationships with personality, and the subjective Psychological Well-being Questionnaire. All data

were collected independently in the four samples. None of the participants were paid for their services.

3.4. Results

3.4.1. Item analysis and exploratory factor analysis

The 128 items of the experimental Spanish trait version of the STCI-T were tested in the construction sample. Discrimination indices (i.e., corrected item-total correlation < .20) and high content redundancy led to removing 24 items. Thus, we proposed a 104-item Spanish version of the STCI-T. Of the total of 104 items, 72 came from the original version while 32 belonged to the new set of items created by the facets conceptualization. Specifically, eight of the new items were included in the cheerfulness, 12 in seriousness and 12 in bad mood facets.

This difference in the number of items between the original and the Spanish version is due to the BM2 facet (8 items in the original version; 6 items in the Spanish version). The items were deleted taking into account the content validity results for the Spanish language version. Considering the original conceptualization of this facet, it was decided not develop new items for this facet. The number of items of the other facets of the Spanish version of the STCI-T was the same as in the original STCI-T.

No facets deviated from a normal distribution. The average absolute levels of skewness and kurtosis of the facets were .13 and .18, respectively. Cronbach alpha ranged from .68 to .84 for the cheerfulness facets; from .61 to .79 for the seriousness facets; and from .64 to .84 for the bad mood facets. Cronbach alpha was high for the scales (i.e., cheerfulness = .91, seriousness = .89, and bad mood = .93). We obtained the following mean discrimination indices for the facets: .48 for cheerfulness, .42 for seriousness, and .51 for bad mood. Thus, individual items exhibited adequate properties.

The internal structure was tested with a principal components analysis. KMO value was .87, and Bartlett's test showed statistical significance (Chi-square = 1611.94, df = 120, $p < .001$), indicating that the samples met the expected criteria for interpreting factor solutions.

Due to the high correlation between the temperamental basis of sense of humor a Promax rotation (kappa = 4) was applied. The factor pattern (Table 1) suggested the

existence of three factors with eigenvalues higher than 1 (4.84, 3.64, and 3.59) that altogether explained 61.11% of the variance. The factors were clearly identified as cheerfulness, seriousness, and bad mood. As shown on Table 1, CH1 loaded on cheerfulness and bad mood equally high; all others facets loaded highest on the factor that it was supposed to belong to. Thus, responses of participants reflected the same dimensions specified in the theoretical model taken as a reference.

The intercorrelations between factors revealed the following: cheerfulness showed a mild negative correlation with seriousness ($r = -.14$, $p < .001$) and a negative correlation with bad mood ($r = -.50$, $p < .001$). A positive correlation was found between the two forms of humorlessness ($r = .35$, $p < .001$).

The potential effect of gender was also tested. No effects were identified for cheerfulness [$F (1, 275) = 2.03$, $p = .15$] or seriousness [$F (1, 275) = .05$, $p = .81$], but significant gender effects emerged for bad mood, where women exhibited significantly higher scores than men [males: $M = 1.74$, $SD = .48$; females: $M = 1.96$, $SD = .58$; $F (1, 234) = 10.20$, $p < .01$]. Gender effects were connected to age because they were found only for participants older than 55. Regarding age, bad mood tended to be slightly higher among older participants ($r = .14$, $p < .05$), with a statistically significant effect of sample size. Seriousness was strongly correlated with age ($r = .48$, $p < .001$), although no age effect was observed for cheerfulness ($r = .02$, $p = .85$). Thus, older participants mainly scored higher on seriousness, which is consistent with former studies.

Table 1.

Loadings of the 16 STCI-T facets on the three unrotated and obliquely rotated factors.

Facets	PC 1	PC 2	PC 3	Obl 1	Obl 2	Obl 3	h^2
Cheerfulness							
CH1	-.69	.51	-.04	.52	.21	-.52	.74
CH2	-.60	.42	.18	.63	.05	-.22	.57
CH3	-.32	.58	.21	.66	.28	-.05	.49
CH4	-.58	.43	.48	.92	-.08	.11	.77
CH5	-.53	.26	.54	.84	-.24	.22	.64
Seriousness							
SE1	.51	.23	-.08	-.11	.44	.19	.32
SE2	.35	.66	-.10	.19	.77	.01	.58
SE3	.44	.52	-.11	.06	.67	.07	.48
SE4	.61	.47	-.10	-.01	.69	.20	.61
SE5	.34	.60	-.24	.02	.77	-.14	.54
SE6	.60	.33	-.30	-.28	.67	-.01	.57
Bad Mood							
BM1	.77	-.13	.45	.06	-.06	.96	.82
BM2	.79	-.12	.28	-.09	.05	.79	.72
BM3	.75	.08	.34	.11	.17	.81	.69
BM4	.73	-.07	.40	.07	.00	.88	.71
BM5	.65	.15	.08	-.06	.33	.46	.45

Note. $N = 276$. Expected loadings were italicized. PC = unrotated factors (principal components). Obl = rotated factors. h^2 = communality

3.4.2. Test-retest

The reliability of the Spanish version of the STCI-T was evaluated using a test-retest procedure with an eight-week interval between the first and the second administration (test-retest sample, $n = 150$). In the second administration, Cronbach alpha ranged from .70 to .90 for the cheerfulness facets; from .63 to .77 for the seriousness facets; and from .71 to .88 for the bad mood facets. The scales showed higher Cronbach alpha values (i.e., cheerfulness = .84, seriousness = .76, and bad mood = .87). These alpha

values were maintained at retest. The test-retest correlations ranged from .77 to .80 for the cheerfulness facets, from .58 to .80 for the seriousness facets, and from .62 to .80 for the bad mood facets (all values $p < .001$). Again, higher values were observed for the scales, where the following test-retest correlations were obtained: cheerfulness = .84, seriousness = .83, and bad mood = .83 (all values $p < .001$). Both results show adequate reliability levels in all scales.

3.4.3. Confirmatory factor analysis

A confirmatory factor analysis using Mplus 5.0 (Muthén & Muthén, 2004-2008) was performed for Sample 3 with the aim of assessing whether the three dimensions (i.e., cheerfulness, seriousness, and bad mood) emerged from the data obtained, confirming their usefulness for defining the temperamental basis of sense of humor. Item parcels were created in order to distinguish measurement error from true differences by choosing the optimal solution in terms of fit (Carretero-Dios et al., 2011). Three indicators were used for each factor as it was the optimal solution, that is, the lowest number of indicators needed for reaching adequate properties. Nine observed variables were created in total – three for each trait. The MLR estimator was used, which takes into account the non-independence of observations and also the possible non-normality of the data.

Three different models derived from theoretical foundations (Ruch, et al., 1996) were tested: a two-factor model (Model 1), composed of positive dimensions (i.e., cheerfulness) versus negative dimensions (i.e., seriousness and bad mood), a three-factor model (Model 2), composed of the three independent dimensions (i.e., cheerfulness, seriousness, and bad mood), and a one-factor model. The latter model did not show any convergence, so only the results of the other two models are presented.

Various alternative criteria were used to determine global model-data fit as recommended by Kaplan (2000). Table 2 shows the fit indices obtained with each model.

Table 2.

Assessment of the fit of the STCI-T data

Models	Chi-square	*df*	RMSEA	SRMR	CFI	TLI
Model 1	656.94	53	0.164	0.106	0.852	0.815
Model 2	101.45	51	0.048	0.033	0.988	0.984

Note. N = 423. RMSEA = Root-Mean-Square Error of Approximation. SRMR = Standardized Root Mean Square Residual. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index.

As shown on Table 2, Model 1 (i.e., cheerfulness vs. seriousness and bad mood) showed a poor fit. By contrast, the model considering the three temperamental basis of sense of humor showed excellent fit indices. Thus, a structure defined by three factors, which corresponded to the three expected scales, showed the best fit to the data.

3.4.4. Relationships with other variables: personality

Validity evidence based on relationships with other variables was obtained. First, the relationship between humor and personality was tested in order to confirm the relationships found by Ruch and Köhler (2007) in a Spanish sample. These authors associated (a) cheerfulness with higher extraversion, openness, and agreeableness, and with lower neuroticism; (b) seriousness with lower extraversion but higher conscientiousness; and (c) bad mood with low extraversion, agreeableness, and high neuroticism. Responses to the shortened version of the NEO-PI-R (NEO-FFI) were collected and its scores were correlated with those of the STCI-T. Table 3 shows the results of correlating domains from both instruments.

Table 3 shows that the intercorrelations between the STCI-T and personality were similar to those found in former studies. First, cheerfulness correlated positively with extraversion and agreeableness and negatively with neuroticism (all effects were mid-range to high). At the same time, the positive correlation between cheerfulness and openness was low even though statistical significance was reached. Conversely, bad mood correlated positively with neuroticism (strong effect) and negatively with the remaining factors of personality (all effects were low to mid-range). Finally, seriousness only correlated significantly with conscientiousness, showing a positive relationship between both factors (mid-range effect).

Table 3.

Means, standard deviations, Cronbach alphas, and intercorrelations between the trait form of the State-Trait-Cheerfulness-Inventory (STCI-T) and the NEO Five-Factor Inventory (NEO-FFI).

Scales	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
STCI-T										
(1) Cheerfulness	2.90	.45	*.91*							
(2) Seriousness	2.51	.37	-.10	*.84*						
(3) Bad Mood	2.06	.57	-.57*	.41*	*.87*					
NEO-FFI										
(4) Neuroticism	1.78	.58	-.43*	.21	.65*	*.69*				
(5) Extraversion	2.54	.70	.67*	-.17	-.58*	-.52*	*.73*			
(6) Openness	2.30	.64	.29*	.06	-.25*	-.21	.26*	*.61*		
(7) Agreeableness	2.39	.54	.45*	.00	-.35*	-.29*	.42*	.38*	*.70*	
(8) Conscientiousness	2.43	.55	.21	.40*	-.26*	-.29*	.26*	.22	.45*	*.73*

Note. N = 200. Cronbach alphas in italics.

* *p* < .001 (adjusted level of significance due to alpha error accumulation)

3.4.5. Relationships with other variables: well-being

Taking into account previous research (Martin et al., 2003), positive correlations (mid-range) were expected between cheerfulness and positive dimensions of well-being (e.g., happiness or life satisfaction), while negative indicators of well-being (e.g., anxiety or depression) were expected to correlate negatively with cheerfulness (mid-range effects). The expected pattern was the opposite for bad mood (and seriousness, with lower correlations values). Table 4 shows the results of computing correlations between the STCI-T and positive and negative scales of well-being.

As shown on Table 4, results fit the expected pattern. First, all the positive factors of well-being correlated positively with the cheerfulness facet. By contrast, negative correlations were found for seriousness and bad mood. All the correlations were statistically significant (*p*s < .01), except for those between health, hope and satisfaction facets as well as seriousness (*p* > .05).

Relationships between (a) the STAI and BDI and (b) STCI-T facets were also tested by following the previous hypotheses. Both showed significant negative correlations with cheerfulness and significant positive correlations with bad mood (and seriousness, with lower correlations values).

Table 4.

Means, standard deviations, Cronbach alphas, and intercorrelations between the trait form of the State-Trait-Cheerfulness-Inventory (STCI-T) and the psychological well-being scales

Scales	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STCI-T												
(1) Cheerfulness	3.07	.45	*.93*									
(2) Seriousness	2.37	.36	-.39*	*.87*								
(3) Bad Mood	1.73	.50	-.65*	.53*	*.94*							
Well-being												
(4) Happiness	3.50	.75	.64*	-.23*	-.56*	*.83*						
(5) Hope	3.24	.81	.53*	-.19	-.53*	.77*	*.85*					
(6) Health	3.67	.72	.36*	-.10	-.41*	.61*	.57*	*.66*				
(7) Sociability	4.19	.64	.52*	-.24*	-.41*	.58*	.50*	.48*	*.71*			
(8) Life Satisfaction	3.86	.64	.49*	-.12	-.52*	.75*	.74*	.71*	.57*	*.87*		
(9) Anxiety	20.98	9.96	-.55*	.35*	.75*	-.65*	-.61*	-.53*	-.40*	-.65*	*.81*	
(10) Depression	6.13	5.44	-.45*	.33*	.64*	-.46*	-.51*	-.41*	-.39*	-.55*	.62*	*.86*

Note. N = 423. Cronbach alphas in italics.

* *p* < .001 (adjusted level of significance due to alpha error accumulation)

3.5. Discussion

The aim of the study was to provide an overall evaluation of the STCI-T scale in the Spanish context in order to obtain validity evidence for this specific sample. To do so, a wide variety of procedures were implemented, providing strong evidence of the adequacy of the scale and the three-dimensional definition of the attitudinal basis of sense of humor.

First, results of the item analysis led to the development of a Spanish version in which items with poor properties were removed. Once an experimental version with 104 items had been administered, exploratory factor suggested the existence of three factors clearly identified as cheerfulness, seriousness, and bad mood. In factor pattern CH1 loaded on cheerfulness and bad mood equally high. Results obtained with original version of the STCI-T also showed that CH1 loaded slightly on BM (Ruch, et al., 1996). In this sense, CH1 items imply a "lack of bad mood" and not only a presence of cheerfulness mood.

Correlations analyses highlighted clear convergences between the theoretical and applied relationships found between facets and scales and between scales. The reliability of the scale was confirmed by assessing its internal consistency but also by using a test-retest procedure. Finally, findings of the confirmatory factor analysis indicated that the three-dimensional model had the best fit.

Regarding the effects of age and gender, the main patterns already observed in previous studies were reproduced (Ruch et al., 1996). Gender was not found to have an effect on the temperamental basis of sense of humor on participants younger than 55 (previous studies didn´t include older participants), while higher seriousness scores were observed among older participants. Along the same lines, when validity evidence was explored based on the relationships with other variables (i.e., personality and well-being) the previous findings (Martin et al., 2003; Ruch & Köhler, 2007) were reproduced. Cheerfulness was correlated with higher extraversion, openness, and agreeableness, and with lower neuroticism; seriousness was correlated with higher conscientiousness; and bad mood was correlated with high neuroticism and lower extraversion. Regarding well-being, positive correlations (mid-range) were observed between cheerfulness and positive dimensions of well-being (e.g., happiness or hope),

while negative indicators of well-being (e.g., anxiety or depression) were negatively correlated with cheerfulness (mid-range effects). The observed pattern was the opposite for bad mood (and seriousness, with lower correlations values). These results suggested a relationship between a "good sense of humor profile" according to the temperamental basis of sense of humor (i.e., high scores in cheerfulness and low scores in seriousness and bad mood) and a positive well-being.

In summary, all the findings converged to indicate the adequacy of applying the scale in Spanish samples. Results corroborated that the attitudinal basis of sense of humor is composed of three dimensions: cheerfulness, seriousness, and bad mood. Furthermore, they confirmed the predicted relationships between the three factors and basic personality dimensions as well as a selection of variables used to assess psychological well-being. Future research should focus on testing the usefulness of the scale in applied settings and obtaining new validity evidence based on relationships with other theoretically relevant variables.

Capítulo IV-Estudio Psicométrico II: Are You Ready to Have Fun? The Spanish state form of the State-Trait-Cheerfulness-Inventory

4.1. Abstract

Although cheerfulness, seriousness, and bad mood as traits have been widely studied as the basis of sense of humor, data are scarce regarding the same dimensions as states. In this study, we adapted the state form of the State-Trait-Cheerfulness-Inventory (STCI-S) into Spanish. At the same time, we empirically tested new predictions. We assessed five independent samples accounting for 1,029 participants (647 women) with ages ranging from 18 to 78 years. We confirmed the three-factor structure as well as a strong measurement invariance between men and women. The internal consistency of the scale was satisfactory, the expected intercorrelations emerged, and the convergence between states and traits was corroborated. We also confirmed that the STCI-S's items were sensitive to affective changes in the environment. A longitudinal stability study of the state-trait dimensions using latent state-trait (LST) models revealed that all three trait measures capture mostly stable interindividual differences, with occasion-specific effects mainly in the state dimensions. Finally, we examined the relationship between the STCI-S scores and state well-being, and a clear relationship pattern was observed. The results suggest that the STCI-S is a valid option for measuring the state basis of sense of humor in the Spanish population.

Keywords: humor, STCI-S, cheerfulness, seriousness, bad mood, well-being

4.2. Introduction

The sense of humor has been widely studied in psychology (e.g., Martin, 2007; Papousek & Schulter, 2010). However, few attempts have been made to provide a comprehensive theoretical framework to guide sense of humor research. On the basis that the sense of humor establishes stable differences across time and situations between individuals (trait manifestation) as well as differences across situations for the same individual (state manifestation), Ruch, Köhler, and van Thriel (1996, 1997) developed a theoretical proposal that focuses on isolating the affective and cognitive basis of sense of humor as both states and traits. More specifically, a state-trait model of "exhilaratability" (i.e., the disposition for laughter and exhilaration) was developed (Ruch, 1993). The model incorporates the dimensions of cheerfulness, seriousness, and bad mood. The relationships among the three concepts as well as between states and traits were outlined and tested, and some basic postulates were formulated (Ruch & Köhler, 2007). Furthermore, the State-Trait-Cheerfulness-Inventory both in the trait form (STCI-T; Ruch et al., 1996) and state form (STCI-S; Ruch et al., 1997) was developed.

From a trait perspective, the basis of sense of humor model has produced a considerable amount of research and has been applied to a variety of fields, such as health and well-being (e.g., Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014), personality (e.g., Ruch & Köhler, 2007), emotional intelligence and social competence (e.g., Yip & Martin, 2006), and clinical intervention (e.g., Papousek & Schulter, 2010). Moreover, the psychometric properties of the trait form of the STCI have been extensively analyzed across independent samples from different countries (e.g., Carretero-Dios, Eid, & Ruch, 2011; Chen, Ruch, & Li, 2016).

Although some studies have empirically explored the role of the temperamental state basis of sense of humor in personality, humor, and affective induction settings (see Ruch & Hofmann, 2012), to date, the knowledge of these factors has been scarce. In this study, the Spanish adaptation of the STCI-S is presented at the same time that new hypotheses related to the longitudinal stability of states versus traits, as well as the link between the affective and cognitive state basis of sense of humor and state well-being dimensions, are tested.

4.2.1. The State Basis of Sense of Humor: Definition and Measure

State cheerfulness is an affective-emotional dimension described as the awareness of a temporally changed readiness to show a low threshold for displaying laughs and smiles in response to humorous stimuli, as well as to express cheerful, peaceful, calm, elated, and joyful affective states. State bad mood, understood as the opposite affective component, is defined as actual action tendencies associated with a lack of interest in participating in situations where humor is present, together with the readiness to feel and express melancholic, sad, grumpy, grouchy, complaining, and curmudgeonly affective states. Finally, state seriousness, considered a cognitive dimension, refers to attitudes, thoughts, or reflections on life, situations, etc. It is described as an actual readiness to process most things in a deeply analytical way, together with a serious, objective, sober, and thoughtful mental attitude toward the world. Whereas cheerfulness would facilitate the exhilaration response, understood as the process of making cheerful or the temporary rise in the cheerful state (Ruch, 1993), seriousness and bad mood would inhibit it.

The state form of the STCI-S has shown adequate psychometric properties. The internal consistency of the scale has been high, with Cronbach alpha values ranging from .85 to .94. The corrected item-total correlations range from .34 to .85, with skewness and kurtosis values ranging from -0.39 to 1.40 and from -0.75 to 1.27, respectively. The mean correlation between state cheerfulness and the others factors is negative (r = -.49 for state seriousness and r = -.60 for state bad mood), whereas the latter two are positively correlated (r = .46). The homologous state-trait factors are usually the most positively correlated, with values fluctuating from .35 to .40. The test-retest correlations range from.33 to .36. No important age and sex significant effects have been observed for the three facets. Exploratory factor analyses suggest three factors, which explain 52.8% to 66.2% of the variance (Ruch et al., 1997; Ruch & Köhler, 2007).

4.2.2. Longitudinal Stability of the State-Trait Basis of Sense of Humor

The distinction between state and trait temperamental basis of sense of humor is meaningful only if one adopts the temporal (or longitudinal) perspective: Trait temperamental basis of sense of humor covers individual differences that are temporally permanent, whereas the state temperamental basis of sense of humor deals with

individual differences related to a given moment. Temporal stability and cross-situational consistency are considered essential prerequisites for the description of individuals in trait terms. In contrast, for state dimensions, it would be expected that individuals were primary influenced by situations, depending more strongly on moment than on person. From the research area of classic psychological variables, such as anxiety, several attempts have been made to clarify the temporal stability of traits versus states as well as their interactions with situations by employing psychometric models that allow for analyzing different variance sources (e.g., Vautier, 2004). Following a similar analysis strategy (Geiser et al., 2015), temporal stability related to cheerfulness, seriousness, and bad mood factors as traits and states could be studied. However, to date, no data has assessed the validity of the basis of sense of humor proposal through a longitudinal follow-up study where both state and trait manifestations are simultaneously evaluated. In this sense, with a longitudinal approach it should be confirmed that the state scores of STCI are more affected by the assessment moments than trait scores. More specifically, if a specific state score is decomposed in terms of person effect (trait component) and occasion effect (state component, which includes the effects of the situation and the person x situation interaction), it would be expected that, in the case of state scores, the proportion of variance due to occasion effects should be higher than that due to person stable effects. This pattern should be the opposite in the case of trait scores.

4.2.3. The Present Study

The aim of this study was to conduct a comprehensive assessment of the STCI-S in independent samples of Spanish adults. We conducted traditional psychometric analyses and studied the factor structure of the STCI-S using confirmatory analyses. Furthermore, we examined the temporal stability of the state versus trait basis of sense of humor and we obtained new evidence of the STCI-S scores' external validity. To date, the study of connections between the state dimensions of sense of humor, well-being, and physical-psychological health has received far less attention. Therefore, taking previous research into account and assuming that state cheerfulness is also a positive disposition connected to trait cheerfulness to facilitate the emotional response of sense of humor (Ruch & Köhler, 2007), we considered that the study of affective states at a specific time point could be a relevant tool for allowing a better understanding of areas as physical-psychological health, personality, or social

interactions. At this form, in this study, we present: 1) content validity results; 2) the internal structure of the scale according to confirmatory factor analysis; 3) item analysis, reliability data, gender, and sex influences; 4) an experimental evaluation of the items' sensitivity to affective changes in the environment; 5) state-trait relationships; 6) an analysis of the longitudinal data of the state-trait basis of sense of humor; and 7) the relationship between the state basis of sense of humor and state manifestations of well-being.

4.3. Method

4.3.1. Participants

Sample 1 (*Construction Sample*) included 345 adults (158 male and 187 female) aged between 18 and 78 years (*M* = 31.94, *SD* = 14.63). Slightly less than half were married or lived with a partner (44.6%), and 55.4% were single or unmarried. Among them, 19.2% were undergraduate university students, 21.5% held a school-leaving diploma qualifying them for university entrance, 29.3% held a university degree, and the rest had vocational training education.

Sample 2 (*Replication Sample*) consisted of 309 participants (two people did not fill out personal data; 117 male and 190 female) aged between 18 and 40 years (*M* = 21.35, *SD* = 3.32), of whom 59.2% were undergraduate university students, 18.8% held a school-leaving diploma qualifying them for university entrance, and 22% held a university degree.

Sample 3 (*Item Sensitivity Sample)* consisted of 129 undergraduate students (four people did not fill out personal data; 26 male and 99 female) aged between 19 and 32 years (*M* = 20.90, *SD* = 2.16).

Sample 4 (*State–Trait Relationship Sample*) consisted of 120 undergraduate students (40 male and 80 female) aged between 18 and 55 years (*M* = 21.52, *SD* = 5.75).

Sample 5 (*Longitudinal Stability Sample*) included 126 participants (35 male and 91 female), all of them undergraduate university students aged between 18 and 55 years (*M* = 21.66, *SD* = 5.71).

4.3.2. Measures

We used the Spanish Experimental state form of the State-Trait-Cheerfulness-Inventory (STCI-S) to assess the psychometric properties of the scale. Although an international version of the scale, which was the instrument of reference for future adaptations, was created to assess state cheerfulness (14 items; e.g., "I could laugh at the drop of a hat"); state seriousness (15 items; e.g., "I am in a pensive frame of mind"); and state bad mood (16 items; e.g., "I am in a crabby mood"), the authors developed a short version with just 10 items per factor (Ruch et al., 1997). Therefore, although we initially used the 45-item version, once we confirmed the good psychometric behavior of the items, we reported the data related to the short version. The items were rated on a four-point Likert scale (1 = "strongly disagree," 2 = "moderately disagree," 3 = "moderately agree," 4 = "strongly agree"). The 45-item international version underwent a back-translation process (Spanish-English). At the beginning, two bilingual specialists translated the STCI-S to Spanish, and then two different bilingual specialists translated items to English. After that, the new and the original English versions were compared to check that there were no differences in items in the translations (Hambleton & de Jong, 2003). Finally, six experts in test construction assessed the STCI-S's items to obtain evidence of validity based on the test's content (Delgado-Rico, Carretero-Dios, & Ruch, 2012). According to the criteria that Angleitner, John, and Lohr (1986) outlined, the items were assessed in terms of: a) clarity (i.e., whether the item was concise/accurate/direct); b) ambiguity (i.e., the chances that the item would be interpreted in different ways); and c) comprehension (i.e., whether the item was properly understood). Furthermore, the expert judgment focused on determining the extent to which the items created were representative of the target dimension. All of the items showed adequate content validity indexes (CVIs above .70; an interjudge agreement Kappa index above the .40–.59 reference range). The evaluation criteria for Kappa are as follows: a) excellent, above .74; b) good, between .60 and .74; and c) fair, between .40 and .59 (Cicchetti & Sparrow, 1981).

The trait form of the State-Trait-Cheerfulness-Inventory (STCI-T; Carretero-Dios et al., 2014; Ruch et al., 1996) was used in the State-Trait Relationship Sample and the Longitudinal Stability Sample. It consisted of 104 items to assess cheerfulness (38 items; e.g., "Life gives me very few reasons to laugh"); seriousness (37 items; e.g., "I am a serious person"); and bad mood (29 items; e.g., "Compared to others, I really can

be grumpy and grouchy"). All of the items were rated on a four-point Likert scale (1 = "strongly disagree," 2 = "moderately disagree," 3 = "moderately agree," and 4 = "strongly agree"). Previous studies have provided alpha values ranging from .68 to .84 for the cheerfulness facets; from .61 to .79 for the seriousness facets; and from .64 to .84 for the bad mood facets.

The state form of the Positive and Negative Affective Scale (PANAS-S; Sandín et al., 1999; Watson, Clark, & Tellegen, 1988a) was administered to the Replication Sample. The PANAS-S is a self-report questionnaire used to assess two subscales of 10 items each—positive affect (e.g., "proud") and negative affect (e.g., "nervous")—using a five-point Likert scale between 1 ("nothing") and 5 ("very much so"). Previous analyses have provided a Cronbach's alpha of .88 for positive affect and .90 for negative affect.

The state form of the State-Trait Depression Inventory (ST-DEP-S; Ritterband & Spielberger, 1996; Spielberger, Agudelo, & Buela-Casal, 2008) was used to assess dysthymia or negative affect (five items; e.g., "I am sad") and euthymia or positive affect (five items; e.g., "I feel good") in the Replication Sample. The ST-DEP-S is a self-report instrument featuring a four-point Likert scale (from 1 = "not at all" to 4 = "very much so"). Some reliability analyses have provided a Cronbach's alpha of .87 for dysthymia and .90 for euthymia.

The state form of the State-Trait Anxiety Inventory (STAI-S; Spielberger, Gorsuch, & Lushene, 1970, 1982) was also used in the Replication Sample. The STAI-S is a 20-item self-report for assessing state anxiety (e.g., "I feel nervous"). The responses are rated on a four-point Likert scale and range from 1 ("not at all") to 4 ("very much so"). This scale usually has a good internal consistency, with alphas between .82 and .92.

The state form of the State-Trait Anger Expression Inventory-2 (STAXI-2-S; Miguel-Tobal, Casado, Cano-Vindel, & Spielberger, 2001; Spielberger, 1999) was administered to the Replication Sample. It evaluates anger as an emotional state at a particular time and includes three subscales of five items each: anger feelings (e.g., "I am furious"), expressing anger verbally (e.g., "I want to yell at somebody"), and expressing anger physically (e.g., "I feel like hitting someone"). Verbal anger and physical anger conform to a global factor of anger responses. Anger intensity is measured on a four-point Likert scale and ranges from 1 ("not at all") to 4 ("very much

so"). Previous data have provided Cronbach's alpha values ranging from .78 to .89.

We administered *prototypical affective scenarios* to examine whether the items are sensitive to affective changes in the environment. Specifically, we analyzed whether the mean of each item increased significantly from a neutral condition to the condition in which its corresponding state is induced. The participants were instructed to read and to imagine relevant and prototypical situations as described in scenarios, which were initially selected from the authors' materials employed to develop the scale (Ruch et al., 1997). Additionally, some scenarios were created in order to cover the different definitional components (facets) of the temperamental state basis of sense of humor (Ruch & Köhler, 2007; Ruch et al., 1997). In sum, two scenarios were written per state (Ruch et al., 1997). A neutral scenario was also depicted. The scenarios did not include the key terms used in the STCI-S's items. The situations were as follows: 1) *state cheerfulness* – a) A group of friends are dining when a person chokes and spits a piece of food into the face of another friend, and all of them laugh, and b) Two friends are celebrating that they have passed an exam, when one of them puts his or her leg in a bucket of water; 2) *state seriousness* – c) A person spends all day studying in a library in a focused and reflexive way, and d) a person wants to buy a laptop and discusses its characteristics with a friend; 3) *state bad mood* – e) Someone receives a phone call saying that a friend has died in a motorbike accident, and f) A person tries to solve an administrative problem at the university for several days without success; and 4) *neutral* – g) A sequence of events in a regular day is described, such as taking the bus to buy something and going to a university.

4.3.3. Procedure

The participants were assessed individually or in small groups in public places or libraries at a university campus. The individuals who agreed to cooperate received a booklet that included the standard instructions. Only the STCI-S was administered to the Construction Sample (Sample 1). In the Replication Sample (Sample 2), we used a booklet of questionnaires that included the STCI-S and instruments for assessing state well-being. All of the participants received the following measures in the same fixed order: STCI-S, PANAS-S, STAXI-2-S, STAI-S, and ST-DEP-S. In the Item Sensitivity Sample (Sample 3), the neutral scenario was always presented at the beginning, while the order of the remaining six prototypical affective scenarios was counterbalanced. The

STCI-S was completed after each situation. The State-Trait Relationship Sample (Sample 4) and Longitudinal Stability Sample (Sample 5) completed the STCI-T and then the STCI-S. In this last case, the procedure consisted of four sessions on regular school hours, with a time lag of two months. All of the data were collected independently in the five samples. None of the participants was paid for his or her services.

4.3.4. Statistical Analyses: longitudinal stability of state versus trait scores

To analyze the longitudinal stability of the trait versus state basis of sense of humor, firstly we created item parcels to separate measurement errors from true differences. We created item parcels using the single-factor method (Landis, Beal, & Tesluk, 2000). Three indicators for each of the state and trait factors of sense of humor were constructed. Then, we computed the descriptive statistics for all state and trait indicators at each of the four time points in order to observe the fluctuations in the mean and standard deviation of factors. After that, correlations across time points and within measurement occasions were also computed.

From a confirmatory perspective, the use of latent variable techniques, such as structural equation modeling (SEM), enables the analysis of the degree to which psychological measurements reflect stable attributes, occasion-specific fluctuations, and random measurement error (e.g., Geiser et al., 2015). In this context, the latent state-trait (LST) theory (i.e., Steyer, Mayer, Geiser, & Cole, 2015) is considered the theoretical framework of reference. Specifically, using LST models, an observed score is composed of three components: (a) a component that characterizes the person effect—the latent trait component, which is stable across time; (b) a component that characterizes systematic state variability—the latent state residual component, which shows the effects of the situation and person x situation interactions; and (c) a random measurement error component that reflects the unsystematic measurement error or unreliability of the observed scores (the path of the classic LST model is shown in Figure 1a).

In Figure 1a (a classic LST model), Y_{it} refers to the *ith* observed variable (indicator) measured at time *t*, *T* denotes the latent trait factor, and SR_t represents the latent state residual factor, which is a random variation. The model assumes that SR_t scores are uncorrelated, as it is the error variable e_{it} with *T* and *SRt*.

This variance decomposition enables us to establish three coefficients that are the most important values in all LST studies: the consistency (CO), the occasion specificity ($OSpe$), and the reliability (Rel) coefficients (for more detailed information about the LST coefficients, see Geiser et al., 2015). CO indicates the degree to which individual differences in the observed variables are determined by stable person-specific (trait) effects. The larger the CO values, the fewer the scores vary over specific situations or assessment points. $OSpe$ stands for the proportion of variance determined by the interaction of situation and state. The larger the $OSpe$ values, the stronger the impact of situation-specific or person x situation interaction variability on the observed scores. Rel is the sum of the CO and the $OSpe$ indicators, reflecting the degree to which observed individual differences are not due to measurement error.

We tested two different LST models and compared the fit of the models. Specifically, we tested a classic LST model, also called single trait–multistate LST model with no method factors (NM; see Figure 1a), and a multitrait–multistate LST model with indicators-specific trait factors (IT; see Figure 1b).

Although both NM and IT models assume that traits are stable over time, there are important differences between them. The NM model assumes that all indicators (item parcels in our study) share the same latent trait. Also, the indicators assessed at a given time point would share the same latent-state residual factor. According to the NM model, variances and covariances of the indicators are fully explained by the latent trait factor, state residual factors, and error variables, with error variables assumed to be uncorrelated. Based on this assumption, indicators (item parcels) would not be expected to share components with themselves over time. Nevertheless, indicators often include some method-specific component not shared with the remaining indicators (Geiser et al., 2015), and thus identical indicators (item parcels in our study) would be more highly correlated with themselves over time than with other indicators. The IT model considers the idiosyncratic effects of each indicator variable by allowing each variable to load onto its own (indicator-specific) trait (method) factor. In sum, the IT model allows the association of each indicator with its own trait (method) factor, relaxing the assumption of perfectly correlated trait variables that appears in the NM model. This allows the definition of method effects (indicator specificity) across time (see Geiser et al., 2015, for a more detailed description of the model).
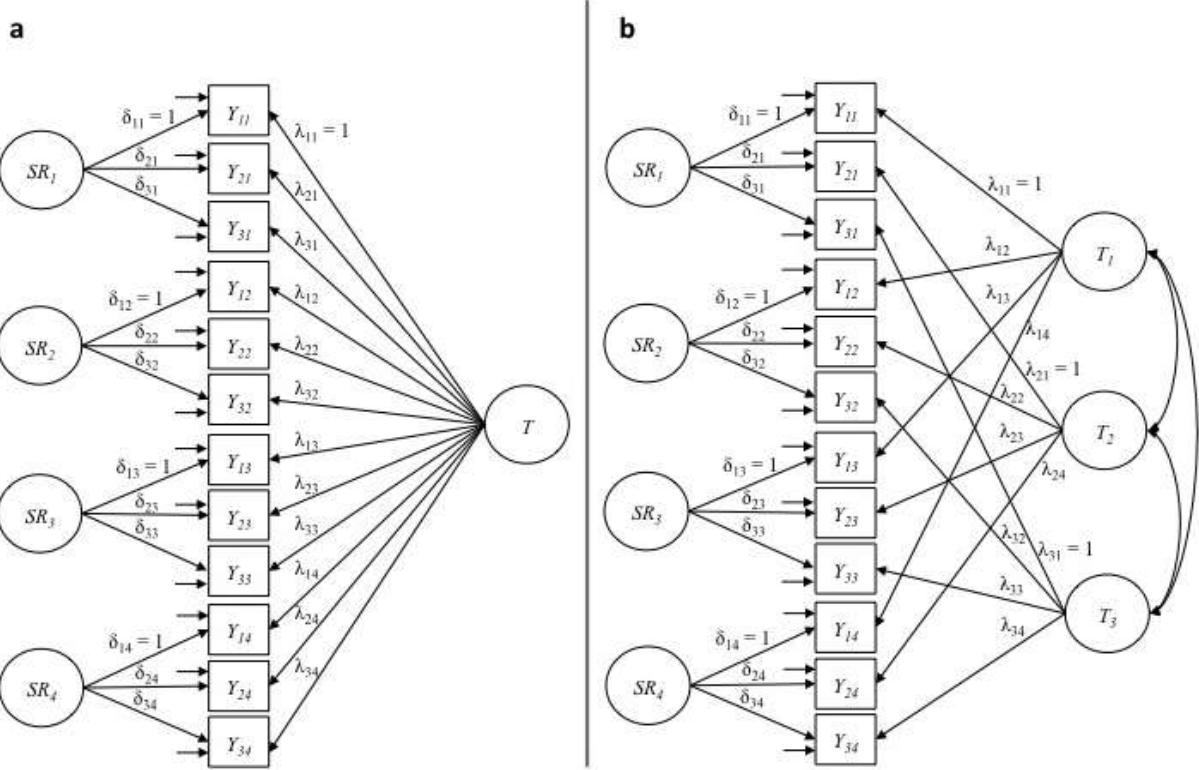
Figure 1. Path diagrams illustrating two Latent State-Trait models. Y_{it} denotes the ith observed variable (indicator) measured at time t. T: latent trait factor. T_i: trait factor for indicator. SR_t: latent state residual factor. λ_{it}: trait factor loading. δ_{it}: state residual factor loading. (a) Classic Latent State-Trait model with no method factor (NM model), or Singletrait-Multistate model. (b) Latent State-Trait model with indicators-specific trait factors (IT), or Multrait-Multistate model (Longitudinal Stability Sample).

We used an MLR estimator and the analyses were conducted using Mplus 7.0 (Muthén & Muthén, 2012). Due to the high computing requirements of a confirmatory factor analysis of the LST model of the state-trait basis of sense of humor, we decided to conduct the analyses using only one dimension and separating states from traits. That is, in order to guarantee the convergence, the analysis model was computed separately for each dimension. These analyses produced all the information needed for the research aims of this study.

We fitted the two models to each state-trait dimension. Mplus scripts for all analyses were obtained from the four-wave longitudinal measurement. To assess overall goodness-of-fit, we used the Chi square, the RMSEA, the CFI, the TLI, and descriptive model comparison indices (Akaike Information Criterion, AIC; Bayesian Information Criterion, BIC). Models exhibiting RMSEA lower than .08 and CFI-TLI greater than

.95 offer a useful account of the data. In addition, the smaller the AIC and the BIC are, the better the model fits the data (Burnham & Anderson, 2002).

4.4. Results

4.4.1. Internal Structure

The items were treated as categorical variables, and the weighted least squares means and variance-adjusted (WLSMV) estimation method was used (Muthén & Muthén, 2012). The model fit was assessed with the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) with a 90% confidence interval (CI). TLI and CFI values greater than .90 and RMSEA values less than .08 indicate acceptable model fit, whereas TLI and CFI values greater than .95 and RMSEA values less than .05 indicate good model fit (Kaplan, 2000). Three different models (Ruch et al., 1996) were tested (see Table 1): a one-factor model with all of the STCI-S items (Model 1); a two-factor model (Model 2) composed of positive dimensions (i.e., cheerfulness) versus negative dimensions (i.e., seriousness and bad mood); and a three-factor model (Model 3) composed of the three correlated dimensions (i.e., cheerfulness, seriousness, and bad mood).

Model 1 and Model 2 showed a very poor fit. However, CFA confirmed that a structure defined by three factors showed an acceptable-to-good model fit in the two assessed samples: (a) Construction Sample: χ^2 (400) = 1028.301, CFI = .948, TLI = .944, RMSEA = .067, 90% CI [0.062, 0.073] and (b) Replication Sample: χ^2 (400) = 1035.895, CFI = .946, TLI = .941, RMSEA = .072, 90% CI [0.067, 0.077]. All of the standardized factor loadings were statistically significant ($p<.001$) and ranged from .37 to .91 and from .36 to .92 (cheerfulness), from .31 to .82 and from .39 to .79 (seriousness), and from .53 to .88 and from .57 to .88 (bad mood) for the Construction Sample and the Replication Sample, respectively.

Table 1

Confirmatory factor analysis of the STCI-S

Model	$\chi^2(df)$	CFI	TLI	RMSEA [90% CI]
Construction Sample ($N = 345$)				
Model 1	2552.012 (405)	.823	.809	.124 [.119, .129]
Model 2	2137.127 (404)	.877	.866	.102 [.107, .116]
Model 3	1028.301 (400)	.948	.944	.067 [.062, .073]
Replication Sample ($N = 309$)				
Model 1	2347.519 (405)	.835	.823	.125 [.120, .130]
Model 2	1929.005 (404)	.881	.871	.101 [.106, .116]
Model 3	1035.895 (400)	.946	.941	.072 [.067, .077]

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval: Model 1 = one general factor; Model 2 = two factors: cheerfulness versus seriousness/bad mood; Model 3 = a three-factor model with cheerfulness, seriousness, and bad mood.

4.4.2. Invariance of the STCI-S across Gender

We explored the measurement invariance for gender testing the configural, the metric, and the scalar invariance in a stepwise manner (Millsap & Yun-Tein, 2004). The confirmation of the configural invariance entails that the STCI-S items are clustered under the same factors for men and women. To conclude in favor of the metric invariance implies that, additionally, the factor loadings of the items are similar in the different groups. The scalar invariance would reflect that item thresholds (i.e., item intercepts for categorical variables) are similar for different groups.

To explore the measurement invariance for gender, firstly we tested whether an unconstrained model (baseline model M_0, in which factor loadings and thresholds were freely estimated between groups) fit well in both groups separately. Secondly, we studied the metric invariance comparing the baseline model (M_0) with a model in which the factor loadings of the items on the latent factor were constrained to be equal across the groups (M_1). We compared the models using the chi-square difference test on the

WLSMV estimator (Muthén & Muthén, 2012). No significant difference in the model fit between M_0 and M_1 would indicate metric invariance. Finally, to test scalar invariance, and again with the chi-square difference test on the WLSMV estimator, we compared the metric model (M_1) with a model in which the thresholds of the items were also constrained to be equal in the two groups (M_2). No significant difference in the model fit between M_1 and M_2 would indicate scalar invariance.

As a first step in exploring the measurement invariance, we applied a CFA by gender ($N = 652$; Construction Sample + Replication Sample). Fit indices showed an acceptable fit of the three-factor model for men ($N = 275$) χ^2 (400) = 1109.622, CFI = .930, TLI = .923, RMSEA = .079, 90% CI [.069, .080] and women ($N = 377$) χ^2 (400) = 1380.829, CFI = .933, TLI = .930, RMSEA = .077, 90% CI [.068, .079]. After this, we calculated the configural, the metric, and the scalar invariance between men and women (see Table 2).

Table 2

Measurement invariance Tests of the STCI-S between genders

Variable	χ^2(*df*)	CFI	TLI	RMSEA [90% CI]
Configural invariance	2376.357 (914)	.934	.928	.080 [.072, .081]
Metric invariance	2006.775 (800)	.942	.944	.066 [.062, .069]
Scalar invariance	2195.932 (830)	.947	.945	.064 [.062, .069]

Note. $N = 652$ (Construction Sample + Replication Sample). CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval

Measurement invariance calculations showed an acceptable fit to the model data. The application of chi-square difference tests on the WLSMV estimator (Muthén & Muthén, 2012) revealed no significant differences in the model fit between the configural and the metric model ($p = .86$) or between the metric and the scalar model ($p = .97$). Thus, the three-factor model for the STCI-S scores showed strong measurement invariance between men and women.

4.4.3. Descriptive Statistics, Reliability, and Relationship between State Dimensions

Cheerfulness and seriousness items did not deviate from the normal distribution: skewness (Construction Sample: cheerfulness = −0.68 to -0.08, seriousness = −0.99 to 0.24; Replication Sample: cheerfulness = −0.97 to -0.06, seriousness = −0.94 to 0.41) and kurtosis (Construction Sample: cheerfulness = −0.98 to 0.26, seriousness = −0.99 to 0.24; Replication Sample: cheerfulness = −0.96 to 0.12, seriousness = −0.98 to 0.46). However, in the case of bad mood items, as expected, some of the skewness values were higher than 1: skewness (Construction Sample: 0.81 to 1.50; Replication Sample: 0.81 to 1.54) and kurtosis (Construction Sample: −0.62 to 1.19; Replication Sample: −0.58 to 1.27).

Cronbach alpha values were high for all of the states (Construction Sample: cheerfulness = .86, seriousness = .86, and bad mood = .93; Replication Sample: cheerfulness = .87, seriousness = .82, and bad mood = .92). We obtained the following corrected item-total correlations mean for the states: Construction Sample = .57 for cheerfulness (.28 to .69), .59 for seriousness (.46 to .67), and .72 for bad mood (.62 to .76); Replication Sample = .60 for cheerfulness (.25 to .73), .51 for seriousness (.34 to .69), and .73 for bad mood (.64 to .78).

Factor average scores were above the midpoint in the response options of the scale for cheerfulness (Construction Sample: $M = 2.68$, $SD = 0.59$; Replication Sample: $M = 2.74$, $SD = 0.62$) and seriousness (Construction Sample: $M = 2.80$, $SD = 0.57$; Replication Sample: $M = 2.80$, $SD = 0.55$). In the opposite direction, average scores were below the midpoint in the response option scale for bad mood (Construction Sample: $M = 1.70$, $SD = 0.71$; Replication Sample: $M = 1.68$, $SD = 0.71$).

Three independent ANOVAs were performed to test the gender effects. No effects were identified for cheerfulness [Construction Sample: $F (1, 343) = .98$, $p = .32$; Replication Sample: $F (1, 305) = .64$, $p = .42$], seriousness [Construction Sample: $F (1, 343) = .11$, $p = .74$; Replication Sample: $F (1, 305) = .42$, $p = .52$], or bad mood [Construction Sample: $F (1, 343) = .14$, $p = .71$; Replication Sample: $F (1, 305) = .02$, $p = .88$]. These results supported the data reported in the original scale.

Regarding age, in the case of the Construction Sample, although bad mood was positively correlated with age ($r = .22$, $p < .05$), a negative correlation was found for

cheerfulness ($r = −.14$, $p < .01$), with a significant effect due to sample size. Seriousness was not correlated with age ($r = .04$, $p = .42$). In the Replication Sample, all of the correlations were around zero (cheerfulness: $r = −.02$, $p = .69$; seriousness: $r = .09$, $p = .13$; bad mood: $r = −.03$, $p = .61$).

The inter-correlations between state dimensions were explored taking the mean factor scores into account. The correlation pattern was as expected: Cheerfulness showed a negative correlation with seriousness (Construction Sample: $r = −.29$, $p < .001$; Replication Sample: $r = −.32$, $p < .001$) and bad mood (Construction Sample: $r = −.59$, $p < .001$; Replication Sample: $r = −.61$, $p < .001$). A positive correlation was found between seriousness and bad mood (Construction Sample: $r = .41$, $p < .001$; Replication Sample: $r = .45$, $p < .001$).

4.4.4. Item Sensitivity

To evaluate the items' sensitivity to affective changes, one-way ANOVAs with the seven scenarios as the repeated measurement factor were separately computed for all STCI-S items. The changes produced on each item from the neutral scenario to affective or cognitive scenarios were compared adjusting the confidence interval by means of Bonferroni correction. Furthermore, for the three states, planned comparisons were computed by testing the difference between the neutral condition and the averaged homologous scenarios (see Figure 1).

Regarding the analyses considering each of the STCI-S items, the mean of each item significantly increased from a neutral condition to the condition in which its corresponding state was induced ($p < .05$). All of the changes were positive and ranged from 0.21 to 2.41, with medians of 0.72 for cheerfulness, 0.60 for seriousness, and 2.12 for bad mood items. The differences among the three state scores and the averaged homologous scenarios (see Figure 1) were in all cases significant: cheerfulness, $F (1,127) = 275.45$, $p < .001$, $\eta^2 = .34$; seriousness, $F (1,127) = 63.97$, $p < .001$, $\eta^2 = .69$; and bad mood, $F (1,127) = 1040.36$, $p < .001$, $\eta^2 = .89$.
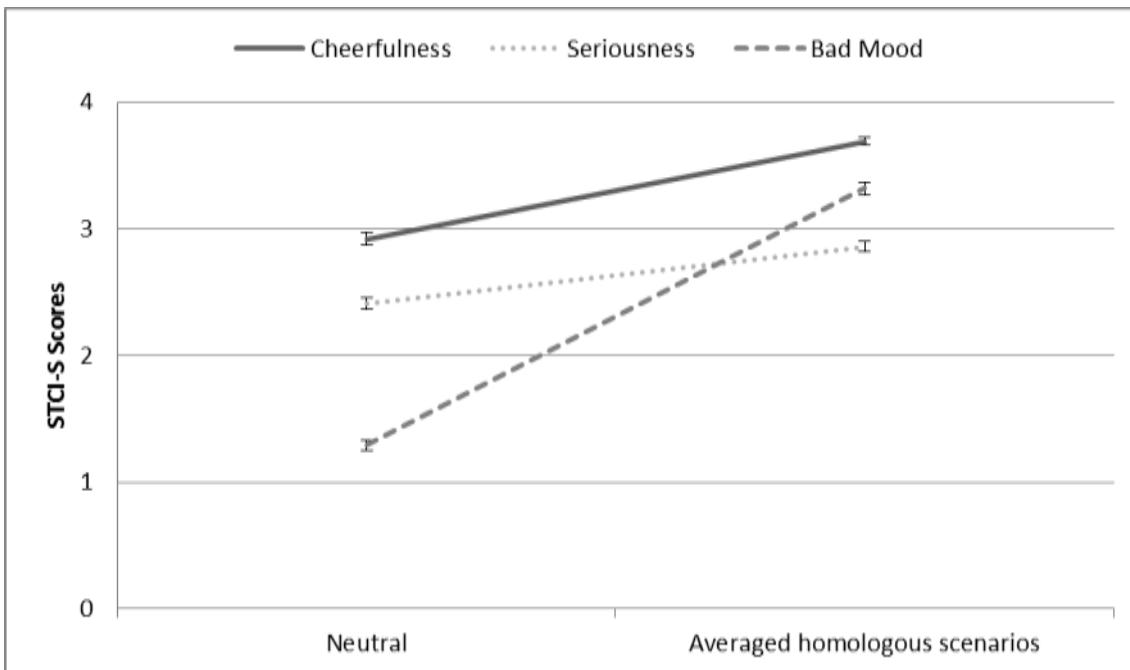
Figure 2. Differences in state cheerfulness, state seriousness, and state bad mood between the neutral condition and the averaged homologous scenarios (Item Sensitivity Sample). Error bars represent standard errors.

4.4.5. State-Trait Relationship

A correlation analysis with mean factor scores was carried out to check the relationship between the state and the trait forms of the STCI. The correlations are presented in Table 3.

Similar to previous correlational analyses from Construction and Replication Samples, Table 3 showed that state cheerfulness was negatively correlated with state seriousness ($r = -.43$, $p < .001$) and, especially, with state bad mood ($r = -.73$, $p < .001$), whereas these were positively correlated themselves ($r = .41$, $p < .001$). This pattern was also observed for traits. Importantly, as we expected, the inter-correlations between the homologous state-trait factors showed the highest coefficients (cheerfulness: $r = .53$, $p < .001$; seriousness: $r = .30$, $p < .001$; bad mood: $r = .61$, $p < .001$). We also explored the data pattern across states and traits. The analysis revealed that trait cheerfulness correlated negatively with state bad mood ($r = -.44$, $p < .001$) and, similarly, trait bad mood correlated negatively with state cheerfulness ($r = -.40$, $p < .001$). However, in general, the coefficients were lower, suggesting that trait cheerfulness and trait bad mood did not correlate with state seriousness ($r = -.11$ and r

= .18, respectively) as well as trait seriousness was not related to the affective states ($r =$ .01 for state cheerfulness and $r = .12$ for state bad mood). These results supported the data reported on the original scale.

Table 3

Means, standard deviations, Cronbach alpha values, and intercorrelations between the Trait and the State Forms of the State–Trait-Cheerfulness-Inventory (STCI) (State–Trait Relationship Sample)

Scales	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)
STCI-T								
(1) Trait Cheerfulness	3.15	.43	*.94*					
(2) Trait Seriousness	2.32	.37	−.38*	*.85*				
(3) Trait Bad Mood	1.79	.48	−.73*	.47*	*.94*			
STCI-S								
(4) State Cheerfulness	2.68	.65	.53*	.01	−.40*	*.91*		
(5) State Seriousness	2.90	.48	−.11	.30*	.18	−.43*	*.81*	
(6) State Bad Mood	1.72	.73	−.44*	.12	.61*	−.73*	.41*	*.94*

Note. $N = 120$. Cronbach alphas in italics.

* $p < .001$

4.4.6. Longitudinal Stability of the State-Trait Temperamental Basis of Sense of Humor

We computed the descriptive statistics for all indicators (item parcels; see statistical analyses section) at each of the four time points. Slight fluctuations in the mean and standard deviation of each dimension at the four time points were observed for indicators of trait dimensions (trait cheerfulness: $M = 3.00$ to 3.21; $SD = .39$ to .47; trait seriousness: $M = 2.04$ to 2.47; $SD = 0.38$ to 0.47; trait bad mood: $M = 1.57$ to 1.82; $SD = 0.46$ to 0.58) and state dimensions (state cheerfulness: $M = 2.46$ to 3.00; $SD = 0.70$ to 0.80; state seriousness: $M = 2.38$ to 3.01; $SD = 0.56$ to 0.78; state bad mood: $M = 1.58$ to 1.85; $SD = 0.67$ to 0.82). However, the fluctuations in the mean value and the standard deviation for the state indicators were higher, indicating a possible higher impact of the measurement occasions.

Similarly, trait indicators in these four periods were closely correlated ($p < .01$), and there were no clear variations across time points (trait cheerfulness: $r = .63$ to .89; trait

seriousness: r = .61 to .84; trait bad mood: r = .61 to .90). For the three state dimensions, the indicators correlated higher within measurement occasions (cheerfulness: r = .67 to .90, p < .01; seriousness: r = .60 to .83, p <.01; bad mood: r = .74 to .88, p <.01) than between occasions (cheerfulness: from r = .11, p = .20 to r = .48, p <.01; seriousness: from r = .23, p < .05 to r = .55, p <.01; bad mood: from r = .11, p = .20 to r = .42, p <.01), indicating variability in state cheerfulness, seriousness, and bad mood between the four assessment points.

Table 4 shows the goodness-of-fit statistics for a single trait–multistate LST model with no method factors (NM; see Figure 1a), and a multitrait–multistate LST model with indicators-specific trait factors (IT; see Figure 1b).

Table 4

Goodness-of-fit Indices for different latent state-trait models

Model	χ^2(*df*)	$p(\chi^2)$	RMSEA	CFI	TLI	AIC	BIC
			Trait Cheerfulness				
NM	270.479 (45)	<.001	.201	.893	.843	-26.17	100.37
IT	61.363 (48)	.093	.042	.993	.990	-241.366	-123.255
			State Cheerfulness				
NM	103.975 (45)	<.001	.103	.957	.937	2006.05	2132.96
IT	48.424 (48)	.455	.001	1.000	1.000	1948.62	2067.07
			Trait Seriousness				
NM	232.519 (45)	<.001	.182	.903	.874	126.18	252.36
IT	53.458 (48)	.272	.031	.997	.995	-39.28	78.83
			State Seriousness				
NM	133.545 (45)	<.001	.134	.916	.877	2038.17	2165.08
IT	80.344 (48)	<.001	.072	.969	.953	1990.90	2109.35

Trait Bad Mood							
NM	200.412 (45)	<.001	.171	.919	.881	334.82	461.00
IT	64.696 (48)	.064	.052	.990	.987	196.19	313.96
Sate Bad Mood							
NM	87.128 (45)	<.001	.098	.970	.956	1868.56	1995.48
IT	52.005 (48)	.320	.034	.997	.996	1829.44	1947.90

Note. $N = 126$. NM = Singletrait-Multistate Model (no method factors; Figure 1). IT = Multitrait-Multistate Model (indicators-specific traits as method factors; Figure 2). RMSEA = Root-Mean-Square Error of Approximation. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion.

The NM models showed a poor fit for the state-trait dimensions of cheerfulness, seriousness, and bad mood. The descriptive model comparison indices (AIC and BIC) and other fit indices showed an acceptable fit for all IT models. Therefore, the IT models were used to compute the *CO*, the *OSpe*, and the *Rel* coefficients of each indicator. The results are shown in Table 5.

As Table 5 shows, *Rel* (trait cheerfulness = .86 to .95; trait seriousness = .80 to .91; trait bad mood = .79 to .93) and *CO* (trait cheerfulness = .72 to .82; trait seriousness = .72 to .81; trait bad mood = .63 to .82) were very high for all indicators of the trait basis of sense of humor. These results showed that each indicator primarily captures trait variance, with slight occasion influence. On the other hand, indicators of the state basis of sense of humor mainly reflected the influence of time points. *Rel* coefficients were high (state cheerfulness = .71 to .91; state seriousness = .67 to .90; state bad mood = .85 to .93), and the *OSpe* coefficients were higher than the *CO* coefficients (state cheerfulness = .43 to .64; state seriousness = .37 to .50; state bad mood = .46 to .65). However, as expected, stable trait variance also was observed, reflecting the influence of homologous traits on state manifestations.

Table 5

LST coefficients and reliability estimates for the state-trait indicators of the basis of sense of humor.

| | Basis of Sense of Humor | | | | | |
| | Trait | | | State | | |
	CO	*OSpe*	*Rel*	*CO*	*OSpe*	*Rel*
Cheerfulness						
CH_{11}	.75	.15	.90	.35	.56	.91
CH_{21}	.80	.14	.94	.28	.43	.71
CH_{31}	.79	.10	.89	.38	.46	.84
CH_{12}	.78	.10	.88	.30	.57	.87
CH_{22}	.80	.15	.95	.24	.56	.80
CH_{32}	.74	.13	.87	.30	.61	.91
CH_{13}	.76	.19	.95	.31	.55	.86
CH_{23}	.75	.16	.91	.25	.59	.84
CH_{33}	.72	.23	.95	.31	.60	.91
CH_{14}	.82	.10	.92	.30	.61	.91
CH_{24}	.81	.14	.95	.24	.62	.86
CH_{34}	.76	.10	.86	.26	.64	.90
Seriousness						
SE_{11}	.75	.12	.87	.39	.41	.80
SE_{21}	.78	.09	.87	.36	.41	.77
SE_{31}	.72	.15	.87	.35	.42	.77
SE_{12}	.81	.09	.90	.39	.43	.82
SE_{22}	.81	.10	.91	.32	.40	.72
SE_{32}	.75	.05	.80	.35	.43	.78
SE_{13}	.76	.12	.88	.35	.40	.75
SE_{23}	.78	.09	.87	.40	.46	.86
SE_{33}	.76	.14	.90	.32	.45	.77
SE_{14}	.73	.15	.88	.36	.40	.76
SE_{24}	.76	.12	.88	.30	.37	.67

	CO	OSpe	Rel			
SE$_{34}$	.77	.11	.88	.40	.50	.90
Bad Mood						
BM$_{11}$	.63	.19	.82	.32	.58	.90
BM$_{21}$	.66	.14	.80	.42	.46	.88
BM$_{31}$	.68	.21	.89	.38	.55	.93
BM$_{12}$	.66	.22	.88	.31	.62	.93
BM$_{22}$	.77	.11	.88	.29	.56	.85
BM$_{32}$	.80	.12	.92	.30	.61	.91
BM$_{13}$	.72	.18	.90	.27	.65	.92
BM$_{23}$	.70	.12	.82	.37	.48	.85
BM$_{33}$	.76	.15	.91	.30	.59	.89
BM$_{14}$	.75	.07	.82	.29	.56	.85
BM$_{24}$	.59	.20	.79	.41	.52	.93
BM$_{34}$	.80	.13	.93	.30	.59	.89

Note. $N = 126$. The first index refers to the indicator, the second to the measurement occasion. CO = Consistency; OSpe = Occasion Specificity; Rel = Reliability.

4.4.7. State Basis of Sense of Humor and State Well-Being

Table 6 shows the computed correlations between the STCI-S and positive and negative scales of state well-being.

Taking into account previous research (Carretero-Dios et al., 2014), the results fit the expected pattern (see Table 6). State cheerfulness was positively correlated with positive affect ($r = .60$, $p < .001$) and euthymia ($r = .70$, $p < .001$), and negatively correlated with negative affect ($r = -.42$, $p < .001$), anger feelings ($r = -.48$, $p < .001$), anger responses ($r = -.20$, $p < .001$), dysthymia ($r = -.48$, $p < .001$), and anxiety ($r = -.63$, $p < .001$). The data pattern was the opposite for state bad mood, underlining the correlations found with anger feelings ($r = .74$, $p < .001$) and anger responses ($r = .46$, $p < .001$). State seriousness was positively correlated with negative affect, anger feelings, dysthymia, and anxiety, and negatively correlated with euthymia. In all of the cases, the correlations observed with state bad mood were stronger than those found with state seriousness.

Table 6

Means, standard deviations, Cronbach alpha values, and intercorrelations among the State Form of the State–Trait-Cheerfulness-Inventory (STCI-S), the State Form of the Positive and Negative Affectivity Scale (PANAS-S), the State Form of the State–Trait-Anger-Expression-Inventory-2 (STAXI-2-S), the State Form of the State–Trait-Depression-Inventory (ST-DEP-S), and the State Form of the State–Trait-Anxiety-inventory (STAI-S) (Replication Sample).

Scales	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STCI-S												
(Scores range 1-4)												
(1) Cheerfulness	2.59	0.63	.89									
(2) Seriousness	2.92	0.48	-.20*	.84								
(3) Bad Mood	1.86	0.70	-.62*	.23*	.91							
PANAS-S												
(Scores range 1-5)												
(4) Positive Affect	3.03	0.80	.60*	.07	-.52*	.89						
(5) Negative Affect	1.82	0.74	-.42*	.30*	.62*	-.32*	.88					
STAXI-2-S												
(Scores range 1-4)												
(6) Anger Feelings	1.50	0.68	−.48*	.26*	.74*	−.38*	.64*	.90				
(7) Anger Responses	1.41	0.60	−.20*	.07	.46*	−.18*	.46*	.63*	.91			
ST-DEP-S												
(Scores range 1-4)												
(8) Euthymia	2.55	0.82	.70*	−.18*	−.67*	.73*	−.51*	−.55*	−.30*	.92		
(9) Dysthymia	1.53	0.66	−.48*	.18*	.69*	−.43*	.68*	.66*	.46*	−.60*	.89	
STAI-S												
(Scores range 1-4)												
(10) Anxiety	1.14	0.61	−.63*	.24*	.72*	−.57*	78*	.66*	.45*	−.77*	.74*	.93

Note. N = 309. Cronbach alphas in italics.

* $p < .001$

4.5. Discussion

The aims of this study were to evaluate the STCI-S among independent samples of Spanish adults and to test new hypotheses about the longitudinal stability of trait versus state basis of sense of humor and links between the STCI-S and state well-being in this population. Six studies were conducted, which provided evidence of the three-dimensional definition of the state basis of sense of humor and the adequacy, relevance, and applicability of the scale.

In order to obtain a final Spanish version of the STCI-S, we used the same items that the authors of the original version selected (Ruch et al., 1997). The internal structure was first tested with a confirmatory approach. The analysis reflected that this three-factor model showed good fit indices, with high Cronbach alpha values for all of the states, replicating the theoretical framework proposed by Ruch et al. (1997). Moreover, new empirical evidence about the internal structure of the STCI-S was obtained, and the invariance across gender was examined, with data supporting a strong invariance between men and women.

Item analysis showed that the corrected item-total correlation was greater than .25 for all the cases and that cheerfulness and seriousness items did not deviate from the normal distribution. However, as we expected, some skewness values in the bad mood items were higher than 1; that is, the normal population is less likely to be in a sad, irritable, and grouchy mood. Regarding the sensitivity of the STCI-S items to affective changes, the mean score of each item increased significantly from a neutral condition to the condition in which its corresponding state was induced. The differences between the three state scores and the averaged homologous scenarios were statistically significant in all cases.

Furthermore, the potential effects of gender and age were also tested. No gender effects were identified. Regarding age, state bad mood tended to be slightly higher among older participants, while state cheerfulness was slightly lower among older people in the Construction Sample only. For the Replication Sample, all the correlation coefficients were close to zero. These results reproduce only partially the original data pattern found by Ruch et al. (1997). As we mentioned in the Results section above, data could be due to statistic parameters as sample sizes employed (the correlation coefficients were low, with $r_s < .23$). Another possible explanation is derived from the

age ranges of participants in the Construction Sample (18 to 78 years old) and the Replication Sample (18 to 40 years old). The age range of the Replication Sample was similar to that of the original study samples (Ruch et al., 1997). However, the Construction Sample included a broader age range, so the differences in our results could reflect that, among older people, age is slightly related with bad mood and cheerfulness. Future research should clarify this question.

One core assumption associated with the state–trait model of exhilaratability (Ruch, 1993; Ruch et al., 1996, 1997) claims that traits represent the disposition of their respective states. In previous studies, the state–trait correlation of homologous factors yielded the highest coefficients. The correlations among the three basis of sense of humor as traits and states yielded the expected pattern of relationships: while cheerfulness was negatively correlated with seriousness and, especially, with bad mood, the latter two were positively correlated. Similarly, across states and traits, the affective basis of sense of humor were negatively correlated, that is, significant negative correlations were observed between trait cheerfulness and state bad mood as well as between trait bad mood and state cheerfulness, while there were no significant correlations between those and seriousness.

We carried out a longitudinal stability study in which the state and the trait forms of the STCI were administered in four assessment sessions with a time lag of six months, and LST theory (Steyer et al., 2015) was adopted. Taken together, the LST results showed that all the indicators of state and trait basis of sense of humor exhibited good *Rel*. Most of this variance in *Rel* captured stable inter-individual differences in the case of trait basis of sense of humor, as evidenced by the fact that *CO* clearly exceeded *OSpe*. However, when state basis of sense of humor were considered, the *OSpe* coefficients were higher to *CO* values, especially in the case of affective state dimensions. The differences between *OSpe* and *CO* were lower for state seriousness, revealing that this factor is the least influenced by the specific time assessment.

The theoretical model of the basis of sense of humor (Ruch et al., 1996, 1997) relies on personality approaches, in which the distinction between traits and states is considered as a fundamental key. While state manifestation refers to intra-individual differences associated with short-term variations that fluctuate over time through situations and contexts, trait manifestation alludes to long-term, permanent, stable, and

enduring individual differences across time, situations, and contexts. In contrast to states, trait manifestations are defined by greater temporal stability and cross-situational consistency over long periods of time with regard to an individual's personality characteristics. Therefore, we expected differences in temporal stability of traits versus states as well as different patterns of interaction with specific situations. The results obtained from an LST approach are useful to corroborate all these predictions.

To carry out the analysis of longitudinal stability of state versus trait temperamental basis of sense of humor, we tested two different LST models and compared the fit of the models. Specifically, we tested a classic LST model with no method factors (NM; see Figure 1a), and a multitrait–multistate LST model with indicators-specific trait factors (IT; see Figure 1b). The NM models showed a poor fit for the state-trait dimensions of cheerfulness, seriousness, and bad mood. In contrast, the IT models showed an acceptable fit for the state-trait temperamental basis of sense of humor. Therefore, the IT models were used to compute the *CO*, the *OSpe*, and the *Rel* coefficients of each indicator.

From a theoretical point of view, it might be thought that the poor fit of NM models contradict the results from the CFA model. In the CFA model, we found a clear three factor structure, with items corresponding to one latent variable (cheerfulness, seriousness, and bad mood). However, in the IT models are defined by multiple latent variables (one for each item parcel) for each dimension. To understand this possible contradiction in our results, the longitudinal structure of the data set should be taken into account. While CFA are data from a cross-sectional study, LST models provide data from a longitudinal perspective. In this sense, according to NM model, from a longitudinal perspective, the variances and covariances of the indicators are fully explained by the latent trait factor, state residual factors, and error variables, with error variables assumed to be uncorrelated. Based on this assumption, item parcels would not be expected to share components with themselves over time. However, empirical data show that indicators often include some method-specific component not shared with the remaining indicators (Geiser et al., 2015), and thus specific item parcels are more highly correlated with themselves over time than with other item parcels. The IT model considers the specific effects of each item parcel by allowing each variable to load onto its own indicator-specific factor. In this way, the IT model allows the definition of method effects (indicator specificity) across time. Our results showed once again these

method factors in longitudinal studies, being in line with previous findings (Geiser et al., 2015; Geiser & Lockhart, 2012).

Finally, correlational analyses between the state basis of sense of humor and well-being variables were carried out to obtain external evidence of validity. As we expected, state cheerfulness was positively correlated with all of the positive dimensions and negatively correlated with all of the negative dimensions. The opposite data pattern was observed for state seriousness and state bad mood, with lower correlations for the first case.

Previous correlational and experimental evidence has focused on the relationship between the cognitive and affective trait basis of sense of humor and psychological well-being (see Ruch & Hofmann, 2012, for a review). For example, while trait cheerfulness has been positively associated with positive dimensions of well-being (e.g., happiness or hope) and negatively related to negative dimensions of well-being (e.g., anxiety or depression), the opposite data pattern has been found for trait seriousness and, especially, for trait bad mood (e.g., Carretero-Dios et al., 2014; Ruch & Köhler, 2007). Furthermore, some data have suggested that people with high trait cheerfulness have a more stable psychological well-being and physical health, a better regulation and management of emotions, and a greater capacity to face stressful events as well as to recover from them (see Ruch & Hofmann, 2012, for a review).

In this study, we have shown new findings regarding the link between the state basis of sense of humor and psychological well-being. These results are in line with studies that have observed the effect of the affective and cognitive basis of sense of humor on particular diseases. For example, Delgado-Domínguez, Font-Ugalde, Ruiz-Vílchez, Carretero-Dios, and Collantes-Estévez (2014) studied the relationship between disease activity and the affective state basis of sense of humor in patients with ankylosing spondylitis. Critically, they found that affective states at the moment of the assessment of the disease differentially predicted self-report and clinical indicators. In the same line, Delgado-Domínguez et al. (2016) analyzed how state cheerfulness was related to disease activity parameters in patients with rheumatoid arthritis. The authors replicated results found in the previous study, even when trait cheerfulness was controlled.

In this sense, an increase in state cheerfulness as well as decreases in state seriousness and state bad mood would be connected to a positive state of well-being.

Additionally, many researchers have pointed out that positive states also help to trigger more efficient, better, and faster recovery after individuals face negative events (see Papousek & Schulter, 2010), which facilitates more stable psychological well-being. Therefore, in line with previous research, and taking into account the present data, we revealed a core idea: individuals' momentary state regarding the affective and cognitive basis of sense of humor should also be reflected in their corresponding states of physical health and psychological well-being.

Despite these results, the present study has some limitations. First, all data were collected using self-reports and many studies were based on correlational analyses. In order to avoid common method variance issues, future validation work should verify the state basis of sense of humor by using peer-ratings as well as experimental settings. Secondly, almost all of our studies employed university samples, which may not be representative of larger samples. Therefore, data should be replicated and extended in different Spanish samples, with different age ranges, to improve the generalizability of the results. Thirdly, we conducted a six-month longitudinal study to determine the stability of the state-trait basis of sense of humor over time. However, from a predictive point of view, we were not considered other variables to explore longitudinal processes. To analyze and understand facets in a deeper way, future research should focus on the relationship between cheerfulness, seriousness, and bad mood (as states), health parameters, and well-being dimensions (as states and traits), through a broader duration of time. Finally, our results of state variability are influenced by the adopted design regarding the number of assessment times and the characteristics of the assessment situations. The Longitudinal Stability Sample completed the STCI-T and the STCI-S in four sessions on regular school hours, a time lag of two months between assessments, which were very similar to each other. Therefore, perhaps there was not as much contextual variability as it would have been desirable to check for contextual modulation over state basis of sense of humor. In the same line, we could argue about how many assessment times are necessaries to study state variability. From a statistical point of view, most applications of LST models used only two indicators ("test halves" or item parcels) measured on just two measurement occasions (2 x 2 designs). Although these small designs are useful to show the minimal conditions under which LST models can be used, they make harder to test certain invariance assumptions and to detect trait-state variations over time. As Geiser and colleagues pointed out (2015, p. 189):

Even though small designs are sufficient to estimate the *CO*, *OS*, and *Rel* coefficients, and may be useful, researchers should generally avoid these kinds of designs if possible. We recommend that researchers include at least three indicators in their analyses and collect data for the same indicators on four or more time points.

The present study is one of the few LST model applications to date where three indicators have been included by latent variables and the same indicators have been assessed on four time points. Nevertheless, and more importantly, the question about the number of assessment times should be approached from a theoretical point of view. Are four time points enough to appropriately study the state variability? The study of the intra-individual variability requires the specification of assessment occasions, and these occasions can be daily, weekly, monthly, yearly, or any other regular or irregular length of time. However, when the aim has been the study of affects or mood dimensions, the usual strategy has been that over the course of one or two week, even during one month, respondents complete day by day short assessments about their mood (Almeida, Wethington, & Kessler, 2002; Mroczek, Spiro III, & Almeida, 2003). We used four assessment points with a time lag of two months. This approach, as cheerfulness and bad mood are affective dimensions, might not provide sufficiently accurate measures to address the intra-individual variability in these dimensions. Future SEM applications should deal with designs with more assessment times and with a time lag conceptually more linked to variations of the state temperamental basis of sense of humor.

To summarize, the findings of this study support the utility of the concepts, the validity, and the adequate psychometric properties of the STCI-S in Spanish samples. The data showed that cheerfulness, seriousness, and bad mood comprised the three temperamental basis of sense of humor as states. Moreover, statistical analyses revealed the expected results and patterns: (a) for items of each dimension; (b) between state and trait factors; (c) between state basis of sense of humor and demographic factors, such as gender and age; (d) for the longitudinal stability of trait versus state basis of sense of humor; and (e) between the state basis of sense of humor and well-being variables. Future research should obtain further empirical evidence from the STCI-S in new correlational and experimental settings.

Capítulo V-Serie Experimental I: Modulation of cognitive flexibility processes by trait cheerfulness

5.1. Abstract

Many studies have shown the beneficial effect of positive emotions on various cognitive processes, such as creativity and cognitive flexibility. Cheerfulness, understood as an affective predisposition to sense of humor, has been associated with positive emotions. So far, however, no studies have shown the relevance of this dimension in cognitive flexibility processes. The aim of this research was to analyze the relationship between cheerfulness and these processes. To this end, we carried out two studies using a task-switching paradigm. The total sample was composed of 139 participants (of which 86 were women) selected according to their high versus low scores in trait cheerfulness. In a random way, participants had to judge whether the face presented to them in each trial was that of a man or a woman (gender recognition task) or whether it expressed anger or happiness (expressed emotion recognition task). We expected participants with high versus low trait cheerfulness to show a lower task-switching cost (i.e., higher cognitive flexibility). Results did not confirm this hypothesis. However, in both studies, participants with high versus low trait cheerfulness showed a higher facilitation effect when the stimuli attributes were repeated and also when a cue was presented anticipating the demand to perform. We discuss the relevance of these results for a better understanding of cheerfulness.

Keywords: sense of humor, trait cheerfulness, task switching, cognitive flexibility, attribute repetition, preparation

5.2. Introduction

Traditionally, the aim of the psychology of emotion has been to gain knowledge on so-called negative emotions (see, for example, Mandler, 1984). However, in the last few decades this interest has been complemented by a special effort to understand and value positive emotions (e.**g.,** Cohn, Fredrickson, Brown, Mikels, & Conway, **2009**). In this context, sense of humor has also started to be included in these new research topics.

One of the main areas of interest in this field has been to provide a global theoretical framework to guide research on sense of humor and allow for a coherent interpretation of the results obtained. In this sense, Ruch, Köhler, and van Thriel (1996, 1997) developed a theoretical model focused on isolating the temperamental basis of sense of humor: cheerfulness, seriousness, and bad mood, which have two manifestations: as traits and as states. According to these authors, sense of humor determines stable differences between individuals, times, and situations (trait) as well as differences in the same individual depending on the context (state).

Cheerfulness, the subject of this research, is understood as a predisposition to smile/laugh and express positive emotions in response to humorous stimuli, alongside a general tendency to show a positive and a joy affective state. Its affective opposite is bad mood, which can manifest itself as a lack of interest in actions or situations involving humor and is characterized by a usual presence of bad mood states, along with a general negative affectivity. Another related concept is seriousness, which is considered to be a cognitive factor in terms of world view and refers to an attitude or way of thinking about life, situations, and so on. It is a tendency to address most issues in a thorough and rigorously analytical way. Cheerfulness encourages hilarity[1], whereas bad mood and seriousness inhibit it.

Ruch and colleagues developed an inventory to assess the individual differences and connections that may exist between the affective and cognitive basis laid out in the model from both a trait perspective (State-Trait Cheerfulness Inventory-Trait Version, STCI-T; Ruch et al., 1996) and a state perspective (State-Trait Cheerfulness Inventory-State Version, STCI-S; Ruch et al., 1997). This fact, along with the extensive body of

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[1] Ruch proposed the term *exhilaration* or *amusement* (hilarity, joy, euphoria or rejoicing) as a name for this emotion, which is used to denote either the process of making cheerful or the temporary rising and fading out of a cheerful state (Ruch & Köhler, 2007 p. 205).

knowledge obtained on cheerfulness over the last 20 years, has contributed to its development from both a theoretical and empirical point of view. It has also proven the applicability and relevance of cheerfulness in areas as diverse as sense of humor, personality, health, or emotion (e.g., Beermann & Ruch, 2011; Carretero-Dios, Eid, & Ruch, 2011; Delgado-Domínguez, Escudero-Contreras, Font-Ugalde, Ruiz-Vílchez, Collantes-Estévez, & Carretero-Dios, 2016; Papousek & Schulter, 2010; Ruch, 1993, 1997; Ruch & Hofmann, 2012; Ruch & Köhler, 2007; Ruch et al., 1996, 1997; Yip & Martin, 2006).

The concept of cheerfulness can be granted similar virtues to those attributed to positive emotions (see Lyubomirsky, King, & Diener, 2005, for a review). For instance, it has been established that trait cheerfulness is closely associated with better physical and psychological well-being, an increased manifestation and expression of positive emotions, satisfaction, and quality of life, better resilience, ability to cope, and recovery from stressful situations, a greater ability to use creative thinking, and high interpersonal skills (Papousek & Schulter, 2010; Ruch & Hofmann, 2012).

Within the area of research on positive emotions, several studies have highlighted the influence of such emotions on cognitive flexibility (e.g., Wadlinger & Isaacowitz, 2006). The results obtained can be included in Fredrickson's broaden-and-build theory (2001), which suggests that positive emotions expand our mental and behavioral repertoire. As a consequence, after being exposed to positive affective states our scope of attention broadens (see, for example, Johnson, Waugh, & Fredrickson, 2010) and aspects such as cognitive flexibility increase, leading to an adaptation to changes in the environment. In this regard, it should be noted that the conceptualization of cheerfulness as a positive affective dimension linked to sense of humor leads us to wonder how relevant this factor is for the study of cognitive flexibility.

5.2.1. Cognitive flexibility and control processes

Control processes are related to individuals' ability to select relevant information and ignore irrelevant information when performing a task (Posner & Rothbart, 2007). They are also related to cognitive flexibility (Davidson, Amso, Anderson, & Diamond, 2006), understood as the ability to modify one's way of thinking or acting in accordance with changing demands.

Some authors argue that cognitive flexibility has two central components: the inhibition of whatever is irrelevant to the fulfillment of our goals, and the switch between mindsets to activate the relevant material for the particular demand at hand (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). When we perform two or more tasks alternately, we must constantly reconfigure our mindset to respond to the new demand (Crone, Wendelken, Donohue, & Bunge, 2006). The ease with which these readjustments are carried out is the key defining characteristic of cognitive flexibility.

Studies on control processes and cognitive flexibility have used numerous tasks (e.g., Eriksen & Eriksen, 1974; Simon, 1969; Stroop, 1935). Recently, one of the most widely used experimental procedures to explore cognitive flexibility has been task switching (Kiesel et al., 2010; Monsell, 2003). In task-switching tasks, participants are instructed to perform one of two possible tasks in each trial. In some consecutive trials the same demand is repeated, while in others it is different. This makes it possible to determine the task-switching cost, measured as the difference when the task changes in two consecutive trials, compared to when it is repeated.

It has additionally been proved that, in this type of task, the amount of stimuli attributes that are either repeated or change can also affect behavior and the typical effects of task switching. When an individual is exposed to a stimulus, a mental file is created about this event, including the attributes of the stimulus as well as the response to it. This representation is subsequently reactivated in the presence of similar stimuli, thus affecting the performance of tasks involving these stimuli (Hommel, 2004). In this regard, it has been reported that total attribute repetition only has a beneficial effect if the response is the same in two consecutive trials (Kahneman, Treisman, & Gibbs, 1992). However, the performance is worse when there is partial attribute repetition than when there is no attribute repetition (or when all the attributes are repeated). This is because, although in some cases this repetition may help solve the demand, it normally requires reconfiguring the previously created mental file (Hommel, 1998, 2004). Additionally, some studies have included cognitive or affective demands in the presence of the same stimuli, which has made it possible to determine the task-switching cost between two consecutive trials depending on the type of demand (e.g., Egner, Etkin, Gale, & Hirsch, 2008; Ochsner, Hughes, Robertson, Cooper, & Gabrieli, 2009; Schuch, Werheid, & Koch, 2011).

Despite the lack of any existing literature on the modulation of cognitive flexibility processes by sense of humor, some studies are beginning to offer clues on their possible relationship. Previous research has pointed out that the induction of positive affective states, which are related to cheerfulness, are associated with a better cognitive flexibility (Baumann & Kuhl, 2005; Yang & Yang, 2014). From a correlational perspective, it has been established that cheerfulness is linked to some personality variables of interest for the current research (Ruch & Köhler, 2007). For example, Carretero-Dios, Benítez, Delgado-Rico, Ruch, and López-Benítez (2014) observed positive relationships among trait cheerfulness, extraversion, openness, and agreeableness, and negative relationships between trait cheerfulness and neuroticism. And, importantly, some studies have found that such personality characteristics may modulate performance on tasks that requires cognitive flexibility (Murdock, Oddi, & Bridgett, 2013). For example, while positive associations among openness (DeYoung, Peterson, & Higgins, 2005), agreeableness (Jensen-Campbell, Rosselli, Workman, Santisi, Rios, & Bojan, 2002), and cognitive flexibility has been observed, extraversion (Campbell, Davalos, McCabe, & Troup, 2011) and neuroticism (Compton, 2000) seem to contribute to reduce it.

More specifically related to cheerfulness, we conducted a pilot study in our laboratory (López-Benítez, Carretero-Dios, Acosta, & Lupiáñez, unpublished manuscript) in which participants differentiated in trait cheerfulness (assessed with the STCI-T) were required to perform the following task-switching paradigm: in a random way, in each trial, they had to say whether the face presented to them on a screen was that of a man or a woman (gender recognition task) or if the face expressed anger or happiness (expressed emotion recognition task). The task could change, or not, between two consecutive trials. The various conditions of repetition of the stimuli attributes were also analyzed (Hommel, 1998, 2004; Kahneman et al., 1992). With the additional goal of studying interference effects, the faces were always presented with a written word at the center that could match their gender or expression (congruent trials) or not (incongruent trials) (depending on the task; e.g., Etkin, Egner, Peraza Kandel, & Hirsch, 2006). Results showed an interesting trend: individuals with high trait cheerfulness showed a lower task-switching cost than those with low trait cheerfulness, especially in the conditions in which all the attributes were repeated between consecutive trials. These results were interpreted as showing that these individuals have higher cognitive

flexibility in repetition conditions, precisely where cognitive flexibility is most necessary.

However, this interpretation should be taken cautiously due to several factors. First, the size of the effect observed was small (.05) and the interaction between task change, group, and attribute repetition was only marginally significant, all of which suggests that the result should be replicated. Moreover, the inclusion of the interference variable complicated the interpretation of the pattern of results. This led to the decision to perform the present study eliminating this variable in order to replicate the finding of lower task-switching cost in individuals with high trait cheerfulness in more favorable conditions.

5.3. Study 1

Given that the effect of lower task-switching cost in individuals with high trait cheerfulness was only observed in certain conditions, we decided to conduct Study 1. In this study, a primary goal was to replicate the data from the previous study, while further exploring the differences in cognitive and emotional flexibility depending on trait cheerfulness (operationalized with the STCI-T). To this end, as in the previous study, participants carried out a task in which they had to correctly identify either the emotion or the gender of a face presented in the center of the screen; this task was randomly repeated or alternated between consecutive trials. Half of the trials were preceded by a cue that anticipated the upcoming task, allowing participants to get ready for it. The inclusion of this variable is important, as it has been proven that the presentation of a cue that anticipates the demand reduces the cognitive effort required, which is likely to lead to a better performance in this type of task (see Kiesel et al., 2010). Based on the above-mentioned studies and taking into account that several studies have shown that positive affective states are associated with a lower task-switching cost (Yang & Yang, 2014), we predicted that, compared to individuals with low trait cheerfulness, individuals with high trait cheerfulness would have greater cognitive flexibility, thus showing a lower task-switching cost, particularly when performing trials that require greater cognitive flexibility (i.e., attribute repetition and no prior preparation).

5.4. Method

5.4.1. Participants

The sample was composed of 49 students from the University of Granada, who were selected from a total of 244 people according to their high versus low trait cheerfulness scores, obtained with the STCI-T (Carretero-Dios et al., 2014; Ruch et al., 1996). The average score ± 1 SD was used as a criterion to create the groups. Specifically, the high trait cheerfulness group comprised 24 participants (20 women, mean age 19.50 years, SD = 5.82, cut-off score ≥ 3.42), and the low trait cheerfulness group was made up of 25 participants (20 women, mean age 21.60 years, SD = 7.65, cut-off score ≤ 2.68). All participants had normal or corrected-to-normal vision, participated in the study voluntarily, and received course credit in exchange for participating. Data from one participant were not taken into account because the number of correct responses was low compared to the group (2.5 SD below). The study was carried out following the guidelines of the Ethics Committee of the University of Granada, in accordance with the 1964 Declaration of Helsinki.

5.4.2. Stimuli

In order to conduct the study, eight photographs were selected from the database of the Karolinska Institute in Stockholm, Sweden (Goeleven, De Raedt, Leyman, & Verschuere, 2008). The images showed two happy men (AM25HAS; AM10HAS), two angry men (AM09ANS; AM02ANS), two happy women (AF31HAS; AF14HAS), and two angry women (AF20ANS; AF25ANS). All the photographs were 141x191 mm in size. Additionally, a 100 ms sound was used to provide participants feedback on their performance during the practical part of the experiment.

5.4.3. Procedure

Participants went to the laboratory individually and were led to a soundproofed, dimly lit room. They were seated in a comfortable chair in front of a 15-inch computer monitor, at a distance of 60 cm. They gave their consent prior to the start of the experiment. Next, the researcher informed them that the goal of the study was to analyze their performance in a psychological task, to which they should respond as quickly as possible while trying to avoid any errors.

The researcher explained how they should respond to the task, and was present during some practice trials to ensure that they were performing them correctly. After that, the researcher left the room and the experimental trials were presented.

At the beginning of each trial, a fixation point appeared in the center of the screen for one second. Randomly, in half of the trials a green or purple mark (preparation condition) also appeared around the fixation point, anticipating the task participants had to perform next. After the second, one of the eight photographs previously described appeared on the screen, surrounded by a green or purple frame, which indicated the nature of the task to perform: to indicate either the emotion on the face (happiness vs. anger) or the gender (man vs. woman). In the half of the trials in which the colored frame did not appear along with the fixation point (no preparation condition), the frame was presented simultaneously with the photograph. To prevent any biases, the color associated to each task was counterbalanced across participants as follows: for half of the sample the green color was associated with the gender task and the purple color was associated with the emotion task; the opposite was true for the other half of the sample. To respond, participants had to press the "Z", "M", "X", or "N" keys. The correspondence between key and response was also counterbalanced across participants. Specifically, for half of the sample the "Z" key was associated with "male", "M" with "female", "X" with "happiness", and "N" with "anger", while for the other half of the sample "Z" was associated with "female", "M" with "male", "X" with "anger", and "N" with "happiness". The total duration of each trial was 4 seconds. Figure 1 illustrates the sequence of events in two trials.

The experimental task was programmed using E-prime software (Schneider, Escaman, & Zuccolotto, 2002). It comprised 8 blocks of 64 trials each, with a total duration of 40-45 minutes.
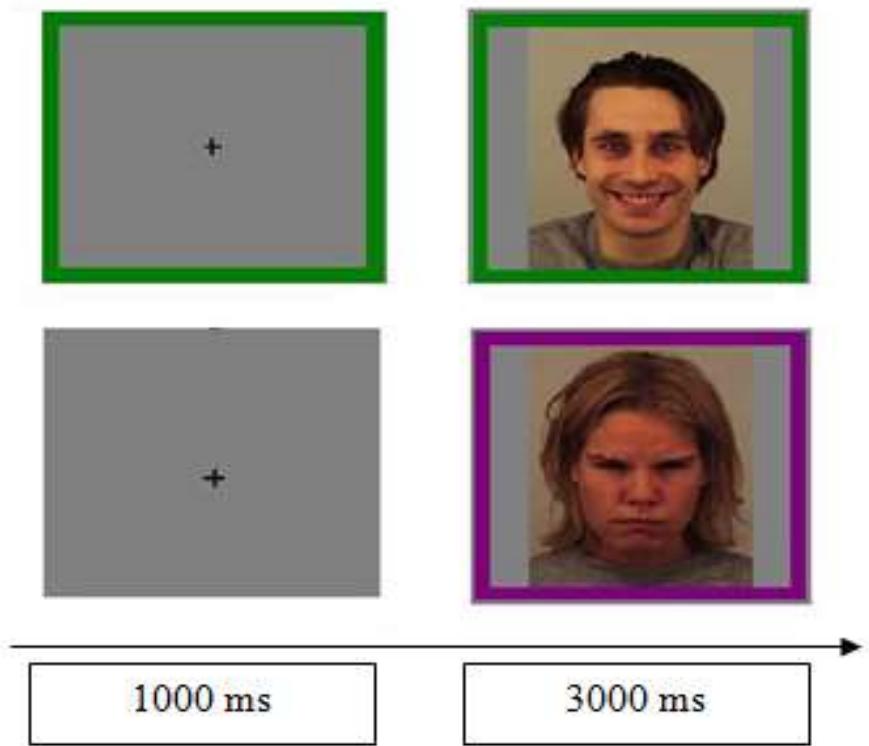
Figure 1. Sequence of events in two trials. In the upper example, which illustrates the preparation condition, the fixation point is surrounded by a signal that anticipates the task. After 1000 ms, a picture of a happy man appears for three seconds, surrounded by a green frame. In the lower example (i.e., the no preparation condition), the target, an angry woman surrounded by a purple frame, is not preceded by any signal. The color of the frame indicates the demand to perform, which is to identify either the gender or the emotion of the face, depending on the counterbalancing.

5.4.4. Design

The data were analyzed using SPSS 21.0 statistical software, with a 2 (Group; High Trait Cheerfulness vs. Low Trait Cheerfulness) X 2 (Task; Emotion vs. Gender) X 3 (Repetition; Complete Alternation vs. Complete Repetition vs. Partial Repetition) X 2 (Task Change; Different vs. Same) X 2 (Preparation; Preparation vs. No Preparation) mixed factorial design. The first variable was manipulated between groups, and the rest were manipulated within participants. The dependent variables were reaction time (RT) and error percentage (EP).

5.5. Results

Descriptive statistics are shown on Table 1. The analysis revealed a main effect of each of the within-participant variables: Task, $F(1,46) = 39.56$, $p < .001$, $\eta^2 = .46$, Repetition, $F(2,92) = 16.31$, $p < .001$, $\eta^2 = .26$, and Preparation, $F(1,46) = 339.00$, $p < .001$, $\eta^2 = .88$. Participants were faster to respond when the task was gender identification (898 ms vs. 966 ms), when all the attributes were repeated in two consecutive trials, compared to when none were repeated or only some of them were (912 ms vs. 945 ms vs. 939 ms, respectively), and when a cue was presented anticipating the task to perform (824 ms vs. 1040 ms). Moreover, our task replicated the expected task-switching cost results, $F(1, 46) = 191.31$, $p < .001$, $\eta^2 = .81$, meaning that participants were faster when the task was repeated between two consecutive trials (134 ms task-switching cost). Additionally, as expected, this effect was modulated by attribute repetition, $F(2, 92) = 21.66$, $p < .001$, $\eta^2 = .32$, preparation conditions, $F(1, 46) = 46.82$, $p < .001$, $\eta^2 = .50$, and task type, $F(1, 46) = 10.64$, $p = .002$, $\eta^2 = .19$. Specifically, participants showed a lower task-switching cost when none of the stimulus attributes (i.e., gender or emotion) were repeated in consecutive trials, compared to when they were repeated, which generated the highest task-switching cost (101 ms vs.182 ms). In addition, the task-switching cost was lower when the task involved recognizing the gender than when it required recognizing the emotion (116 ms vs.154 ms), and in the preparation conditions compared to those in which there was no preparation cue (103 ms vs.167 ms).

Table 1

Mean reaction time (in ms) and error percentage in each of the experimental conditions as a function of trait cheerfulness

| | | Complete Alternation | | | | Complete Repetition | | | | Partial Repetition | | | |
| | | Different | | Same | | Different | | Same | | Different | | Same | |
		P	NP	P	NP	P	NP	P	NP	P	NP	P	NP
High Trait Cheerfulness	Emotion	889	1225	818	1033	946	1184	751	952	930	1204	824	997
		(5.69)	(6.75)	(2.54)	(5.89)	(4.72)	(7.55)	(2.29)	(1.27)	(5.66)	(5.93)	(4.38)	(5.62)
	Gender	881	1131	786	1009	863	1098	729	869	831	1108	764	968
		(6.13)	(8.59)	(2.38)	(5.95)	(1.88)	(6.17)	(0.56)	(2.70)	(3.57)	(9.09)	(3.37)	(4.55)
Low Trait Cheerfulness	Emotion	877	1136	820	999	950	1118	774	914	914	1142	824	964
		(3.14)	(6.10)	(1.44)	(2.44)	(4.50)	(4.36)	(1.34)	(0.52)	(4.24)	(4.63)	(2.36)	(2.95)
	Gender	789	1036	730	961	817	1050	701	878	825	1045	758	930
		(3.19)	(5.29)	(1.82)	(4.77)	(2.52)	(2.55)	(1.40)	(1.07)	(3.03)	(3.28)	(3.59)	(4.29)

Note. P = Preparation, NP = No Preparation

More directly related to our main goal, and perhaps most importantly, we did not find any evidence of a lower task-switching cost in the high trait cheerfulness group (see Figure 2). In fact, we observed a non-significant trend in RT, $F(1, 46) = 2.23$, $p = .14$, $\eta^2 = .05$, in the opposite direction (149 ms task-switching cost in the high trait cheerfulness group, compared to 120 ms cost in the low trait cheerfulness group).

(a)
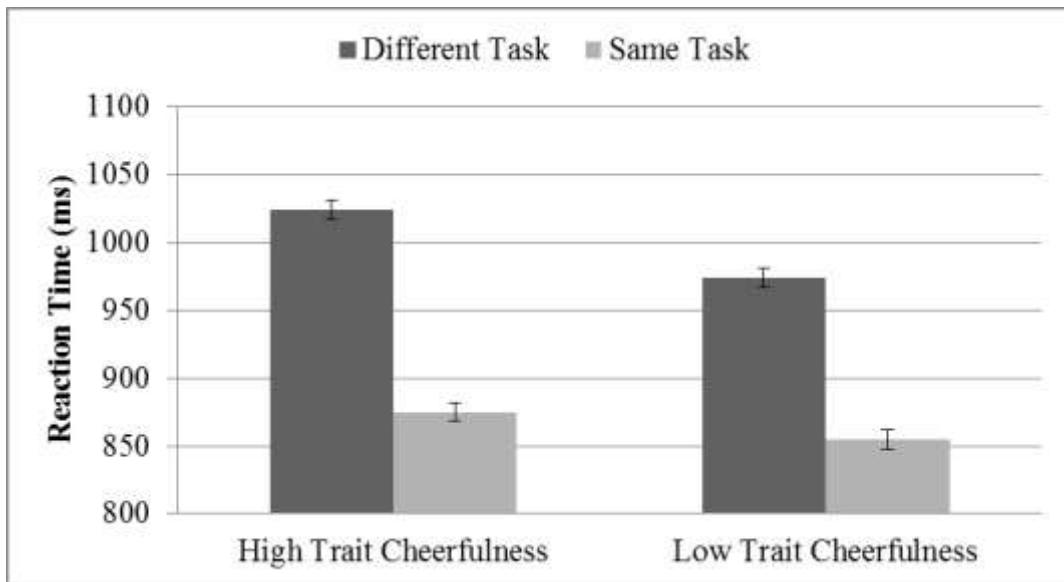
(b)
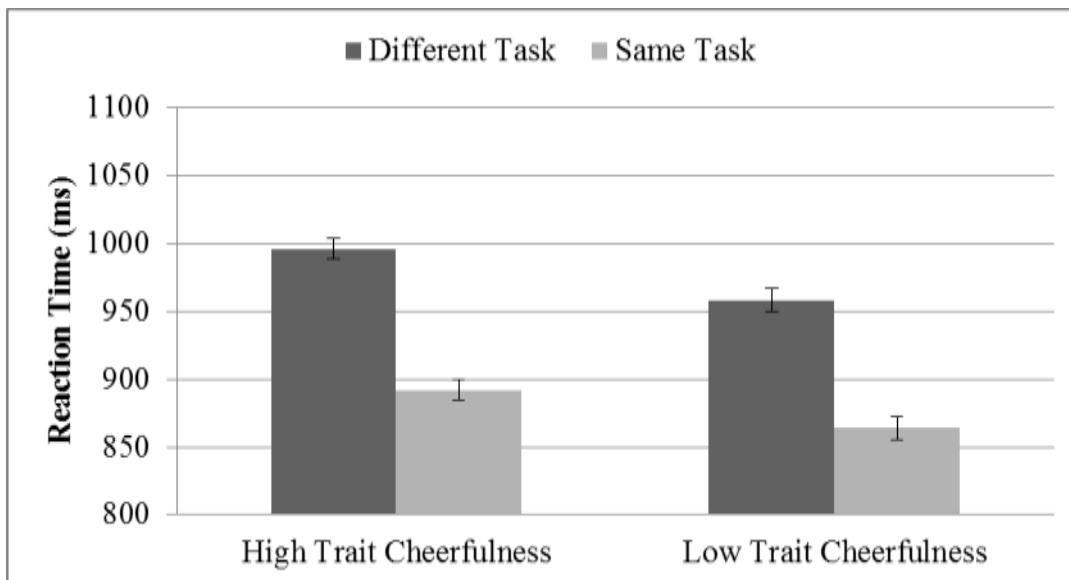
(c)
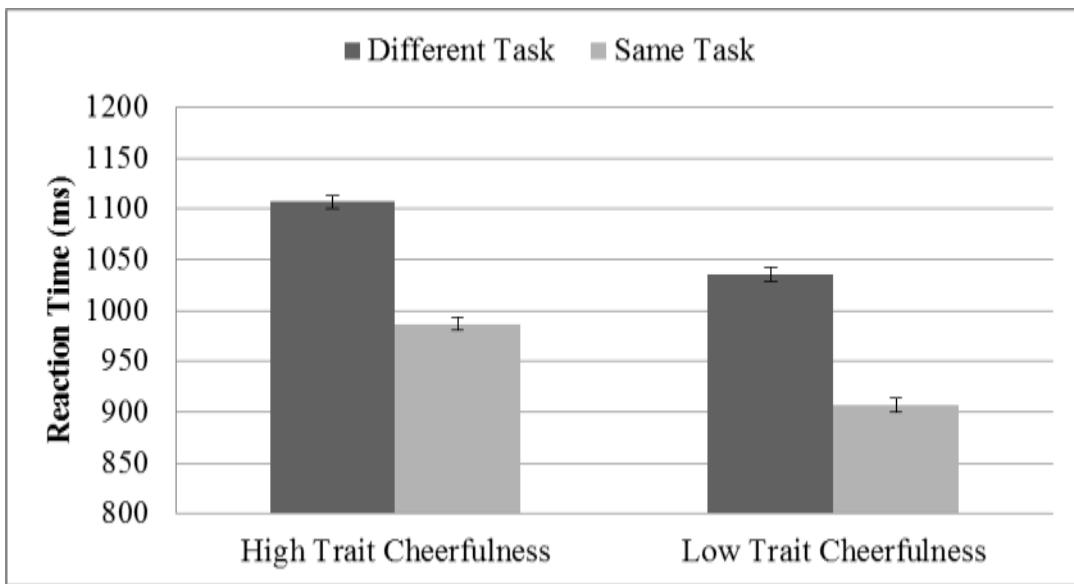
Figure 2. Effect of the task-switching cost as a function of trait cheerfulness group for: a) Study 1; b) Study 2, preparation part; and c) Study 2, no preparation part. Note the lack of differences between both groups. If anything, the general trend is in the opposite direction, as individuals with high trait cheerfulness showed a higher task-switching cost (measured as the difference between a task being repeated or not) than individuals with low trait cheerfulness. The error bars represent the standard error of the mean, with variability between participants removed by means of Coussineau's method.

Interestingly, however, group was found to modulate other relevant variables. For example, the Group X Repetition interaction was significant, $F(2, 92) = 3.30$, $p = .041$, $\eta^2 = .07$. Specifically, the previously described effect of repetition (i.e., faster responses when all attributes were repeated than when none were repeated) was present to a greater extent in the high trait cheerfulness group compared to the low trait cheerfulness group (47 ms vs. 18 ms; see Figure 3). The Group X Task X Preparation interaction was also significant, $F(1, 46) = 7.54$, $p = .009$, $\eta^2 = .14$, showing a higher preparation effect in the high versus low trait cheerfulness group, although this was only observed in the emotion recognition task [$F(1, 46) = 5.31$, $p = .026$, $\eta^2 = .10$, 239 ms vs. 185 ms] and not in the gender recognition task ($F<1$).

(a)
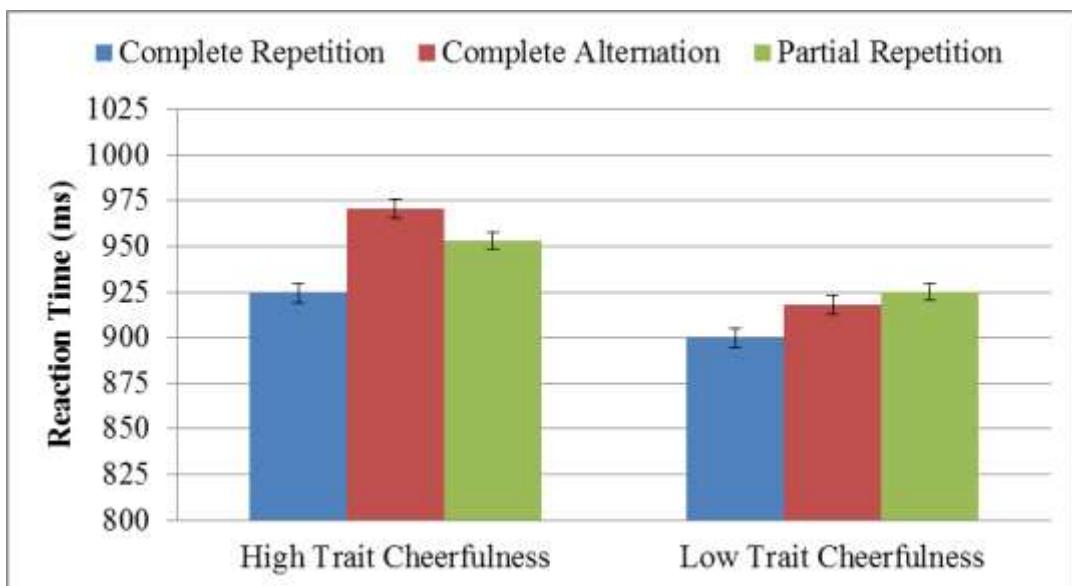
(b)
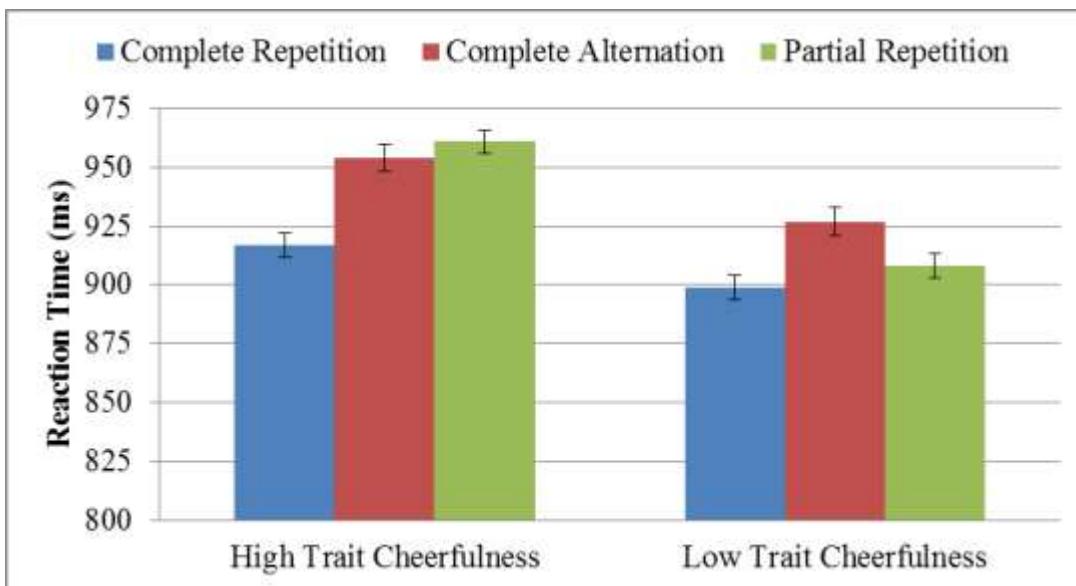
Figure 3. Effect of attribute repetition as a function of the trait cheerfulness group for: a) Study 1; and b) Study 2, preparation part. Both graphs reveal that participants with high trait cheerfulness showed a higher repetition effect than those with low trait cheerfulness, measured as an increased difference when all attributes were repeated compared to no repetition or partial repetition. The error bars represent the standard error of the mean, with variability between participants removed by means of Coussineau's method.

The analysis of EP showed significant main effects in the variables Repetition, $F(2,92) = 14.32$, $p < .001$, $\eta^2 = .24$, and Preparation, $F(1,46) = 17.68$, $p < .001$, $\eta^2 = .28$.

Overall, the pattern was very similar to that observed in RT: participants made fewer errors when the stimuli attributes were repeated than when they were not repeated or were only partially repeated (2.8% vs. 4.5% vs. 4.4%), and also when a cue was provided anticipating the demand to perform (3.2% vs. 4.7%). Again, our task replicated the predicted effects of task-switching cost, $F(1, 46) = 42.23$, $p < .001$, $\eta^2 = .48$: participants made fewer errors when the task was repeated in two consecutive trials (2% task-switching cost). Furthermore, as expected, this effect was significantly modulated by attribute repetition, $F(2, 92) = 4.35$, $p = .016$, $\eta^2 = .09$, and marginally modulated by task type, $F(1, 46) = 3.36$, $p = .073$, $\eta^2 = .07$. Specifically, we observed a higher task-switching cost when all attributes were repeated than when no attributes were repeated or when only some were repeated (2.9% vs. 2.2% vs. 1%). We also observed a trend towards a higher cost when the task to perform was expressed emotion recognition (2.5% vs. 1.6%).

Regarding our main goal, the analysis revealed a main effect of Group, $(1, 46) = 6.80$, $p = .012$, $\eta^2 = .13$, which reflected that individuals with high trait cheerfulness had a higher EP than those with low trait cheerfulness (4.7% vs. 3.1%). We also observed a significant interaction between Group X Task X Task Change, $F(1, 46) = 5.52$, $p = .023$, $\eta^2 = .11$. The interaction revealed that individuals with high trait cheerfulness showed a higher task-switching cost than those with low trait cheerfulness, although this only applied to the gender recognition task (2.6% vs. 0.5%), not to the emotion recognition task (2.4% vs. 2.7%).

Additionally, a higher effect of preparation was observed in individuals with high versus low trait cheerfulness (2.2% vs. 0.8%) regardless of the task, as reflected by the marginally significant Group X Preparation interaction, $F(1, 46) = 3.90$, $p = .054$, $\eta^2 = .08$ (see Figure 4).

(a)
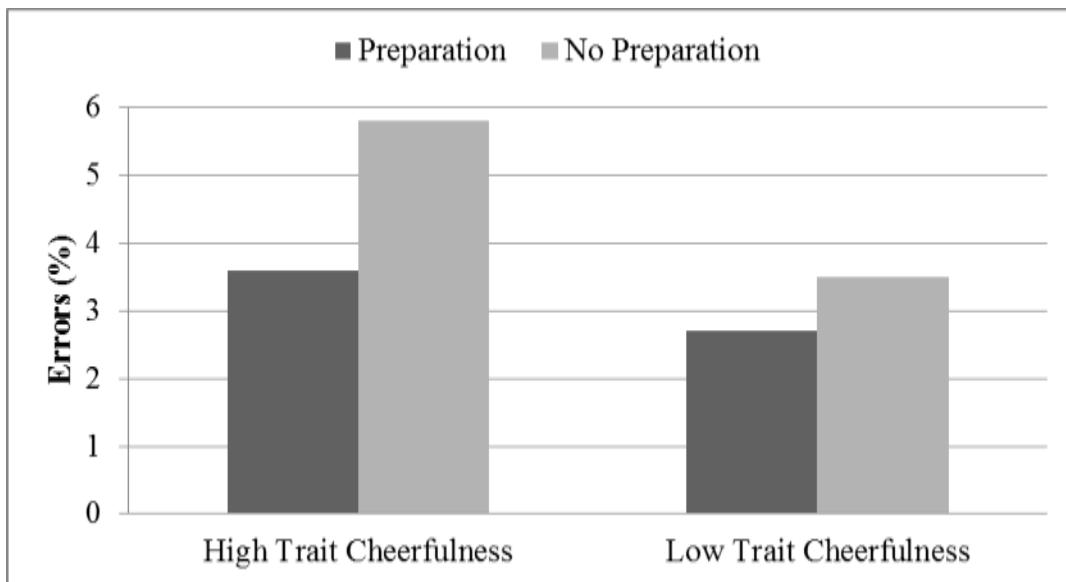
(b)
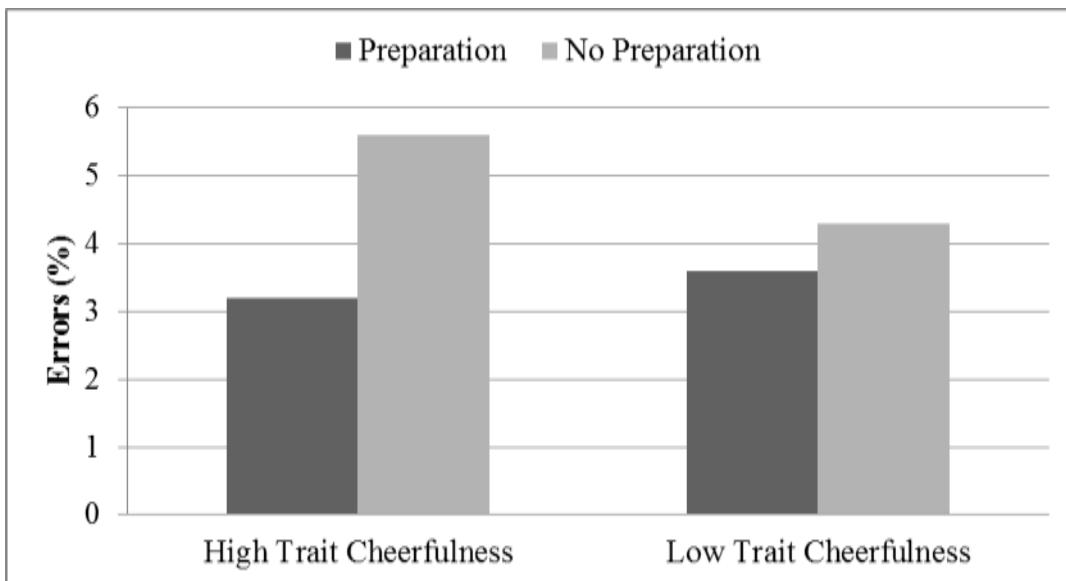
*Figure 4*. Effect of preparation as a function of the trait cheerfulness group for: a) Study 1; and b) Study 2, preparation part. Both graphs reveal that participants with high trait cheerfulness showed a higher effect of preparation than those with low trait cheerfulness, measured as a greater reduction in error percentage when the target was preceded by a signal that anticipated the upcoming demand than when it was not presented.

5.6. Discussion

In this study, our aim was to replicate the modulation of cognitive flexibility by trait cheerfulness observed in a previous pilot study and further analyze these relationships. Results proved that the task-switching paradigm we used was an efficient instrument to study this process, since the usual task-switching cost pattern was observed (e.g., modulation by task type, attribute repetition, and preparation cue). However, it is important to note that, overall, our data reflected that individuals with high trait cheerfulness do not seem to show a lower task-switching cost than those with low trait cheerfulness. If anything, the little evidence collected indicated the opposite, as the EP results revealed a higher, not lower, task-switching cost in individuals with high trait cheerfulness in the gender recognition task. The pattern observed in RT followed the same trend, although differences were not significant. Hence, our result pattern did not support the idea of a link between trait cheerfulness and a lower task-switching cost and thus increased cognitive flexibility.

However, we did observe significant effects of group with regard to the repetition of the stimuli attributes and the prior preparation to them. Specifically, individuals with higher trait cheerfulness showed a larger effect of stimuli repetition and a larger effect of task preparation, particularly in the expressed emotion recognition task. We consequently decided to carry out a second study with the goal of verifying if, indeed, trait cheerfulness did not modulate the task-switching cost, and also of exploring whether the effects of repetition and preparation were consistent.

5.7. Study 2

Considering the findings of Study 1, we conducted a Study 2 to further exploring whether trait cheerfulness modulated the task-switching cost, and studying whether it was possible to replicate the modulation by trait cheerfulness of the repetition of the stimuli attributes and the preparation to the stimuli. A previous study had produced some evidence suggesting that individuals with high trait cheerfulness show a lower task-switching cost compared to individuals with low trait cheerfulness (López-Benítez et al., unpublished manuscript). Yet, this effect was not replicated in Study 1. This could be due to the presence of a demand anticipating cue in half of the trials, given that, if the participant has sufficient preparation, the effect of task-switching cost as a function of

trait cheerfulness may diminish or even disappear. Note that, in the previous study, no preparation cue was presented.

Therefore, the present study had two parts (of 4 blocks each) that were counterbalanced. Half of the blocks followed the same structure as in Study 1, but in the other half the demand anticipating cue was eliminated (as in López-Benítez et al., unpublished manuscript). If the determining factor in the differential effect of task-switching cost as a function of trait cheerfulness is anticipation of the demand, we hypothesized that participants with high versus low trait cheerfulness will show a lower task-switching cost (i.e., higher cognitive flexibility) in an experiment in which the demand is not anticipated. Furthermore, in line with Study 1, we expected to find a higher effect of both attribute repetition and preparation to the task in individuals with high trait cheerfulness than in those with low trait cheerfulness.

5.8. Method

5.8.1. Participants

Following the same method as in Study 1, 48 students from the University of Granada were selected out of 569 people. In this case, the high trait cheerfulness group was made up of 25 participants (19 women, mean age 22.36 years, SD = 4.37, cut-off score $\geq$ 3.50), while the low trait cheerfulness group comprised 23 participants (19 women, mean age 21.83 years, SD = 3.42, cut-off score $\leq$ 2.63). All the participants had normal or corrected-to-normal vision, performed the task voluntarily, and received course credit in exchange for participating. Data from one participant were not taken into account because the number of correct responses was low compared to the group (2.5 SD below). Again, the study was carried out following the guidelines of the Ethics Committee of the University of Granada, in accordance with the 1964 Declaration of Helsinki.

5.8.2. Stimuli and procedure

The stimuli and procedure were the same as in Study 1, with two exceptions. First, instead of being composed of 8 similar blocks, the study was divided into 2 distinct parts, each of which comprised 4 blocks. The first part was the same as in Study 1, but in the second part no pre-target cue was given to indicate the upcoming task. Both parts were counterbalanced between groups. Second, in order to maintain the alertness level

of participants, an audio feedback signal was used every time a wrong response or no response was given.

5.8.3. Design

The data were analyzed using SPSS 21.0 statistical software. We decided to analyze this study separately depending on whether the trials with a previous preparation condition were mixed with those that did not have any (preparation part), or whether there was no mix between trials (no preparation part). We used the same design as in Study 1 in the blocks in which there was a possibility of preparing for the demand: 2 (Group; High Trait Cheerfulness vs. Low Trait Cheerfulness) X 2 (Task; Emotion vs. Gender) X 3 (Repetition; Complete Alternation vs. Complete Repetition vs. Partial Repetition) X 2 (Task Change; Different vs. Same) X 2 (Preparation; Preparation vs. No Preparation). The same design was used for the analysis of the blocks of trials in which there was no possibility of preparing for the demand, with the sole exclusion of the preparation variable: 2 (Group; High Trait Cheerfulness vs. Low Trait Cheerfulness) X 2 (Task; Emotion vs. Gender) X 3 (Repetition; Complete Alternation vs. Complete Repetition vs. Partial Repetition) X 2 (Task Change; Different vs. Same). Again, reaction time and error percentage were analyzed as dependent variables.

5.9. Results

5.9.1. Analysis of the preparation part

Descriptive statistics are shown on Table 2. The analysis revealed a main effect of each of the within-participant variables: Task, $F(1,45) = 52.53$, $p < .001$, $\eta^2 = .54$, Repetition, $F(2,90) = 13.51$, $p < .001$, $\eta^2 = .23$, and Preparation, $F(1,45) = 261.45$, $p < .001$, $\eta^2 = .85$. As in Study 1, participants were faster to respond when the task was gender recognition (877 ms vs. 978 ms), when all the attributes were repeated between two consecutive trials, compared to no or partial attribute repetition (908 ms vs. 940 ms vs. 934 ms), and when a cue was used to anticipate the demand (810 ms vs. 1044 ms). Once again, our procedure additionally showed the expected task-switching cost effects, $F(1, 45) = 74.24$, $p < .001$, $\eta^2 = .62$, meaning that participants' responses were faster when the task was repeated in two consecutive trials (99 ms task-switching cost). This effect was modulated by attribute repetition, $F(2, 90) = 24.66$, $p < .001$, $\eta^2 = .35$, preparation conditions, $F(1, 45) = 30.17$, $p < .001$, $\eta^2 = .40$, and task type, $F(1, 45) =$

9.71, $p = .003$, $\eta^2 = .18$. Thus, the task-switching cost was lower when none of the stimuli attributes (i.e., gender or emotion) were repeated in consecutive trials than when they were repeated; the latter condition generated the highest task-switching cost (46 ms vs. 166 ms). The task-switching cost was also lower in the preparation conditions (63 ms vs. 135 ms) and when the task was gender recognition (75 ms vs. 127 ms). In addition, the lower task-switching cost in preparation conditions was modulated by attribute repetition, $F(2, 90) = 8.34$, $p < .001$, $\eta^2 = .16$, as this effect was lower when only some or none of the stimuli attributes were repeated between two consecutive trials than when all the attributes were repeated (27 ms vs. 49 ms vs. 145 ms).

Regarding our goal, and as shown in Figure 2, no evidence was found of a lower task-switching cost in individuals with high versus low trait cheerfulness ($F<1$). However, we replicated the modulation of attribute repetition by trait cheerfulness, as reflected in the Group X Repetition interaction, $F(2, 92) = 3.30$, $p = .041$, $\eta^2 = .07$. This confirmed that, compared to individuals with low trait cheerfulness, those with high trait cheerfulness showed a higher effect of repetition when all the attributes were repeated between two consecutive trials than when only some of them were repeated (44 ms vs. 10 ms; see Figure 3).

EP analysis revealed significant main effects in the following variables: Task, $F(1,45) = 10.86$, $p = .002$, $\eta^2 = .19$, Repetition, $F(2,90) = 3.13$, $p = .049$, $\eta^2 = .07$, and Preparation, $F(1,45) = 11.57$, $p = .001$, $\eta^2 = .20$. In general, the pattern was very similar to that observed in RT and with that observed in Study 1. In fact, participants made fewer errors when the task was gender recognition (3.3% vs. 5%), when the stimuli attributes were repeated, compared to no repetition or partial repetition (3.5% vs. 4.3% vs. 4.8%), and when a cue was given anticipating the demand (3.4% vs. 4.9%). Once more, we observed the expected effects of task-switching cost, $F(1, 45) = 14.90$, $p < .001$, $\eta^2 = .25$, reflected in a higher accuracy when the task was repeated in two consecutive trials (1.5% task-switching cost). Additionally, and as expected, this effect was significantly modulated by attribute repetition, $F(2, 90) = 4.91$, $p = .010$, $\eta^2 = .10$, and by task type, $F(1, 45) = 5.83$, $p = .020$, $\eta^2 = .12$. In this regard, we found that the task-switching cost was higher when all the attributes were repeated, compared to no repetition or partial repetition (3.3% vs. 0.6% vs. 0.6%), and when the task was expressed emotion recognition (2.4% vs. 0.5%).

Regarding our main goal, no evidence was found that trait cheerfulness modulated the effect of task-switching cost ($F<1$). However, as observed in Study 1, the Group X Preparation interaction was found to be marginally significant, $F(1, 45) = 3.70$, $p = .061$, $\eta^2 = .08$, replicating the trend towards a higher overall effect of preparation in participants with high versus low trait cheerfulness (2.4% vs. 0.7%; see Figure 4).

5.9.2. Analysis of the no preparation part

Descriptive statistics are shown on Table 2. As in the previous studies, the analysis revealed a main effect of each of the within-participant variables: Task, $F(1,45) = 22.95$, $p < .001$, $\eta^2 = .34$, and Repetition, $F(2,90) = 17.59$, $p < .001$, $\eta^2 = .28$. Specifically, participants were faster when the task was gender recognition (969 ms vs. 1049 ms) and when all attributes between two consecutive trials were repeated, as opposed to no repetition or partial repetition of attributes (981 ms vs. 1022 ms vs. 1025 ms). Once again, our study showed that participants were faster when the task was repeated between two consecutive trials (124 ms task-switching cost), $F(1, 45) = 185.69$, $p < .001$, $\eta^2 = .81$. As expected, this effect was again modulated by task type, $F(1, 45) = 12.60$, $p = .001$, $\eta^2 = .22$, and attribute repetition, $F(2, 90) = 28.72$, $p < .001$, $\eta^2 = .39$. In this regard, the task-switching cost was lower when the task was gender recognition (101 ms vs. 148 ms) and also when none of the stimuli attributes (i.e., gender or emotion) were repeated in consecutive trials, compared to when they were repeated, which generated the highest task-switching cost (78 ms vs. 192 ms).

With regard to our main goal, and as can be seen in Figure 2, individuals with high trait cheerfulness did not show a lower task-switching cost than those with low trait cheerfulness ($F<1$). We did not find either that trait cheerfulness modulated the effect of other variables, such as repetition ($F<1$).

The accuracy analysis revealed a main effect of the Repetition variable, $F(2,90) = 5.13$, $p = .008$, $\eta^2 = .10$, that is, participants made fewer errors when all the stimuli attributes were repeated between two trials than when none were repeated (3.6% vs. 5%). As expected, accuracy increased when the task was repeated in two consecutive trials, $F(1,45) = 23.85$, $p < .001$, $\eta^2 = .35$, showing a 1.8% task-switching cost. This effect was also modulated by task type, $F(1,45) = 9.11$, $p = .004$, $\eta^2 = .17$, and marginally modulated by attribute repetition, $F(2,90) = 2.68$, $p = .074$, $\eta^2 = .06$. In other

words, the task-switching cost was lower when the task was gender recognition (3.6% vs. 5%) and also when no (or only some) attributes were repeated, compared to complete attribute repetition (1.1% vs. 1.1% vs. 3.1%).

As happened with RT, individuals with high trait cheerfulness did not show a lower task-switching cost than individuals with low trait cheerfulness (F<1). We did not find any relationship with other relevant variables either (F<1).

Table 2

Mean reaction time (in ms) and error porcentaje in each of the experimental conditions as a function of trait cheerfulness

		Complete Alternation						Complete Repetition						Partial Repetition					
		Different			Same			Different			Same			Different			Same		
		P	NP	PNP	P	NP	PNP	P	NP	PNP	P	NP	PNP	P	NP	PNP	P	NP	PNP
High Trait Cheerfulness	Emotion	915	1219	1123	804	1063	1059	891	1174	1178	805	937	931	936	1187	1148	847	1081	1034
		(5.00)	(8.78)	(5.80)	(1.64)	(6.97)	(4.21)	(4.11)	(8.82)	(5.12)	(1.90)	(0.97)	(1.99)	(5.24)	(8.20)	(5.07)	(4.36)	(6.92)	(4.23)
	Gender	756	1056	1057	785	1032	1008	819	1089	1062	752	869	909	811	1099	1073	736	989	978
		(3.13)	(4.15)	(3.53)	(2.00)	(7.30)	(4.94)	(3.13)	(4.79)	(4.80)	(1.44)	(1.74)	(2.09)	(2.90)	(4.86)	(5.76)	(3.30)	(3.69)	(5.21)
Low Trait Cheerfulness	Emotion	886	1142	1098	860	1049	968	915	1180	1078	790	926	876	904	1129	1109	831	1009	984
		(4.17)	(6.39)	(8.51)	(3.92)	(4.14)	(4.44)	(5.48)	(7.27)	(5.62)	(2.13)	(1.28)	(1.06)	(5.57)	(5.94)	(6.14)	(4.46)	(7.50)	(3.51)
	Gender	732	1002	964	750	991	898	790	1072	988	691	827	824	746	996	978	701	947	892
		(2.62)	(2.18)	(4.33)	(2.35)	(3.56)	(4.01)	(3.89)	(3.16)	(4.98)	(3.31)	(1.82)	(2.91)	(3.00)	(4.73)	(4.70)	(2.30)	(3.28)	(4.10)

Note. P = Preparation, NP = No Preparation, PNP = No Preparation Part

5.10. Discussion

The goal of this study was to study whether individuals with high trait cheerfulness showed a lower task-switching cost by exploring whether this modulation could be caused by the presentation of a cue anticipating the demand and hence the response. We also intended to verify whether the higher effect of attribute repetition and task preparation in participants with high trait cheerfulness found in Study 1 was replicated.

As in Study 1, Study 2 confirmed the suitability of the task for the study of task-switching cost. Again, our data did not provide evidence that individuals with higher trait cheerfulness showed higher cognitive flexibility, measured as a lower task-switching cost, than those with low trait cheerfulness.

However, and although this was only significant in the preparation part, individuals with high trait cheerfulness again displayed both a larger effect of attribute repetition between two consecutive trials, and a larger effect of task preparation, compared to individuals with low trait cheerfulness, thus replicating the findings of Study 1.

5.11. General Discussion

The main aim of this research was to study the modulation of cognitive flexibility processes by trait cheerfulness, as a temperamental basis of sense of humor (Ruch et al., 1996, 1997), by using a task-switching paradigm. Although the procedure used showed the typical effects of task-switching cost, the results reflected a total absence of modulation by trait cheerfulness on the cognitive flexibility processes involved in task switching.

Some authors have pointed out the potential benefits of positive emotions in areas such as cognition (see, for example, Lyubomirsky et al., 2005, for a review). Specifically, it has been observed that positive affect reduces the task-switching cost in a paradigm with no emotional implications (i.e., task-switching between color and shape; Yang & Yang, 2014). Additionally, previous research has shown that some personality characteristics may benefit (DeYoung et al., 2005) or impair (Campbell et al., 2011; Compton, 2000) performance on cognitive flexibility tasks. Considering that a certain link has been established among cheerfulness, understood as a positive affective predisposition, positive emotions (Ruch & Hofmann, 2012), and personality variables (Carretero-Dios et al., 2014) related to better cognitive flexibility, and taking the results

of our previous pilot study into account, it could then be inferred that individuals with high trait cheerfulness should also display a lower task-switching cost compared to individuals with low trait cheerfulness, thus reflecting higher cognitive flexibility. Our findings, however, did not confirm this hypothesis.

Cheerfulness is a positive affective predisposition associated with sense of humor (Ruch & Köhler, 2007). It is therefore related to the manifestation, enhancement, and maintenance of positive emotions, along with a lower manifestation of negative emotions and a higher resilience to them (Papousek & Schulter, 2010; Zweyer, Velker, & Ruch, 2004). This endows it with qualities that are very closely linked to processes of an emotional nature, such as induction processes, regulation, and emotional intelligence (e.g., Ruch, 1997; Yip & Martin, 2006), and processes more related to social interaction and empathy (e.g., Beermann & Ruch, 2009a; Ruch & Köhler, 2007). From this viewpoint, trait cheerfulness may have a higher predictive power in tasks that involve processes of this nature, compared to more cognitive demands which do not include elements typical of humoristic, emotional, or social stimulation.

From a personality perspective, our results could be partially explained. On the one hand, trait cheerfulness is closely related to extraversion (Carretero-Dios et al., 2014; Ruch & Köhler, 2007), which is negatively associated with the performance in tasks that involve cognitive flexibility (Campbell et al., 2011). This fact could justify that individuals characterized by high trait cheerfulness did not show higher cognitive flexibility in our study (as measured by a lower task-switching cost). If anything, our results indicated the opposite trend, i.e., a higher task-switching cost for high trait cheerfulness people.

On the other hand, trait cheerfulness is also positively linked to openness and agreeableness, and negatively related to neuroticism (Carretero-Dios et al., 2014), which promote (DeYoung et al., 2005; Jensen-Campbell et al., 2002) and impair (Compton, 2000), respectively, cognitive flexibility. In this sense, high trait cheerfulness people should have a greater ability to shift their mental set when they are working on different tasks. However, this is not the case. It might be possible that the affective, humoristic, communicative, expressive, and social characteristics that compound trait cheerfulness play a relevant and distinctive role to explain the differences on cognitive flexibility

performance found in the present study. Further research needs to be carried out in this field to clarify these ideas.

Furthermore, it is important to note that other studies have also failed to find a clear pattern of task-switching cost reduction when a motivational intensity induction is carried out (high interest) compared to negative emotional states or a control condition (Zhou & Siu, 2015). Some studies have not found a clear pattern of benefits from positive affective induction in multitasking conditions either (Morgan & D'Mello, 2016). Contradictory results were also observed by Phillips, Bull, Adams, and Fraser (2002), who revealed a poorer performance after a positive affective state induction, compared with a neutral induction, in task-switching conditions between naming the color versus the word in Stroop tasks. Yet, they found a smaller difference between alternation and non-alternation conditions in a verbal fluency task (i.e., alternating or not between saying words starting with a specific letter and words from a specific semantic category).

In addition, and although this was not our main goal, in Study 1 and in the preparation part of Study 2 we observed that, compared to individuals with low trait cheerfulness, those with high trait cheerfulness showed a higher effect of attribute repetition between two consecutive trials (e.g., Hommel, 2004). They also showed a tendency towards a higher effect of preparation when presented with a cue anticipating the demand in a trial that immediately followed (e.g., Kiesel et al., 2010) that was even higher in the expressed emotion recognition task (Study 1).

To our knowledge, no studies have explored the modulation of the effects of attribute repetition by predisposition to affective states (or affective states themselves). However, if our findings are confirmed, it may be possible to explain them in terms of the broaden-and-build theory (Fredrickson, 2001). According to this approach, positive emotions often lead to a more holistic processing of the context, thus expanding the attention focus (see, for example, Johnson et al., 2010). Takin into account that trait cheerfulness is a predisposition towards positive affective states, it could be inferred that individuals with high trait cheerfulness are defined by a more global processing style, generating a higher cognitive "permeability" or "receptivity" to the stimuli presented. In this sense, even if all participants were to benefit from attribute repetition between consecutive trials and from a cue anticipating the next demand, it would be

possible to theorize that, due to their more global mindset configuration, individuals with high trait cheerfulness benefit more from these facilitation effects, having the information on the demand to carry out more active in their short-term memory, which would improve their immediate response, particularly in the expressed emotion recognition task (Study 1), which is considered more complicated (e.g., Egner et al., 2008; Ochsner et al., 2009). In any case, future studies should replicate and extend these findings in order to understand the role of trait cheerfulness on these phenomena.

Notwithstanding the importance of the results, our study had some limitations. First, a behavioral approach was used in both studies, with the aim of exploring the possible modulation of cognitive flexibility by trait cheerfulness. Given the relevance of studying human beings using different measures, it would be interesting to verify whether this effect is restricted to behavioral measures or can be replicated and extended to other measures, such as self-reports or the analysis of brain function.

Second, as pointed out above, participants in our studies were selected according to their trait cheerfulness scores. Ruch and colleagues (1996, 1997) suggest that the temperamental basis of sense of humor have two manifestations, as traits and as states, which are closely related to one another. Clear dissociations have been observed between traits and states, which have differential modulation effects on attentional processes in other areas such as anxiety (Pacheco-Unguetti, Acosta, Callejas, & Lupiáñez, 2010). Therefore, it would be interesting to verify whether the induction of state cheerfulness, as opposed to the selection of participants with high trait cheerfulness, would have the same effects as those caused by trait cheerfulness or if, on the other hand, participants' state at the time of the task is a more powerful predictive factor to explain cognitive flexibility. Moreover, further research is needed to assess whether other elements of sense of humor are relevant for making predictions on this type of processes. As an example, given that seriousness is described from a cognitive, attitudinal, and reflexive perspective, it may modulate to a greater extent the effect of these processes, which have a more cognitive nature. Additionally, based on studies that have found a relationship between negative affective states and a poorer performance in multitasking conditions, which require high cognitive flexibility (Morgan & D'Mello, 2016), it could be inferred that bad mood, through its affective properties, may also modulate cognitive flexibility, leading to a lower task-switching cost.

Third, taking into account that trait cheerfulness is linked to personality characteristics that may affect the performance on tasks that require cognitive flexibility (e.g., Compton, 2000; Jensen-Campbell et al., 2002), they should be incorporated in future studies together with related variables such as, for example, optimism, to observe their differential weight in cognitive tasks compared to trait cheerfulness.

Finally, assuming the conceptualization of the cheerfulness construct (for a review, see Ruch & Hofmann, 2012), it might be more interesting to analyze the modulation of emotional induction processes by cheerfulness, in its trait and state manifestation, in the presence not only of positive but also of negative emotions. It would also be interesting to explore its possible relationship with emotion regulation strategies, which are involved in these processes with the goal of modifying the affective response experienced by an individual.

In short, two studies were conducted in this research to verify whether individuals with high trait cheerfulness, compared to those with low trait cheerfulness, showed higher cognitive flexibility, manifested as a lower task-switching cost. The results did not confirm this scenario. However, individuals with high versus low trait cheerfulness showed higher effects of attribute repetition and task preparation. Future research should analyze whether these effects can be generalized to other cognitive processes such as creativity while exploring the modulation of affective processes by this factor.

Capítulo VI-Serie Experimental II: High trait cheerfulness individuals are more sensitive to the emotional environment

6.1. Abstract

The aim of this paper was to study whether trait cheerfulness modulates changes in state cheerfulness as a result of exposing participants to affective stimuli. Two studies with a within-participant experimental design were carried out. Forty-eight (33 women) and sixty-four (45 women) undergraduate psychology students were selected as Sample 1 and Sample 2, respectively, for scoring high or low on the Trait Form of the State-Trait-Cheerfulness Inventory (STCI-T; Ruch, Köhler, & van Thriel, 1996, 1997). Participants watched amusing, neutral, and sad film clips and reported their affective states before and after viewing them. In the second study, heart rate and skin conductance level were also recorded. Results showed that people with high trait cheerfulness reported greater changes in state cheerfulness when exposed to both amusing and sad film clips, showing larger increases and decreases in state cheerfulness, respectively, than participants with low trait cheerfulness. Effects were not mediated by social desirability. Furthermore, people with low trait cheerfulness showed a greater heart rate deceleration during the visioning of the clips compared to high trait cheerfulness participants, especially in an amusing scene with high emotional load. No modulation on trait cheerfulness was found for skin conductance level. Data with self-report and electrophysiological measures are discussed, highlighting that high trait cheerfulness people are more permeable to affective events, perhaps showing a better understanding and management of them.

Keywords: State cheerfulness, trait cheerfulness, affective induction, heart rate, skin conductance level.

6.2. Introduction

Humor has been traditionally considered a complex and global concept that includes cognitive processes, emotional responses, and expressive elements (see, for example, Martin, 2007). In this context, Ruch, Köhler, and van Thriel developed a theoretical approach focused on isolating the affective and cognitive basis of sense of humor to predict the emotional response to humor (1996, 1997): cheerfulness, seriousness, and bad mood. Cheerfulness, which is the object of study of the present research, is considered an affective tendency or predisposition to participate and interact in contexts where humor is present, to appreciate and produce it, to have a low threshold for showing laughter, and to smile in response to humoristic stimuli, together with the expression of a set of positive affective states with relatively high arousal values. Therefore, cheerfulness, which is associated with positive, self-enhancing and affiliative humor styles (see, for example, Ruch & Hofmann, 2012), is understood as a predictive variable of individual differences in exhilaration emotion. The concept comprises five facets, which have been empirically differentiated through multilevel confirmatory factor analysis (Carretero-Dios, Eid, & Ruch, 2011): the prevalence of a cheerful mood, a low threshold for smiling and laughter, a composed view of adverse life circumstances, a broad range of active elicitors of cheerfulness and smiling/laughter, and a generally cheerful interaction style. While cheerfulness facilitates an exhilaration response to humorous stimuli, two other dimensions inhibit this response: bad mood, understood as the opposite affective component and manifested as a lack of interest in participating in situations where humor might be present, and seriousness, described as a tendency to deeply analyze most things.

In the conceptualization of cheerfulness, some facets are described as general positive affective dispositions; in fact, a certain parallelism between cheerfulness and some qualities of positive emotions, such as joy or happiness, has been reported (e.g., Papousek & Schulter, 2010). Empirically some data suggest that people who have high trait cheerfulness manifest higher and more stable psychological well-being, a better ability to cope with stressful situations, a greater capacity for creative thinking, and greater emotional management (Yip & Martin, 2006); they also report more positive emotions and less negative emotions when confronted with emotional events (see Ruch & Hofmann, 2012, for a review).

As in other personality dimensions (e.g., anxiety), cheerfulness can also be understood in terms not only trait by also state, which is defined by the presence of a cheerful, tranquil, and composed mood state as well as by the presence of hilarity, which is a merry, shallow, and outwardly directed mood state (Ruch & Köhler, 2007; Ruch et al., 1997). Both trait and state affect the habitual and actual dispositions of exhilaratability (Ruch, 1997). Self- and peer-evaluation data as well as joint factor analyses have found that both dimensions correlate positively, confirming the idea that traits represent dispositions for their respective states (Ruch et al., 1997). In this sense, the authors argue that high trait cheerfulness individuals enter state cheerfulness more easily, experience cheerfulness more often and more strongly, remain in the mood for longer until it disappears naturally, and are able to keep a high level of state cheerfulness when facing adversities or negative events (Ruch, 1997; Ruch & Köhler, 2007; Ruch et al., 1997).

The manifestations of cheerfulness have been studied from different perspectives, including the study of facial expressions with the Facial Action Coding System (FACS; Beermann & Ruch, 2011), the differential activation of brain areas (Rapp, Wild, Erb, Rodden, Ruch, & Grodd, 2008), the response to affective induction (Ruch, 1997), and the modulation of performance on cognitive tasks (Papousek & Schulter, 2010). However, to our knowledge, not many studies have investigated physiological parameters linked to cheerfulness. In the current study, we aimed to bridge this gap.

Heart Rate (HR) and Skin Conductance Level (SCL), associated with valence and arousal dimensions, respectively, have been considered classic references in the study of affective dimensions (see Kreibig, 2010, for a review) as well as well-being and health (Tugade & Fredrickson, 2004). However, in spite of these studies, the exact relationship between electrophysiological measures and other responses is not clear. For example, some authors have posited that there is a convergence between electrophysiological and so-called subjective measures, such as inventory and self-reports, whereas in other studies self-report changes were observed without concomitant autonomic variations (Mauss & Robinson, 2009).

Some attempts have also been made to study sense of humor with psychophysiological parameters (Langevin & Day, 1972; Newman & Stone, 1996). Moreover, the psychophysiological correlates of humor appreciation have been

investigated. For example, Lackner, Weiss, Schulter, Hinghofer-Szalkay, Samson, and Papousek (2013) observed the psychophysiological response to humor perception. They found that detecting punch lines in cartoons was associated with an increased cardiac response, which was modulated by participants' self-reported perception of the amusement. More recently, Fiacconi and Owen (2015) studied the temporal outline of humor elicitation using HR and facial electromyography. They discovered a greater physiological response when people were exposed to jokes as well as a decreased HR response at the onset of humor comprehension.

In spite of the connections found between humor appreciation and physiological variables, there is no literature establishing a clear relationship between cheerfulness, as a trait and a state, and periphery parameters of the autonomic nervous system. However, a relationship between them could be observed by attending at the elements that constitute the affective states referred by cheerfulness from a dimensional perspective (Russell, 2003). Although cheerfulness is not considered an emotion itself, it promotes the manifestation, maintenance, and enhancement of positive affective states with high arousal, as amusement, joy, and happiness (Ruch & Hofmann, 2012). Taking into account that heart rate and skin conductance level are useful measures to capture the nuances (valence and arousal) of these affective states (Kreibig, 2010), it could be possible to find a close link between state cheerfulness and psychophysiological responses, and therefore, a trait cheerfulness modulation over them.

Ruch (1997) elicited state cheerfulness in participants exposed to amusing stimuli, observing the modulation of trait cheerfulness over state cheerfulness. In that study, the experimenter's behavior was experimentally manipulated while asking a set of questions to participants in order to create a neutral versus amusing condition. For a stronger manipulation, participants also had to recall a neutral versus amusing event at the end of the session. The amusing condition caused a greater increase in state cheerfulness with respect to the neutral condition. More importantly, higher state cheerfulness variations were observed in participants with high rather than low trait cheerfulness. Furthermore, the first group also showed more frequent, intense, and longer laughs. These results are very interesting, although they had some important shortcomings. The trait–state relationship was studied using a procedure to elicit a positive but not a negative affective state. Moreover, whether social desirability could have contaminated the data was not examined, as participants could have responded

based upon their predictions about the experimenter's expectancies in some circumstances when they reported their feelings and thoughts.

No matter the limitations of that study, it is important to investigate the relationship between state–trait cheerfulness (Ruch et al., 1996, 1997). Therefore, new research should solve the limitations of the previous research and extend the study of the sate–trait cheerfulness relationship to other affective states. This was precisely the main goal of the current research. Specifically, we aimed at investigating how trait cheerfulness modulates state cheerfulness not only when facing positive affective induction but also when facing negative affective induction. Using negative induction in this context is highly relevant because results from previous studies (Papousek & Schulter, 2010; Ruch, 1997; Zweyer et al., 2004) can be easily interpreted as a selective bias in high trait cheerfulness individuals toward positive events. If high trait cheerfulness individuals are more sensitive to both positive and negative affective content than low trait cheerfulness individuals, the explanation would not be a simple positive bias but rather a larger sensitivity to the emotional environment, which could underlay a better management of emotions.

In order to achieve this goal, two experiments were carried out. In both experiments 2 groups of participants scoring high or low in trait cheerfulness watched amusing and sad film clips (in counterbalanced order), and their cheerfulness state (together with other states) was assessed with self-reported measures before and after the affective induction. In Experiment 2, as an additional aim, psychophysiological measures were also taken before and during the presentation of the films in order to investigate online modulation of the cheerfulness trait and the covariation between self-reported and electrophysiological measures.

6.3. Experiment 1

The purpose of Experiment 1 was twofold. First, we wanted to check that the affective inductions used in the present study elicited consistent and robust effects in state cheerfulness. Although some studies have reported state cheerfulness changes (Ruch, 1997), there is less literature about how state cheerfulness is modified.

To elicit state cheerfulness variations, we used a validated set of film clips, using two for each emotional category (Fernández, Pascual, Soler, & Fernández Abascal, 2011). In order to better study the differential effect of induction over state cheerfulness, we

employed a within-participant manipulation (Carvalho, Leite, Galdo-Álvarez, & Gonçalves, 2012; Codispoti, Surcinelli, & Baldaro, 2008). We hypothesized that state cheerfulness would increase after watching amusing clips, whereas it would decrease after sad clips (Hypothesis 1).

In line with previous evidence, proposing a direct relationship between trait and state cheerfulness (Ruch, 1997; Ruch et al., 1996, 1997) and taking into account emotional nature as a fundamental feature in the conception of cheerfulness, which might lead high cheerfulness participants to show a larger general sensitivity to the emotional environment, we considered that participants with high trait cheerfulness might be induced to a larger extent than participants with low trait cheerfulness after watching both amusing and sad films, as measured by means of score changes in the state cheerfulness inventory (Hypothesis 2).

Furthermore, we thought it was necessary to demonstrate that the observed effects did not depend on social desirability. In order to avoid this issue, Marlowe and Crowne's Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960) was included.

6.4. Method

6.4.1. Participants

Experiment 1 included 48 undergraduates selected from an initial sample of 321 undergraduate students depending on their high versus low scores in trait cheerfulness obtained from the Trait Form of the State-Trait-Cheerfulness Inventory (STCI-T; Ruch et al., 1996). There were 23 participants in the high trait cheerfulness group (17 women, mean age 19.09, $SD = 1.44$; trait cheerfulness mean 3.31) and 25 participants in the low trait cheerfulness group (16 women, mean age 19.20, $SD = 1.78$; trait cheerfulness mean 2.89). In this and the following experiment, all participants spoke Spanish as a first language, had normal or corrected-to-normal visual acuity, and received course credits for their voluntary participation. A written consent was obtained prior to the experiment, and the study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. In order to get an effect size of $f = .20$ and a power of .80 with 2 independent groups and six repeated measurements averaged, the minimum sample required for this study was 28 participants (estimate with G*Power 3.1 software).

6.4.2. Measures and Stimuli

1. The Trait Form of the State-Trait-Cheerfulness Inventory (STCI-T; Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Ruch et al., 1996). This instrument assesses cheerfulness (e.g., "Life gives me very few reasons to laugh"), seriousness (e.g., "I am a serious person"), and bad mood (e.g., "Compared to others, I really can be grumpy and grouchy") as temperamental dimensions of the sense of humor in trait manifestation using a Likert scale between 1 ("strongly disagree") and 4 ("strongly agree"). Although participants were chosen using this self-report, because of the time elapsed between the first time they completed the test and the experimental session, they had to fill out the trait cheerfulness part again when they started the experiment to check that they were in the correct group. During the experiment, participants only filled out the cheerfulness part. The reliability analysis provided a Cronbach's alpha of .94 for our sample. Mean comparison analysis between 2 samples was significant, $t(43) = -10.24$, $p < .001$.

2. The State Form of the State-Trait-Cheerfulness Inventory (STCI-S; López-Benítez, Acosta, Lupiáñez, and Carretero-Dios, 2016, *manuscript in preparation*; Ruch et al., 1997). As in the trait version, this self-reported questionnaire evaluates cheerfulness (e.g., "I am ready to have some fun"), seriousness (e.g., "I am in a pensive frame of mind"), and bad mood (e.g., "I am in a crabby mood") as temperamental dimensions of sense of humor in state manifestations. In this case, during the experiment, participants only filled out the state cheerfulness part, answering 14 items and using a 4-point Likert scale between 1 ("strongly disagree") and 4 ("strongly agree"). Cronbach's alpha values for our sample oscillated between .90 and .97.

3. Scale for Mood Assessment (EVEA; Sanz, Gutiérrez, & García-Vera, 2014). This instrument assesses joy (e.g., "I feel optimism"), anxiety (e.g., "I feel nervous"), hostility (e.g., "I feel angry"), and depression (e.g., "I feel sad") factors. Participants have to respond to a 10-point Likert scale (scores ranging from 0, indicating total lack of affect, to 10, maximum intensity of it). Cronbach's alpha values were elevated for all four scales every time they were administered, ranging from .79 to .96 in our sample. In the present paper, only assessment information directly related to the content of the films is provided, including joy and depression factors.

4. Self-Assessment Manikins (SAM; Bradley & Lang, 1994; Moltó et al., 1999). SAM is an easy instrument used to measure the valence, arousal, and dominance affective dimensions. It consists of three different picture sets with five figures mixed with four points that generate a continuum for each factor. In the valence dimension, figures oscillate between a happy man (9) and a sad man (1); in the arousal dimension, the continuum vary between a stressed man (9) and a relaxed man (1); in the dominance dimension, figures fluctuate between a small man without control (1) and a big man with control (9). In this experiment, we only employed valence and arousal dimensions.

5. Discrete Emotions Scale (DES; Izard, Dougherty, Bloxom, & Kotsch, 1974). This inventory provides a systematic measure to evaluate the emotions experienced by a person in an experimental situation. This experiment used a simplified version already utilized in previous studies (Fernández et al., 2011). Participants had to evaluate the following moods: amusement, sadness, anger, happiness, neutrality, disgust, fear, and tenderness. In this case, we employed an 11-point Likert scale, from 0 "Not at all" to 10 "Totally," for each label. Finally, in order to avoid facilitation effects with respect to films, the order of the presentation of the different labels was randomized for each participant. Only assessment information directly related to the content of the films (amusement, sadness, and neutrality factors) is provided in the present paper.

6. Marlowe and Crowne's Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960; Ferrando & Chico, 2000). This inventory allows for the scoring of social desirability to evaluate the degree to which people voluntarily choose responses that are more socially desirable. This self-report is composed of questions about people's behavior in their own contexts (e.g., "I never hesitate to go out of my way to help someone in trouble"). Participants had to respond true or false to each question. The reliability analysis provided a Cronbach's alpha of .63 for our sample.

7. Films. In order to create an adequate induction depending on the affective material, six clips (two per affective state) were selected from a Spanish validated and updated films database that has been demonstrated as an effective and powerful tool to elicit affective states (Fernández, Pascual, Soler, Elices, Portella, & Fernández Abascal, 2012; Fernández et al., 2011). This procedure of induction provokes a relatively differentiated affective state that can last for several minutes. The content for each clip was as follows: (a) *Bennie and Joon*–one man plays with food; (b) *There's Something*

About Mary–a fight between a dog and a man; (c) *Blue 2*–people doing regular activities; (d) *Sticks*–a set of sticks moving on the screen; (e) *Champion*–a child sees his father dying; and (f) *City of Angels*–one woman dies because of an accident (see Table 1). Film clips a and b were used to elicit positive affective states, c and d to induce a neutral affective state, and e and f to trigger negative affective states.

Table 1

Scores of the valence, arousal, amusement, and sadness subscales for each film clip.

Film	SAM Valence	SAM Arousal	DES Amusement	DES Sadness	Duration
Bennie and Joon	7.54	4.46	5	1	124
There's Something About Mary	6.94	4.38	5.27	1.67	179
Blue 2	4.85	3.31	1.23	1.46	40
Sticks	4.57	3.46	1.77	1	208
Champion	3.08	4.92	1.15	5.46	115
City of Angels	3.75	4.63	1.5	5.63	267

Note. SAM = Self-Assessment Manikins, DES = Discrete Emotions Scale. Duration was measured in seconds. While the first two and last two film clips were used to elicit positive and negative affective states, respectively, the third and fourth clips were employed to produce a neutral affective state.

6.4.3. Procedure

Participants came to the laboratory in subgroups of 3 to 5. They were each seated at a 90º −angle facing the screen in comfortable chairs at independent experimental booths located at opposite sides of a room with weak light. After that, written consent was obtained and instructions were given to the participants. It was explained that they would watch subsets of film clips. They would have to pay attention and try to empathize while watching the clips. Moreover, they were told that they had to report their thoughts and feelings by filling out different types of self-reports before and after watching the clips. Finally, participants were informed that they would have to perform a task between clips. All of the self-reports and instructions were printed and placed close to the laptop. The experimental task was programmed using E-prime software (Schneider, Escaman, & Zuccolotto, 2002), and the clips were presented on a 15-inch screen located approximately 60 cm away from the participants. The duration of the session was approximately 75 minutes. In order to ensure that participants' responses were directly related to the manipulation and not to the social engagement with the

study or the experimenter, a predefined and standardized protocol was created. It included all verbal encounters with participants and a timeline with specific statements about the duration of different parts of the experiment.

To strengthen the affective induction effect, the two films in each affective category were always displayed one after the other (Amusing: *Bennie and Joon – There's Something About Mary*; Neutral: *Blue 2 – Sticks*; Sad: *Champion – City of Angels*). In order to avoid possible confounding effects due to affective inductions, the order of amusing and sad clips was counterbalanced across participants. The two neutral films were always displayed between the two affective inductions. See Figure 1 for the event sequence of the experiment.

Before the first affective content induction, participants completed STCI-T, EVEA, STCI-S, SAM, and DES self-reports. Then, half of the participants watched amusing clips, and the other half watched sad clips. A break of 10 seconds between films of the same affective category was included. Then all participants filled out STCI-S, SAM, and DES self-reports and performed a global–local task in which a big letter composed of smaller letters was presented and participants were to detect as quickly and accurately as possible either the big (i.e., global) or the small (i.e., local) letter by pressing a key (Kimchi & Palmer, 1982).[1] The literature has sometimes described an excitation transfer effect (Bryant & Miron, 2003; Zillmann, 1983) in which a specific affective state could last long enough to be transferred to a new situation or context, increasing the intensity of an affective state elicited later. In order to control the excitation transfer potential and promote the return of the participants' affective state to their baseline, we included an interval of 3 minutes between clips of different affective categories, which has been demonstrated to be an effective period of time in previous research (Fernández et al., 2011; Fredrickson & Levenson, 1998).

Before the second (neutral content) induction, all of the participants completed STCI-S, SAM, and DES self-reports. Then they watched the neutral film clips, after which they again filled out the STCI-S, SAM, and DES self-reports and performed the global–local task. The purpose of presenting these two neutral films was for participants

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[1] As our main aim was to assess affective changes experienced by participants exposed to different affective inductions and the possible modulation of trait cheerfulness over these changes, we did not consider or analyze data from this task.

to achieve an affective state equivalent to the one they had at the beginning of the session.

Before the third affective content induction, all participants completed the STCI-S, SAM, and DES self-reports, then they watched the last films (one half watched the sad film clips, and the other half watched the amusing film clips), after which all of the participants filled out STCI-S, SAM, and DES self-reports and did the global–local task for the last time. Finally, the MCSDS was administered to check that participants' responses were not due to social desirability. To prevent confounding effects caused by having previous knowledge of the films, participants were asked whether they had watched them before the experiment and when.
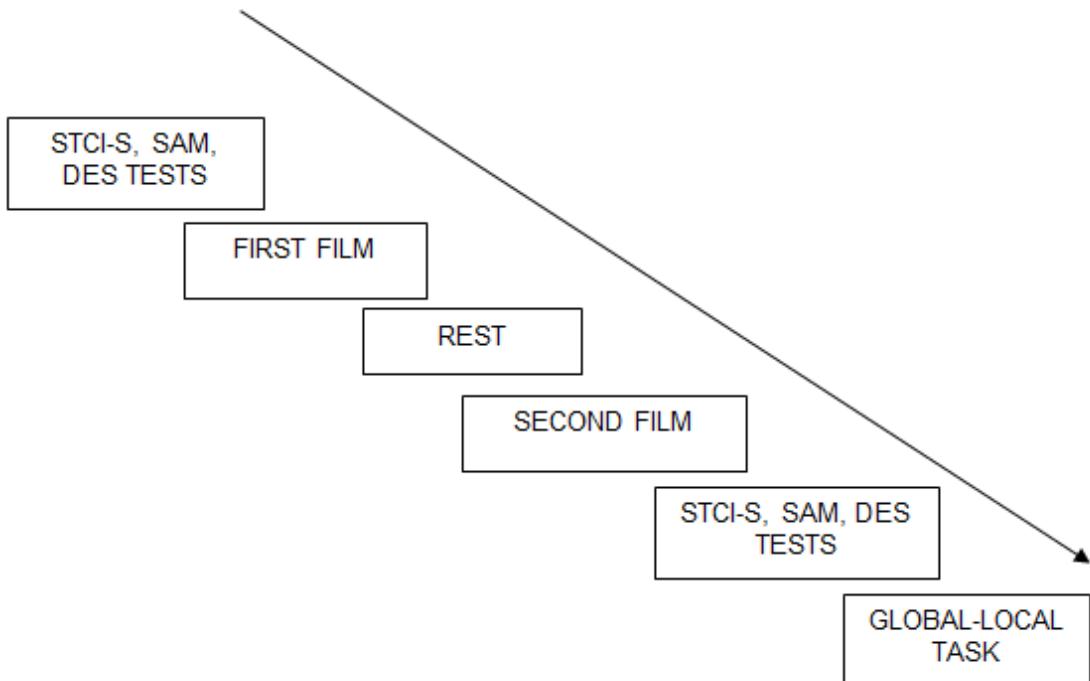
Figure 1. Schematic representation of the experiment for the second (neutral) affective induction. The participants had to fill out the STCI-S (State Form of the State-Trait Cheerfulness Inventory), SAM (Self-Assessment Manikins), and DES (Discrete Emotions Scale) self-reports before and after watching two consecutive neutral film clips, which were separated by a 10-second period. Then, they completed STCI-S, SAM, and DES self-reports again and performed a global–local task. This sequence was repeated three times in the experiment, but in the first induction (amusing or sad), the participants filled out two additional self-reports at the beginning of the experiment: the STCI-T (Trait Form of the State-Trait Cheerfulness Inventory) and the EVEA (Scale for Mood Assessment). Finally, after the third induction (amusing or sad), at the end of the session, the MCSDS (Marlowe and Crowne's Social Desirability Scale) was administered.

6.4.4. Design and Statistical Analysis

Data were analyzed with the SPSS 15.0 statistical package. We used a mixed factorial design: 2 (Trait Cheerfulness Group; High versus Low) x 3 (Affective Induction; Amusing versus Neutral versus Sad) x 2 (Affective State Assessment Moment; Pre versus Post). To check for the effectiveness of our induction procedure, SAM and DES measures were treated as dependent variables. In order to check whether trait cheerfulness modulated state cheerfulness scores, these were considered as

dependent variables. Additionally, to confirm that social desirability was not modulating results, MCSDS scores were introduced as a covariate.

6.5. Results

The different assessed variables changed in the expected direction, reflecting that the manipulation was effective (all $ps \leq .05$). In general, state cheerfulness, valence (SAM), and amusement (DES) increased and sadness (DES) decreased after participants watched amusing clips. The opposite pattern was observed after they watched sad clips. Neutrality (DES) scores increased after watching neutral films and decreased after watching amusing and sad films. Descriptive statistics can be found in Table 2.

Table 2

Mean and standard deviation of the state cheerfulness, valence, arousal, amusement, neutrality, and sadness variables as a function of trait cheerfulness group, affective state assessment moments, and affective induction conditions.

| | High Trait Cheerfulness | | | | | | Low Trait Cheerfulness | | | | | |
| | Pre | | | Post | | | Pre | | | Post | | |
Measures	A	N	S	A	N	S	A	N	S	A	N	S
State Cheerfulness	35.48	36.78	36.52	47.78	32.04	22.83	32.00	29.72	28.68	39.56	25.08	20.96
	(12.81)	(10.43)	(9.94)	(7.63)	(13.32)	(7.41)	(7.92)	(7.14)	(6.52)	(8.34)	(7.18)	(4.99)
SAM Valence	6.26	6.30	5.91	8.26	5.35	3.52	6.04	5.52	5.48	7.44	4.04	3.04
	(1.66)	(1.61)	(1.83)	(1.39)	(2.25)	(2.31)	(1.57)	(1.53)	(1.78)	(1.45)	(1.88)	(1.51)
SAM Arousal	5.61	5.48	5.09	5.35	4.57	4.48	5.12	4.80	5.04	5.36	5.20	4.56
	(2.39)	(2.33)	(2.25)	(2.29)	(2.54)	(2.23)	(2.15)	(2.10)	(2.47)	(2.40)	(2.36)	(2.10)
DES Amusement	4.48	5.04	4.17	8.70	2.52	1.30	3.20	3.36	2.44	6.28	1.48	0.92
	(2.56)	(2.48)	(2.96)	(1.15)	(2.91)	(1.92)	(2.63)	(2.22)	(1.98)	(2.64)	(1.69)	(1.12)
DES Neutrality	5.43	4.70	5.91	1.61	4.96	2.39	5.76	5.88	6.00	4.00	5.12	3.40
	(3.00)	(2.29)	(2.92)	(2.23)	(3.78)	(2.62)	(2.91)	(2.76)	(2.35)	(2.60)	(2.49)	(1.96)
DES Sadness	1.52	1.43	1.00	0.57	1.87	7.22	1.24	1.20	1.28	1.00	1.40	6.28
	(2.61)	(2.39)	(2.00)	(1.12)	(2.55)	(2.30)	(2.26)	(1.71)	(1.88)	(1.53)	(1.73)	(2.46)

Note. A = Amusing, N = Neutral, S = Sad, SAM = Self-Assessment Manikins, DES = Discrete Emotions Scale

Importantly, in the state cheerfulness measure, the Affective Induction x Affective State Assessment Moment interaction was significant: $F(2, 92) = 97.91$, $p < .001$, $\eta^2 = .68$. While there were no differences in the pre-induction measures ($F < 1$), large and significant differences were observed in the post-induction measures: $F(2, 92) = 142.91$, $p < .001$, $\eta^2 = .87$. This was due to the fact that, after the induction with amusing clips, state cheerfulness increased—$F(1, 46) = 84.11$, $p < .001$, $\eta^2 = .65$—while inducing participants with sad clips reduced state cheerfulness: $F(1, 46) = 96.68$, $p < .001$, $\eta^2 = .68$. Neutral induction also mildly reduced cheerfulness: $F(1, 46) = 22.73$, $p < .001$, $\eta^2 = .33$.

More importantly, this interaction was significantly modulated by Trait Cheerfulness Group—$F(2, 92) = 6.26$, $p = .003$, $\eta^2 = .12$—confirming our predictions (see Table 2 and Figure 2). Although both groups showed an increase in the post-induction measures for amusing clips—$F(1, 22) = 48.95$, $p < .001$, $\eta^2 = .69$ and $F(1, 24) = 33.61$, $p < .001$, $\eta^2 = .58$ for high and low trait cheerfulness, respectively—and a decrease for sad clips—$F(1, 22) = 49.51$, $p < .001$, $\eta^2 = .69$ and $F(1, 24) = 51.30$, $p < .001$, $\eta^2 = .68$ for high and low trait cheerfulness, respectively—the effect of the induction was larger in the high trait cheerfulness group than the low trait cheerfulness group: $F(1, 46) = 4.80$, $p = .034$, $\eta^2 = .09$ and $F(1, 46) = 7.53$, $p = .009$, $\eta^2 = .14$ for amusing and sad clips, respectively (see Figure 2). It is important to note that the modulation remained significant when social desirability was introduced as a covariate: $F(1,45) = 4.23$, $p = .045$, $\eta^2 = .09$ and $F(1,45) = 6.14$, $p = .017$, $\eta^2 = .12$ for the amusing and sad affective conditions, respectively. This shows that participants' reports did not depend on their predictions about how they should respond to the experimenter.

(a)
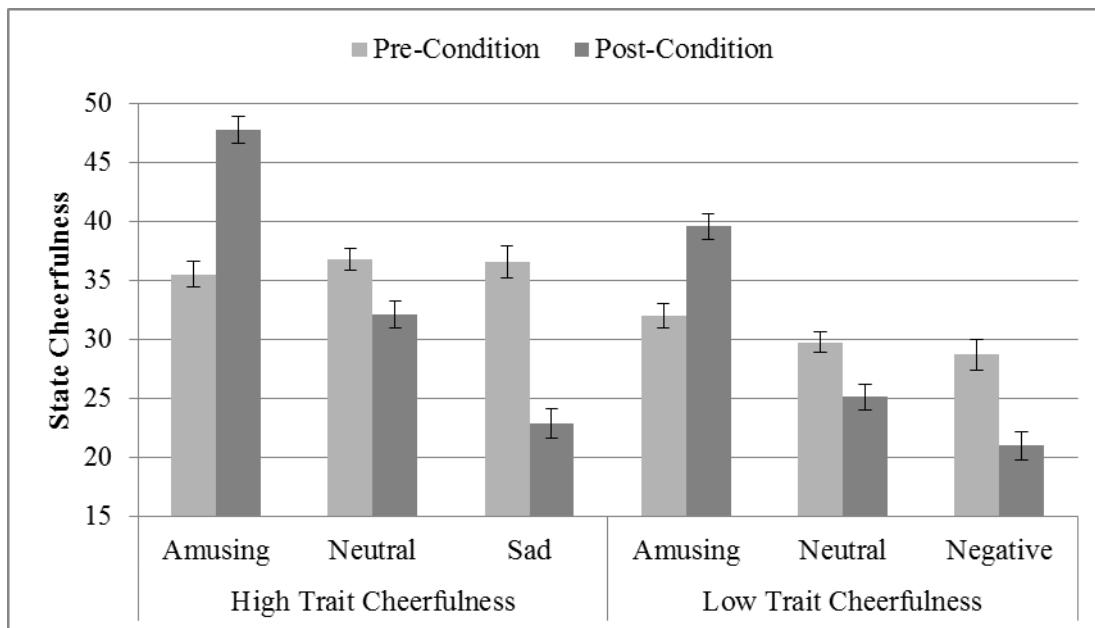
(b)
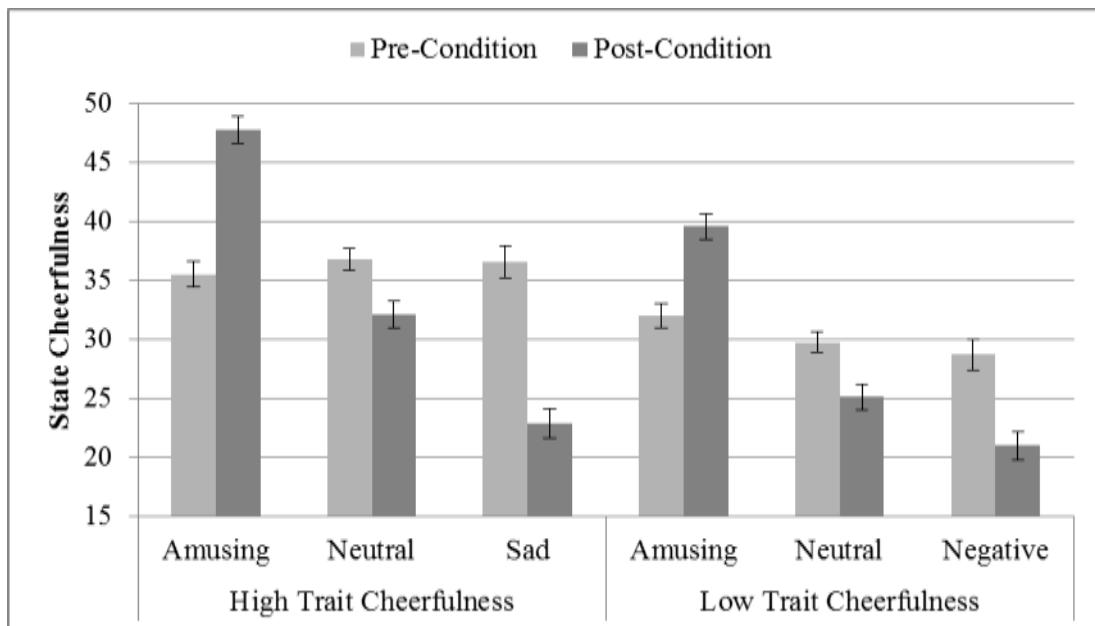
*Figure 2*. Changes in state cheerfulness depending on high and low trait cheerfulness in the pre- and posttest conditions as a consequence of watching amusing, neutral, and sad film clips. The error bars represent the standard error of the mean, with variability between participants removed by means of Coussineau's method. Panel a represents data from Experiment 1, and panel b is data from Experiment 2.

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6.6. Discussion

In this experiment, we wanted to study variations in state cheerfulness produced by an affective induction procedure that used film clips from a validated database. More importantly, we aimed to investigate whether trait cheerfulness modulated these variations independent of social desirability.

Results showed reliable affective induction effects in the expected direction, with state cheerfulness increasing or decreasing as a consequence of watching amusing or sad films, respectively. More importantly, this effect was modulated by trait cheerfulness, confirming our predictions and demonstrating that participants characterized by high trait cheerfulness reported larger induction effects than participants with low trait cheerfulness for both amusing and sad films. Importantly, this effect remained significant when social desirability was introduced as a covariate, supporting the idea that participants' responses were specifically expressed their feelings and thoughts after watching the film clips and were not meant to respond to experimental demands.

6.7. Experiment 2

Before entertaining theoretical accounts or the important implications of those results, we decided to replicate the pattern of data in a follow-up experiment. Thus, we expected to replicate the finding that participants with high trait cheerfulness would increase in state cheerfulness further after watching amusing films and would decrease in state cheerfulness further after watching sad films, as compared with participants characterized by low trait cheerfulness. Moreover, we did not expect this difference to be mediated by social desirability (Hypothesis 1). Furthermore, in this new experiment we investigated whether the modulation of trait cheerfulness over state variations after induction were restricted to self-report measures or extended to electrophysiological measures such as HR and SCL. We expected affective induction to produce the usual changes in HR and SCL. In line with the self-report measures, we expected these changes to be larger for participants with high trait cheerfulness versus low trait cheerfulness (Hypothesis 2).

6.8. Method

6.8.1. Participants

Experiment 2 included 64 psychology undergraduate students, selected from an initial sample of 889 undergraduate students, volunteered for the experiment in exchange for course credits. There were 31 participants in the high trait cheerfulness group (25 women, mean age 21.13, SD = 5.39; trait cheerfulness mean, 3.51) and 33 participants in the low trait cheerfulness group (20 women, mean age 21.12, SD = 5.59; trait cheerfulness mean, 2.54). Among them, 9 participants were excluded from the SCL analysis due to recording problems throughout the experiment. Additionally, partial data from 3 participants were removed from the SCL analyses (two for the first sad film clip and one for the second sad clip) and partial data from 9 participants were removed from the HR analyses (three for *Bennie and Joon*, one for *There's Something about Mary*, one for *Blue 2*, two for *Champion*, and two for *City of Angels*) due to recording problems in these specific moments. Although in order to get an effect size of f = .20 and a power of .80 with 2 independent groups and six repeated measurements the minimum sample required for this study was 28 participants (as estimated with G*Power 3.1 software), we increased the number of participants to 64 given that electrophysiological measures are usually noisier and that, usually, it is necessary to exclude some participants.

6.8.2. Procedure

The procedure, sequence of events, duration, and environmental laboratory conditions were similar to those of Experiment 1 with the following differences: (a) participants performed the session individually instead of running it in subgroups of 3 to 5 people, (b) we included the EVEA self-reports in all affective inductions, (c) the irrelevant task was removed and replaced by 3-minute adaptation periods in order to adapt the experiment to psychophysiological characteristics, and (d) self-reports were administered four times instead of six in order to simplify the procedure. After each affective induction, self-reports scores were considered post-induction measures and also as pre-tests for the next induction period.

After they arrived at the laboratory, participants were given instructions and written consent was obtained. After that, HR and SCL electrodes were placed on the skin and a

test to screen for electrode performance was carried out. As in Experiment 1, a previously specified protocol for the procedure was used. Participants were told about the importance of avoiding any movement with the goal of keeping the recording as clean as possible. At the beginning of the experiment, participants filled out the STCI-T, STCI-S, SAM, DES, and EVEA self-reports. Later, a 3-minute adaptation period was conducted where participants had to relax while seeing a white fixation point superimposed over the black background of the screen. Subsequently, half of the participants watched the two consecutive amusing film clips and the other half watched the two consecutive sad film clips and again completed the STCI-S, SAM, DES, and EVEA self-reports (see Figure 3). After the participants filled out self-reports, a new 3-minute adaptation period occurred, and the same sequence started again. To complete the counterbalance, in the final affective induction, half of the participants watched the two consecutive sad film clips and the other half watched the two consecutive amusing film clips. Finally, all participants completed the MCSDS scale.
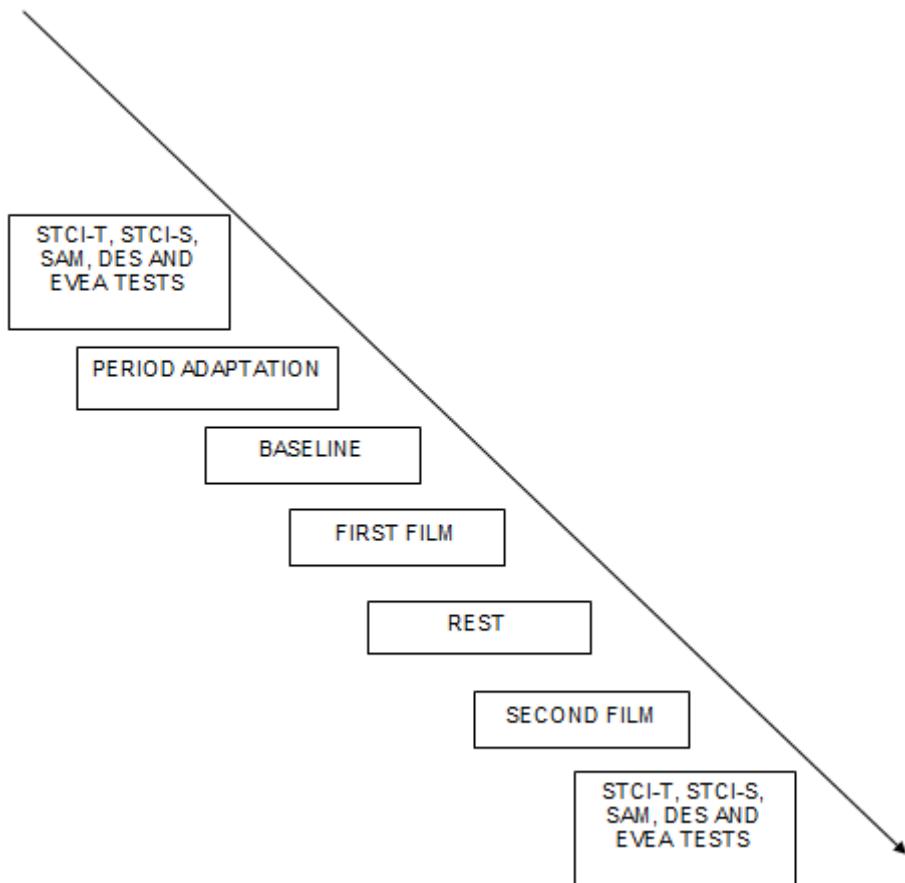
Figure 3. Schematic representation of the experiment for the first affective content induction. At the beginning, the participants had to fill in the STCI-T (Trait Form of the State-Trait Cheerfulness Inventory), STCI-S (State Form of the State-Trait Cheerfulness Inventory), SAM (Self-Assessment Manikins), DES (Discrete Emotions Scale), and EVEA (Scale for Mood Assessment) self-reports. Then came the three-minute adaptation period, of which the last 10 seconds were taken as a baseline. After that, half of the participants watched the two consecutive amusing film clips, and the other half watched the two consecutive sad film clips, which were separated by a 10-second period. Then, the participants had to take the STCI-S, SAM, DES, and EVEA self-reports again, which were considered post-induction measures and also as pre-tests for the next induction period. This sequence was repeated two more times in the experiment. In the second affective content induction, the participants watched two consecutive neutral films and did not fill in the STCI-T self-report. In the third affective content induction, the first half of the participants watched the two sad film clips and the other half watched the two amusing film clips. Finally, the MCSDS (Marlowe and Crowne's Social Desirability Scale) was administered at the end of the session.

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6.8.3. Self-report Measures

The same self-reports as in Experiment 1 were used in this experiment. In this case, Cronbach's alpha values for our sample were as follows: (a) Trait Form of the State–Trait Cheerfulness Inventory—.97; (b) Scale for Mood Assessment—from .76 to .96; (c) State Form of the State–Trait Cheerfulness Inventory —from .95 to .98; and (d) Marlowe and Crowne's Social Desirability Scale —.78. The mean comparison analysis between 2 trait cheerfulness samples was significant: $t(46) = 11.89$, $p < .001$.

6.8.4. Psychophysiological Measures

HR and SCL were registered during the experiment on a BIOPAC MP150 system using AcqKnowledge 3.9 (BIOPAC Systems Inc.). Baselines and records during the clips were considered to be target conditions for the analysis. After filling out self-reports and before starting each affective induction (amusing, neutral, or sad), participants had a time period of 3 minutes to relax, and the last 10 seconds were taken as the baseline for clips with the same affective content. HR was recorded by three electrodes using the II configuration. Before placing the electrodes, the wrists and left ankle were cleaned with alcohol. A rate of 1000 samples per second and a gain of 5000 were used. SCL was recorded using two Ag–Ag–Cl 8 mm electrodes fixed to the middle phalanx of the index and ring fingers of the nondominant hand with K-Y jelly filling (Grey & Smith, 1984). In this case, the zones were cleaned with distilled water before the electrodes were placed. For the conductance level, a rate of 125 samples per second and a gain of 5μΩ/V were used. A recording between 0–5 microSiemens (μS) was carried out. In order to avoid artifacts, a pre-analysis 5-point digital filter bandpass was applied to the HR. HR was analyzed using the MATLAB R2010a tool and the KARDIA program (Perakakis, Joffily, Taylor, Guerra, & Vila, 2010). In the first step, a MATLAB algorithm showed the raw electrocardiogram (ECG), detecting each R–R interval as well as R-wave identification marks, which were viewed by the experimenter to identify artifacts. R-waves were corrected to remove identification marks that were incorrectly specified (e.g., R-waves that were missed by the program were scored and marks that were coded as R-waves were removed). In the second step, inter-beat intervals were transformed off-line into HR in beats per minute with the KARDIA program. To process the SCL signal, a MATLAB algorithm was employed to plot target conditions graphically. Data were carefully visualized to detect movements or artifacts,

which were edited to minimize their impact following a strategy for interpolation between adjacent points.

6.8.5. Analysis and Design

1. *Self-report Measures*. As in Experiment 1, we used a mixed factorial design: 2 (Trait Cheerfulness Group; High versus Low) x 3 (Affective Induction; Amusing versus Neutral versus Sad) X 2 (Affective State Assessment Moment; Pre versus Post). Again, to check for the effectiveness of our induction procedure, SAM, DES, and EVEA measures were treated as dependent variables. In order to check whether trait cheerfulness modulated state cheerfulness scores, they were treated as dependent variables. Additionally, to confirm that the results did not depend on social desirability, an ANCOVA was carried out that included MCSDS scores as a covariate.

2. *Psychophysiological Measures*. The mean change in HR and SCL for each film was calculated and subtracted from the mean score obtained in relation to the 10 seconds before the onset of each affective induction (baseline). For the analysis, Bonferroni corrected comparisons between experimental conditions were conducted to ensure that spurious effects were not declared as significant effects. In this case, the subtracted HR and SCL values for film clips with the same affective content were combined. Then, we checked whether the observed changes were modulated by trait cheerfulness. The index of change in terms of both HR and SCL was analyzed as a function of the trait cheerfulness score (High versus Low), the content of the film (Amusing versus Neutral versus Sad), and the film's position for each affective category (Film 1 versus Film 2). Descriptive statistics can be found in Table 4. Again, the last variable was included to detect possible habituation effects in electrophysiological measures due to the repetition of the same affective content.

In a further step, and following an analysis strategy used for the affective clips, which consisted in segmenting each clip (Carvalho et al., 2012; Codispoti et al., 2008), amusing and sad clips were divided into 10-second periods (to get the same period as baseline). A time variable was created, and mean psychophysiological scores were obtained for each period. Data were analyzed by subtracting these values from the mean scores obtained in the baseline. Moreover, extracts with the highest affective load were selected. To do this, 2 judges watched the clips and indicated moments when affective content was more intense for both amusing and sad films. As a result, segments with the

highest affective impact were as follows: 1) *Bennie and Joon*: segments 6–11 (the protagonist plays with food); 2) *There´s Something About Mary*: segments 5–11 (a woman displays eccentric behavior) and segments 12–18 (a man fights with a dog); 3) *Champion*: segments 1–6 (a kid speaks with his father while he is dying); and 4) *City of Angels*: segments 4–10 (there is a traffic accident) and 18–27 (a man speaks with a woman while she is dying). A repeated-measures ANOVA for each amusing and sad film clip was carried out on the 10-second segments for each film as well as on extracts with the most intense affective content.

Table 4

Means and standard deviations of HR and SCL subtracted from baseline for each film clip as a function of trait cheerfulness group

Film Clips	High Trait Cheerfulness		Low Trait Cheerfulness	
	HR	SCL	HR	SCL
Bennie and Joon	-2.50	0.27	-3.59	0.25
	(3.65)	(0.62)	(2.61)	(0.47)
There's Something About Mary	-1.98	0.16	-3.31	0.24
	(3.42)	(0.46)	(3.01)	(0.64)
Blue 2	0.25	0.12	-1.81	0.06
	(3.46)	(0.23)	(3.90)	(0.19)
Sticks	0.49	-0.14	-2.20	-0.16
	(3.84)	(0.31)	(5.72)	(0.32)
Champion	-1.40	0.43	-4.72	0.36
	(4.64)	(0.61)	(4.39)	(0.52)
City of Angels	-1.40	0.25	-3.71	0.20
	(4.52)	(0.59)	(4.65)	(0.46)

Note. HR = Heart Rate, SCL = Skin Conductance Level

6.9. Results

6.9.1. Self-report Analysis

As in Experiment 1, the assessed variables changed in the expected direction, reflecting the effectiveness of the manipulation (all *ps* $\leq$ .05). In general, state

cheerfulness, valence (SAM), amusement (DES), and joy (EVEA) increased and sadness (DES) and depression (EVEA) decreased after participants watched amusing clips. The opposite pattern was observed after they watched sad clips. Neutrality (DES) scores increased after they watched neutral films and decreased after they watched amusing and sad films. Descriptive statistics can be found in Table 3.

The Affective Induction x Affective State Assessment Moment interaction was, again, significant for state cheerfulness—$F(2, 124) = 53.25$, $p < .001$, $\eta^2 = .46$—showing the effectiveness of the induction. Although there were no differences in the pre-induction measures ($F < 1$), significant differences were found in the post-induction measures—$F(2, 124) = 103.54$, $p < .001$, $\eta^2 = .63$—as amusing induction increased state cheerfulness—$F(1, 62) = 27.21$, $p < .001$, $\eta^2 = .31$—while induction with sad clips reduced state cheerfulness: $F(1, 62) = 150.89$, $p < .001$, $\eta^2 = .71$. Neutral induction also reduced cheerfulness mildly: $F(1, 62) = 10.79$, $p = .002$, $\eta^2 = .15$.

Importantly, reconfirming our hypothesis, this interaction was modulated by the Trait Cheerfulness Group: $F(2, 124) = 4.46$, $p = .013$, $\eta^2 = .07$ (see Table 3 and Figure 2). As in Experiment 1, both groups showed an increase in the post-induction measures for amusing clips—$F(1, 30) = 34.32$, $p < .001$, $\eta^2 = .53$ and $F(1, 32) = 4.87$, $p = .035$, $\eta^2 = .13$ for high and low trait cheerfulness, respectively—as well as a decrease for sad clips: $F(1, 30) = 85.22$, $p < .001$, $\eta^2 = .74$ and $F(1, 32) = 64.85$, $p < .001$, $\eta^2 = .67$ for high and low trait cheerfulness, respectively. Importantly, however, the effect of the induction was again larger in the high trait cheerfulness group compared to the low trait cheerfulness group, remaining significant when social desirability was introduced as a covariate for amusing and sad clips: $F(1,61) = 5.33$, $p = .024$, $\eta^2 = .08$ and $F(1,61) = 9.35$, $p = .003$, $\eta^2 = .13$, respectively.

Table 3

Mean and standard deviation of the state cheerfulness, valence, arousal, amusement, neutrality, sadness, joy, and depression variables as a function of trait cheerfulness group, affective state assessment moment, and affective induction conditions.

| | High Trait Cheerfulness | | | | | | Low Trait Cheerfulness | | | | | |
| | Pre | | | Post | | | Pre | | | Post | | |
Measures	A	N	S	A	N	S	A	N	S	A	N	S
State Cheerfulness	38.19	39.39	40.97	45.68	35.81	26.68	30.63	29.76	29.09	34.42	26.27	22.00
	(9.12)	(10.49)	(7.17)	(7.11)	(8.75)	(8.78)	(9.57)	(11.59)	(8.81)	(10.15)	(7.26)	(6.40)
SAM Valence	6.45	6.58	6.74	7.42	5.61	4.29	5.61	5.36	5.18	6.27	4.64	3.45
	(2.19)	(2.14)	(1.44)	(1.57)	(1.87)	(1.70)	(1.78)	(2.38)	(1.53)	(1.82)	(1.39)	(1.54)
SAM Arousal	4.16	5.19	4.16	4.90	3.71	4.58	3.85	4.97	4.03	4.76	3.73	4.91
	(2.05)	(1.97)	(1.86)	(2.24)	(1.92)	(1.89)	(1.87)	(1.88)	(2.02)	(2.08)	(2.04)	(1.89)
DES Amusement	3.71	5.00	5.13	7.23	3.45	2.26	2.39	3.61	2.09	5.09	1.64	1.30
	(2.71)	(3.34)	(2.31)	(2.26)	(2.77)	(2.02)	(2.16)	(3.39)	(2.10)	(2.97)	(1.75)	(1.76)
DES Neutrality	5.71	3.07	5.26	3.52	5.81	2.39	6.70	3.82	6.55	3.73	6.27	3.76
	(3.81)	(3.05)	(3.02)	(2.83)	(3.41)	(2.71)	(3.15)	(3.05)	(3.05)	(2.70)	(2.92)	(2.85)
DES Sadness	0.55	2.32	0.13	0.19	0.55	5.39	1.52	3.24	1.33	1.18	1.52	5.85
	(1.57)	(3.11)	(0.43)	(0.60)	(1.57)	(2.97)	(2.14)	(3.42)	(1.99)	(1.69)	(2.03)	(2.43)
EVEA Joy	6.20	6.26	6.85	7.33	5.46	4.33	4.05	3.89	3.70	4.92	2.80	2.11
	(2.61)	(2.07)	(1.62)	(1.46)	(2.33)	(2.10)	(2.82)	(3.02)	(2.57)	(2.54)	(2.23)	(2.05)
EVEA Depression	1.51	2.29	0.71	0.46	1.54	4.02	2.23	2.91	2.02	1.24	2.15	4.65
	(1.69)	(2.69)	(0.96)	(0.90)	(1.76)	(2.26)	(1.89)	(2.91)	(1.77)	(1.51)	(1.89)	(2.11)

Note. A = Amusing, N = Neutral, S = Sad, SAM = Self-Assessment Manikins, DES = Discrete Emotions Scale, EVEA = Scale for Mood Assessment

6.9.2. Psychophysiological Analysis

HR. In order to check differences between affective materials, Bonferroni post-hoc tests were conducted. We discovered statistically significant differences between the neutral and other content of films (neutral versus amusing [$p = .023$] and neutral versus sad [$p = .018$]), but not between amusing and sad conditions. Participants showed a decreased HR as a consequence of seeing amusing (-2.85) and sad film clips (-2.89) compared to neutral film clips ($-.92$). In short, the data indicated that our manipulation of the affective content of films was effective.

In order to study the modulation of trait cheerfulness over the differential effect elicited by film clips, a 2 (Trait Cheerfulness Group) x 3 (Affective Induction) x 2 (Film Position) repeated-measures ANOVA was carried out. We found the expected main effect of Affective Induction to be significant: $F(2, 118) = 6.68$, $p = .002$, $\eta^2 = .10$. Participants' HR decreased further as a consequence of seeing amusing (-2.85) and sad clips (-2.81) compared to the neutral film clips ($-.82$). Moreover, and more importantly, the main effect of the Trait Cheerfulness Group was also significant: $F(1, 59) = 11.99$, $p = .001$, $\eta^2 = .17$. Low trait cheerfulness participants showed a larger decrease in the HR score than high trait cheerfulness people (-3.22 versus -1.09, respectively).

In order to analyze this effect more specifically, a Trait Cheerfulness Group x Time ANOVA was carried out for each affective clip. Main significant effects were found in the Trait Cheerfulness Group for the *Champion, City of Angels,* and *There's Something About Mary* film clips: $F(1, 60) = 10.44$, $p = .002$, $\eta^2 = .15$; $F(1, 60) = 4.50$, $p = .038$, $\eta^2 = .07$; and $F(1, 61) = 4.58$, $p = .036$, $\eta^2 = .07$, respectively. Participants with low trait cheerfulness showed a higher decrease in HR score compared to participants with high trait cheerfulness (-4.82 versus -1.05 for *Champion*, -4.09 versus -1.48 for *City of Angels*, and -4.45 versus -1.98 for *There's Something About Mary*). Additionally, a Trait Cheerfulness Group x Time interaction was observed only for the second amusing film: $F(17, 1037) = 2.28$, $p = .002$, $\eta^2 = .04$ (see Figure 4). Therefore, the HR decrease difference for low versus high trait cheerfulness people varied depending on segments in this clip.

Similar analyses were carried out including only extracts with the highest affective load. The analyses confirmed the previous results. Main significant effects were found for the Trait Cheerfulness Group for *Champion* (segments 1–6)*, City of Angels* (segments 18–27), and *There's Something About Mary* (segments 12–18): $F(1, 62) = 10.86$, $p = .002$, $\eta^2 = .15$; $F(1, 60) = 5.01$, $p = .029$, $\eta^2 = .08$; and $F(1, 61) = 7.98$, $p = .006$, $\eta^2 = .12$, respectively. Participants with low trait cheerfulness showed a higher decrease in HR score compared to high trait cheerfulness (−4.84 versus −.43 for *Champion*, −3.64 versus −.92 for *City of Angels*, and −4.93 versus −1.47 for *There's Something About Mary*). Again, we found a Trait Cheerfulness Group x Time interaction specifically for the second set of segments with high affective impact in the second amusing film clip: $F(6, 366) = 2.24$, $p = .039$, $\eta^2 = .04$. Again, the HR decrease difference for low versus high trait cheerfulness people varied depending on segments in this clip (see Figure 4).
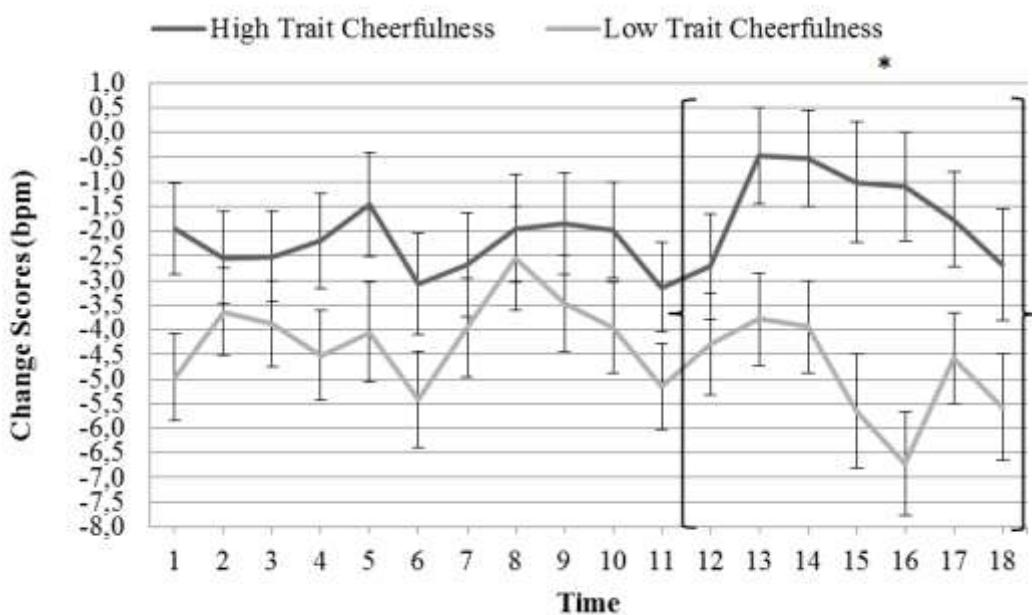
Figure 4. Differential scores in HR for both low and high trait cheerfulness groups for the second amusing film clip, which was segmented into 18 parts of 10 seconds each. The results showed a larger general HR decrease for low versus high trait cheerfulness people. This difference was greater at the final part of the clip (segments 12-18). *$p < .05$.

SCL. In order to check differences between affective materials, Bonferroni post-hoc tests were conducted. Statistically significant differences between the neutral and the other conditions were found (neutral versus amusing [$p = .004$] and neutral versus sad

[p < .001]). Moreover, we did not find differences between the amusing and sad conditions. Participants showed an increased SCL as a consequence of seeing amusing (.23) and sad film clips (.31) compared to neutral film clips (−.03). Again, SCL analysis indicated that our manipulation was adequate.

In order to study the differential effect elicited by film clips depending on trait cheerfulness, a 2 (Trait Cheerfulness Group) x 3 (Affective Induction) x 2 (Film Position) repeated-measures ANOVA was carried out. Analysis showed the main effects of an Affective Induction and a Film Position: $F(2, 106) = 15.06$, $p < .001$, $\eta^2 = .22$ and $F(1, 53) = 27.03$, $p < .001$, $\eta^2 = .34$, respectively. Moreover, Film Position was modulated by Affective Induction: $F(2, 106) = 3.96$, $p = .002$, $\eta^2 = .07$. Amusing and sad film clips displayed in the first position elicited greater increases in SCL scores than films displayed later (.26 versus .20 and .40 versus .23, respectively). This was the case even for neutral film clips (.09 versus −.15). However, no main effect or interaction with the group was observed.

A Trait Cheerfulness Group x Time ANOVA was carried out for each affective clip. No interactions were observed. Similar to HR, an analysis with the highest affective load extracts was carried out. However, we did not discover any significant interaction. Therefore, SCL did not depend on trait cheerfulness.

6.10. Discussion

In the present study, we aimed to replicate the modulatory effect of trait cheerfulness over state cheerfulness. We also wanted to study whether this effect would be observed when employing psychophysiological measures such as HR and SCL. The self-report measures from Experiment 2 replicated the pattern of data found in Experiment 1, as high trait cheerfulness participants showed a larger effect of affective induction on state cheerfulness as a consequence of watching both amusing and sad film clips. Moreover, this difference was not modulated by the participants' social desirability.

A different pattern was observed, however, when psychophysiological measures were used. Participants with low trait cheerfulness showed a larger decrease in HR while viewing the affective clips than did the high trait cheerfulness individuals. That decrease was more prominent and significant for the film clips from *Champion, City of Angels, and There's Something About Mary*, especially during the more intense

moments of the latter film. However, we did not observe any relationship between SCL and trait cheerfulness. Therefore, the results suggest different processes when electrophysiological and self-report measures are used to study the trait cheerfulness modulation of affective events.

6.11. General Discussion

Two studies were carried out to explore whether trait cheerfulness modulated participants' affective responses after watching films that differed in valence. In the first study, the State Form of the State-Trait Cheerfulness Inventory (STCI-S) was used to measure changes in cheerfulness state after induction. In the second study, we added the HR and SCL measures. For both amusing and sad film clips, participants with high trait cheerfulness exhibited larger changes in state cheerfulness after induction than the low trait cheerfulness participants, regardless of social desirability.

Ruch (1997) found that high trait cheerfulness people reported greater state cheerfulness changes than low trait cheerfulness people when they were exposed to amusing stimuli. The results from that study can be easily explained on the basis of a more pronounced positive bias in high trait cheerfulness individuals, as they tend to express a positive affective state and show a positive state. However, cheerfulness is also related to better coping with stressful situations (Papousek & Schulter, 2010; Zweyer et al., 2004). Therefore, one could also expect a lower affective impact of negative situations on high than low trait cheerfulness people, which could reflect the action of a mechanism that protects them from such situations. In our two studies, however, our data did not support this hypothesis. On the contrary, high trait cheerfulness individuals reported greater changes in affective state than low trait cheerfulness individuals for the negative affective induction as well. Therefore, instead of a positive bias or protection mechanism, cheerfulness would be related to a greater permeability to the affective environment, perhaps explaining high trait cheerfulness people's better management of emotions. In fact, it has been demonstrated that cheerfulness is related to regulatory processes and emotional intelligence (Papousek & Schulter, 2010). For example, Yip and Martin (2006) found a positive correlation (.27) between trait cheerfulness and the emotional management factor of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002a),

which involves abilities such as openness to positive and negative feelings and monitoring as well as reflection of emotions.

Results within the virtues and strengths literature have also established a relationship between humor and social/emotional intelligence. For example, Beermann and Ruch (2009a) found that humanity, understood as being involved in relating to others in a benevolent and empathetic way (e.g., social intelligence or kindness). was one of the virtues more related to humor. Müller and Ruch (2011) found similar results. Therefore, together with previous research (Ruch et al., 1996), our data support the idea that the concept of cheerfulness itself involves permeability to the emotional environment.

Differences in arousal cannot explain the observed pattern of results. We grouped and analyzed participants' arousal levels in the two studies before and after facing amusing and sad stimuli. The results showed that arousal levels did not differ between the affective film clips, $F(1, 111) = 0.11$, $p = .74$, $\eta^2 = .001$. Furthermore, there were no significant differences in baseline arousal between high versus low trait cheerfulness individuals, $F(1, 110) = 0.47$, $p = .50$, $\eta^2 = .004$. Finally, no Affective Induction x Affective State Assessment Moment interaction was observed, $F(1, 111) = 1.04$, $p = .31$, $\eta^2 = .009$, which reveals that affective material did not elicit differences in arousal levels.

Therefore, the higher affective state management observed in high cheerfulness individuals seems to be specifically related to valence. It is not clear, however, whether this also affects electrophysiological regulation. Our results with these measures were not so conclusive. Both high and low trait cheerfulness individuals showed the expected general effect of induction for HR and SCL (decreased HR and increased SCL during affective compared to neutral induction). Furthermore, whereas trait cheerfulness did not modulate the observed increase in SCL, the observed decrease in HR differed across groups. Low trait cheerfulness individuals generally showed a more pronounced decrease in HR, especially in the *Champion*, *City of Angels*, and *There's Something About Mary* clips, compared to high cheerfulness group.

In the present research, the inclusion of "objective" measures was aimed at investigating whether self-report results could be extrapolated to different response systems. Some theories establish that a significant emotional event triggers a subjective, physiology, and behavior emotional response, which are interrelated and synchronized

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(Scherer, 2005), while other authors posit that there is no one-to-one correlation between different response systems, so a "subjective" change may occur as a result of exposure to an affective stimulus without physiological variations and vice versa (see Mauss & Robinson, 2009, for a review). In this sense, physiological results would support the last idea, highlighting the need to explore different response systems from a multidisciplinary and independent perspective by means of various techniques.

In Ruch and colleagues' theoretical approach, cheerfulness is understood as an affective dimension that is closely linked to positive emotions and includes expressive, communicative, affective, cognitive, and social elements (Martin, 2007; Ruch et al., 1996, 1997). Hence, in terms of explanatory and predictive power, one possible explanation may be that social and cognitive elements could have higher relevance to humor and cheerfulness than physiological parameters (Yovetich, Dale, & Hudak, 1990). This could explain the pattern of results observed for SCL (i.e., no group differences), which has been traditionally linked to arousal (e.g., Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000), therefore also explaining the lack of group differences in arousal measures reported above.

However, the pattern of results observed for HR, which was the opposite of what we expected, needs a different kind of explanation. In our study, compared with low trait cheerfulness individuals, high trait cheerfulness individuals showed a reduced decrease in HR while facing either amusing or sad clips, but they reported larger changes in self-report measures after watching the clips. Some studies have pointed out that HR deceleration can be understood as reflecting alertness, sustained attention, and orienting processes (Carvalho et al., 2012; Codispoti et al., 2008; Fernández et al., 2012). Therefore, low trait cheerfulness individuals might need more attentional focusing to have a specific affective state induced, whereas high trait cheerfulness individuals would be induced more naturally, due to their larger permeability to the emotional environment, with scarce attentional deployment. Nevertheless, further studies are needed to test that hypothesis.

Importantly, taking into account that cheerfulness is associated with emotional regulation and emotional intelligence, a tentative explanation for the overall pattern of data observed in the two experiments reported in this paper might be that high trait cheerfulness individuals can better manage their affective states, leading to the reduced

physiological impact of the affective environment. The fact that low trait cheerfulness individuals have worse management of their affective states would explain the larger physiological impact.

Previous research has described a relationship among cheerfulness, well-being, and health (Martin et al., 2003; Papousek & Schulter, 2010; Zweyer et al., 2004). For instance, a recent study showed that trait cheerfulness was positively correlated with positive indicators of well-being, such as life satisfaction and happiness, and negatively with negative dimensions of well-being, such as anxiety and depression (Carretero-Dios et al., 2014). Delgado-Domínguez, Font-Ugalde, Ruiz-Vílchez, Carretero-Dios, and Collantes-Estévez (2014) demonstrated that cheerfulness was also associated with a lower inflammatory marker level among patients with ankylosing spondylitis disease. More recently, Delgado-Domínguez, Escudero-Contreras, Font-Ugalde, Ruiz-Vílchez, Collantes-Estévez, and Carretero-Dios (2016) found that state cheerfulness was related to lower values of self-reported disease activity and C-reactive protein in patients with rheumatoid arthritis.

Therefore, by taking our results and previous research into account, it is possible that the better permeability to the affective environment of high cheerfulness individuals together with their improved management and communication of emotions could contribute to their well-being and high health in comparison to low cheerfulness people. This is evidenced by a lower cardiac impact when facing affective stimuli. In any case, we consider it necessary to replicate the present data as well as to use other affective state measures to ensure that the effect is not spurious.

Despite the potential importance of the obtained results, our studies had some shortcomings. First, we did not incorporate a neutral stimulus at the beginning of the experiment to ensure that all of the participants showed an equivalent initial affective state. Future studies should replicate the current pattern of data while ensuring an initial affective state and perhaps adding facial expression measures to the self-report and psychophysiological measures used in the current experiments. In this way, it will be possible to explore whether cheerfulness also influences facial expression, in terms of intensity, duration, and frequency, after being exposed to stimuli with less pictorial load than films, such as music or images, in which humor is not present. However, it might be interesting to incorporate bad moods and seriousness into future studies, as

cheerfulness and bad mood are considered opposite affective dimensions (Ruch et al., 1996, 1997). To our knowledge, no study to date has explored the role of bad mood in affective inductions. Moreover, taking into account the possible relevance of the cognitive dimension, it would be intriguing to determine whether seriousness exerts a moderating effect on affective induction.

In summary, high and low trait cheerfulness individuals were exposed to a set of affective clips. The results showed that the high trait cheerfulness people reported larger affective changes than the low trait cheerfulness people after viewing amusing and sad clips, reflecting a greater permeability to the affective environment and better communication of emotions. Moreover, they experienced a lower decrement in HR while viewing the clips, which might indicate better emotional management. These results have important implications. Therefore, it would be fruitful to consider sense of humor, and specifically trait cheerfulness, to be an important tool in emotional intelligence intervention programs, which can incorporate humoristic stimulations into the process of managing and understanding of emotions. In a similar way, given the established relationship between trait cheerfulness and health, it would be useful to develop and implement procedures to train cheerfulness in order to enhance a set of personality characteristics related to well-being and health, such as HR, optimism, and resilience.

Capítulo VII-Serie Experimental III: Trait cheerfulness sensitivity to positive and negative affective states

7.1. Abstract

Recent research suggests that trait cheerfulness triggers larger state cheerfulness variations after facing amusing and sad clips. The present study is aimed at replicating and extending these effects. It was selected 80 psychology students (68 women) depending on their scores in trait cheerfulness. Participants watched a set of positive and negative pictures, which was accompanied by statements, and were asked to report their affective states. Additionally, to explore the possible role of trait cheerfulness on the affective modulation of attentional networks functioning, the Attentional Network Test-Interactions task was administered after each induction. The results showed that high versus low trait cheerfulness participants reported a larger increase in state cheerfulness, valence, and joy measures after the positive induction and a larger decrease in state cheerfulness after the negative induction. However, no effects of affective induction or trait cheerfulness on the attentional task were found. The results support the idea that high trait cheerfulness people are more sensitive to the affective environment.

Keywords: Trait-State Cheerfulness; Affective Induction; Emotional Sensitivity; IAPS; ANT-I

7.2. Introduction

Although the research on negative emotions has been extensively analyzed in the past, the interest in positive emotions did not start to increase until a few decades ago. In this context, the sense of humor has been considered a construct of relevance in the emotion and personality fields.

Ruch, Köhler, and van Thriel (1996, 1997) developed a theoretical model to isolate the temperamental basis of sense of humor: cheerfulness, bad mood, and seriousness. Cheerfulness, understood as a positive affective predisposition, is composed by multiple facets (Ruch et al., 1996): the prevalence of a cheerful mood, a low threshold for smiling and laughter, a composed view of adverse life circumstances, a broad range of active elicitors of cheerfulness and smiling/laughter, and a generally cheerful interaction style. Bad mood is considered an affective tendency opposed to cheerfulness that is characterized by ill-humoredness and sadness affective states, whereas seriousness is defined as a cognitive dimension that alludes to reflexive and sober attitudes and thoughts about life. The temperamental basis configure the personal disposition for displaying the emotional response associated to sense of humor (exhilaration), which would be promoted only by cheerfulness (Ruch & Köhler, 2007; Ruch et al., 1996, 1997).

Similar benefits as positive emotions have been found in cheerfulness. Indeed, positive relationships between cheerfulness, physical health, and psychological well-being have been observed (e.g., Delgado-Domínguez et al., 2016; Delgado-Domínguez, Font-Ugalde, Ruiz-Vílchez, Carretero-Dios, & Collantes-Estévez, 2014; Ruch & Köhler, 2007). For example, several studies suggest that people with high trait cheerfulness manifest a greater and more stable psychological well-being and life satisfaction as well as lower levels of anxiety and negative affectivity (Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Papousek & Schulter, 2010).

Ruch and colleagues (1996, 1997) assumed that the basis of sense of humor can be understood as traits and states. The first one refers to the differences between individuals, which remain stable over time and are consistent in different contexts. The second one alludes to the momentary tendency related to a particular situation, which varies for the same individual. Both predispositions modulate the exhilaratability response (Ruch, 1997). Importantly, traits represent dispositions for their respective

states (Ruch et al., 1997). In this sense, it is postulated that high versus low trait cheerfulness people would exhibit more frequent, intense, and lasting state cheerfulness to humoristic stimuli and would maintain a high state cheerfulness after exposing to negative events as well as a faster mood recovery from them (see Ruch & Hofmann, 2012, for a review).

Ruch (1997) found that participants characterized by high trait cheerfulness levels reported a larger state cheerfulness increase than low trait cheerfulness individuals after interacting with an experimenter dressed as a clown asking nonsense questions. Additionally, facial expression data confirmed these differences, showing more frequent and intense signs of exhilaration for high versus low trait cheerfulness participants. This state-trait relationship has also been replicated by using other strategies (see Ruch & Hofmann, 2012).

Recently, López-Benítez, Acosta, Lupiáñez, and Carretero-Dios (*under review*), in two experiments, elicited different affective states by using amusing, sad, or neutral clips selected from a validated database. They found a larger state cheerfulness increase for high versus low trait cheerfulness participants as a consequence of watching amusing clips, thus replicating results from previous research. Furthermore importantly, a larger decrease in state cheerfulness was also observed for high trait cheerfulness people when facing sad clips. This pattern of results is critical for demonstrating that trait cheerfulness predisposition is not related to a selective bias toward positive states or a protection mechanism. The authors interpreted it as a high sensitivity to the affective environment, regardless of its valence, which might underlay a better management of emotions.

7.2.1. The present study

The current study aimed at replicating and extending these results. We wanted to check whether the trait cheerfulness modulation over state cheerfulness could be generalized to other affective states by using a different affective procedure and complementary affective self-report measures. Additionally, we wanted to test whether the modulation of trait cheerfulness also indirectly affects the consequences of affective induction on attentional performance (Pacheco-Unguetti, Acosta, Callejas, & Lupiáñez, 2010).

In the study by López-Benítez and colleagues (*under review*), amusing and sad clips were used respectively to elicit positive and negative affective states. It could be argued that such states are closely related to the cheerfulness construct. Cheerfulness is directly associated to humoristic (amusing) stimuli and predicts amusement responses (see Ruch & Hofmann, 2012, for a review), while sad contents are linked to bad mood, which is the affective factor opposite to cheerfulness (Ruch & Köhler, 2007; Ruch et al., 1996, 1997). Therefore, the pattern of results with amusing and sad stimuli could be interpreted as a specific sensitivity to affective states related to cheerfulness and not as a greater general sensitivity to any affective stimulus. In addition, in López-Benítez and colleagues' study, the highest sensitivity of participants with a high predisposition to cheerfulness was replicated in two independent studies using clips and the state cheerfulness self-report measure. In order to analyze the generalizability of the effect, it is important to employ other induction procedures and self-report measures not restricted to state cheerfulness.

Thus, in the present research, we aimed at bridging these gaps and extending the previous findings. Firstly, a different induction procedure was employed, which has demonstrated to be effective and useful in other studies from our laboratory (Pacheco-Unguetti et al., 2010; Pérez-Dueñas, Acosta, & Lupiáñez, 2014). Secondly, we employed affective stimuli related to joy and anxiety that were not so closely related to the cheerfulness construct. The first one is described as a positive emotion with situational characteristics less restricted than amusing (Ekman & Cordaro, 2011), whereas, the second one, strictly, is not theoretically involved in cheerfulness or bad mood dimensions. Finally, we analyzed the trait cheerfulness modulation by using complementary (dimensional and discrete) self-report measures of affective state: state cheerfulness, Self-Assessment Manikins (SAM), and Scale for Mood Assessment (EVEA).

The key hypothesis here is whether the greater sensitivity effect observed for high trait cheerfulness people is general and independent of the procedures and materials used, in which case we would expect larger affective variations in self-report measures for high versus low trait cheerfulness participants when facing affective stimuli related to joy and anxiety.

7.3. Method

7.3.1. Participants

An initial sample of 414 students was evaluated by using the Trait Form of the State-Trait-Cheerfulness Inventory (STCI-T). Applying the criterion of ± 1 *SD* on the average score, 80 psychology students were selected depending on their high versus low scores in trait cheerfulness. Each group was composed of 40 participants: high trait cheerfulness group (34 women, mean age 19.10, *SD* = 2.64; Trait cheerfulness average 3.70, *SD* = 0.12); and low trait cheerfulness group (34 women, mean age 18.90, *SD* = 2.00; Trait cheerfulness average 2.34, *SD* = 0.29). Participants spoke Spanish as a first language, had normal or corrected-to-normal vision, and received course credits for their voluntary participation. The study was carried out in accordance to the Declaration of Helsinki. To get an effect size of *f* = .20 and a power of .80 with two independent groups and four repeated measurements averaged, the minimum sample required for this study was 36 participants (estimate with G*Power 3.0.10 software).

7.3.2. Measures

1. The Trait Form of the State-Trait-Cheerfulness Inventory (STCI-T; Carretero-Dios et al., 2014; Ruch et al., 1996). This self-report evaluates cheerfulness (38 items; e.g., "Life gives me very few reasons to laugh"), seriousness (37 items; e.g., "I am a serious person"), and bad mood (29 items; e.g., "Compared to others, I really can be grumpy and grouchy") as the facets of sense of humor in trait manifestation with a 4-point Likert scale from 1 ("strongly disagree") to 4 ("strongly agree"). Only cheerfulness items were administered in the study to check the correct assignment of participants. Cronbach's alpha value was .98 for our study. Comparison analysis confirmed that both groups were different, *t*(52) = -27.83, *p* < .001.

2. The State Form of the State-Trait-Cheerfulness Inventory (STCI-S; López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, *under review*; Ruch et al., 1997). This questionnaire assesses the facets of sense of humor in state manifestation: cheerfulness (10 items; e.g., "I am ready to have some fun"), seriousness (10 items; e.g., "I am in a pensive frame of mind"), and bad mood (10 items; e.g., "I am in a crabby mood"), using a 4-point Likert scale from 1 ("strongly disagree") to 4 ("strongly agree"). Given that cheerfulness was the relevant variable in our study, participants only filled out items

related to that facet. Internal consistency analyses provided alpha values that oscillated between .91 and .94.

3. Self-Assessment Manikins (SAM; Bradley & Lang, 1994). This instrument assesses the affective experience through valence, arousal, and dominance dimensions. Each factor is represented in a continuum composed by a mixture of five figures and four points. In the valence dimension, figures oscillated between a happy man (9) and a sad man (1). In the arousal dimension, figures fluctuated from a stressed picture (9) to a relaxed picture (1). Finally, in the dominance dimension, the continuum displayed a set of figures ranging from a small person without emotional control (1) to a big person with control (9).

4. Scale for Mood Assessment (EVEA; Sanz, Gutiérrez, & García-Vera, 2014). This self-report includes 16 statements to describe different affective states, which are assessed on a Likert scale from 0 ("nothing") to 10 ("so much"). Four factors are derived with four items each: joy (e.g., "I feel optimistic"), anxiety (e.g., "I feel nervous"), hostility (e.g., "I feel angry"), and depression (e.g., "I feel sad"). Cronbach alpha coefficients for our sample ranged between .94 and .96 for joy, .89 and .91 for anxiety, .89 and .95 for hostility, and .85 and .87 for depression.

5. The Marlowe and Crowne's Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960; Ferrando & Chico, 2000). This instrument measures the degree in which the answers given by people are influenced by their perceptions about responses considered socially appropriate and expected. It is composed of 33 items (e.g., "I never hesitate to go out of my way to help someone in trouble"), assessed on a dichotomous scale (true or false). The analysis provided an alpha of .76.

6. Affective stimuli. To elicit participants' affective state, text-photograph sets were used, which have been a useful and effective tool to trigger relatively differentiated affective states that can last for several minutes (Pacheco-Unguetti et al., 2010; Pérez-Dueñas et al., 2014). In this procedure, a set of slides of the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997; Moltó et al., 1999) were

displayed accompanied by brief statements to emphasize the affective state triggered[1]. To ensure that participants had enough time to read each text and watch the image, the statement was presented alone during five seconds, and then the image was added for 10 seconds. In addition, to avoid possible confound effects, the order of presentation of each text-photograph was randomized within each type of induction.

7.3.3. Procedure

The study was individually conducted in a soundproof and weakly illuminated room. Participants were seated in a comfortable chair in front of a 15-inch screen situated at 60 cm. Then, written consents were obtained before the experimenter gave them the instructions. Participants were told that they should carefully watch different images accompanied by brief statements. Additionally, they would have to respond to a set of questions related to their feelings and behaviors. Finally, they would perform an experimental task. Affective manipulations and the task were programmed using E-Prime 2.0.10 software, whereas all self-reports were located close to the screen. To ensure that all participants received the same information, a standardized protocol with the steps and instructions of the study was used. The duration of the experiment was 75 minutes.

At the beginning of the study, participants performed two practice blocks of the Attentional Network Test-Interactions task (ANT-I; Callejas, Lupiáñez, & Tudela, 2004), which measure alerting, orienting, and executive function attentional networks. Briefly, after a fixation point, five arrows appeared in the center of the screen and participants had to respond to the central arrow by pressing the "C" or the "M" keys when the arrow pointed to the left or right, respectively, as soon and accurately as possible (see Callejas et al., 2004, for a full explanation). An additional objective of this task was to leave a time period of several minutes enough to help participants to get back to their basal states and to minimize the excitation transfer effect, through which a lasting elicited affective state could affect to a later state (Bryant & Miron, 2003).

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[1] It was employed a set of 10 photographs as stimuli related to joy (1463, 2150, 5830, 8496, 7502, 2071, 2040, 5831, 2091, 2050; mean valence = 8.19, mean arousal = 4.48) or anxiety (9400, 9921, 3005.1, 2750, 3530, 3550, 6212, 6940, 9910, 2683; mean valence = 1.94, mean arousal = 7.04). Statements associated the positive induction related to achieve life goals and personal satisfaction (e.g., "Nature gives us great possibilities of enjoyment and fulfillment"), whereas text accompanied the negative induction related to the lack of control and uncertainty (e.g., "Our cities are unsafe. We always can be victims of a terrorist attack").

After the two practice blocks, participants completed the STCI-S, SAM, and EVEA questionnaires as pre-induction measures. Then, they were exposed to the first affective induction (either the positive or negative one, in counterbalanced order). Next, they completed the same self-reports as post-induction measures and performed three experimental blocks of the ANT-I task. After that, this sequence was repeated except that participants were exposed to the other induction procedure. Finally, all participants filled out the STCI-T and MCSDS scales at the end of the session.

7.3.4. Research Design

Data were analyzed using SPSS 22.0 software. A mixed factorial design was employed: 2 (Trait Cheerfulness Group; High vs. Low) × 2 (Affective Induction; Joy vs. Anxiety) x 2 (Assessment Moment; Pre vs. Post). The first independent variable was manipulated between-participants and the other two were treated as within-participant factors. Measures of self-report were considered as dependent variables in different analyses. In a further step, to analyze the effect of induction on each group, differential scores were calculated by subtracting self-report scores in the pre-condition from the post-condition. To confirm that participants' responses were not exclusively attributable to social desirability, MCSDS scores were included as a covariate.

7.4. Results

7.4.1. Preliminary analyses and manipulation check

The mean comparison analysis for each measure previous to both affective inductions showed no significant differences (all $ps > .05$). Furthermore, the analysis of the Affective Induction × Assessment Moment interaction reflected a significant effect for all variables (all $ps < .05$). State cheerfulness, valence, and joy measures increased and anxiety, hostility, and depression measures decreased after participants faced stimuli related to joy. The opposite data pattern was found when they faced stimuli associated to anxiety. Although the arousal score increased when participants were exposed to stimuli related to anxiety—$F(1, 77) = 51.44$, $p < .001$, $\eta^2 = .40$—there were no differences after facing stimuli associated to joy ($F < 1$). In short, these results showed that our affective manipulation was appropriated. Descriptive statistics for all conditions are presented in Table 1.

Table 1

Mean and standard deviation in state cheerfulness, valence, arousal, joy, anxiety, hostility, and depression variables as a function of trait cheerfulness group, affective induction conditions, and assessment moments. MCSDS scores are included as a covariate.

Measures	High Trait Cheerfulness				Low Trait Cheerfulness			
	Joy		Anxiety		Joy		Anxiety	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
State Cheerfulness	2.22	2.84	2.33	1.44	1.95	2.33	2.00	1.40
	(0.11)	(0.11)	(0.10)	(0.08)	(0.11)	(0.11)	(0.10)	(0.08)
SAM Valence	5.63	7.58	5.95	3.23	5.76	6.88	5.85	3.42
	(0.30)	(0.24)	(0.29)	(0.29)	(0.29)	(0.24)	(0.28)	(0.29)
SAM Arousal	3.72	4.18	3.86	5.19	4.00	3.75	3.84	5.64
	(0.29)	(0.35)	(0.29)	(0.33)	(0.28)	(0.34)	(0.29)	(0.33)
EVEA Joy	4.46	6.50	5.02	2.43	4.24	5.28	4.36	2.04
	(0.44)	(0.38)	(0.42)	(0.35)	(0.44)	(0.38)	(0.42)	(0.35)
EVEA Anxiety	2.15	1.19	2.10	3.58	3.31	2.19	2.82	4.10
	(0.35)	(0.32)	(0.37)	(0.43)	(0.35)	(0.32)	(0.37)	(0.43)
EVEA Hostility	1.88	0.83	1.32	4.23	2.22	1.49	1.94	4.38
	(0.38)	(0.28)	(0.30)	(0.48)	(0.38)	(0.28)	(0.30)	(0.48)
EVEA Depression	2.44	1.85	2.20	4.99	3.54	3.04	3.26	5.31
	(0.36)	(0.36)	(0.37)	(0.41)	(0.36)	(0.36)	(0.37)	(0.41)

Note. $N = 80$, SAM = Self-Assessment Manikins, EVEA = Scale for Mood Assessment.

7.4.2. Trait cheerfulness analyses

State Cheerfulness. Confirming the results of previous studies, the Affective Induction × Assessment Moment interaction was modulated by Trait Cheerfulness Group, $F(1, 77) = 7.14$, $p = .009$, $\eta^2 = .09$ (see Table 1). Specifically, high trait cheerfulness individuals reported a larger decrease in state cheerfulness than low trait individuals after being exposed to stimuli related to anxiety—$F(1, 77) = 6.07$, $p = .016$, $\eta^2 = .07$—and a tendency to a larger increase in state cheerfulness after facing stimuli related to joy, $F(1, 77) = 3.03$, $p = .086$, $\eta^2 = .04$ (see Table 1 and Figure 1).

(a)
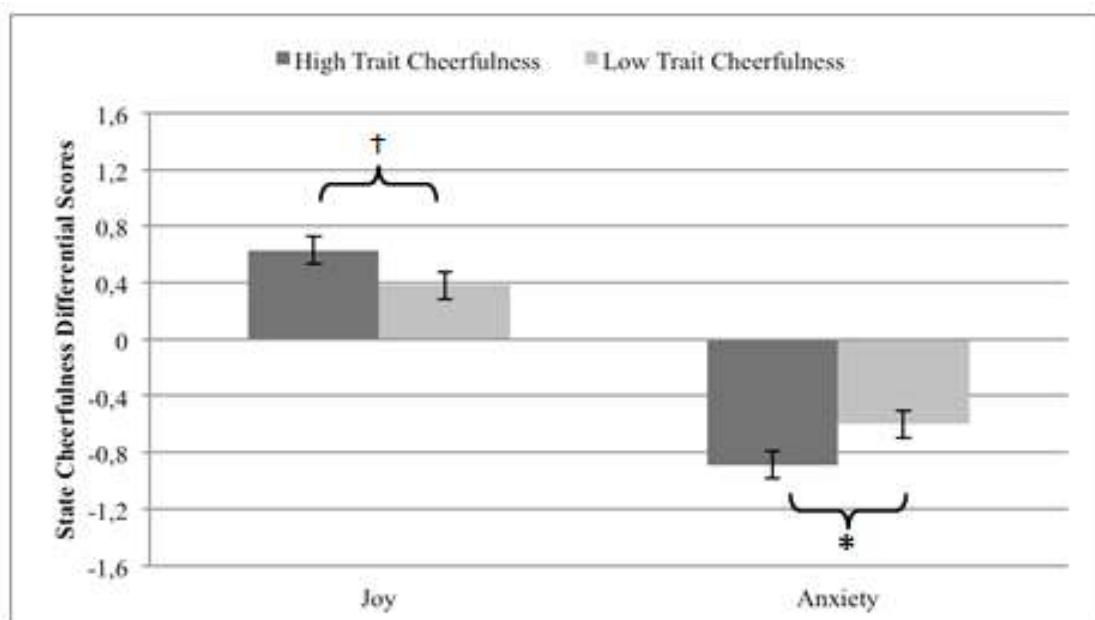
(b)
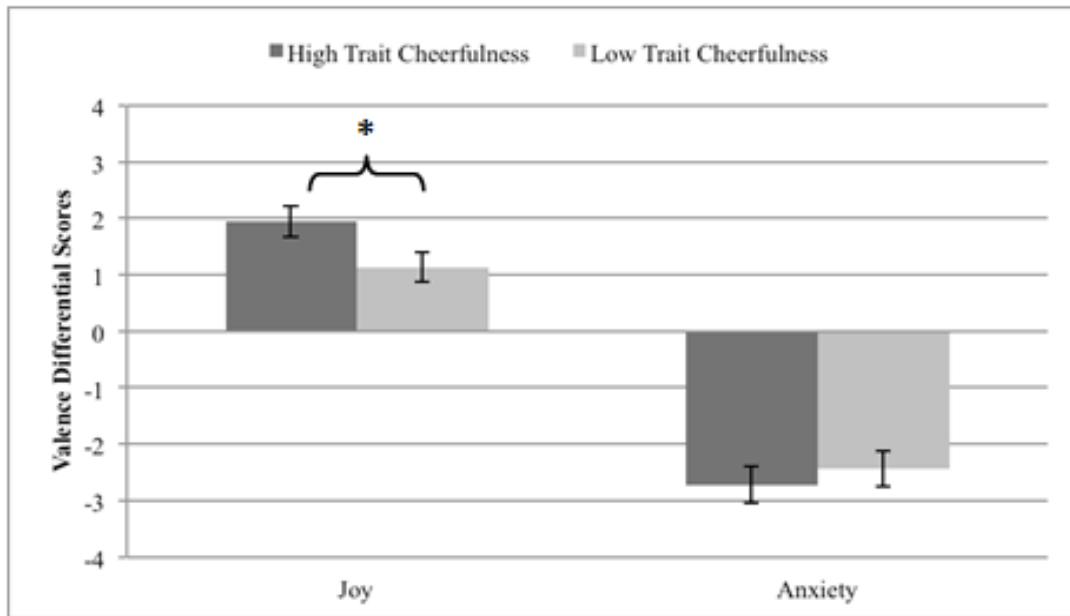
(c)
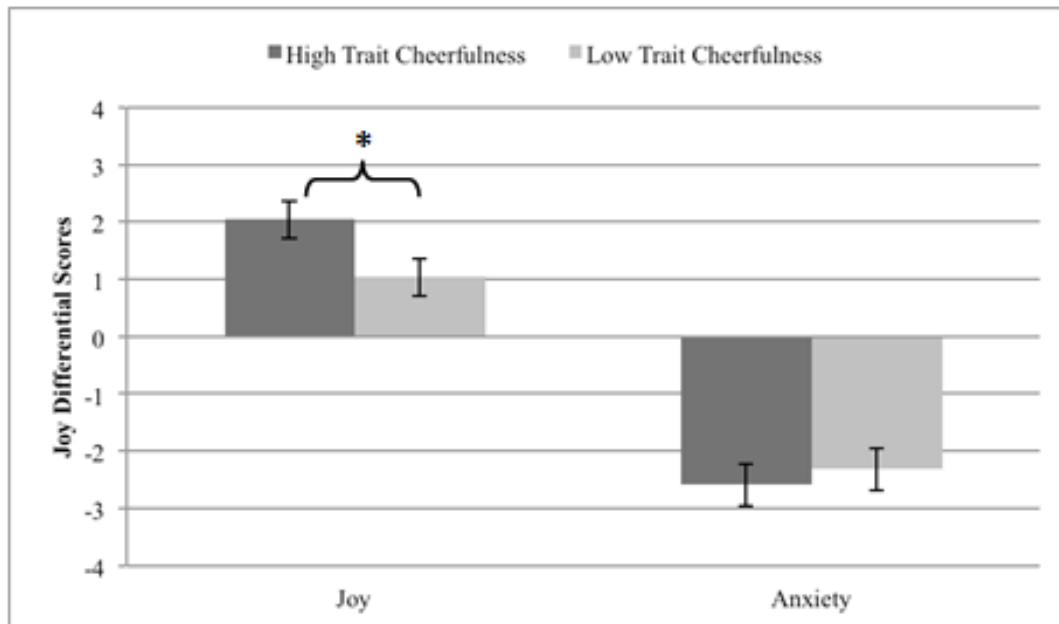
Figure 1. Differential scores in state cheerfulness (panel a), valence (panel b), and joy (panel c) depending on trait cheerfulness groups and affective induction conditions. The error bars represent the standard error of the mean. MCSDS scores are included as a covariate. High trait cheerfulness individuals reported a larger valence, joy, and state cheerfulness (marginal) increase after facing stimuli related to joy and a larger state cheerfulness decrease after facing stimuli related to anxiety. †$p = .09$. *$p < .05$.

SAM Valence. An Affective Induction × Assessment Moment × Trait Cheerfulness Group marginal interaction was also found, $F(1, 76) = 2.90$, $p = .093$, $\eta^2 = .04$ (see Table 1). Confirming our predictions, high trait cheerfulness people reported a larger increase than low trait cheerfulness individuals in valence scores after being exposed to stimuli related to joy, $F(1, 76) = 4.40$, $p = .039$, $\eta^2 = .06$ (see Table 1 and Figure 1). Although we did not find a group effect for stimuli linked to anxiety, the high trait cheerfulness group also reported a larger decrease in valence (see Table 1).

SAM Arousal. An Affective Induction × Assessment Moment × Trait Cheerfulness Group marginal interaction was discovered, $F(1, 76) = 3.56$, $p = .064$, $\eta^2 = .04$ (see Table 1). In contrast to the pattern observed for other measures, for stimuli associated to anxiety low trait cheerfulness participants experienced a larger arousal increase than high trait cheerfulness participants. Additionally, they reported an arousal decrease after facing stimuli linked to joy whereas high trait cheerfulness participants experienced an increase in this condition. However, none of these apparent modulations of group was significant in the separate analyses carried out for each induction.

EVEA Joy. Although the three-way interaction was not significant ($F < 1$), we observed a Trait Cheerfulness Group modulation for the positive affective induction—$F(1, 77) = 4.40$, $p = .039$, $\eta^2 = .05$—(see Table 1 and Figure 1) confirming again our prediction. High trait cheerfulness people reported a larger increase than low trait cheerfulness participants in the joy score after facing stimuli associated to joy. Although the modulation was not significant for the negative affective induction, the high trait cheerfulness group also reported a larger joy decrease (see Table 1).

EVEA Anxiety, Hostility, and Depression. Although the affective manipulation was adequate (see above), and the high trait cheerfulness group showed a larger increase or decrease in the post measures than the low trait cheerfulness group in general (see Table 1), the three-way interaction did not approach significance in any of the three measures.

ANT-I. We wanted to explore whether trait cheerfulness modulated the effects of a negative (anxiety) versus positive (joy) affective state induced on attentional networks. In line with previous studies (Pacheco-Unguetti et al., 2010), we expected the influence of a negative (anxiety) state on attentional processing (i.e., larger effects in alerting and orienting networks) to be larger in participants with high trait cheerfulness scores. Nevertheless, although we found the expected measures of the three attentional

components (i.e., alerting, orienting, and executive function; Callejas et al., 2004) in reaction time (all ps < .001) and accuracy (all ps < .05), neither the affective induction nor trait cheerfulness modulated any attentional component (F < 1). It could be possible that performing the task under a specific affective state might influence the participant's task set for the rest of the experiment. Furthermore, taking all results into account, one might think that trait cheerfulness differentially affects affective and cognitive dimensions. Future studies should explore these possibilities.

7.5. Discussion

Cheerfulness is a positive predisposition to sense of humor associated to psychological well-being, physical health, and to a better resilience and coping toward negative events. Indeed, López-Benítez and colleagues (*under review*) critically observed that high trait cheerfulness individuals reported a larger state cheerfulness decrease after being exposed to stimuli related to sad, supporting the idea that people who are characterized by high trait cheerfulness might not simply show a bias toward positive states or a defense mechanism to protect themselves from negative affective states but rather a greater sensitive to the emotional context.

In the present study, a procedure that combines slides with brief statements was used to elicit positive (joy) and negative (anxiety) affective states that were measured through complementary inventories. In line with previous results, high trait cheerfulness individuals reported a larger affective change than low trait cheerfulness people after facing stimuli related to both joy and anxiety, regardless of social desirability.

In addition, after the positive affective induction, this pattern of results was also observed for valence (SAM) and joy (EVEA) factors, which are less related to the cheerfulness construct. Moreover, changes in self-report measures were also more pronounced in participants with high predisposition to cheerfulness after the negative affective induction, although they only reached significance in the measure of state cheerfulness.

These results support the idea that the greater emotional sensitivity is not limited to affective states directly associated to affective dimensions of the sense of humor, that is, cheerfulness and bad mood, but generalizes to other states less theoretically linked to them. Although the stimuli associated to joy does not include components of humoristic

nature, they elicit a larger state cheerfulness increase for high versus low trait cheerfulness participants. This could be related to these individuals being characterized by a lower threshold for smiling and laughter and a broader range of active elicitors of cheerfulness (Ruch et al., 1996; Ruch & Hofmann, 2012).

Regarding the negative affective state elicited, we expected larger changes for high versus low trait cheerfulness participants in valence dimension (SAM), anxiety, hostility, and depression factors (EVEA). Although the differences were not significant, we observed this tendency. Given the relationship between cheerfulness, amusement, and positive dimensions of well-being (Carretero-Dios et al., 2014; Papousek & Schulter, 2010), it might be that the larger affective impact in high trait cheerfulness people manifest in positive affective state self-reports rather than in negative affective state self-reports. From a constructivist perspective, there are individual differences in the use of the affective dimensions attributed to a situation (Barrett & Niedenthal, 2004). In any case, future studies are needed to explore this possibility.

Theoretical and empirical data have pointed out that cheerfulness is associated to communicative, affiliative, socially warm, and non-aggressive factors as well as emotional intelligence components as, for example, emotional management (see Ruch & Hofmann, 2012, for a review). In this sense, it might be that the larger emotional sensitivity for high trait cheerfulness people promotes a better communication and management of affective states, which could be associated to an improvement of abilities related to emotional expression, psychological recovery processes, emotional intelligence, and interpersonal relationships.

7.6. Conclusions

High and low trait cheerfulness participants were exposed to positive and negative affective states. In line with previous results, high versus low trait cheerfulness individuals reported larger affective changes for both types of inductions. This study supports the idea that people characterized by high trait cheerfulness are more sensitive to the affective context, and highlights its relevance in aspects such as communication of emotions and emotional/social intelligence. Future research should explore the underlying characteristics of this phenomenon and its relationships with others predispositions related to cheerfulness such as optimism or extraversion.

Capítulo VIII-Serie Experimental IV: Influence of Emotion Regulation on Affective State: Moderation by Trait Cheerfulness

8.1. Abstract

Emotion regulation research has exponentially grown in the past several years. However, to date, there is little information regarding its relation to cheerfulness, understood as a positive affective predisposition to sense of humor. The aim of the present study was to analyze the relationship between emotion regulation strategies and state and trait dimensions of cheerfulness. More precisely, we wanted to explore whether trait cheerfulness moderated the effect of emotion regulation strategies on the participants' reported affective state after they were exposed to both amusing and sad stimuli. To achieve our goal, we randomly assigned 248 undergraduate psychology students (178 women) to one of the following conditions: up-regulation reappraisal, down-regulation reappraisal, suppression, and control. They watched amusing, neutral, and sad clips, reporting their affective state several times throughout the study. The results showed that the up-regulation reappraisal group showed the most affective changes, whereas the down-regulation reappraisal group showed the fewest affective changes with both amusing and sad stimuli. Critically, trait cheerfulness moderated the changes in the participants' affective state as a consequence of their being exposed to the amusing film clip in the up-regulation reappraisal group. The effects were not affected by social desirability or reappraisal/suppression tendencies (as measured with the Emotion Regulation Questionnaire). The results are discussed highlighting the idea that the higher level of sensitivity to amusing affective contexts of high-trait-cheerfulness individuals could be due to their more habitual and efficient use of up-regulation reappraisal strategies.

Keywords: up-regulation reappraisal, down-regulation reappraisal, suppression, state-trait cheerfulness, affective induction

8.2. Introducción

One topic of special interest in the emotion field has been how people use strategies to modify and manage the emotions they feel. Emotion regulation alludes to the processes through which people influence their emotions, how and when they experience them, and the extent to which they express them. Research on this topic has grown exponentially in the past several years (see Gross, 2015, for a review). In this sense, its study has been applied to a wide variety of fields, such as personality (Gross & John, 2003), cognition (Miller, Rodriguez, Kim, & McClure, 2014), attachment (Shaver & Mikulincer, 2014), and health (DeSteno, Gross, & Kubzansky, 2013).

Gross (1998b) developed his process model of emotion and his emotion regulation framework to guide research in this field. According to this model, a specific emotion might be altered at several different points in the emotion-generative process: the a) selection of the situation; b) modification of the situation; c) deployment of attention; d) change of cognitions; and e) modulation of experiential, behavioral, or physiological responses. Emotion regulation strategies are described depending on the primary point on which they act. Whereas the first four are antecedent focused, the latter is response focused.

The most-researched antecedent-focused strategy has been the reappraisal, which refers to the cognitive reevaluation of a situation that elicits an emotion to alter the affective impact that generates in a person (Gross, 1998b). Traditionally, it has been used to down-regulate negative emotions (e.g., Feinberg, Willer, Antonenko, & John, 2012; Kross & Ayduk, 2011). Many studies have underlined that the down-regulation of negative emotions is associated with decreased levels in the reported affective state, autonomic nervous system response, and brain areas' emotion-related activation (see Gross, 2015, for a review).

On the other hand, the up-regulation reappraisal strategy has received much less attention. In this case, most research has focused on increasing positive emotions and analyzing the affective consequences (see Quoidbach, Mikolajczak, & Gross, 2015, for a review). For example, Guiliani, McRae, and Gross (2008) found larger increases in affective state, behavior, and physiological measures in participants who applied an up-regulation reappraisal strategy while watching amusing clips compared to individuals who only visualized them.

Suppression, understood as the inhibition of expressive behavior once an emotion has been generated (Gross, 1998b), is the response-focused strategy most analyzed. Similar to the down-regulation reappraisal strategy, it has been specially associated with the study of negative emotions (Gross, 2015). Many studies have pointed out that this strategy usually produces a reported decrease in positive but not negative emotions, together with a decrease in expressiveness as well as an increase in sympathetic activity (e.g., Gross & Levenson, 1993).

Importantly, numerous studies have corroborated that emotion regulation strategies are related to psychological well-being and physical health. In this sense, reappraisal has been associated with positive dimensions of well-being, lower cardiovascular risks, better affective functioning, and better social interactions, whereas the suppression strategy is related to greater stress, anxiety, depression, and negative emotion levels, as well as an increased risk of physical problems (e.g., Gross, 2015; Nezlek & Kuppens, 2008; Quoidbach et al., 2015). However, not many studies have analyzed the relevance and influence of these strategies in the sense of humor field. In the present study, we aimed to bridge this gap.

8.2.1. Emotion Regulation Strategies and Sense of Humor

Ruch, Köhler, and van Thriel (1996, 1997) elaborated a theoretical proposal focused on isolating the affective and cognitive basis of sense of humor as traits and states: cheerfulness, seriousness, and bad mood. This model assumes that sense of humor establishes stable differences (trait) between individuals across time and situations as well as differences in momentary dispositions (state) for a person to respond to a specific situation. According to the model, these three inter-related factors delimitate and affect the exhilaration[1] emotion. In the current study, new empirical data are presented related to cheerfulness.

Cheerfulness is an affective predisposition composed of the prevalence of a cheerful mood, a low threshold for smiling and laughter, a composed view of adverse life circumstances, a broad range of active elicitors of cheerfulness and smiling/laughter, and a generally cheerful interaction style (Carretero-Dios, Eid, & Ruch, 2011; Ruch et

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[1] Ruch (1993) defined exhilaration as: "either the process of making cheerful or the temporary rise and fall of a cheerful state" (p. 606). In the theoretical model, trait and state manifestations of sense of humor modulate the exhilaration emotional response. That is, cheerfulness promotes the exhilaration response, whereas seriousness—and especially bad mood—contribute to inhibit it.

al., 1996). In the past 20 years, a large amount of research has been accumulated in the cheerfulness field (see Ruch & Hofmann, 2012, for a review). Additionally, cheerfulness benefits have been extensively corroborated. For example, trait cheerfulness has been associated with emotional management and emotional intelligence (e.g., López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, *under review*; Yip & Martin, 2006), positive personality constructs, such as extraversion and optimism (e.g., Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Ruch & Köhler, 2007), and physical health (e.g., Delgado-Domínguez et al., 2016; Delgado-Domínguez, Font-Ugalde, Ruiz-Vílchez, Carretero-Dios, & Collantes-Estévez, 2014).

Several correlational studies have demonstrated that the homologous state-trait factors are positively correlated and that traits represent dispositions for their respective states (e.g., Ruch, 1997; Ruch & Köhler, 2007; Ruch et al., 1997). In this sense, recent studies have systematically shown that high trait cheerfulness promotes more affective state changes, as assessed by state cheerfulness, than does low trait cheerfulness when individuals are exposed to both positive and negative affective stimuli using affective induction procedures with clips (López-Benítez et al., *under review*) or pictures (López-Benítez, Coll-Martín, Carretero-Dios, Lupiáñez, & Acosta, *under review*). According to the hypothesis proposed by the authors, high trait cheerfulness individuals are more sensitive to the affective environment, which would be linked to processes as empathy, emotional management, and physical health. However, the psychological mechanisms that underlie this phenomenon are still unclear.

From a theoretical perspective, it has been pointed out that the definition of trait cheerfulness already incorporates characteristics associated with reappraisal strategies (Ruch & Köhler, 2007). Empirically, several attempts have been made to explore the relationships between trait cheerfulness and some emotion regulation strategies. For example, some studies suggest that, compared to low trait cheerfulness individuals, high trait cheerfulness is related to better recovery from negative events, fewer reports of negative feelings, and better coping after being exposed to misfortunes (e.g., Papousek & Schulter, 2010; Ruch & Hofmann, 2012).

In a broader sense, humor has been considered an adaptive coping strategy as well (see Martin, 2007). In line with positive emotions, humor could help in the recovery of negative events through different mechanisms, such as emotional (Fredrickson,

Mancuso, Branigan, & Tugade, 2000) or cognitive ones (Strick, Holland, van Baaren, & van Knippenberg, 2009). Additionally, other studies have detected differences in emotion regulation depending on humor styles. For example, Samson and Gross (2012) conducted two studies to analyze whether, compared to negative humor, positive and benevolent humor was related to the ability to regulate emotions. They found that positive humor was the most effective tool for down-regulating negative and up-regulating positive emotions.

Taking all of these results together, one could think that people characterized by high trait cheerfulness are more able to apply certain emotion regulation strategies when facing affective stimuli than are people with low trait cheerfulness. Despite the importance of this idea, the literature is still scarce. Therefore, we considered it highly relevant to know the moderation that trait cheerfulness might exert on the self-regulation of positive and negative affective states to both increase and attenuate them.

8.2.2. The Present Study

The purpose of the present study was threefold. First, we wanted to explore the pattern of relationships between trait cheerfulness and the habitual use of emotion regulation strategies (reappraisal and suppression) as measured through the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Given that reappraisal is associated with positive dimensions of well-being and better affective functioning, whereas suppression is associated with negative dimensions of well-being and a larger risk of health problems (Gross, 2015), and assuming that cheerfulness is a positive predisposition, we hypothesized that trait cheerfulness would be positively correlated with the frequent use of reappraisal measures and negatively correlated with the suppression strategy (Hypothesis 1).

Our second goal was to analyze the modulation of emotion regulation strategies, compared to a neutral condition, over participants' differential affective state, as assessed by the state cheerfulness measure and by complementary discrete measures, during the confronting of amusing and sad stimuli. To do so, different participants were instructed to apply different emotion regulation strategies (up-regulation reappraisal, down-regulation reappraisal, suppression) or a control strategy while watching affective clips, which were selected from a validated database (Fernández, Pascual, Soler, & Fernández Abascal, 2011). Taking into account previous research (e.g., Gross, 1998b;

Gross, 2015; Quoidbach et al., 2015), we hypothesized that the most affective state changes should occur in the up-regulation reappraisal condition, whereas the fewest affective state changes would emerge in the down-regulation reappraisal condition. Additionally, the suppression condition would produce a similar affective state change as the control condition for the sad clip and a larger decrement in the affective state change compared to the control condition for the amusing clip (Hypothesis 2).

Finally, and more importantly, we aimed to investigate whether the relationships between the emotion regulation strategies and the actual changes in the affective state, as assessed by state cheerfulness, would be moderated by trait cheerfulness. Assuming that trait and state cheerfulness are closely linked (Ruch et al., 1996, 1997), and taking into account previous evidence showing the relationships between trait cheerfulness and some emotion regulation strategies (e.g., Papousek & Schulter, 2010; Ruch & Hofmann, 2012), we thought trait cheerfulness could play an important role in these relationships.

Cheerfulness is related to affective, expressive, and communicative processes associated with positive emotions (e.g., Carretero-Dios et al., 2014; Ruch et al., 1996, 1997). In order to maintain and enhance such affective states, high trait cheerfulness people might have a greater ability to apply an up-regulation reappraisal strategy when facing amusing stimuli compared to low trait cheerfulness individuals. Furthermore, some studies have shown that the increase of negative emotions is sometimes associated with better emotional intelligence (e.g., Ford & Tamir, 2012). If high trait cheerfulness is linked to higher emotional management and emotional intelligence (e.g., López-Benítez et al., *under review*; Yip & Martin, 2006), one might think that, as with amusing stimuli, high-trait-cheerfulness individuals also ought to have a greater ability to apply an up-regulation reappraisal strategy when coping with sad stimuli. Therefore, we hypothesized that trait cheerfulness would contribute to the participants' affective state changes when they are exposed to both amusing and sad stimuli, but only for the up-regulation reappraisal group (Hypothesis 3).

8.3. Method

8.3.1. Participants

The total sample consisted of 248 Spanish-speaking undergraduates, who were randomly assigned to the different groups. The final composition of each emotion regulation group was as follows: (a) control, 66 participants (46 women; mean age 22.23, SD = 4.34); (b) up-regulation reappraisal, 60 participants (42 women; mean age 21.53, SD = 2.81); (c) down-regulation reappraisal, 62 participants (44 women; mean age 21.47, SD = 3.28); and (d) suppression, 60 participants (46 women; mean age 21.77, SD = 3.39). The groups did not differ in sex, χ^2 (3, N = 248) = .96, p = .81 or age, χ^2 (48, N = 248) = 49.53, p = .41. All participants had normal or corrected-to-normal visual acuity, and each received a cafeteria ticket for their voluntary participation. Written consent was obtained prior to the experiment, and the study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki.

8.3.2. Measures and Stimuli

1. State-Trait-Cheerfulness Inventory (STCI-T; trait version, Carretero-Dios et al., 2014; Ruch et al., 1996). This instrument assesses the trait temperamental basis of sense of humor: cheerfulness (38 items, e.g., "Life gives me very few reasons to laugh"), seriousness (37 items, e.g., "I am a serious person"), and bad mood (29 items, e.g., "Compared to others, I can really be grumpy and grouchy") using a Likert scale between 1 ("strongly disagree") and 4 ("strongly agree"). In our study, participants just filled out the cheerfulness part, as it was the relevant variable for our hypothesis. Internal consistency analysis provided a Cronbach's alpha of .92 for our sample.

2. State-Trait-Cheerfulness Inventory (STCI-S; state version, López-Benítez et al., *under review*; Ruch et al., 1997). This self-report questionnaire evaluates cheerfulness (e.g., "I am ready to have some fun"), seriousness (e.g., "I am in a pensive frame of mind"), and bad mood (e.g., "I am in a crabby mood") as temperamental dimensions of sense of humor in the state manifestation by means of 10 items per facet. The items were rated on a four-point Likert scale between 1 ("strongly disagree") and 4 ("strongly agree"). As in the trait questionnaire, participants just filled out the state cheerfulness part. Cronbach's alpha values for our sample ranged from .90 to .96.

3. Emotion Regulation Questionnaire (ERQ; Cabello, Salguero, Fernández-Berrocal, & Gross, 2013; Gross & John, 2003). It assesses the habitual use of emotion reappraisal (ERQ-R; six items, e.g., "When I want to feel more positive emotion, I change the way I'm thinking about the situation") and emotion suppression (ERQ-S; four items, e.g., "I control my emotions by not expressing them"). Each item is assessed on a Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Internal consistency analysis provided a Cronbach's alpha for our sample of .76 for reappraisal and .80 for suppression.

4. Discrete Emotions Scale (DES; Izard, Dougherty, Bloxom, & Kotsch, 1974). It is a self-report questionnaire used to evaluate the actual affective state. For our proposal, a simplified version was used. Specifically, participants assessed, with an 11-point Likert scale, from 0 ("Not at all") to 10 ("Totally"), amusement, sadness, anger, happiness, neutrality, and fear states. The order of labels was presented in a random way for each participant and affective induction condition. Only affective assessment information directly related to the content of the films (amusing, sadness, and neutral) is provided.

5. Marlowe and Crowne's Social Desirability Scale (MCSDC; Crowne & Marlowe, 1960; Ferrando & Chico, 2000). This questionnaire was developed to evaluate the degree to which people respond truthfully or choose responses that are more socially desirable. Participants had to respond with "true" or "false" to 33 questions about their own regular behavior (e.g., "It is sometimes hard for me to go on with my work if I am not encouraged"). In our study, internal consistency analysis provided a Cronbach's alpha of .74.

6. Films. Six clips were used in this study selected from a Spanish validated film clip database (Fernández et al., 2012; Fernández et al., 2011). To understand the instructions, two film clips were used in the emotion regulation strategy training period: *Hellraiser* (1 min 29 s) and *American History X* (1 min 17 s). In the first one, which elicits disgust, a monster grows up from the floor. In the second one, associated with anger, a neo-Nazi kills another person by crushing his head with a curb. Additionally, two neutral film clips were used. *Blue 2* (40 s), which shows a man ordering papers and a woman walking by a garden, was employed to ensure that participants had an equivalent affective state prior to the target manipulations. The second neutral film clip was *Sticks* (3 min 28 s), which was used between affective inductions, shows a set of

sticks moving on the screen. To ensure that participants were not tired, and considering that the clip displayed a repeated sequence, the duration of the film was only one minute. Regarding the affective clips, one was employed to elicit amusement (*There´s Something about Mary*, 2 min 59 s, represents a fight between a dog and a man), and the other was used to elicit sadness (*The Champ*, 1 min 55 s, shows a little boy who sees how his father dies). All clips are considered an appropriate tool for eliciting affective states in an experimental setting (Fernández et al., 2012; Fernández et al., 2011).

8.3.3. Procedure and Manipulation

Participants were randomly assigned to one of the following four conditions: control, up-regulation reappraisal, down-regulation reappraisal, or suppression. Then, they were seated in comfortable chairs at a 90-degree angle facing a 15-inch screen, which was located to 60 cm approximately, at opposite sides of a dimly illuminated room (a maximum of two people participated at the same time). Before the study was started, it was explained to them that the main goal of the study was to deepen emotion knowledge. After that, written consent was obtained, and an overview of the experiment was provided. The participants were told that they would have to watch a set of film clips following specific instructions that would be provided to them first. Then, they would have to report their affective state on several questionnaires, which were situated close to the screen, as well as perform a task on a laptop. E-prime software (Schneider, Escaman, & Zuccolotto, 2002) was employed for this purpose. The duration of the session was around 60 minutes.

At the beginning of the study (see Figure 1), the participants filled out the STCI-T and ERQ questionnaires. Then, an emotion regulation practice was carried out. In this case, participants read the specific instructions associated with their groups, and the experimenter answered any questions they might have. After that, they watched two film clips: *Hellraiser* and *American History X*. After each extract, the experimenter made sure they had understood and applied the instructions. To manipulate classic emotion regulation strategies as well as allow future comparisons between studies, instructions for each condition were adapted from previous literature (e.g., Gross, 1998a; Henry et al., 2007; Kunzmann, Kupperbusch, & Levenson, 2005).
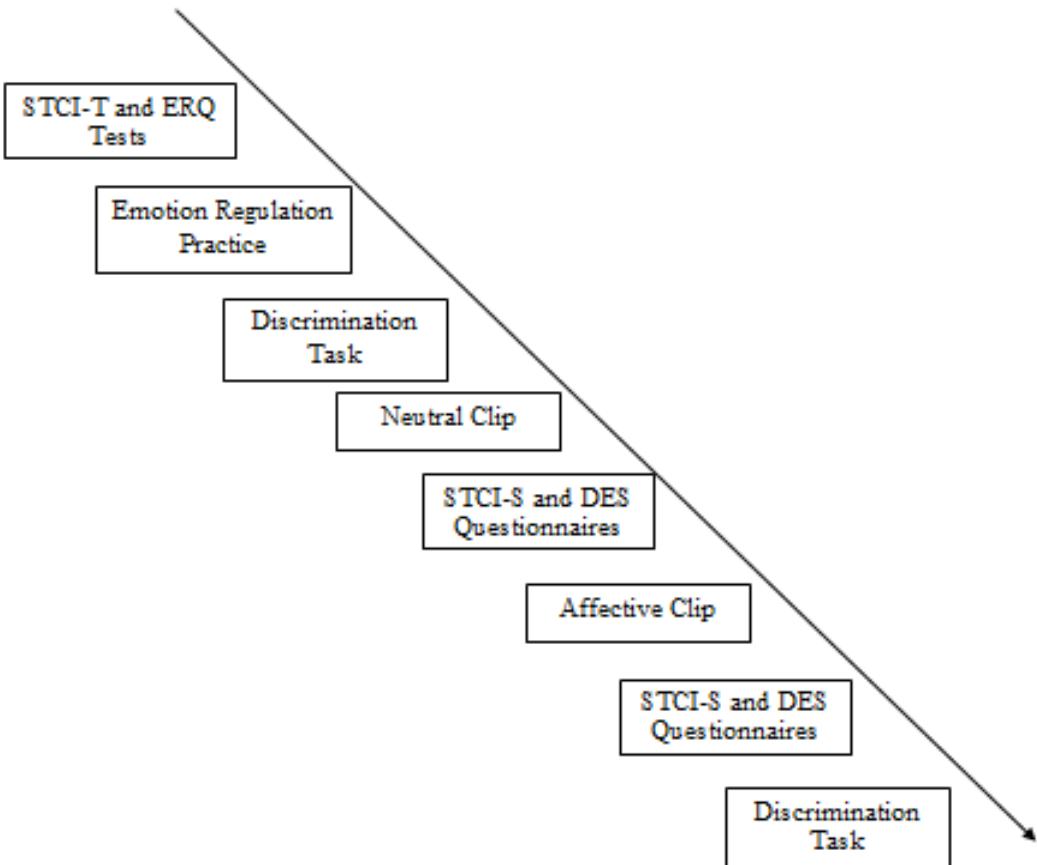
Figure 1. Representation of the study for the first affective induction. At the beginning, the participants had to fill out the Trait Form of the State-Trait Cheerfulness Inventory (STCI-T) and the Emotion Regulation Questionnaire (ERQ) self-reports. Then, they performed an emotion regulation practice depending on their membership group. After that, they did a discrimination task during two minutes and then, a neutral clip was displayed. Then, they completed the State Form of the State-Trait Cheerfulness Inventory (STCI-S) and the Discrete Emotions Scale (DES) inventories. After that, half of the participants watched an amusing clip and the other half watched a sad clip. Then, they completed the same state questionnaires and performed again the discrimination task. This sequence was repeated two more times in the study. In the second affective induction, a neutral clip was displayed and in the third affective induction the first half of the participants watched a sad clip and the other half visualized an amusing clip. Moreover, in the last one, participants did not perform the discrimination task. Finally, they completed the Marlowe and Crowne's Social Desirability Scale (MCSDS).

In the *control* condition, participants received the following instructions:

"We will now be showing you a set of film clips. Your task will be to watch each of these videos without distractions and pay attention to them."

In the *up-regulation reappraisal*[2] condition, the instructions were:

"We will now be showing you a set of film clips. Your task will be to watch each of these videos. If you have any feelings as you watch the film clip, please try your best to show and experience your feelings, exaggerating them. In other words, try to behave in such a way that a person watching you would clearly know what you are feeling. To summarize, show your feelings as much as you can."

In the *down-regulation reappraisal* condition, the instructions presented were:

"We will now be showing you a set of film clips. Your task will be to watch each of these videos. Try to adopt a neutral and unemotional attitude as you watch the film. In other words, try to concentrate on what you are seeing objectively. Imagine that you are a director and watch the film in terms of the technical aspects of the film, how certain moods are produced, and what cuts and camera angles are used. To summarize, you have to watch the content with an unemotional attitude, in such a way that you do not feel anything at all."

In the *suppression* condition, the instructions were as follows:

"We will now be showing you a set of film clips. Your task will be to watch each of these videos. If you have any feeling as you watch the film, please try your best not to let those feelings show. In other words, as you watch the film clip, try to behave in such a way that a person watching you would not know that you were feeling anything. Do not let your feelings show to anyone."

After that, to minimize the effects of the affective induction triggered by the training period and to guarantee an equivalent affective state prior to the relevant manipulation, all participants performed an easy discrimination task for two minutes. They were told

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[2] To have another reappraisal group to get a direct contrast with the down-regulation reappraisal condition, and taking into account that we were not going to carry out a facial or gestural record in our study, we modified the instructions to also reflect a reappraisal process. In this sense, we ensured in the emotion regulation practice that participants who belonged to the up-regulation reappraisal condition understood that they had to experience, feel, and enhance their affective state as much as they could as well as express it.

that a cross would appear in the center of the screen. They had to press the "X" key if the cross was red and the "M" key if the cross was blue as soon as possible, trying not to make errors. After that, they watched the neutral film clip *Blue 2*. Then, they completed the STCI-S and the DES questionnaires. As the task was not relevant to our goals, we did not consider or analyze these results.

Later, the order of the presentation of the affective content was counterbalanced across participants. Therefore, half of the participants watched the amusing clip first and the sad clip third, whereas the other half of the participants received these clips in opposite order. A neutral film clip was always displayed in second place between the two affective inductions. After each film clip, all participants filled out the STCI-S and the DES self-reports. Additionally, they performed the discrimination task two times (between the first affective content induction and the neutral clip and between the neutral clip and the second affective content induction) to leave enough time between affective manipulations. Finally, the social desirability scale was included at the end of the study. To simplify the study, and given that a neutral film was always included between the first and third clips, in which the affective content was manipulated, the participants' affective state scores after visualizing each film clip were used as the scores for the state preceding the next affective induction.

8.3.4. Design and Statistical Analysis

Data were analyzed with the SPSS 21.0 statistical package. In the present study, a correlation analysis was first conducted to study the relationships among trait cheerfulness, the self-reported emotion regulation strategies, and the key dependent variables (state cheerfulness, amusement, and sadness) prior to the first affective target induction (Hypothesis 1). Then, we analyzed the data with a mixed factorial design: 4 (emotion regulation group; control vs. up-regulation reappraisal vs. down-regulation reappraisal vs. suppression) x 3 (affective induction; amusing vs. neutral vs. sad) x 2 (assessment moment; pre vs. post). To determine the differences in the affective state between the emotion regulation groups, Bonferroni post-hoc tests were carried out. State cheerfulness and DES relevant measures (amusement and sadness) were treated as dependent variables in different analyses (Hypothesis 2). Furthermore, to assess whether trait cheerfulness produced a moderating effect in the relationship between emotion regulation groups and state cheerfulness pre-post differential scores

(Hypothesis 3), separate regression analyses for each clip were conducted with the PROCESS Macro (Model 1), using the bootstrapping method with bias-corrected confidence intervals (95%), and employing 5,000 bootstrapped resamples (see Hayes, 2013, for a more detailed explanation). Finally, social desirability scores were considered as a covariate to ensure that participants responded truthfully.

8.4. Results

8.4.1. Correlational Analyses

Bivariate correlations are presented in Table 1.

Table 1

Means, standard deviations, and intercorrelations between the Trait Version of the State-Trait-Cheerfulness-Inventory (STCI-T), the Emotion Regulation Questionnaire (Reappraisal, ERQ-R; Suppression, ERQ-S), the State Version of the State-Trait-Cheerfulness-Inventory (STCI-S), and the Discrete Emotions Scale (amusement and sadness).

Scales	M	SD	(1)	(2)	(3)	(4)	(5)	(6)
(1) STCI-T	3.10	.40	—					
(2) ERQ-R	29.43	6.14	.34**	—				
(3) ERQ-S	13.05	5.46	−.32*	−.03	—			
(4) State Cheerfulness	2.35	.61	.41**	.14*	−.07	—		
(5) Amusement	4.26	2.63	.25**	.07	−.09	.70**	—	
(6) Sadness	3.00	2.88	−.20*	−.11†	.04	−.43**	−.42**	—

Note. $N = 248$. Previous states to the first affective induction were considered in the correlation analyses
†$p = .08$. *$p < .05$. **$p < .01$

As can be observed in Table 1, the inter-correlations between the factors yielded the expected pattern. Confirming our predictions, trait cheerfulness was positively correlated with the reappraisal strategy ($r = .34$, $p < .01$) and negatively correlated with the suppression strategy ($r = −.32$, $p < .05$), whereas these were not correlated. Moreover, reproducing the usual pattern of correlations, trait cheerfulness was positively correlated with state cheerfulness ($r = .41$, $p < .01$) and amusement ($r = .25$, $p < .01$) variables, and it was negatively correlated with the sadness factor ($r = −.20$, $p < .05$). Although state cheerfulness and amusement were positively correlated ($r = .70$, $p <$

.01), negative correlations emerged between them and sadness (state cheerfulness and sadness: $r = -.43$, $p < .01$; amusement and sadness: $r = -.42$, $p < .01$). Additionally, the reappraisal regulation strategy was positively correlated with state cheerfulness ($r = .14$, $p < .05$) and marginally negatively with sadness ($r = -.11$, $p = .08$). No significant correlation was observed for the suppression regulation strategy.

8.4.2. Affective Induction Preliminary Analyses

A one-way Analysis of Variance (ANOVA) was carried out on state cheerfulness, amusement, neutrality, and sadness scores to check whether emotion regulation groups differed in the measures taken before the first affective induction. Indeed, the results confirmed that groups were equivalent in all variables (all Fs < 1). Furthermore, a 3 (affective induction; amusing vs. neutral vs. sad) x 2 (assessment moment; pre vs. post) repeated measures ANOVA for the control regulation group showed that these variables varied in the expected direction (all ps < .05; see Table 2). In general, state cheerfulness and amusement scores increased and sadness scores decreased when participants watched the amusing clip. The opposite pattern was found after the participants watched the sad clip. The neutrality score increased during the neutral film and decreased as a consequence of watching the amusing and sad clips. Therefore, our affective induction procedure was adequate.

Table 2

Differential score and standard deviation of state cheerfulness, amusement, neutrality, and sadness variables as a function of emotion regulation groups and affective induction conditions. Social desirability scores are included as a covariate.

Measures	Control			Up-Regulation Reappraisal			Down-Regulation Reappraisal			Suppression		
	A	N	S	A	N	S	A	N	S	A	N	S
State Cheerfulness	0.31	-0.03	0.42	0.75	0.10	0.72	0.22	0.13	0.23	0.31	0.04	0.47
	(0.67)	(0.62)	(0.51)	(0.67)	(0.77)	(0.50)	(0.46)	(0.59)	(0.40)	(0.50)	(0.66)	(0.40)
DES Amusement	1.76	0.62	1.25	3.27	0.77	2.12	1.13	0.64	0.74	1.37	0.28	1.71
	(3.02)	(2.96)	(2.30)	(3.33)	(3.10)	(2.31)	(2.47)	(2.56)	(1.76)	(2.38)	(2.78)	(2.42)
DES Neutrality	1.33	1.38	1.45	2.56	2.31	1.65	0.68	0.62	0.49	2.21	1.26	0.93
	(3.69)	(3.72)	(3.24)	(3.94)	(3.55)	(3.08)	(3.52)	(2.77)	(2.91)	(3.70)	(3.60)	(3.90)
DES Sadness	0.83	2.00	2.98	1.48	2.10	3.84	0.68	0.80	0.21	0.12	1.74	2.94
	(2.33)	(3.03)	(3.14)	(2.67)	(3.23)	(3.22)	(1.64)	(2.69)	(2.85)	(2.11)	(2.96)	(3.07)

Note. A = Amusing, N = Neutral, S = Sad, DES = Discrete Emotions Scale. Differential scores were computed in absolute terms, i.e., according to the general effect that induction produced. For state cheerfulness and amusement, values represent post-induction increases in the amusing, and post-induction decrements in neutral and sad clips condition; for neutrality values represent post-induction increases in neutral, and post-induction decrements in amusing and sad clips condition; for sadness values represent post-induction decrements in the amusing, and post-induction increases in neutral and sad clips condition.

8.4.3. Emotion Regulation Analyses[3]

State cheerfulness. The affective induction x assessment moment interaction was modulated by the emotion regulation group, $F(6, 468) = 7.64$, $p < .001$, $\eta^2 = .09$. State cheerfulness increased for the amusing clip and decreased for the sad clip for all groups (see Table 2). One-way ANOVAs with emotion regulation groups applied to the state cheerfulness differential scores reflected significant effects, $F(3, 235) = 9.75$, $p < .001$, $\eta^2 = .11$ and $F(3, 244) = 11.13$, $p < .001$, $\eta^2 = .12$, for the amusing and sad film clips, respectively. Bonferroni post-hoc tests showed statistically significant differences between the up-regulation reappraisal group and the other three conditions when participants watched the amusing clip (all $ps < .001$). Moreover, significant differences ($p < .001$) were observed between the up-regulation reappraisal group and each of the other groups (all $ps < .05$) as well as between the down-regulation reappraisal and suppression groups ($p < .05$) after the participants watched the sad clip. Importantly, the up-regulation reappraisal group showed a larger increase (0.75) in state cheerfulness compared to the rest of the groups after the participants watched the amusing clip (control: 0.30; down-regulation reappraisal: 0.23; suppression: 0.31), and it showed a larger decrease (0.72) after the participants watched the sad clip (control: 0.42; down-regulation reappraisal: 0.24; suppression: 0.47), respectively. Critically, the down-regulation reappraisal group reported a smaller decrease in state cheerfulness than did the suppression group after viewing the sad film clip.

DES amusement. The affective induction x assessment moment interaction was also modulated by the emotion regulation group, $F(6, 458) = 4.20$, $p < .001$, $\eta^2 = .05$. As in the case of state cheerfulness, amusement increased for the amusing clip and decreased for the sad clip for all groups (see Table 2). The one-way ANOVA performed on differential scores revealed significant effects for both the amusing film clip, $F(3, 233) = 6.42$, $p < .001$, $\eta^2 = .08$, and the sad film clip, $F(3, 241) = 4.17$, $p = .007$, $\eta^2 = .05$. As for state cheerfulness, Bonferroni post-hoc tests showed differences between the up-regulation reappraisal group and the rest of the emotion regulation groups as a consequence of watching the amusing clip (all $ps < .05$). Significant differences between the up-regulation reappraisal group and the down-regulation reappraisal group

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[3] All analyses were repeated controlling for self-reported emotion regulation strategies (ERQ-R and ERQ-S). The results replicated data patterns for all dependent variables (state cheerfulness, amusement, and sadness).

were found for the sad clip (p = .005). Importantly, the up-regulation reappraisal group showed a larger increase in amusement (3.22) than did the rest of the groups after being exposed to the amusing clip (control: 1.76; down-regulation reappraisal: 1.11; suppression: 1.37), as well as a higher decrease in amusement (2.12) than did the down-regulation reappraisal group (0.73) when the participants viewed the sad clip. Although we did not find a significant difference between the down-regulation reappraisal and suppression groups (F<1), the first group reported a smaller affective impact than did the second one (0.73 vs. 1.65).

DES sadness. As with the others variables, the affective induction x assessment moment interaction was also modulated by the emotion regulation group, $F(6, 466)$ = 8.63, p < .001, η^2 = .10. As with the other variables, we observed the expected data (see Table 2). Sadness increased for the sad clip and decreased for the amusing clip for all groups. The one-way ANOVA performed on differential scores revealed significant effects for both the amusing film clip, $F(3, 235)$ = 3.68, p = .013, η^2 = .05, and the sad film clip, $F(3, 243)$ = 13.74, p < .001, η^2 = .15. Bonferroni post-hoc tests showed significant differences between the up-regulation reappraisal group and the suppression group (p = .007) for the amusing film clip. Moreover, the analysis revealed differences between the down-regulation reappraisal emotion regulation group and the three other conditions (all ps < .001) for the sad clip. The up-regulation reappraisal group reported a greater decrease in sadness (1.48) than did the suppression group (0.12). Critically, the down-regulation reappraisal group showed a smaller decrease in sadness (0.47) compared to the rest of the groups (control: 2.95; up-regulation reappraisal: 3.83; suppression: 3.02).

8.4.4. Moderation Analysis

Finally, we carried out a moderation analysis for each affective stimulus to explore whether the relationships between different emotion regulation strategies and the participant's affective state (as measured by state cheerfulness differential scores) after watching amusing and sad clips depended on trait cheerfulness. All of the emotion regulation groups were entered in the moderation analysis as predictor variables, being previously dummy-coded by the PROCESS Macro (Hayes, 2013). In this sense, the control group was always coded as 0, and so were the rest of the strategies except for the target group, which was coded as 1. Trait cheerfulness was also centered at its mean

before the analysis was conducted. The interactions of each of the predictors with trait cheerfulness were computed. Additionally, simple slope analyses (Aiken & West, 1991) were performed to explore the relationships between the predictors and state cheerfulness differential scores at low and high levels of trait cheerfulness using the criterion of ± 1 *SD* on the average score.

To ensure that participants' responses were truthful, social desirability scores were included as a covariate. Furthermore, taking into account the relationships previously found in our study between trait cheerfulness and self-reported emotion regulation strategies (ERQ-R and ERQ-S), we also incorporated them as covariates for ensuring that results were not influenced by participants' habitual use of emotion regulation strategies. The results are presented in tables 3 and 4.

Regarding the amusing film clip (see Table 3), an up-regulation reappraisal group main effect was found, *b* = -2.05, *t*(228) = -2.45, *p* = .02, *SE* = 0.84, 95% CI [-3.70, -0.40]. Importantly, and confirming our predictions, a trait cheerfulness x up-regulation reappraisal group interaction was observed, *b* = 0.80, *t*(228) = 3.00, *p* = .003, *SE* = 0.27, 95% CI [0.27, 1.32], indicating that the relationship between up-regulation reappraisal and state cheerfulness differential scores was moderated by trait cheerfulness. Specifically, a simple slope analysis showed that a significant positive relationship between up-regulation reappraisal and the participant's affective state emerged only for people characterized by high trait cheerfulness, *b* = 0.74, *t*(228) = 5.06, *p* < .001, *SE* = 0.15, 95% CI [0.45, 1.03]. The relationship was clearly not present in low trait cheerfulness individuals, *b* = 0.10, *t*(228) = 0.61, *p* = .54, *SE* = 0.16, 95% CI [-0.21, 0.40]. We did not find significant effects for the rest of the variables.

Table 3

Regression model predicting state cheerfulness differential scores in the amusing clip with trait cheerfulness as a moderator controlling for social desirability, reappraisal, and suppression scores.

Variable	*b*	*SE B*	t
DS	0.01 [−0.28, 1.94]	0.01	0.65
ERQ-R	0.01 [−0.01, 0.02]	0.01	1.03
ERQ-S	0.00 [−0.01, 0.02]	0.01	0.26
STCI-T	−0.28 [−0.62, 0.07]	0.18	−1.56
Up-Regulation Reappraisal	−2.05 [−3.70, −0.40]	0.84	−2.45*
Down-Regulation Reappraisal	−1.09 [−2.58, 0.40]	0.76	−1.44
Suppression	−1.33 [−3.01, 0.34]	0.85	−1.57
Up-Regulation Reappraisal x STCI-T	0.80 [0.27, 1.32]	0.27	3.00**
Down-Regulation Reappraisal x STCI-T	0.33 [−0.15, 0.82]	0.25	1.35
Suppression x STCI-T	0.44 [−0.10, 0.98]	0.27	1.60

Note. N = 239. R^2 = .16. DS =Social Desirability; ERQ-R = Emotion Regulation Questionnaire-Reappraisal; ERQ-S = Emotion Regulation Questionnaire-Suppression; STCI-T =State-Trait-Cheerfulness-Inventory-Trait Form.

*p < .05. **p < .01

With the sad film clip (see Table 4), neither the main effect nor the trait cheerfulness x up-regulation reappraisal reached statistical significance.

Table 4

Regression model predicting state cheerfulness differential scores in the sad clip with trait cheerfulness as a moderator controlling for social desirability, reappraisal, and suppression scores.

Variable	*b*	*SE B*	t
DS	0.00 [−0.01, 0.01]	0.01	0.16
ERQ-R	0.00 [−0.01, 0.01]	0.01	0.40
ERQ-S	−0.01 [−0.02, 0.00]	0.01	−1.39
STCI-T	−0.01 [−0.28, 0.26]	0.14	−0.05
Up-Regulation Reappraisal	−0.45 [−1.75, 0.84]	0.66	−0.69
Down-Regulation Reappraisal	−0.44 [−1.59, 0.71]	0.58	−0.75
Suppression	−0.31 [−1.63, 1.00]	0.67	−0.47
Up-Regulation Reappraisal x STCI-T	0.23 [−0.18, 0.65]	0.21	1.12
Down-Regulation Reappraisal x STCI-T	0.09 [−0.29, 0.46]	0.19	0.46
Suppression x STCI-T	0.11 [−0.31, 0.54]	0.21	0.53

Note. N = 248. R^2 = .14. DS =Social Desirability; ERQ-R = Emotion Regulation Questionnaire-Reappraisal; ERQ-S = Emotion Regulation Questionnaire-Suppression; STCI-T =State-Trait-Cheerfulness-Inventory-Trait Form.

8.5. Discussion

The aim of this study was to explore the relationships between emotion regulation (habitual use and instructed) and cheerfulness, as state and trait manifestations. Participants were assigned to different emotion regulation strategy groups while they were exposed to amusing and sad stimuli. The results reflected that trait cheerfulness was related to a more frequent use of reappraisal and to a lower use of suppression (as measured by ERQ). Moreover, the up- and down-regulation reappraisal groups showed the most and the fewest affective changes, respectively, for both amusing and sad

stimuli, whereas the suppression group was similar to the control group. Furthermore, importantly, we found that trait cheerfulness moderated the relationships between the up-regulation reappraisal group and the participants' affective state for the amusing condition. These effects were not influenced by social desirability and the habitual use of reappraisal or suppression strategies (ERQ).

Trait cheerfulness correlated positively with the reappraisal strategy and negatively with the suppression strategy of the ERQ. This fits well with research from the psychological health and personality fields that has described similar benefits for trait cheerfulness (Carretero-Dios et al., 2014; Ruch & Köhler, 2007) and the reappraisal measure (Gross, 2015). For example, whereas trait cheerfulness and the reappraisal strategy are directly related to positive dimensions of well-being (e.g., optimism and life satisfaction) and classic personality variables positively associated with health (e.g., extraversion and openness), the suppression strategy is related to personality variables negatively associated with health, such as neuroticism or depression (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Carretero-Dios et al., 2014). In this sense, our data show that trait cheerfulness and the habitual use of emotion regulation strategies are specifically connected, thus offering new empirical support for the temperamental basis of the sense of humor model (Ruch et al., 1996, 1997).

Additionally, and confirming previous data (Ruch & Hofmann, 2012), trait cheerfulness was positively related to amusement and especially to its homologue in the state manifestation, and it was negatively correlated to sadness levels measured before the first affective induction. Moreover, some studies have clearly shown that reappraisal and suppression strategies are associated with positive and negative affective states, respectively, using inventories that assess the participants' general affective state (e.g., Gross & John, 2003). In our study, we found a significant positive relationship between the habitual use of the reappraisal strategy and state cheerfulness, as well as a marginal negative relationship between reappraisal and sadness.

The effect of instructed emotion regulation strategies on the affective state was also explored. The results showed that the up- and down-regulation reappraisal groups triggered the most and fewest changes, respectively, in the reported changes in affective experience after the emotional induction, regardless of the stimuli valence. According to Gross's process model of emotion regulation theory (1998b), the reappraisal strategy

would allow a cognitive reinterpretation of an emotional situation to alter (up or down) the affective response. In this sense, our data confirmed that idea.

Some studies have manifested that the suppression strategy, compared to no regulation, leaves relatively unchanged negative affective states while producing a decrement of positive states (e.g., Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Stepper & Strack, 1993). Although not reaching statistical significance, we observed a smaller increase in the affective state for some measures (amusement) for the suppression versus control groups in the amusing condition. Interesting, we found that individuals belonging to the suppression group showed changes in the affective state similar to those in the control group after seeing the sad film clip, which confirms previous research and corroborates the fact that the reappraisal is a more effective strategy than expressive suppression for reducing negative states (see Gross, 2015).

Furthermore importantly, given that trait cheerfulness is related to emotion regulation strategies (e.g., Papousek & Schulter, 2010) and emotional management (Yip & Martin, 2006), we included that factor to analyze whether it could be a key variable in the effect of emotion regulation strategies over the changes in the affective state.

Recent studies have shown that high versus low trait cheerfulness individuals have greater permeability to the emotional environment surrounding them, as they experience greater changes in their affective state as a result of being exposed to positive and negative events (e.g., López-Benítez et al., *under review*). Additionally, in the current study, we have verified that a relationship exists between trait cheerfulness and the habitual use of reappraisal strategies, not only to minimize negative emotions but also to increase positive emotions. In line with previous results, in the current study, trait cheerfulness moderated the relationship between the up-regulation reappraisal strategy and the participants' affective state when they watched the amusing clip. Specifically, high trait cheerfulness people showed a greater ability to up-regulate the affective state experienced by a positive emotion compared to low trait cheerfulness individuals.

Considering that high cheerfulness people report a more frequent use of reappraisal strategies as well as a greater capacity to increase their positive emotions, and taking into account that cheerfulness is an affective predisposition that promotes the manifestation, potentiation, and maintenance of positive affective states (e.g., Ruch & Hofmann, 2012), it follows that people characterized by high trait cheerfulness might

have more sensitivity toward perceiving, interpreting, and enhancing the elements and nuances of positive emotions present in the affective environment in an easy and frequent way. This would lead them to experience positive emotions at high degrees in their daily lives.

This idea has important implications. Previous research has shown that positive emotions produce a series of physical, cognitive, social, and psychological improvements (Lyubomirsky, King, & Diener, 2005). Furthermore, in a recent review, Quoidbach and colleagues (2015) pointed out that the frequent use of emotion regulation strategies aimed at increasing positive emotions is associated with positive dimensions of psychological well-being, such as life satisfaction and happiness (e.g., Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). In this sense, the frequent use of up-regulation strategies in daily life by high-trait-cheerfulness individuals to maximize the affective impact of positive emotions could explain, at least partially, that these people have better emotional management (Yip & Martin, 2006), greater physical and psychological health (Carretero-Dios et al., 2014; Delgado-Domínguez et al., 2016; Delgado-Domínguez et al., 2014), and more social closeness (Ruch & Köhler, 2007). Therefore, given the potential benefits of trait cheerfulness as well as its relationship with up-regulation strategies, it would be interesting to consider its properties and relevance in the development and training of emotion regulation skills.

On the other hand, previous studies have established that trait cheerfulness is associated with better coping with negative events, thus minimizing the affective impact (e.g., Papousek & Schulter, 2010; Ruch & Hofmann, 2012). This could be due to either a reduced permeability to negative events, a more efficient use of down-regulation strategies, or a more frequent use of such strategies (instead of suppression) for handling negative events' impact. No study, to our knowledge, has shown that high trait cheerfulness people have a smaller affective impact for negative inductions when strategies are not taught. In fact, the opposite has been shown, i.e., a higher affective impact of negative induction in high trait cheerfulness people (e.g., López-Benítez et al., *under review*). On the other hand, in the current study, higher trait cheerfulness did not lead to a statistically significant better ability to apply a down-regulation reappraisal strategy, although it showed a better ability to up-regulate positive emotions. However, higher-trait-cheerfulness participants in the current study reported a generally more frequent use of reappraisal strategies for down-regulating negative emotions and up-

regulating positive emotions. Therefore, the more frequent use of down-regulation strategies for handling negative emotions, rather than the reduced permeability to negative events of its better down-regulation, seems to be the more plausible explanation for the better coping with negative events observed in high trait cheerfulness individuals (Papousek & Schulter, 2010; Ruch & Hofmann, 2012).

Despite the relevance of our results, this research had some limitations. First, all data were collected using self-reports. From the Gross's process model of emotion regulation framework (1998b), emotion response tendencies could be observed and modulated through experiential, behavioral, and physiological levels. Future studies should analyze whether the effects that we found might be replicated and expanded to other types of measures. Second, although ERQ (Gross & John, 2003) is used to study the habitual use of the reappraisal strategy (up and down), it does not explicitly include other intriguing reappraisal forms, such as the up-regulation of negative emotions. In this sense, it would be interesting to explore the relationships between the temperamental basis of sense of humor and the use of strategies through an instrument that evaluates a broader range of emotion regulation strategies. Finally, although the criterion of $\pm$ 1 SD on the participants' trait cheerfulness average scores employed by simple slope analyses usually is an effective statistical method for getting two differentiated groups, the score for the group characterized by low trait cheerfulness was relatively high. If the tendency of our data is lineal, the use of a procedure for creating more extreme groups could reveal significant interactions between emotion regulation strategies and trait cheerfulness in affective contexts, especially for negative induction.

In summary, the participants in this study were instructed to apply a specific emotion regulation strategy while amusing and sad film clips were displayed. In general, trait cheerfulness, which was positively associated with the reappraisal measure, moderated the relationships between the up-regulation strategy and the participants' affective state in the amusing condition, reflecting that high versus low trait cheerfulness individuals have a greater ability to increase positive emotions through reappraisal. Regarding the sad condition, however, new studies are needed to clarify this issue. Future research should continue to explore the relationships between cheerfulness and emotion regulation strategies when they are tested in clinical settings.

8.6. Supplementary Material

Original instructions for each emotion regulation group.

Control group

"A continuación te vamos a mostrar una serie de vídeos. Tu tarea simplemente consistirá en visionar cada uno de estos vídeos sin distraerte y prestando atención."

Up-regulation reappraisal group

"A continuación te vamos a mostrar una serie de vídeos. Tu tarea simplemente consistirá en visionar cada uno de estos vídeos, haciendo TODO lo posible para MOSTRAR y EXPERIMENTAR las emociones que te provoquen los vídeos, es decir, EXAGÉRALAS. En otras palabras, trata de comportarte de tal manera que si una persona te está observando, sabría con claridad lo que estás sintiendo. Por ello, MUESTRA tus emociones TANTO COMO PUEDAS."

Down-regulation reappraisal group

"A continuación te vamos a mostrar una serie de vídeos. Tu tarea simplemente consistirá en visionar cada uno de estos vídeos adoptando EN TODO MOMENTO una actitud emocional NEUTRAL mientras los visionas. En otras palabras, trata de concentrarte en lo que estás viendo de manera OBJETIVA. Imagina que eres un director de cine y tienes que valorar el contenido que ves en función de aspectos técnicos, estados de ánimo, cortes y ángulos de la cámara que se utilizan, etc. Por ello, el contenido lo tienes que ver de una manera NEUTRAL, en la que no se siente nada en absoluto."

Suppression group

"A continuación te vamos a mostrar una serie de vídeos. Tu tarea simplemente consistirá en visionar cada uno de estos vídeos, haciendo TODO lo posible para NO MOSTRAR las emociones que te provoquen los vídeos. En otras palabras, trata de comportarte de tal manera que si una persona te está observando, no sepa si estás sintiendo alguna emoción. NO DEJES que tus emociones sean percibidas por los demás."

Capítulo IX: Discusión

9.1. Resumen de resultados

Los objetivos generales de la presente tesis doctoral fueron, por un lado, desarrollar la versión española del instrumento de referencia empleado para medir las bases afectivas y cognitivas del sentido del humor, tanto en su manifestación de rasgo como de estado, y por otro, analizar la modulación del factor *cheerfulness*, entendido como una tendencia/propensión al sentido del humor, sobre procesos cognitivos (flexibilidad) y afectivos (inducción emocional y uso de estrategias de regulación emocional). Los estudios realizados han cubierto estos objetivos y han llevado a plantear futuras líneas de investigación. A continuación, se presenta un resumen de los principales resultados obtenidos, los cuales serán posteriormente discutidos.

Mientras que en el Estudio 1 nos centramos en la adaptación española de la *State-Trait Cheerfulness Inventory, trait version* (STCI-T; Ruch & cols., 1996), en el Estudio 2 queríamos comprobar las características psicométricas de la versión española de la *State-Trait Cheerfulness Inventory, state version* (STCI-S; Ruch & cols., 1997). Nuestros resultados proporcionaron evidencia de la idoneidad, relevancia, y aplicabilidad de la escala, tanto en su formato rasgo como estado. En este sentido, se corroboró, tanto a través de procedimientos exploratorios como confirmatorios, la estructura de tres factores diferenciados para las bases afectivas y cognitivas del sentido del humor: *cheerfulness*, *seriousness*, y *bad mood*. Los tres factores han mostrado un comportamiento excelente en cuanto a la fiabilidad (consistencia interna y *test-retest*) de sus puntuaciones. De igual forma, se replicaron los patrones de relaciones entre dichos factores, a la vez que éstos fueron de nuevo empíricamente ubicados dentro de un espacio conformado por dimensiones básicas de personalidad (Ruch & cols., 1996, 1997). Más aún, se establecieron nuevas relaciones con respecto al bienestar psicológico, y de manera importante, en el Estudio 2, se confirmó la diferenciación entre las medidas rasgo *versus* estado de estos factores a través de modelos latentes aplicados sobre una aproximación longitudinal (ej., Steyer, Mayer, Geiser, & Cole, 2015).

Posteriormente, nos planteamos analizar el efecto del *cheerfulness* rasgo sobre procesos de flexibilidad cognitiva. Para ello, llevamos a cabo en primer lugar la *Serie Experimental I*, la cual estaba formada por 2 estudios. Los participantes, que eran seleccionados por sus puntuaciones altas *versus* bajas en *cheerfulness* rasgo en el STCI-

T (Ruch & cols., 1996), realizaron un paradigma de cambio de tarea (Kiesel & cols., 2010), en el cual se presentaba un rostro en el centro de la pantalla y debían realizar una de dos tareas, bien responder a al género del rostro (hombre o mujer) o bien a la emoción expresada (alegría o enfado). La demanda de tarea podía cambiar o no entre dos ensayos consecutivos, lo cual permitía analizar el coste por cambio de tarea, siendo considerado éste como una medida de flexibilidad cognitiva. Dada la propia conceptualización del *cheerfulness* y su estrecha vinculación con los beneficios que promueven las emociones positivas (Ruch & Hofmann, 2012), pensábamos que las personas caracterizadas por un elevado nivel de *cheerfulness* rasgo tendrían menor coste por cambio de tarea que las personas con bajo *cheerfulness* rasgo. Sin embargo, nuestros resultados no reflejaron que el *cheerfulness* rasgo ejerciera modulación alguna sobre los procesos de flexibilidad cognitiva, independientemente de la naturaleza de la demanda de tarea (cognitiva o emocional). Sin embargo, sí encontramos que las personas con alto *cheerfulness* rasgo, en comparación con las de bajo, mostraban un mayor efecto de repetición de atributos del estímulo entre dos ensayos consecutivos, así como una tendencia a un mayor efecto de preparación ante una clave que anticipaba la demanda a realizar. Esto podría interpretarse como una mayor "receptividad" cognitiva a los estímulos (y sus características) del medio.

Los resultados anteriores nos hicieron plantearnos que quizás el *cheerfulness* rasgo se encontrara más estrechamente vinculado a tareas que implican procesos socio-afectivos y comunicativos (Ruch & Hofmann, 2012), y no tanto a demandas más cognitivas. Por tanto, en las siguientes series experimentales estudiamos la modulación que ejercía el *cheerfulness* rasgo sobre procesos de inducción y regulación emocional, profundizando, además, en las relaciones estado-rasgo que establece el modelo (Ruch & Köhler, 2007; Ruch & cols., 1997).

En el Estudio 1 de la *Serie Experimental II*, queríamos explorar si el mayor cambio en el estado afectivo reportado por las personas con niveles elevados de *cheerfulness* rasgo tras una inducción emocional positiva, en comparación con los individuos caracterizados por un nivel de *cheerfulness* rasgo bajo (Ruch, 1997), solo se observaba ante contenidos afectivos positivos o, por el contrario este tipo de personas eran más sensibles en general al entorno afectivo, lo que implicaría un mayor efecto de inducción emocional, con independencia de la valencia, es decir, tanto para los contenidos afectivos positivos como negativos. Para poner a prueba esta idea, los participantes,

seleccionados nuevamente por un nivel diferenciado en *cheerfulness* rasgo en función de sus puntuaciones en el STCI-T (Ruch & cols., 1996), visualizaron extractos de películas de diversión, neutrales, y de tristeza (Fernández & cols., 2012; Fernández & cols., 2011), de forma contrabalanceada, reportando su estado afectivo antes y después de cada *film*. Los resultados mostraron que, comparados con las personas con bajo *cheerfulness* rasgo, los individuos con alto *cheerfulness* rasgo reportaron un mayor cambio en su estado afectivo tanto ante los *clips* de diversión como ante los de tristeza. De manera importante, este efecto no se vio influido por la deseabilidad social de los participantes. Por tanto, los resultados ofrecieron apoyo empírico a favor de la idea de que las personas altas en *cheerfulness* rasgo son más sensibles al medio ambiente emocional que las personas con bajo *cheerfulness* rasgo. El patrón de resultados sugería que los participantes con niveles elevados de *cheerfulness* rasgo no evitaban o se protegían de la información afectiva negativa, sino que se impregnaban de ella de una forma más completa que los participantes con *cheerfulness* rasgo bajo, al igual que hacían con la información de valencia positiva. Por tanto, su estado afectivo positivo general parece no deberse a que rehúyan la información afectiva negativa. Este hecho podría estar vinculado con un mejor manejo de sus emociones. En estudios posteriores se investigó el uso de estrategias clásicas de regulación emocional sobre dichos estados afectivos en función del *cheerfulness*.

En el Estudio 2 de la *Serie Experimental II* queríamos, por un lado, replicar el efecto observado en el estudio previo y, por otro, explorar si dicho resultado podría ser extendido a medidas psicofisiológicas, en particular la tasa cardíaca y la conductancia eléctrica de la piel. El procedimiento y las hipótesis fueron las mismas que en el Estudio 1, es decir, se esperaba un mayor cambio del estado afectivo tras la inducción para las personas con alto *cheerfulness* rasgo en comparación con quienes puntuaban bajo en esta medida tanto para la inducción positiva (diversión) como para la negativa (tristeza). Con respecto a la medida de auto-reporte (*cheerfulness* estado), los resultados replicaron el mismo patrón hallado en el Estudio 1. No obstante, sí observamos un patrón diferente para las medidas psicofisiológicas. En concreto, las personas con bajo *cheerfulness* rasgo mostraron un mayor decremento en tasa cardíaca mientras visualizaban los *clips* que las personas con alto *cheerfulness* rasgo. Dichas diferencias fueron más prominentes durante los *clips* de tristeza, así como durante los momentos más intensos de uno de los *clips* de diversión, perteneciente a la película *Algo Pasa con Mary*. Sin

embargo, no observamos ninguna relación entre el *cheerfulness* rasgo y la conductancia eléctrica de la piel. Los resultados reflejaban cambios diferentes cuando se empleaban medidas de auto-informe y psicofisiológicas en contextos afectivos, y concluimos que las personas con alto *cheerfulness* rasgo eran más permeables al ambiente afectivo que las de bajo *cheerfulness* rasgo. Como en el estudio previo, podría ocurrir que esta permeabilidad se asociase a un mejor manejo y comprensión de sus propias emociones, lo que, a su vez, produciría una serie de beneficios en bienestar y salud, evidenciado en el menor impacto afectivo observado en los cambios cardíacos.

En la *Serie Experimental III*, llevamos a cabo un estudio con el objetivo de replicar el efecto de mayor "permeabilidad" emocional para las personas con alto *cheerfulness* rasgo, al mismo tiempo que queríamos analizar si dicho efecto se expandía a otros estados afectivos, empleando para ello un procedimiento diferente de inducción emocional así como otras medidas de auto-informe complementarias. Por otro lado, queríamos comprobar si el *cheerfulness* rasgo ejercía un rol determinante en la modulación de los estados afectivos sobre las redes atencionales. Seguimos una estructura similar a los dos estudios previos, introduciendo algunos cambios. Primero, realizamos una inducción emocional de alegría y de ansiedad empleando fotografías acompañadas de afirmaciones (Pacheco-Unguetti & cols., 2010; Pérez-Dueñas & cols., 2014). Segundo, los participantes reportaban su estado afectivo tanto en *cheerfulness* estado como en las escalas SAM (Bradley & Lang, 1994) y EVEA (Sanz & cols., 2014). Finalmente, realizaban dos bloques de la tarea ANT-I (Callejas & cols., 2004) entre inducciones emocionales. Esperábamos un mayor cambio del estado afectivo ante ambos tipos de inducciones emocionales así como un mayor efecto de la inducción negativa sobre procesos atencionales para las personas con alto *versus* bajo *cheerfulness* rasgo. En línea con los resultados previos, comparadas con las personas con bajo *cheerfulness* rasgo, los individuos con alto *cheerfulness* rasgo mostraron un mayor cambio del estado afectivo tras ser expuestos a estímulos de alegría y ansiedad (medido a través de la STCI-S), con independencia de la deseabilidad social. Adicionalmente, tras la inducción de alegría, este patrón también se encontró en las medidas de valencia (SAM) y alegría (EVEA). Tras la inducción de ansiedad, el patrón de datos fue similar para todas las medidas: valencia (SAM), ansiedad, hostilidad, y depresión (EVEA), aunque no alcanzó significación estadística. Finalmente, aunque se hallaron los efectos de alerta, orientación atencional, y control cognitivo clásicamente reportados para la

tarea ANT-I (Callejas & cols., 2004), no encontramos ni efectos de la modulación de la inducción afectiva ni del *cheerfulness* rasgo sobre las redes atencionales. Por tanto, en general los resultados mostraron de nuevo una mayor permeabilidad emocional para las personas con alto *cheerfulness* rasgo, lo cual podría ser asociado con una mejor comprensión y manejo de las emociones.

Finalmente, en la *Serie Experimental IV*, analizamos los patrones de relaciones entre el *cheerfulness*, tanto en su manifestación de rasgo como de estado, y las estrategias de regulación emocional (uso habitual e instruido), con el fin de explorar si dichas relaciones podían ofrecer pistas sobre la naturaleza del efecto encontrado. Para ello, llevamos a cabo un estudio en el que diferentes participantes aplicaban estrategias de regulación emocional diferenciadas mientras veían *clips* de películas de diversión, neutral, y de tristeza. Paralelamente, reportaban su estado afectivo. En general, esperábamos encontrar una relación positiva entre el *cheerfulness* rasgo y el uso frecuente de estrategias de *reappraisal* reportadas (ERQ; Gross & John, 2003), así como una moderación del *cheerfulness* rasgo en las relaciones entre las estrategias de *reappraisal* para incrementar la intensidad afectiva y el cambio en el estado afectivo de un individuo (*cheerfulness* estado) tras ser expuesto a una inducción emocional de diversión y de tristeza. Nuestros resultados mostraron que el *cheerfulness* rasgo correlacionaba positivamente con el uso frecuente de estrategias de *reappraisal* y negativamente con el uso de estrategias de supresión. Además, es importante destacar que el *cheerfulness* rasgo moderó las relaciones entre las estrategias de *reappraisal* para incrementar la intensidad afectiva y el cambio en el estado afectivo de los participantes, medido a través de la STCI-S, para la inducción emocional de diversión. Sin embargo, el *cheerfulness* rasgo no moderó las relaciones entre dicha estrategia y el cambio en el estado afectivo para la inducción emocional de tristeza. Una vez más, los resultados no fueron influidos por la deseabilidad social, como tampoco lo fueron en este caso por el uso habitual de estrategias de *reappraisal* o supresión de los participantes. Interpretamos nuestros datos en términos de que la mayor permeabilidad emocional producida para una inducción de diversión en personas con alto *cheerfulness* rasgo podría deberse a una mayor habilidad para potenciar el efecto de las emociones positivas junto a un mayor uso de la estrategia de *reappraisal*. Sin embargo, la mayor permeabilidad emocional observada también para una inducción emocional negativa en este grupo no podría deberse en este caso a una mayor habilidad de *reappraisal* sino que

se debería más bien a una mayor permeabilidad emocional, tal vez mediada por un mayor uso de las estrategias de *reappraisal*.

9.2. Adaptación del Inventario de *Cheerfulness* Estado-Rasgo (STCI)

Los análisis psicométricos llevados a cabo sobre cada uno de los ítems que componían cada factor (por ejemplo, asimetría, kurtosis, o correlación ítem-total corregida), así como los análisis de fiabilidad, pusieron de manifiesto las adecuadas propiedades de los mismos. Por otro lado, los patrones de correlación entre los factores, así como el análisis confirmatorio, corroboraron los resultados de la escala original (Ruch & cols., 1996, 1997), apoyando el modelo tri-factorial de las bases afectivas y cognitivas del sentido del humor. En este sentido, mientras el *cheerfulness* correlacionaba negativamente con el *seriousness* y, especialmente, con el *bad mood*, los últimos dos factores correlacionaban positivamente entre sí. Además, las correlaciones entre los factores rasgo/estado homólogos arrojaron los coeficientes más altos, reflejando que los rasgos representan las disposiciones para sus respectivos estados (Ruch, 1997; Ruch & Köhler, 2007). De manera importante, en ambos estudios se obtuvo nueva evidencia de validez externa en relación a otros constructos tradicionalmente abordados en psicología. Mientras el *cheerfulness* fue asociado positivamente con variables de personalidad y dimensiones que promueven la salud y el bienestar, como la eutimia, la extraversión, o la apertura a la experiencia, el patrón contrario fue observado para el *seriousness*, y especialmente, para el *bad mood*.

Adicionalmente, en el Estudio 2, testamos la estabilidad longitudinal de las dimensiones estado-rasgo utilizando modelos latentes (ej., Steyer & cols., 2015), con el objetivo de verificar la diferenciación teórica de los rasgos *versus* estados. Los resultados revelaron que los rasgos recogían principalmente las diferencias entre individuos de manera estable, mientras que los factores estado eran más sensibles a los efectos propios de la situación, lo cual también quedó reflejado en la sensibilidad mostrada por los ítems al medio ambiente afectivo. Por tanto, se confirmó que los rasgos aluden a las diferencias individuales de manera estable y duradera a lo largo del tiempo entre individuos, a la vez que los estados hacen referencia a las diferencias individuales dependientes del propio individuo, de la situación, así como de la interacción entre ambos.

Tomados en conjunto, nuestros resultados muestran un importante avance desde un punto de vista tanto teórico como empírico, ya que permiten: a) corroborar las adecuadas propiedades psicométricas del instrumento de referencia para evaluar las bases afectivas y cognitivas del sentido del humor en una población diferente; b) poner de manifiesto las diferencias conceptuales entre los rasgos y los estados, lo cual es una asunción capital en el modelo defendido por Ruch y colaboradores (Ruch, 1994; Ruch & Köhler, 2007; Ruch & cols., 1996, 1997) para estudiar y predecir la respuesta emocional al humor; c) analizar, desde un punto de vista correlacional, las relaciones del *cheerfulness*, el *seriousness*, y el *bad mood*, con otras facetas del sentido del humor (Ruch & Carrell, 1997; Ruch & cols., 2011; Wancke, 1996) así como con dimensiones de personalidad asociadas al bienestar físico/social/emocional (Delgado-Domínguez & cols., 2016; Ruch & Köhler, 2007; Yip & Martin, 2006); y d) explorar, desde un punto de vista experimental, cómo las diferencias en las bases temperamentales del sentido del humor producen una diferenciación en procesos psicológicos (ej., López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, *en revisión*-a; López-Benítez, Carretero-Dios, Lupiáñez, & Acosta, *en revisión*; Ruch, 1997).

9.3. Comprendiendo el rol del *cheerfulness* rasgo en procesos cognitivos

Uno de los objetivos de esta tesis fue el estudio de la modulación del *cheerfulness* rasgo sobre procesos de flexibilidad cognitiva. Los resultados recogidos en la *Serie Experimental I* no mostraron un menor coste por cambio de tarea, es decir, más flexibilidad, para los individuos con alto *cheerfulness*. Sin embargo, sí mostraron en estos individuos mayores efectos de repetición de atributos del estímulo y de preparación al *target*.

Una explicación de estos resultados podría ser que las personas que muestran una mayor disposición al sentido del humor, así como a las emociones positivas en general, simplemente tienen más dificultades para realizar la tarea (medido por respuestas más lentas y menos acertadas) que los individuos con bajo *cheerfulness*, los cuáles tendrían un rendimiento tan óptimo que incluso no se beneficiarían de la facilitación que produce la combinación de atributos/estímulos así como de la preparación a los mismos (Hommel, 2004; Kiesel & cols., 2010). Sin embargo, los resultados no apoyaron esta interpretación. A pesar de que en el Estudio 1 de la presente serie encontramos un efecto significativo de grupo, traducido en una menor precisión para las personas con alto

cheerfulness rasgo, en general no se hallaron diferencias de grupo significativas con respecto al rendimiento en la tarea. Por otro lado, las personas con bajo *cheerfulness* rasgo también se beneficiaron de dichos efectos de facilitación.

Otra posible explicación podría centrarse en el tipo de procesamiento utilizado por los individuos con alto *cheerfulness* rasgo. Desde un punto de vista teórico, la exposición (o disposición) a estados afectivos positivos podría desencadenar un estilo de procesamiento distintivo como, por ejemplo, una mayor apertura del campo atencional (Johnson & cols., 2010). Este hecho reflejaría un tipo de procesamiento menos centrado en los detalles, más holístico, global, y flexible (ej., Fredrickson, 2001). Si el *cheerfulness* es una predisposición afectiva positiva, es posible que las personas caracterizadas por un elevado nivel en *cheerfulness* muestren un procesamiento holístico, captando en mayor medida las señales que facilitan las respuestas a los estímulos, integrando información a través del conjunto de dimensiones estimulares, explicando así los efectos de repetición, o a través del tiempo, explicando así los efectos de las señales de anticipación de tarea. Esta hipótesis, no obstante, también adolece de varias limitaciones. Por ejemplo, si esto fuera realmente así, las personas con alto *cheerfulness* rasgo mostrarían un mayor coste por cambio de tarea que las personas con bajo *cheerfulness* rasgo. Sin embargo, nuestros datos no confirman tal idea. Además, algunos datos recogidos en nuestro laboratorio han señalado que los individuos altos *versus* bajos en *cheerfulness* rasgo (seleccionados por la STCI-T) no mostraban un procesamiento holístico cuando realizaban una tarea global-local (Kimchi & Palmer, 1982).

Finalmente, una explicación alternativa alude a las propias características tanto del objeto de investigación como de las demandas exigidas por la propia tarea. Como se apuntó en la introducción de la presente tesis doctoral, el *cheerfulness* es una predisposición afectiva vinculada tanto al sentido del humor como a estados afectivos positivos (Ruch & Köhler, 2007). Adicionalmente, numerosos estudios han puesto de manifiesto la relevancia y poder predictivo que dicho factor tiene en procesos afectivos, comunicativos, expresivos, etc., los cuales se desprenden de su propia conceptualización (ver Ruch & Hofmann, 2012, para una revisión). Por ejemplo, los individuos caracterizados por un nivel elevado en *cheerfulness* rasgo suelen mostrar un mejor bienestar físico (ej., Zweyer & cols., 2004) y psicológico (ej., Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014), muestran menos emociones negativas así

como una mejor recuperación ante ellas (Papousek & Schulter, 2010) y muestran estilos humorísticos más positivos, afiliativos, y socialmente "cálidos" (Ruch & cols., 2011; Ruch, Beermann, & Proyer, 2009). Sin embargo, las demandas que implica un paradigma de cambio de tarea son principalmente cognitivas. En este caso, los individuos deben responder lo más rápido que puedan, intentando no cometer errores, a un conjunto de ensayos que se presentan en una secuencia temporal, lo cual requiere de una determinada capacidad de control cognitivo, concentración, flexibilidad cognitiva ante la demanda, etc., esto es, cualidades que no están presentes en la propia naturaleza del constructo de *cheerfulness*. Desde este punto de vista, una posibilidad plausible podría ser que el *cheerfulness* no potencia en sentido estricto procesos de flexibilidad cognitiva, sino que más bien los inhibe o los atenúa. El uso que hacen de la repetición de atributos o de la anticipación de la demanda puede ayudarles a compensar esta limitación. De esta manera, la aparición de una clave previa a la presentación de la demanda, la cual permite preparar anticipadamente una respuesta, sería un estímulo lo suficientemente útil y saliente, a nivel de procesamiento *bottom-up*, para las personas con alto *cheerfulness*, captando en mayor medida su atención, lo que haría que fueran más "permeables" a ella. Como resultado, tendrían un mayor y mejor procesamiento de la clave, conllevando, en última instancia, una mejora en la respuesta en un ensayo inmediatamente posterior.

Este efecto no se generalizaría a todos los tipos de señales del ambiente, sino que estaría restringido a la utilidad de la misma. Dicha suposición vendría avalada por el estudio llevado a cabo en la *Serie Experimental III*, en donde los participantes, seleccionados por sus puntuaciones altas *versus* bajas en *cheerfulness* rasgo, eran expuestos a inducciones afectivas y, posteriormente, debían realizar una tarea que evaluaba las redes atencionales de alerta, orientación, y control cognitivo, así como sus interacciones (Callejas & cols., 2004). Antes de la aparición del target, en algunos ensayos aparecían señales no predictivas que bien alertaban temporalmente o indicaban una de las localizaciones posibles del target (orientación atencional). En este caso, los resultados mostraron que el *cheerfulness* rasgo no modulaba los efecto de la preparación de dichas claves, ni de alerta ni de orientación. Resultados similares fueron encontrados en estudios pilotos previos llevados a cabo en nuestro laboratorio utilizando una tarea parecida (Roca, Castro, López-Ramón, & Lupiáñez, 2011). Adicionalmente, la explicación de la relevancia de la clave para captar la atención y dirigirla hacia el *target*,

así como a los atributos que los componen, podría explicar, al menos parcialmente, el mayor efecto de repetición de los atributos entre estímulos consecutivos observado para los individuos con alto *cheerfulness*, ya que esto sólo fue observado en las condiciones en que la preparación anticipada a la tarea era posible, es decir cuando se incluía la variable preparación (Estudio 1 y parte de preparación del Estudio 2), pero no cuando la preparación anticipada no era posible (parte de no preparación del Estudio 2).

En resumen, de los estudios aquí presentados, se podría extraer que una mayor disposición al sentido del humor no produciría un beneficio en procesos cognitivos tales como la flexibilidad cognitiva aunque este tipo de personas podrían ser más "sensibles" a ciertas claves contextuales del entorno, beneficiándose de las mismas, lo que podría llevarles, quizás, a una mejor adaptación al medio que les rodea. En cualquier caso, se necesitan futuros estudios para poner a prueba dichas hipótesis.

9.4. *Cheerfulness* rasgo y procesos emocionales

Con el objetivo de situar coherentemente los resultados que se han alcanzado en las *Series Experimentales II*, *III*, y *IV*, éstos serán discutidos a continuación en función del modelo representado en la Figura 2.

Una de las ventajas de la propuesta de las bases afectivas y cognitivas del sentido del humor es que contempla las diferencias individuales rasgo/estado para predecir la respuesta emocional al humor (Ruch & Köhler, 2007). Teniendo en cuenta que el estado contempla las variaciones momentáneas ante las situaciones para un mismo individuo, éste puede ser modificado por estímulos caracterizados por una determinada carga afectiva. En este sentido, y dado que el *cheerfulness* es una predisposición positiva, no es de extrañar que se incremente tras la exposición a estados afectivos positivos/humorísticos (Ruch & Köhler, 2007; Ruch & cols., 1997) y que disminuya ante estados afectivos negativos (ej., López-Benítez, Coll-Martín, Carretero-Dios, Lupiáñez, & Acosta, *en revisión*). Al igual que ocurriría con respecto a la emoción de hilaridad (ver opción (e) en la Figura 1 de la introducción), una mayor o menor disposición estado podría contribuir, a su vez, a la manera en la que la persona "reacciona" o "se enfrenta" a tales estímulos.

De manera importante, los autores proponen que los rasgos representan las disposiciones para sus respectivos estados, de tal manera que las personas con alto

cheerfulness rasgo muestran un mayor nivel de *cheerfulness* estado, mantienen en mayor medida dicho estado ante eventos negativos, una mejor recuperación del estado ante ellos, etc. (ver Ruch & Hofmann, 2012, para un revisión más detallada de las relaciones estado-rasgo). Adicionalmente, se ha demostrado que el *cheerfulness* rasgo modula el impacto de la inducción de diversión (positiva) sobre los cambios producidos en el *cheerfulness* estado (Ruch, 1997; Ruch & Stevens, 1995). A lo largo de nuestros estudios (*Serie Experimental II* y *III*), también hemos confirmado dichas relaciones a través de distintas medidas y procedimientos experimentales (López-Benítez & cols., *en revisión*-a; López-Benítez & cols., *en revisión*), reflejando que las personas caracterizadas por un nivel elevado de *cheerfulness* rasgo muestran un mayor incremento en su estado afectivo tras una inducción positiva en comparación con las personas con bajo *cheerfulness* rasgo.
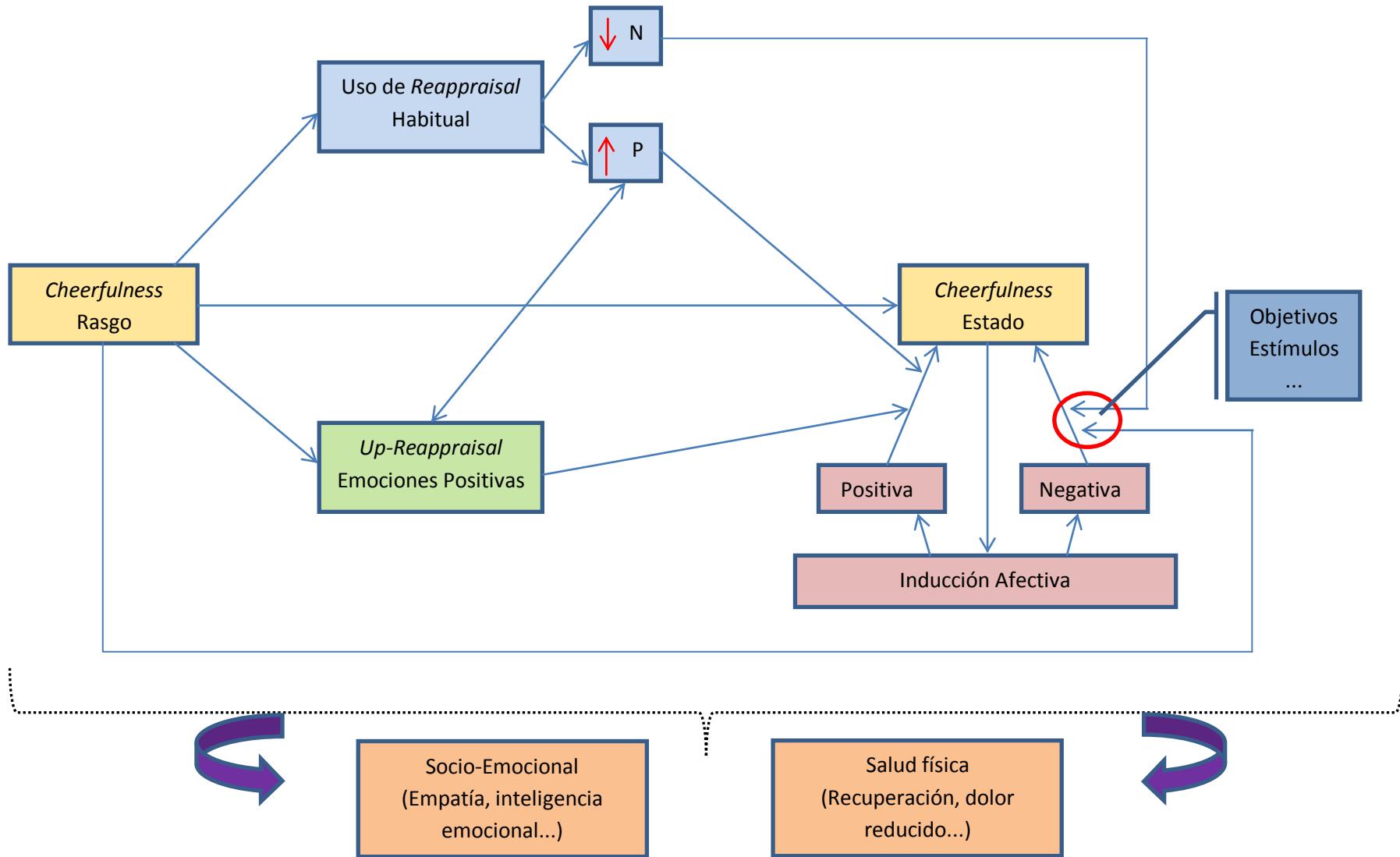
Figura 1. Representación gráfica del rol del *cheerfulness* rasgo sobre procesos emocionales, que ayuda a integrar los resultados hallados en la tesis. El cheerfulness rasgo modularía los efectos de una inducción positiva sobre el cheerfulness estado a través del uso habitual e instruido de estrategias de regulación emocional para incrementar el impacto de las emociones positivas, mientras que el efecto de una inducción negativa sobre el cheerfulness estado vendría determinado por el nivel de cheerfulness rasgo así como por el uso de estrategias de regulación emocional para disminuir la intensidad afectiva, siendo ambas vías influenciadas por aspectos como los objetivos/estímulos. La mayor permeabilidad afectiva para las personas con alto cheerfulness rasgo produciría beneficios socio-emocionales así como en la salud física.

Sin embargo, estos resultados no se extendieron a las medidas psicofisiológicas empleadas en la *Serie Experimental II*. De hecho, se observó un mayor descenso en tasa cardíaca para las personas con bajo *cheerfulness* rasgo ante *films* de diversión y tristeza, mientras que no se observó ningún efecto para la conductancia eléctrica de la piel. Aunque sería conveniente que estos resultados fueran replicados, éstos podrían entenderse también en términos de una mayor atención hacia el material afectivo por parte de los individuos con bajo *cheerfulness* rasgo (Carvalho, Leite, Galdo-Álvarez, & Gonçalves, 2012; Codispoti, Surcinelli, & Baldaro, 2008; Fernández & cols., 2012), debido a que tendrían más problemas para inducirse a estados afectivos presentes en el medio de una forma natural, o simplemente a que, tal y como señalan algunos autores (Mauss & Robinson, 2009; Russell, 2003), los distintos componentes/elementos que forman la emoción pueden desencadenarse de manera independiente a la ocurrencia y/o dirección de los demás. En cualquier caso, nuestro patrón de resultados de auto-informe concuerda con los postulados básicos descritos sobre las relaciones entre el *cheerfulness* rasgo y estado (Ruch & Hofmann, 2012), demostrando que las personas con alto *cheerfulness* muestran una mayor disposición así como un bajo umbral para responder y experimentar positivamente este tipo de estimulación.

Estos planteamientos pueden completarse con los hallazgos obtenidos en la *Serie Experimental IV*, en la cual intentábamos ofrecer pistas sobre la naturaleza de este fenómeno (López-Benítez & cols., *en revisión*). Como apuntamos en la introducción, las estrategias de regulación emocional, ya sea en el uso diario (ERQ; Gross & John, 2003) o instruido (ej., Ehring & cols., 2010), permiten alterar el impacto afectivo que provocan las emociones (Gross, 1998a, 1998b). Desde este punto de vista, una posible explicación para los resultados observados podría ser que las personas con alto *cheerfulness* rasgo usaran y/o aplicaran en mayor medida y/o con mayor eficiencia estrategias de *reappraisal* para incrementar el impacto de las emociones positivas. Los resultados de nuestro estudio parece que apoyan ambas consideraciones. En este sentido: a) encontramos una correlación positiva entre el *cheerfulness* rasgo y las estrategias de *reappraisal* en el uso frecuente de la vida diaria, entre las que se incluyen aumentar las emociones positivas, así como disminuir las negativas (ERQ; Gross & John, 2003); y b) observamos que los individuos altos en *cheerfulness* mostraban una mayor habilidad en el uso instruido de una estrategia de *reappraisal* para aumentar el impacto de una estimulación humorística. Por tanto, es posible pensar que el uso de

estas estrategias con mayor frecuencia y eficacia subyace a la modulación del *cheerfulness* rasgo sobre el estado cuando la inducción es positiva. Además, dichos resultados parecen estar estrechamente vinculados, retroalimentándose mutuamente, es decir, el hecho de que las personas con alto *cheerfulness* rasgo empleen más estrategias para aumentar las emociones positivas podría provocar que sean más eficaces para aplicar este tipo de estrategias, lo que, a su vez, desencadenaría que las usaran en mayor medida en su vida diaria.

Sin duda, uno de los resultados más importantes observados en la presente tesis se refiere a la modulación que el *cheerfulness* rasgo ejerce sobre el estado afectivo (*cheerfulness* estado) cuando los individuos se exponen a eventos con una alta carga afectiva negativa. Los estudios llevados a cabo en las *Series Experimentales II* y *III* reflejaron que, comparadas con las personas con bajo *cheerfulness*, los individuos con alto *cheerfulness* rasgo reportaron un mayor cambio en su estado afectivo, medido por un mayor descenso en *cheerfulness* estado (López-Benítez & cols., *en revisión*-a) así como una tendencia a un mayor incremento de estados afectivos negativos (López-Benítez & cols., *en revisión*) cuando se enfrentan a eventos negativos de tristeza y/o ansiedad.

A priori, estos resultados no concordarían con los datos de la *Serie Experimental IV*, los cuales reflejan una relación positiva entre el *cheerfulness* rasgo y el uso frecuente en la vida diaria de estrategias de *reappraisal* dedicadas a minimizar el impacto de las emociones negativas (López-Benítez & cols., *en revisión*). También irían en contra de las relaciones teóricas propuestas entre el *cheerfulness* rasgo/estado (Ruch & Hofmann, 2012) así como de algunos estudios previos (Ruch & Köhler, 1999; Wancke, 1996), los cuales ponen de manifiesto que las personas con alto *cheerfulness* rasgo mantienen en mayor medida un estado de *cheerfulness* elevado ante emociones negativas, manifestando una menor afectación emocional, así como una recuperación más rápida y eficiente (Papousek & Schulter, 2010; Ruch & Hofmann, 2012).

Antes de pasar a comentar las posibles explicaciones propuestas para aunar las investigaciones previas con los resultados hallados, es necesario hacer una mención especial a los procedimientos y estímulos experimentales empleados. En los estudios llevados a cabo en la presente tesis, utilizamos un procedimiento experimental en el que personas diferenciadas en su nivel de *cheerfulness* rasgo (STCI-T; Carretero-Dios &

cols., 2014) eran inducidas afectivamente mediante estímulos, los cuales se contrabalanceaban, seleccionados de bases de datos validadas para tal fin (Fernández & cols., 2011; Moltó & cols., 1999). Además, de nuestros estudios se desprendía que las respuestas no estaban influidas por la deseabilidad social de los participantes (Ferrando & Chico, 2000). Sin embargo, los estudios, en ocasiones correlacionales, derivados de la investigación previa, no aplicaban un procedimiento de control de variables y de selección de estímulos como los presentados aquí (ver Ruch & Hofmann, 2012, para una revisión), lo que podría explicar, al menos parcialmente, las discrepancias observadas.

En cualquier caso, a pesar de las limitaciones metodológicas observadas en la literatura previa, y asumiendo que dichos resultados son plausibles, nos planteamos tres posibles explicaciones para dar cuenta de dicho patrón de resultados. Como una primera explicación, podrían entenderse los resultados previos asumiendo que las personas con alto *cheerfulness* rasgo poseen una permeabilidad reducida a estímulos y eventos negativos, protegiéndose ante ellos. Sin embargo, nuestros resultados no solo no avalan tal explicación sino que, además, muestran el patrón contrario. La segunda explicación hace referencia a que este tipo de personas aplican de una forma más eficiente estrategias de *reappraisal* para disminuir la intensidad afectiva (*down-regulate reappraisal*) para minimizar el impacto afectivo negativo. Esta idea tampoco se vería apoyada por nuestros datos, ya que el *cheerfulness* no moderaba/modulaba las relaciones entre la estrategia de *reappraisal* para disminuir la intensidad afectiva y el estado afectivo del participante. Por último, la tercera explicación alude a la posibilidad de que estos datos pudieran sustentarse, al menos parcialmente, en que los individuos con alto *cheerfulness* rasgo suelen reportar un uso más frecuente en su día a día de estrategias de *reappraisal* que se emplean para atenuar el impacto de las emociones/situaciones negativas presentes en el medio.

Tal y como representamos en la Figura 2, ésta última vía es la que consideramos más interesante para dotar de un sentido global a los datos encontrados en relación a los planteamientos previos descritos. Por tanto, desde nuestra óptica, tanto un elevado *cheerfulness* rasgo como un uso frecuente de estrategias de *reappraisal* para minimizar el impacto afectivo podrían coexistir y afectar diferencialmente a las relaciones presentes entre una determinada estimulación afectiva negativa y los cambios que ésta produce en el *cheerfulness* estado.

Estas relaciones de permeabilidad y afrontamiento estarían moduladas por una serie de criterios que podrían ayudar a explicar o predecir el "peso" concreto de cada "vía" como, por ejemplo, los posibles objetivos/beneficios de una inducción emocional en un determinado contexto. Se ha sugerido que la preferencia o el incremento de emociones negativas podría ser deseable y útil cuando se pretenden lograr determinados objetivos (Tamir, Mitchell, & Gross, 2008). Por ejemplo, Ford y Tamir (2012) encontraron que la preferencia a sentir enfado en situaciones en las cuales se desarrolla una confrontación con otras personas podría ser considerada como una mejor elección comparada con la preferencia a sentir felicidad. Otro criterio tendría que ver con la propia cualidad afectiva de los estímulos así como con el tiempo. Desde este punto de vista, es posible que las personas con alto *cheerfulness* rasgo sean inducidos en mayor medida a corto plazo como consecuencia de ser expuestos a estados afectivos negativos, quizás, debido a la saliencia del estímulo (a un nivel de procesamiento *bottom-up*), ya que estos individuos estarían caracterizados por una mayor disposición a estados afectivos, lo que les permitiría captar mejor los matices y características de dichos estímulos. No obstante, aplicarían más frecuentemente estrategias de *reappraisal* en su vida diaria para minimizar ese impacto negativo a largo plazo. De esta manera, se justificaría que, aunque experimenten con mayor intensidad las emociones negativas, su estado afectivo general sería positivo debido a que usan estrategias de afrontamiento positivo más a menudo.

Finalmente, el hecho de que las personas con alto *versus* bajo *cheerfulness* rasgo muestren una mayor "sensibilidad" o "permeabilidad" ante estados afectivos diferenciados en valencia, así como un mayor uso tanto frecuente como instruido (al menos en el caso de las emociones positivas) de estrategias de *reappraisal*, desencadenaría toda una serie de beneficios en el bienestar socio-emocional y físico. Por ejemplo, los individuos caracterizados por un nivel elevado de *cheerfulness* rasgo tendrían un mayor manejo y comprensión de sus propias emociones, como ya han apuntado algunos estudios correlacionales (Yip & Martin, 2006), mostrando una mayor habilidad para sentir, monitorizar, mostrar, y "utilizar" las emociones en función del contexto (Ford & Tamir, 2012). Esta relación entre el *cheerfulness* y la inteligencia emocional fomentaría, además, estilos de interacción positivos, socialmente "cálidos", y empáticos (Beermann & Ruch, 2009a; Ruch & cols., 2011). Dichos efectos, junto con las ventajas que producen el uso de estrategias de *reappraisal* (ver Gross, 2015;

Quoidbach & cols., 2015, para revisiones), producirían beneficios en el bienestar psicológico, como un mayor optimismo, satisfacción con la vida, felicidad, y mayores relaciones con dimensiones de personalidad asociadas a salud, como la apertura a la experiencia o la extraversión (Carretero-Dios & cols., 2014; Ruch & Hofmann, 2012; Ruch & Köhler, 2007). Adicionalmente, un mejor manejo emocional y un mayor uso de estrategias de *reappraisal* por parte de las personas con alto *cheerfulness* rasgo podría conllevar un menor impacto fisiológico del ambiente afectivo (López-Benítez & cols., *en revisión*-a) y una mayor tolerancia al dolor físico (Zweyer & cols., 2004), e incluso tener una afrontamiento más "saludable" ante ciertas enfermedades (Delgado-Domínguez & cols., 2016; Delgado-Domínguez & cols., 2014).

9.5. Limitaciones y futuras investigaciones

A pesar de la relevancia de los datos presentados, nuestros estudios podrían adolecer de algunas limitaciones, las cuales deberían ser tenidas en cuenta para futuras investigaciones. Una de las principales limitaciones de la presente tesis doctoral se refiere tanto a la muestra empleada en nuestros estudios como a la creación de grupos de participantes. En este sentido, y exceptuando algunas muestras utilizadas en los estudios psicométricos, los datos fueron recogidos en población universitaria, la cual puede no ser una muestra representativa del amplio espectro que caracteriza a la sociedad, por lo que hay que tomar con cierta cautela la generalización de los resultados. Asumiendo que el sentido del humor es inherente a los seres humanos, futuros estudios deberían intentar replicar y expandir los hallazgos presentados en rangos de poblaciones diferenciados, como niños, adolescentes, o personas mayores.

Además, en nuestros estudios empleamos un método basado en ± 1 desviación típica sobre la puntuación media de los participantes en el STCI-T (Carretero-Dios & cols., 2014) con el objetivo de crear grupos diferenciados en *cheerfulness* rasgo. Aunque este método ha resultado eficaz y es estadísticamente más potente en comparación con los estudios que emplean la mediana (ej., Ruch, 1997), dadas las características de la muestra que utilizamos, el grupo formado por personas con bajo *cheerfulness* rasgo suelen mostrar un nivel elevado de este factor, oscilando su promedio de respuesta entre 2.34 y 2.89 en nuestros estudios, en una escala que va desde 1 a 4. De los datos obtenidos de estudios correlacionales, se observa una tendencia lineal en relación a los procesos estudiados. En este sentido, con el objetivo de profundizar en este

conocimiento, así como para solventar dicha limitación, futuros estudios deberían intentar crear grupos más extremos para analizar las diferencias en *cheerfulness* en personas caracterizadas por valores bajo *versus* medio *versus* alto.

Una segunda limitación alude al uso de las medidas empleadas. Aunque en la *Serie Experimental I* y en el Estudio 2 de la *Serie Experimental II* utilizamos medidas comportamentales y psicofisiológicas, respectivamente, en la mayoría de los estudios llevados a cabo obtenemos los datos a través de auto-informe. Aunque este tipo de medidas son sencillas, fáciles de administrar, y permiten evaluar el estado afectivo "subjetivo" de una persona ante cualquier estímulo y situación, no se debe olvidar que muestran ciertas limitaciones, como por ejemplo la dificultad de algunas personas para expresar y/o cuantificar el estado afectivo así como la posibilidad de falsear los cuestionarios con el objetivo de ofrecer una respuesta más aceptada socialmente (Mauss & Robinson, 2009). Aunque en nuestros estudios intentamos descartar esta última posibilidad mediante la introducción en los análisis de las puntuaciones en el cuestionario de deseabilidad social como covariado, los problemas inherentes a la dificultad para expresar el estado afectivo reportado permanecen. Además, las emociones pueden manifestarse a través de vías claramente diferenciadas, como puede ser el comportamiento, cambios en el Sistema Nervioso Central o Periférico, etc, las cuales, según algunos autores, pueden concretarse en un patrón determinado (Scherer, 2005) o, según otros, pueden desencadenarse de manera independiente (Russell, 2003). Por tanto, las investigaciones futuras deberían seguir indagando en el conocimiento del *cheerfulness*, mediante el uso de técnicas que recojan diferentes sistemas de respuesta.

Una tercera limitación hace referencia a las características del análisis realizado para determinar la estabilidad de las bases temperamentales del sentido del humor rasgo-estado a lo largo de tiempo (*Estudio Psicométrico II*). Se llevó a cabo un estudio longitudinal de seis meses en el que los participantes debían completar la STCI-T y la STCI-S cuatro veces, con una separación temporal de dos meses entre cada evaluación. Por un lado, las características de las sesiones de evaluación fueron muy parecidas entre sí, por lo que quizás no había mucha variabilidad contextual para comprobar la modulación que podía ejercer el contexto sobre las bases afectivas y cognitivas del sentido del humor. Además, es posible que cuatro evaluaciones no fueran suficientes para captar la variabilidad intra-individual. Por otro lado, no consideramos otras variables que pudieran repercutir en el estudio longitudinal, como las dimensiones de

bienestar. Por tanto, futuros estudios deberían solventar dichas limitaciones con el objetivo de seguir profundizando en el análisis y comprensión del *cheerfulness, seriousness*, y *bad mood*.

Una limitación relacionada con los procedimientos de inducción emocional (*Series Experimentales II* y *III*) hace referencia a la falta de igualación del estado afectivo de los participantes como paso previo a la manipulación experimental. Independientemente de la creación de grupos a partir de determinados rasgos, como el *cheerfulness*, el estado afectivo que tiene un individuo cuando comienza el estudio puede ser muy diferente al que muestra otra persona (incluso aunque pertenezcan al mismo grupo), siendo un elemento de especial relevancia en la generación de un estado posterior. Por ello, y como hacemos en la *Serie Experimental IV*, los estudios futuros debieran considerar la inclusión de un estímulo neutro al comienzo del estudio con el fin de eliminar, o al menos minimizar, dicha variable extraña.

Finalmente, aunque queríamos analizar en profundidad el rol del *cheerfulness* sobre procesos cognitivos y emocionales, es importante tener presente que Ruch y colaboradores (1996, 1997) proponen otras dos bases afectivas y cognitivas para predecir la respuesta emocional al humor: *seriousness* y *bad mood*. Dadas las relaciones que el *cheerfulness* mantiene con ellos, sería interesante incorporarlas en estudios futuros con el fin de observar si el *seriousness* y el *bad mood* muestran una modulación opuesta sobre los procesos aquí abordados, o más bien de una naturaleza distinta. Por ejemplo, asumiendo que el *seriousness* alude a procesos cognitivos, de reflexión, y análisis en profundidad de una situación, es posible que quizás tenga más relevancia que el *cheerfulness* en tareas de índole cognitiva.

Desde un punto de vista empírico, los resultados observados abren nuevas vías de investigación en el área del sentido del humor. Por ejemplo, en el estudio llevado a cabo en la *Serie Experimental IV*, descubrimos que los individuos con alto *versus* bajo *cheerfulness* rasgo eran más eficientes en la aplicación de la estrategia de *reappraisal* para incrementar la intensidad afectiva (*up-regulation reappraisal*) con el objetivo de aumentar sus emociones positivas. Desde este punto de vista, sería importante replicar los datos encontrados, para demostrar que no es un efecto espurio. Más importante aún, dada la relevancia de estudiar al ser humano desde sus diferentes sistemas de respuesta, y teniendo en cuenta que Gross (1998b, 2015) propone que las estrategias de regulación

emocional pueden generar cambios en ellos, consideramos que sería muy interesante explorar si dichos efectos también se muestran cuando se analizan sistemas de respuesta emocional "objetivos", tales como los cambios en el Sistema Nervioso Autónomo (tasa cardíaca, conductancia eléctrica de la piel, respiración, etc) así como los cambios conductuales, especialmente la expresión facial (FACS; Ekman & cols., 2002).

En esta misma línea de trabajo, sería interesante analizar la modulación de otros factores que también contribuyen a predecir la respuesta emocional al humor, sobre los procesos de regulación emocional. Por ejemplo, la gelotofobia, la cual es entendida en términos de las diferencias individuales en el miedo a la risa (Titze, 2009; Torres-Marín & Carretero-Dios, 2017), correlaciona negativamente con el factor de *cheerfulness* (Ruch & Proyer, 2008). En este sentido, se podría pensar que las personas con un alto nivel en gelotofobia rasgo quizás mostrarían una peor habilidad para aumentar las emociones positivas ante estimulación humorística, así como una mayor habilidad para aumentar el impacto de las emociones negativas sobre el estado afectivo.

Otra línea de investigación se halla ligada a uno de los postulados básicos del modelo de las bases del sentido del humor, el cual hace referencia a la velocidad de recuperación del estado de ánimo tras la exposición a estímulos afectivos (Ruch & Hofmann, 2012; Ruch & Köhler, 2007). Aunque se ha propuesto que las personas con una elevada disposición a estados afectivos positivos se recuperan más rápido del impacto afectivo que genera una inducción emocional negativa, comparadas con las personas con bajo *cheerfulness* (Papousek & Schulter, 2010; Ruch & Hofmann, 2012), y a pesar de que algunos de nuestros resultados hayan ofrecido pistas en esta dirección cuando se ha medido la tasa cardíaca (López-Benítez & cols., *en revisión*-a), sería interesante desarrollar investigaciones que estudiaran no solo el efecto de la inducción emocional, sino también la recuperación a la misma.

A través de nuestros resultados, hemos interpretado que el *cheerfulness* rasgo se relaciona con aspectos de la inteligencia emocional, como la comprensión y manejo de las emociones. De hecho, algunos estudios ya han puesto de manifiesto relaciones positivas entre los estilos de humor, especialmente, y componentes de la inteligencia emocional (Gignac, Karatamoglou, Wee, & Palacios, 2014; Greven, Chamorro-Premuzic, Arteche, & Furnham, 2008; Yip & Martin, 2006). Sin embargo, hasta la fecha, no hay estudios que hayan analizado la relación entre las bases afectivas y

cognitivas del sentido del humor y la inteligencia emocional. Así, futuras investigaciones deberían poner el foco de atención en el estudio de dichas relaciones, controlando, además, variables de personalidad asociadas a ambos constructos (extraversión, optimismo, etc).

Finalmente, uno de los trabajos que estamos desarrollando en el laboratorio se relaciona con los factores que modulan la intensidad de la respuesta de diversión a estímulos aversivos (*misfortunes*). Así, algunos estudios han apuntado que la gravedad percibida de un acontecimiento y el distanciamiento social que se tiene con respecto al mismo se relacionan con la respuesta humorística dada a dicho acontecimiento (McGraw, Warren, Williams, & Leonard, 2012). Sin embargo, se desconoce si el *cheerfulness* rasgo modula estas respuestas ya que, aunque se ha visto que las personas con alto *cheerfulness* son más sensibles al contexto afectivo, en su vida diaria son más proclives a utilizar estrategias de *reappraisal* para aumentar las emociones positivas o disminuir las negativas. Hasta la fecha, hemos conseguido desarrollar nuestros propios estímulos y replicar la hipótesis planteada por McGraw y colaboradores (2012). En un futuro próximo esperamos estudiar la modulación del *cheerfulness* rasgo sobre los procesos que desencadenan una respuesta de diversión ante estímulos aversivos (*misfortunes*) bien porque son considerados leves, bien por la distancia social desde la que los percibimos.

9.6. Conclusiones

Hasta hace unas décadas, el estudio del sentido del humor no ha sido adecuadamente abordado dentro de la Psicología, quedando su uso relegado a un segundo plano. A través de las series experimentales llevadas a cabo en la presente tesis doctoral, pretendíamos romper esa tradición, destacando la relevancia del *cheerfulness*, como una de las piezas fundamentales dentro del modelo teórico de las bases afectivas y cognitivas del sentido del humor, sobre procesos tanto cognitivos como emocionales. Como paso previo, se llevaron a cabo dos estudios psicométricos con el objetivo de adaptar el instrumento de referencia que sirve para operacionalizar las bases temperamentales del sentido del humor, tanto en su versión de rasgo como de estado. Nuestros resultados demostraron las adecuadas propiedades psicométricas de las escalas, así como su aplicabilidad en el ámbito experimental.

Un resultado importante de la presente tesis doctoral es que el *cheerfulness*, entendido como una predisposición afectiva positiva a la respuesta emocional de hilaridad, no produce mejoras a nivel de flexibilidad cognitiva, medido por un menor coste por cambio de tarea, ni en el funcionamiento de las redes atencionales de alerta, orientación, y control cognitivo, aunque sí muestran más efectos de repetición de atributos y de preparación a la tarea. Este resultado tiene una relevancia especial, ya que pone de manifiesto que el hecho de tener una mayor disposición hacia el sentido del humor y las emociones positivas no implica automáticamente una mejora cognitiva en este tipo de individuos, poniendo el foco de atención, por tanto, en la importancia de no caer en el error de pensar que "todo vale" o que "el humor, el sentido del humor, la risa, y/o las emociones positivas producen siempre beneficios", tal y como se defiende desde algunas corrientes actuales. En cualquier caso, nuestros resultados solo suponen la punta del *iceberg*, siendo necesario un estudio más pormenorizado y profundo sobre los posibles roles que el *cheerfulness* puede ejercer sobre los procesos cognitivos.

De manera importante, el principal patrón de resultados, sistemáticamente observados en esta tesis, señala que los individuos caracterizados por un alto *cheerfulness* rasgo son más "sensibles" o "permeables" al entorno emocional que las personas con bajo *cheerfulness* rasgo, con independencia de la cualidad afectiva que posea el estímulo afectivo. En relación a esto, nuestra última serie experimental revela que dichas personas también suelen aplicar más estrategias de *reappraisal* en su vida diaria, ya sea para aumentar el impacto de un estímulo positivo sobre su estado afectivo, demostrando, además, poseer una mayor eficiencia para llevarlo a cabo, o para reducirlo cuando se trata de un estímulo negativo, comparados con las personas con bajo *cheerfulness* rasgo. Desde nuestra interpretación, estos resultados son muy relevantes, ya que una mayor sensibilidad a las emociones, en general, podría llevar asociada toda una serie de beneficios tanto a nivel físico (por ejemplo, produciendo una mejora en la salud) como psicológico y social (por ejemplo, comprendiendo y manejando mejor las emociones).

A pesar de las limitaciones presentes en los estudios que han guiado los resultados de la presente tesis doctoral, se ha constatado la idoneidad de las escalas que sirven para medir las bases afectivas y cognitivas del sentido del humor, así como la relevancia que el *cheerfulness* rasgo tiene sobre procesos cognitivos y, especialmente, emocionales. Estos resultados remarcarían la propia conceptualización del *cheerfulness* como un

factor eminentemente afectivo, a la vez que señalan futuras vías de investigación, las cuales nos permitirán avanzar en el conocimiento sobre la utilidad que el *cheerfulness* y el sentido del humor tienen en nuestra vida.

Capítulo X: Referencias

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*, 217–237. doi: 10.1016/j.cpr.2009.11.004

Almeida, D. M., Wethington, E., & Kessler, R. C. (2002). The daily inventory of stressful events: An interview-based approach for measuring daily stressors. *Assessment, 9*, 41–55. doi: 10.1177/1073191102091006

American Educational Research Association American Psychological Association National Council on Measurement in Education (1999). *Standards for Educational and Psychological Testing*. Washington, D.C.: American Psychological Association.

Angleitner, A., John, O. P., & Löhr, F. J. (1986). It's what you ask and how you ask it: An itemmetric analysis of personality questionnaires. In A. Angleitner (Ed.), *Personality assessment via questionnaires* (pp. 61–107). Berlin, Germany: Springer.

Apter, M. J. (2001). *Motivational styles in everyday life: A guide to reversal theory*. Washington, D.C.: American Psychological Association.

Bachorowski, J. A. (1999). Vocal expression and perception of emotion. *Current Directions in Psychological Science, 8*, 53–57. doi: 10.1111/1467-8721.00013

Barrett, L. F., & Niedenthal, P. M. (2004). Valence focus and the perception of facial affect. *Emotion, 4*, 266–274. doi: 10.1037/1528-3542.4.3.266

Bastian, B., Kuppens, P., De Roover, K., & Diener, E. (2014). Is valuing positive emotion associated with life satisfaction? *Emotion, 14*, 639–645. doi: 10.1037/a0036466

Baumann, N., & Kuhl, J. (2005). Positive affect and flexibility: Overcoming the precedence of global over local processing of visual information. *Motivation and Emotion, 29*, 123–134. doi: 10.1007/s11031-005-7957-1

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford Press.

Beck, A. T., Steer, R. A., & Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review, 8*, 77–100. doi: 10.1016/0272-7358(88)90050-5

Beermann, U., & Ruch, W. (2009a). How virtuous is humour? What we can learn from current instruments. *Journal of Positive Psychology, 22*, 395–417. doi:10.1080/17439760903262859

Beermann, U., & Ruch, W. (2011). Can people ever "laugh at themselves"? Experimental and correlational evidence. *Emotion, 11*, 492–501. doi:10.1037/a0023444

Berlyne, D. E. (1972). Humor and its kin. In J.H. Goldstein & P.E. McGhee (Eds.), *The psychology of humor: Theoretical perspectives and empirical issues* (pp. 43–60). New York: Academy Press.

Berry, D. S., Willingham, J. K., & Thayer, C. A. (2000). Affect and personality as predictors of conflict and closeness in young adults' friendships. *Journal of Research in Personality, 34*, 84–107. doi: 10.1006/jrpe.1999.2271

Boulton, M.J., & Smith, P.K. (1992). The social nature of play fighting and play chasing: Mechanisms and strategies underlying cooperation and compromise. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp.429–444). New York: Oxford University Press.

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25*, 49–59. doi:10.1016/0005-7916(94)90063-9

Bradley, M. M., & Lang, P. J. (1999). *Affective norms for English words (ANEW): Instruction manual and affective ratings* (pp. 1–45). Technical report C-1, the center for research in psychophysiology, University of Florida.

Bradley, M. M., & Lang, P. J. (2000b). Measuring emotion: Behavior, feeling, and physiology. In R. D. Lane & L. Nadel (Eds.), *Cognitive Neuroscience of Emotion* (pp. 242–276). New York: Oxford University Press.

Bradley, M. M., & Lang, P. J. (2007). *The International Affective Digitized Sounds (IADS-2): Affective ratings of sounds and instruction manual*. Tech. Rep. B–3. University of Florida, Gainesville, FL.

Brans, K., Koval, P., Verduyn, P., Lim, Y. L., & Kuppens, P. (2013). The regulation of negative and positive affect in daily life. *Emotion, 13*, 926–939. doi: 10.1037/a0032400

Bryant, J., & Miron, D. (2003). Excitation-transfer theory. In J. Bryant, D. Roskos-Ewoldsen, & J. Cantor (Eds.), *Communication and emotion: Essays in honor of Dolf Zillmann* (pp. 31–59). Mahwah, NJ: Erlbaum

Burnham, K. P., & Anderson, D. R. (2002). Information and likelihood theory: A basis for model selection and inference. In K. P. Burnham & D. R. Anderson (Eds.), *Model selection and multimodel inference: A practical information-theoretic approach* (pp. 49–97). New York, NY: Springer-Verlag.

Cabello, R., Salguero, J.M., Fernández-Berrocal, P., & Gross, J.J. (2013). A Spanish Adaptation of the Emotion Regulation Questionnaire. *European Journal of Psychological Assessment, 29*, 234–240. doi: 10.1027/1015-5759/a000150

Cacioppo, J. T., Berntson, G. G., Larsen, J. T., Poehlmann, K. M., & Ito, T. A. (2000). The psychophysiology of emotion. In M. Lewis & J. M. Haviland-Jones (Eds.), *The handbook of emotion*. New York: Guildford Press.

Callejas, A., Lupiáñez, J., & Tudela, P. (2004). The three attentional networks: On their independence and interactions. *Brain and Cognition, 54*, 225–227. doi: 10.1016/j.bandc.2004.02.012

Campbell, A. M., Davalos, D. B., McCabe, D. P., & Troup, L. J. (2011). Executive functions and extraversion. *Personality and Individual Differences*, *51*, 720–725. doi: 10.1016/j.paid.2011.06.018

Carretero-Dios, H., Benítez, I., Delgado-Rico, E., Ruch, W., & López-Benítez, R. (2014). Temperamental basis of sense of humor: The Spanish long form of the trait version of the State-Trait-Cheerfulness-Inventory. *Personality and Individual Differences, 68*, 77–82. doi:10.1016/j.paid.2014.03.045

Carretero-Dios, H., Eid, M., & Ruch, W. (2011). *Analyzing multitrait-multimethod data with multilevel confirmatory factor analysis: An application to the validation of the State–Trait Cheerfulness Inventory. Journal of Research in Personality, 45*, 153–164. doi:10.1016/j.jrp.2010.12.007

Carter, L. E., McNeil, D. W., Vowles, K. E., Sorrell, J. T., Turk, C. L., Ries, B. J., & Hopko, D. R. (2002). Effects of emotion on pain reports, tolerance and physiology. *Pain Research and Management*, *7*, 21–30. doi: 10.1155/2002/426193

Carvalho, S., Leite, J., Galdo-Álvarez, S., & Gonçalves, O.F. (2012). The Emotional Movie Database (EMDB): A self-report and psychophysiological study. *Applied*

Psychophysiology and Biofeedback, 37, 279–294. doi:10.1007/s10484-012-9201-6

Cattell, R. B., & Luborsky, L. B. (1947). Personality factors in response to humor. *The Journal of Abnormal and Social Psychology*, *42*, 402–421. doi: 10.1037/h0062651

Chen, G. H., Ruch, W., & Li, Y. N. (2016). Temperamental basis of sense of humor: Validating the State-Trait-Cheerfulness-Inventory in Mainland China. *Humor: International Journal of Humor Research, 29,* 77–97. doi:10.1515/humor-2015-0129

Cicchetti, D. V., & Sparrow, S. A. (1981). Developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. *American Journal of Mental Deficiency, 86,* 127–137.

Codispoti, M., Surcinelli, P., & Baldaro, B. (2008). Watching emotional movies: Affective reactions and gender differences. *International Journal of Psychophysiology, 69,* 90–95. doi:10.1016/j.ijpsycho.2008.03.004

Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A., & Conway, A. M. (2009). Happiness unpacked: positive emotions increase life satisfaction by building resilience. *Emotion, 9,* 361–368. doi: 10.1037/a0015952

Compton, R. J. (2000). Ability to disengage attention predicts negative affect. *Cognition and Emotion, 14,* 401–415. doi 10.1080/026999300378897

Compton, R. J., Wirtz, D., Pajoumand, G., Claus, E., & Heller, W. (2004). Association between positive affect and attentional shifting. *Cognitive Therapy and Research, 28,* 733–744. doi: 10.1007/s10608-004-0663-6

Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.

Craik, K. H., Lampert, M. D., & Nelson, A. J. (1993). *Research manual for the Humorous Behavior Q-sort Deck.* Berkeley, C.A.: University of California.

Crone, E. A., Wendelken, C., Donohue, S. E., & Bunge, S. A. (2006). Neural evidence for dissociable components of task-switching. *Cerebral Cortex, 16,* 475–486. doi: 10.1093/cercor/bhi127

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology, 24,* 349–354

Cuthbert, B. N., Schupp, H. T., Bradley, M. M., Birbaumer, N., & Lang, P. J. (2000). Brain potentials in affective picture processing: Covariation with autonomic arousal and affective report. *Biological Psychology, 52*, 95–111. doi: 10.1016/S0301-0511(99)00044-7

Davidson, M. C., Amso, D., Anderson, L. C., & Diamond, A. (2006). Development of cognitive control and executive functions from 4 to 13 years: Evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia, 44*, 2037–2078. doi: 10.1016/j.neuropsychologia.2006.02.006

Delgado-Domínguez, C. J., Escudero-Contreras, A., Font-Ugalde, P., Ruiz-Vílchez, D., Collantes-Estévez, E., & Carretero-Dios, H. (2016). Upswings in cheerful mood and disease activity in patients with rheumatoid arthritis. *International Journal of Behavioral Medicine, 23*, 606–610. doi:10.1007/s12529-016-9550-2

Delgado-Domínguez, C. J., Font-Ugalde, P., Ruiz-Vílchez, D., Carretero-Dios, H., & Collantes-Estévez, E. (2014). Positive and negative affective states and disease activity in ankylosing spondylitis. *Rheumatology International, 35*, 519–524. doi:10.1007/s00296-014-3107-y

Delgado-Rico, E., Carretero-Dios, H., & Ruch, W. (2012). Content validity evidences in test development: An applied perspective. *International Journal of Clinical and Health Psychology, 12*, 449–460.

Derryberry, D., & Tucker, D. M. (1994). Motivating the focus of attention. In P. M. Neidenthal & S. Mitoyama (Eds.), *The heart's eye: Emotional influences in perception and attention* (pp. 167–196). San Diego: Academic Press.

DeSteno, D., Gross, J. J., & Kubzansky, L. (2013). Affective science and health: The importance of emotion and emotion regulation. *Health Psychology, 32*, 474–486. doi: 10.1037/a0030259

DeYoung, C. G., Peterson, J. B., & Higgins, D. M. (2005). Sources of openness/intellect: Cognitive and neuropsychological correlates of the fifth factor of personality. *Journal of personality*, *73*, 825–858. doi: 10.1111/j.1467-6494.2005.00330.x

Dixon, N.F. (1980). Humor: A cognitive alternative to stress? In I.G. Sarason & C.D. Spielberger (Eds.), *Stress and anxiety* (pp. 281–289). Washington, DC: Hemisphere.

Egner, T., Etkin, A., Gale, S., & Hirsch, J. (2008). Dissociable neural systems resolve conflict from emotional versus nonemotional distracters. *Cerebral Cortex*, *18*, 1475–1484. doi: 10.1093/cercor/bhm179

Ehring, T., Tuschen-Caffier, B., Schnülle, J., Fischer, S., & Gross, J. J. (2010). Emotion regulation and vulnerability to depression: spontaneous versus instructed use of emotion suppression and reappraisal. *Emotion*, *10*, 563–572. doi: 10.1037/a0019010

Ekman, P., & Cordano, D. (2011). What is meant by calling basic emotions. *Emotion Review, 3*, 364–370. doi:10.1177/1754073911410740

Ekman, P., Friesen, W. V., & Hager, J. C. (2002). *The facial action coding system*. Salt Lake City, UT: Research Nexus eBook.

Eriksen, B. A., & Eriksen, C. W. (1974). Effects of noise letters upon the identification of a target letter in a nonsearch task. *Attention, Perception, & Psychophysics*, *16*, 143–149. doi: 10.3758/BF03203267

Etkin, A., Egner, T., Peraza, D. M., Kandel, E. R., & Hirsch, J. (2006). Resolving emotional conflict: a role for the rostral anterior cingulate cortex in modulating activity in the amygdala. *Neuron*, *51*, 871–882. doi: 10.1016/j.neuron.2006.07.029

Eysenck, M.W. (1942). The appreciation of humor: An experimental and theoretical study. *British Journal of Psychology, 32*, 295–309. doi: 10.1111/j.2044-8295.1942.tb01027.x

Eysenck, M.W. (1943). An experimental analysis of five tests of "appreciation of humor". *Educational and Psychological Measurement, 3*, 191–214. doi: 10.1177/001316444300300119

Eysenck, M.W. (1992). *Anxiety: The cognitive perspective*. Hove, UK: Lawrence Erlbaum Associates.

Feinberg, M., Willer, R., Antonenko, O., & John, O. P. (2012). Liberating reason from the passions. *Psychological Science, 23*, 788–795. doi: 10.1177/0956797611434747

Feingold, A., & Mazzella, R. (1991). Psychometric intelligence and verbal humor ability. *Personality and Individual Differences*, *12*, 427–435. doi: 10.1016/0191-8869(91)90060-O

Feingold, A., & Mazzella, R. (1993). Preliminary validation of a multidimensional model of wittiness. *Journal of Personality*, *61*, 439–456. doi: 10.1111/j.1467-6494.1993.tb00288.x

Fernández, C., Pascual, J. C., Soler, J., Elices, M., Portella, M. J., & Fernández-Abascal, E. (2012). Physiological responses induced by emotion-eliciting films. *Applied Psychophysiology Biofeedback, 37*, 73–79. doi:10.1007/s10484-012-9180-7

Fernández, C., Pascual, J. C., Soler, J., & Fernández-Abascal, E. (2011). Spanish validation of an emotion-eliciting set of films. *Psicothema*, *23*, 778–785.

Ferrando, P. J., & Chico, E. (2000). Adaptación y análisis psicométrico de la escala de deseabilidad social de Marlowe Crowne. *Psicothema*, *12*, 383–389.

Fiacconi, C. M., & Owen, A. M. (2015). Using psychophysiological measures to examine the temporal profile of verbal humor elicitation. *PLoS ONE, 10*, 1–16. doi:10.1371/journal.pone.0135902

Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *American Psychologist*, *55*, 647–654. doi: 10.1037/0003-066X.55.6.647

Ford, B. Q., & Tamir, M. (2012). When getting angry is smart: Emotional preferences and emotional intelligence. *Emotion, 12,* 685–689. doi: 10.1037/a0027149

Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, *2*, 300–319. doi: 10.1037/1089-2680.2.3.300

Fredrickson, B.L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56,* 218–226. doi: 10.1037//0003-066X.56.3.218

Fredrickson, B., & Levenson, R. W. (1998). Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cognition and Emotion*, *12*, 191–220. doi:10.1080/026999398379718

Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, *24*, 237–258. doi: 10.1023/A:1010796329158

Freud, S. (1928). Humour. *The International Journal of Psychoanalysis*, *9*, 1–6.

Geiser, C., Keller, B. T., Lockhart, G., Eid, M., Cole, D. A., & Koch, T. (2015). Distinguishing state variability from trait change in longitudinal data: The role of measurement (non) invariance in latent state-trait analyses. *Behavior Research Methods*, *47*, 172–203. doi: 10.3758/s13428-014-0457-z

Geiser, C., & Lockhart, G. (2012). A comparison of four approaches to account for method effects in latent state–trait analyses. *Psychological Methods*, *17*, 255–283. doi: 10.1037/a0026977

Gervais, M., & Wilson, D. S. (2005). The evolution and functions of laughter and humor: A synthetic approach. *The Quarterly Review of Biology*, *80*, 395–430. doi: 10.1086/498281

Gignac, G. E., Karatamoglou, A., Wee, S., & Palacios, G. (2014). Emotional intelligence as a unique predictor of individual differences in humour styles and humour appreciation. *Personality and Individual Differences*, *56*, 34–39. doi: 10.1016/j.paid.2013.08.020

Giuliani, N. R., McRae, K., & Gross, J. J. (2008). The up- and downregulation of amusement: Experiential, behavioral, and autonomic consequences. *Emotion, 8,* 714–719. doi: 10.1037/a0013236

Goeleven, E., De Raedt, R., Leyman, L., & Verschuere, B. (2008). The Karolinska directed emotional faces: a validation study. *Cognition and Emotion*, *22*, 1094–1118. doi: 10.1080/02699930701626582

Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: Reappraisal and suppression of negative emotion. *Biological Psychiatry, 63*, 577–586. doi: 10.1016/j.biopsych.2007.05.031

Gorovoy, I. (2009). *Best predictors of quality of life (QOL) based on character strengths of gratitude, curiosity and cheerfulness* (Trabajo Fin de Máster no publicado). Victoria University, Melbourne, Australia.

Greven, C., Chamorro-Premuzic, T., Arteche, A., & Furnham, A. (2008). A hierarchical integration of dispositional determinants of general health in students: The Big Five, trait emotional intelligence and humour styles. *Personality and Individual Differences, 44*, 1562–1573. doi: 10.1016/j.paid.2008.01.012

Grey, S. J., & Smith, B. L. (1984). A comparison between commercially available electrode gels and purpose-made gel in the measurement of electrodermal activity. *Psychophysiology, 21*, 551–557. doi:10.1111/j.1469-8986.1984.tb00242.x

Gross, J. J. (1998a). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*, 224–237. doi: 10.1037/0022-3514.74.1.224

Gross, J. J. (1998b). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271–299. doi: 10.1037/1089-2680.2.3.271

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry, 26*, 1–26. doi: 10.1080/1047840X.2014.940781

Gross, J. J., & John, O. P. (2003). Individual differences in tow emotion regulation processes: Implications for affect, relationship, and well-being. *Journal of Personality and Social Psychology, 85*, 348–362. doi: 10.1037/0022-3514.85.2.348

Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: Physiology, self–report, and expressive behavior. *Journal of Personality and Social Psychology, 64*, 970–986. doi: 10.1037/0022-3514.64.6.970

Gruner, C. R. (1978). *Understanding laughter: The workings of wit & humor*. Chicago: Nelson-Hall.

Hamaker, E. L., Nesselroade, J. R., & Molenaar, P. C. (2007). The integrated trait–state model. *Journal of Research in Personality, 41*, 295–315. doi: 10.1016/j.jrp.2006.04.003

Hambleton, R. K., & de Jong, J. H. A. L. (2003). Advances in translating and adapting educational and psychological tests. *Language Testing, 20*, 127–134. doi:10.1191/0265532203lt247xx

Harmon-Jones, E., Lueck, L., Fearn, M., & Harmon-Jones, C. (2006). The effect of personal relevance and approach-related action expectation on relative left frontal cortical activity. *Psychological Science, 17*, 434–440. doi: 10.1111/j.1467-9280.2006.01724.x

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis-A regression based approach*. New York: Guilford.

Henry, J. D., Green, M. J., de Lucia, A., Restuccia, C., McDonald, S., & O'Donnell, M. (2007). Emotion dysregulation in schizophrenia: reduced amplification of emotional expression is associated with emotional blunting. *Schizophrenia Research, 95*, 197–204. doi: 10.1016/j.schres.2007.06.002

Hirsch, R. D., Junglas, K., Konradt, B., & Jonitz, M. F. (2010). Humortherapie bei alten Menschen mit einer Depression. *Zeitschrift für Gerontologie und Geriatrie* [Humor therapy in the depressed elderly: Results of an empirical study], *43*, 42–52. doi: 10.1007/s00391-009-0086-9

Hofmann, J., Beermann, U., & Ruch, W. (2010, july). Laughing at oneself (?!). A FACS

study. Poster presented at the *International Summer School and Symposium on Humor and Laughter (ISS)*. Boldern-Männedorf, Switzerland.

Hommel, B. (1998). Event files: Evidence for automatic integration of stimulus-response episodes. *Visual Cognition, 5*, 183–216. doi: 10.1080/713756773

Hommel, B. (2004). Event files: Feature binding in and across perception and action. *Trends in Cognitive Sciences, 8*, 494–500. doi: 10.1016/j.tics.2004.08.007

Isen, A.M. (2003). Positive affect as a source of human strenght. In L.G. Aspinwall & U.M. Staudinger (Eds.), *A psychology of human strengths: Fundamental questions and future directions for a positive psychology* (pp 179–195). Washington, DC: American Psychological Association.

Izard, C. E., Dougherty, F. E., Bloxom, B. M., & Kotsch, N. E. (1974). *The Differential Emotions Scale: A method of measuring the meaning of subjective experience of discrete emotions*. Nashville, TN: Vanderbilt University, Department of Psychology.

Jensen-Campbell, L. A., Rosselli, M., Workman, K. A., Santisi, M., Rios, J. D., & Bojan, D. (2002). Agreeableness, conscientiousness, and effortful control processes. *Journal of Research in Personality, 36*, 476–489. doi: 10.1016/S0092-6566(02)00004-1

Johnson, K. J., Waugh, C. E., & Fredrickson, B. L. (2010). Smile to see the forest: Facially expressed positive emotions broaden cognition. *Cognition and Emotion, 24*, 299–321. doi: 10.1080/02699930903384667

Kahneman, D., Treisman, A., & Gibbs, B. J. (1992). The reviewing of object files: Object-specific integration of information. *Cognitive Psychology, 24*, 175–219. doi: 10.1016/0010-0285(92)90007-O

Kaplan, D. (2000). *Structural equation modeling: Foundations and extensions*. Thousand Oaks, CA: Sage.

Kiesel, A., Steinhauser, M., Wendt, M., Falkenstein, M., Jost, K., Philipp, A. M., & Koch, I. (2010). Control and interference in task switching—A review. *Psychological Bulletin, 136*, 849–874. doi: 10.1037/a0019842

Kimchi, R., & Palmer, S. E. (1982). Form and texture in hierarchically constructed patterns. *Journal of Experimental Psychology: Human Perception and Performance, 8*, 521–535. doi: 10.1037/0096-1523.8.4.521

Köhler, G., & Ruch, W. (1996). Sources of variance in current sense of humor

inventories: How much substance, how much method variance? *Humor: International Journal of Humor Research, 9*, 363–397. doi: 10.1515/humr.1996.9.3-4.363

Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology, 84*, 394–421. doi:10.1016/j.biopsycho.2010.03.010

Kross, E., & Ayduk, O. (2011). Making meaning out of negative experiences by self–distancing. *Current Directions in Psychological Science, 20*, 187–191. doi: 10.1177/0963721411408883

Kucharska-Newton, A. M., Williams, J. E., Chang, P. P., Stearns, S. C., Sueta, C. A., Blecker, S. B…., & Mosley, T. H. (2014). Anger proneness, gender, and the risk of heart failure. *Journal of Cardiac Failure, 20*, 1020–1026. doi: 10.1016/j.cardfail.2014.09.010

Kunzmann, U., Kupperbusch, C. S., & Levenson, R. W. (2005). Behavioral inhibition and amplification during emotional arousal: a comparison of two age groups. *Psychology and Aging, 20*, 144–158. doi: 10.1037/0882-7974.20.1.144

Lackner, H. K., Weiss, E. M., Schulter, G., Hinghofer-Szalkay, H., Samson, A. C., & Papousek, I. (2013). I got it! Transient cardiovascular response to the perception of humor. *Biological Psychology, 93*, 33–40. doi: 10.1016/j.biopsycho.2013.01.014

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods, 3*, 186–207. doi: 10.1177/109442810032003

Lane, R. D., Ahern, G. L., Schwartz, G. E., & Kaszniak, A. W. (1997). Is alexithymia the emotional equivalent of blindsight? *Biological Psychiatry, 42*, 834–844.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1997). *International affective picture system (IAPS): Technical manual and affective ratings.* NIMH Center for the Study of Emotions and Attention, University of Florida.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1999). *International affective picture system (IAPS): Instruction manual and affective ratings*. The center for research in psychophysiology, University of Florida.

Lang, P. J., Greenwald, M. K., Bradley, M. M., & Hamm, A. O. (1993). Looking at pictures: Affective, facial, visceral, and behavioral reactions. *Psychophysiology, 30*, 261–273. doi:10.1111/j.1469-8986.1993.tb03352.x

Langevin, R., & Day, H. I. (1972). Physiological correlates of humor. In J. H. Goldstein & P. E. McGhee (Eds.), *The psychology of humor* (pp. 129–142). New York: Academic Press.

Lazarus, R.S. (1984). Thoughts on the relations between emotion and cognition. In K.R. Scherer & P. Ekman (Eds.) *Approaches to Emotion* (pp.247–257). Hillsdale, NJ: Erlbaum.

LeDoux, L. (2000). Cognitive–emotional interactions: listen to the brain. In R.D. Lane (Ed.), *Cognitive Neuroscience of Emotion* (pp. 129–155). Oxford University Press.

Lee, P.C. (1983). Play as a means for developing relationships. In R.A. Hinde (Ed.), *Primate social relationships* (pp.82–89). Oxford, UK: Blackwell

Lench, H. C., Flores, S. A., & Bench, S. W. (2011). Discrete emotions predict changes in cognition, judgment, experience, behavior, and physiology: A meta-analysis of experimental emotion elicitations. *Psychological Bulletin, 137*, 834–855. doi: 10.1037/a0024244

Leppänen, J. M., & Nelson, C. A. (2009). Tuning the developing brain to social signals of emotions. *Nature Reviews Neuroscience*, *10*, 37–47. doi: 10.1038/nrn2554

Leslie, A. M. (1987). Pretense and representation: The origins of" theory of mind.". *Psychological Review*, *94*, 412–426. doi: 10.1037/0033-295X.94.4.412

Leventhal, H., & Scherer, K. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion*, *1*, 3–28. doi: 10.1080/02699938708408361

López-Benítez, R., Acosta, A., Lupiáñez, J., & Carretero-Dios, H. (2016a). *High trait cheerfulness individuals are more sensitive to the emotional environment.* Manuscript submitted for publication.

López-Benítez, R., Acosta, A., Lupiáñez, J., & Carretero-Dios, H. (2016b). *Are You Ready to Have Fun? The Spanish State Form of the State–Trait Cheerfulness–Inventory.* Manuscript submitted for publication.

López-Benítez, R., Carretero-Dios, H., Acosta, A., & Lupiáñez, J. (2017). *Modulation of cognitive flexibility processes by trait* cheerfulness. Manuscript submitted for publication.

López-Benítez, R., Coll-Martín, T., Carretero-Dios, H., Lupiáñez, J., & Acosta, A. (2017). *Trait cheerfulness sensitivity to positive and negative affective states.* Manuscript submitted for publication.

López-Benítez, R., Lupiáñez, J., Carretero-Dios, H., & Acosta, A. (2017). *Influence of Emotion Regulation on Affective State: Moderation by Trait Cheerfulness.* Manuscript submitted for publication.

Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin, 131,* 803–855. doi.org/10.1037/0033-2909.131.6.803

Machell, K. A., Kashdan, T. B., Short, J. L., & Nezlek, J. B. (2015). Relationships between meaning in life, social and achievement events, and positive and negative affect in daily life. *Journal of Personality*, *83*, 287–298. doi: 10.1111/jopy.12103

Mandler, G. (1984). *Mind and body: Psychology of emotion and stress*. WW Norton.

Martin, R. A. (2007). *The psychology of humor: An integrative approach*. Burlington, MA: Elsevier Academic Press.

Martin, R.A. (2007). Approaches to the sense of humor: A historical review. In W. Ruch (Ed.), *The sense of humor: Explorations of a personality characteristic* (pp. 5–60). Berlin, Germany: Mouton de Gruyter.

Martin, R.A., Puhlik-Doris, P., Larsen, G., Gray, J., & Weir, K. (2003). Individual differences in uses of humor and their relation to psychological well-being: Development of the humor styles questionnaire. *Journal of Research in Personality, 37*, 48–75. doi:10.1016/S0092-6566(02)00534-2

Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition and Emotion, 23*, 209–237. doi:10.1080/02699930802204677

Mayer, J. D., Salovey, P., & Caruso, D. (2002a). *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)*. Version 2.0. Toronto, Canada: Multi-Health Systems.

McGraw, A.P., Warren, C., Williams, L.E., & Leonard, B. (2012). Too Close for Comfort, or Too Far to Care? Finding Humor in Distant Tragedies and Close Mishaps. *Psychological Science, 23*, 1215–1223. doi: 10.1177/0956797612443831

Miguel-Tobal, J. J., Casado, M. I., Cano-Vindel, A., & Spielberger, C. D. (2001). *Inventario de Expresión de Ira Estado-Rasgo (STAXI-2)* [State–Trait Anger Expression Inventory (STAXI-2)]. Madrid, Spain: TEA Ediciones.

Miller, E. M., Rodriguez, C., Kim, B., & McClure, S. M. (2014). Delay discounting: A two-systems perspective. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 93–110). New York, NY: Guilford.

Millsap, R. E., & Yun-Tein, J. (2004). Assessing factorial invariance in ordered-categorical measures. *Multivariate Behavioral Research*, *39*, 479–515. doi: 10.1207/S15327906MBR3903_4

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, *41*, 49–100. doi: 10.1006/cogp.1999.0734

Moltó, J., Montañés, S., Poy, R., Segarra, P., Pastor, M. C., Tormo, M.P., . . .& Vila, J. (1999). Un nuevo método para el estudio experimental de las emociones: El Internacional Affective Picture System (IAPS). Adaptación española. *Revista de Psicología General y Aplicada, 52*, 55–87

Monsell, S. (2003). Task switching. *Trends in Cognitive Sciences*, *7*, 134–140. doi: 10.1016/S1364-6613(03)00028-7

Morgan, B., & D'Mello, S. K. (2016). The influence of positive vs. negative affect on multitasking. *Acta Psychologica*, *170*, 10–18. doi:10.1016/j.actpsy.2016.06.006

Mroczek, D. K., Spiro III, A., & Almeida, D. M. (2003). Between-and within-person variation in affect and personality over days and years: How basic and applied approaches can inform one another. *Ageing international*, *28*, 260-278. doi: 10.1007/s12126-002-1007-z

Müller, L., & Ruch, W. (2011). Humor and strengths of character. *Journal of Positive Psychology, 6*, 368–376. doi:10.1080/17439760.2011.592508

Murdock, K. W., Oddi, K. B., & Bridgett, D. J. (2013). Cognitive Correlates of Personality. *Journal of Individual Differences, 34*, 97–104. doi: 10.1027/1614-0001/a000104

Murphy, F. C., Nimmo-Smith, I. A. N., & Lawrence, A. D. (2003). Functional neuroanatomy of emotions: a meta-analysis. *Cognitive, Affective, & Behavioral Neuroscience*, *3*, 207–233. doi: 10.3758/CABN.3.3.207

Muthén, B. O., & Muthén, L. K. (2004–2008). *Mplus. User manual*. Los Angeles, CA: Muthén & Muthén.

Muthén, L. K., & Muthén, B. O. (2012). *Mplus statistical modeling software: Release 7.0*. Los Angeles, CA: Muthén & Muthén.

Newman, M. G., & Stone, A. A. (1996). Does humor moderate the effects of experimentally-induced stress? *Annals of Behavioral Medicine, 18*, 101–109. doi:10.1007/BF02909582

Nezlek, J. B., & Kuppens, P. (2008). Regulating positive and negative emotions in daily life. *Journal of Personality, 76*, 561–579. doi: 10.1111/j.1467-6494.2008.00496.x

Ochsner, K. N., Hughes, B., Robertson, E. R., Cooper, J. C., & Gabrieli, J. D. (2009). Neural systems supporting the control of affective and cognitive conflicts. *Journal of Cognitive Neuroscience*, *21*, 1841–1854. doi: 10.1162/jocn.2009.21129

O'Connell, W.E. (1976). Freudian humour: The eupsychia of every day. In A.J. Chapman & H.C. Foot (Eds.), *Humor and laughter: Theory, research, and applications* (pp.313–329). London: John Wiley & Sons.

Pacheco-Unguetti, A. P., Acosta, A., Callejas, A., & Lupiáñez, J. (2010). Attention and anxiety different attentional functioning under state and trait anxiety. *Psychological Science, 21*, 298–304. doi:10.1177/0956797609359624

Papousek, I., & Schulter, G. (2010). Don't take an X for a U. Why laughter is not the best medicine, but being more cheerful has many benefits. In I. Wells (Ed.), *Psychological well-being* (pp. 1–75). Hauppauge, NY: Nova Science Publishers.

Paulhus, D. L., & John, O. P. (1998). Egoistic and moralistic biases in self-perception: The interplay of self-deceptive styles with basic traits and motives. *Journal of Personality*, *66*, 1025–1060. doi: 10.1111/1467-6494.00041

Perakakis, P., Joffily, M., Taylor, M., Guerra, P., & Vila, J. (2010). KARDIA: A Matlab software for the analysis of cardiac interbeat intervals. *Computer Methods and Programs in Biomedicine, 98*, 83–89. doi: 10.1016/j.cmpb.2009.10.002

Pérez-Dueñas, C., Acosta, A., & Lupiáñez, J. (2014). Reduced habituation to angry faces: Increased attentional capture as to override inhibition of return. *Psychological Research, 78*, 196–208. doi:10.1007/s00426-013-0493-9

Pessoa, L. (2008). On the relationship between emotion and cognition. *Nature Reviews Neuroscience*, *9*, 148–158. doi: 10.1038/nrn2317

Phillips, L. H., Bull, R., Adams, E., & Fraser, L. (2002). Positive mood and executive function: evidence from stroop and fluency tasks. *Emotion*, *2,* 12–22. doi: 10.1037/1528-3542.2.1.12

Posner, M. I., & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science. *Annu. Rev. Psychol.*, *58*, 1–23. doi: 10.1146/annurev.psych.58.110405.085516

Pressman, S. D., & Cohen, S. (2005). Does positive affect influence health?. *Psychological Bulletin*, *131*, 925–971. doi: 10.1037/0033-2909.131.6.925

Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and Individual Differences, 49,* 368–373. doi.org/10.1016/j.paid.2010.03.048

Quoidbach, J., Mikolajczak, M., & Gross, J. J. (2015). Positive interventions: An emotion regulation perspective. *Psychological Bulletin*, *141*, 655–693. doi: 10.1037/a0038648

Rapp, A. M., Wild, B., Erb, M., Rodden, F. A., Ruch, W., & Grodd, W. (2007). Trait cheerfulness modulates BOLD-response in lateral cortical but not limbic brain areas—a pilot fMRI study. *Neuroscience Letters*, *445*, 242–245. doi:10.1016/j.neulet.2008.09.017

Ritterband, L. M., & Spielberger, C. D. (1996). Construct validity of the Beck Depression Inventory as a measure of state and trait depression in nonclinical populations. *Depression and Stress, 2*, 123–145.

Robinson, M. D., & Clore, G. L. (2002). Belief and feeling: Evidence for an accessibility model of emotional self-report. *Psychological Bulletin, 128,* 934–960. doi: 10.1037/0033-2909.128.6.934

Roca, J., Castro, C., López-Ramón, M. F., & Lupiánez, J. (2011). Measuring vigilance while assessing the functioning of the three attentional networks: the ANTI-Vigilance task. *Journal of Neuroscience Methods*, *198*, 312–324. doi: 10.1016/j.jneumeth.2011.04.014

Rogers, R. D., & Monsell, S. (1995). Costs of predictable switch between simple cognitive tasks. *Journal of Experimental Psychology: General, 124*, 207–231.

Rottenberg, J., Ray, R. D., & Gross, J. J. (2007). Emotion elicitation using films. In J.A. Coan & J.J.B. Allen (Eds.), *The handbook of emotion elicitation and assessment* (pp. 9-28). New York, NY US: Oxford University Press.

Rowe, G., Hirsh, J. B., & Anderson, A. K. (2007). Positive affect increases the breadth of attentional selection. *Proceedings of the National Academy of Sciences*, *104*, 383–388. doi: 10.1073/pnas.0605198104

Ruch, W. (1990). *Die Emotion Erheiterung: Ausdrucksformen und Bedingungen* [The emotion of exhilaration: Forms of expression and conditions.] Unpublished habilitation thesis, University of Düsseldorf, Germany.

Ruch, W. (1993). Exhilaration and humor. In M. Lewis & J. Haviland (Eds.), *The handbook of emotions* (pp. 605–616). New York, NY: Guilford Publications.

Ruch, W. (1994). Temperament, Eysenck's PEN system, and humor-related traits. *Humor: International Journal of Humor Research*, *7*, 209–244. doi: 10.1515/humr.1994.7.3.209

Ruch, W. (1997). State and trait cheerfulness and the induction of exhilaration: A FACS study. *European Psychologist, 2*, 328–341. doi:10.1027/1016-9040.2.4.328

Ruch, W. (2008). The psychology of humor. En V. Raskin (Ed.), *A primer of humor* (pp. 17-100). Berlín: Mouton de Gruyter.

Ruch, W., Beermann, U., & Proyer, R. T. (2009). Investigating the humor of gelotophobes: Does feeling ridiculous equal being humorless? *Humor: International Journal of Humor Research, 22,* 111–143. doi: 10.1515/HUMR.2009.006

Ruch, W., & Carrell, A. (1998). Trait cheerfulness and the sense of humor. *Personality and Individual Differences, 24*, 551–558. doi: 10.1016/S0191-8869(97)00221-3

Ruch, W., & Hofmann, J. (2012). A temperament approach to humor. In P. Gremigni (Ed.), *Humor and health promotion* (pp. 79–113). Hauppauge, NY: Nova Science Publishers

Ruch, W., & Köhler, G. (1999). The measurement of state and trait cheerfulness. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe* (pp. 67–83), Tilburg: University Press.

Ruch, W., & Köhler, G. (2007). A temperament approach to humor. In W. Ruch (Ed.), *The sense of humor: Explorations of a personality characteristic* (pp. 203–230). Berlin, Germany: Mouton de Gruyter.

Ruch, W., Köhler, G., & van Thriel, C. (1996). Assessing the temperamental basis of the sense of humor: Construction of the facet and standard trait forms of the State–Trait Cheerfulness Inventory—STCI. *Humor: International Journal of Humor Research, 9*, 303–339. doi: 10.1515/humr.1996.9.3-4.303

Ruch, W., Köhler, G., & van Thriel, C. (1997). To be in good or bad humour: Construction of the state form of the State–Trait Cheerfulness Inventory—STCI. *Personality and Individual Differences, 22*, 477–491. doi: 10.1016/S0191-8869(96)00231-0

Ruch, W., & Proyer, R. T. (2008). The fear of being laughed at: Individual and group differences in Gelotophobia. *Humor: International Journal of Humor Research, 21*, 47–67. doi: 10.1515/HUMOR.2008.002

Ruch, W., Proyer, R. P., Esser, C., & Mitrache, O. (2011). Cheerfulness and everyday humorous conduct. In Romanian Academy, "George Barit" Institute of History, Department of Social Research (Ed.), *Studies and Researches in Social Sciences* (pp. 67–87). Cluj-Napoca: Argonaut Press.

Ruch, W., & Stevens, M. (1995, july). The differential effects of nitrous oxide on mood level: The role of traitcheerfulness. Work presented at the *7th Meeting of the International Society for the Study of Individual Differences* – ISSID, Warsaw, Poland.

Ruch, W., & Zweyer, K. (2001). Heiterkeit und Humor: Ergebnisse der Forschung [Cheerfulness and humor: Empirical evidence]. In R. D. Hirsch, J. Bruder, & H. Radebold (Eds.). *Heiterkeit und Humor im Alter* (pp. 9–43). Bornheim-Sechtem: Chudeck-Druck.

Russell, J. A. (1994). Is there universal recognition of emotion from facial expression? *Psychological Bulletin, 115*, 102–141. doi: 10.1037/0033-2909.115.1.102

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review, 110*, 145–172. doi: 10.1037//0033-295X.110.1.145

Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: dissecting the elephant. *Journal of Personality and Social Psychology, 76*, 805–819. doi: 10.1037/0022-3514.76.5.805

Salovey, P., Mayer, J. D., Goldman, S., Turvey, C., & Palfai, T. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125–154). Washington, DC: American Psychological Association.

Samson, A. C., & Gross, J. J. (2012). Humour as emotion regulation: The differential consequences of negative versus positive humour. *Cognition and Emotion, 26*, 375–384. doi: 10.1080/02699931.2011.585069

Samson, A. C., Kreibig, S. D., Soderstrom, B., Wade, A. A., & Gross, J. J. (2016). Eliciting positive, negative and mixed emotional states: A film library for affective scientists. *Cognition and Emotion*, *30*, 827–856. doi: 10.1080/02699931.2015.1031089

Sánchez-Cánovas, J. (1994). El bienestar psicológico subjetivo [Subjetive well-being]. Escalas de evaluación. *Boletín de Psicología, 43*, 25–51.

Sandín, B., Chorot, P., Lostao, L., Joiner, T. E., Santed, M. A., & Valiente, R. M. (1999). The PANAS scales of positive and negative affect: Factor analytic validation and cross-cultural convergence. *Psicothema, 11*, 37–51.

Sanz, J., Gutiérrez, S., & García-Vera, M. P. (2014). Propiedades psicométricas de la escala de valoración del estado de ánimo (EVEA): Una revisión [Psychometric properties of the Scale for Mood Assessment (EVEA): A review]. *Ansiedad y Estrés, 20*, 27–49.

Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information, 44*, 695–729. doi: 10.1177/0539018405058216

Schimmack, U., Oishi, S., Furr, R. M., & Funder, D. C. (2004). Personality and life satisfaction: A facet-level analysis. *Personality and Social Psychology Bulletin*, *30*, 1062–1075. doi: 10.1177/0146167204264292

Schneider, W., Escaman, A., & Zuccolotto, A. (2002). *E-Prime user´s guide*. Pittsburg, PA: Psychology Software Tools, Inc.

Schuch, S., Werheid, K., & Koch, I. (2012). Flexible and inflexible task sets: Asymmetric interference when switching between emotional expression, sex, and age classification of perceived faces. *The Quarterly Journal of Experimental Psychology*, *65*, 994–1005. doi: 10.1080/17470218.2011.638721

Seligman, M. E., & Csikszentmihalyi, M. (2000). Special issue on happiness, excellence, and optimal human functioning. *American Psychologist*, *55*, 5–183. doi:10.1037/0003-066X.55.1.5

Shaver, P. R., & Mikulincer, M. (2014). Adult attachment and emotion regulation. In J. J. Gross. (Ed.), *Handbook of emotion regulation* (pp. 237–250). New York, NY: Guilford Press.

Shiota, M. N., Campos, B., Keltner, D., & Hertenstein, M. J. (2004). Positive emotion and the regulation of interpersonal relationships. In P. Philippot & R.S. Feldman (Eds.), *The regulation of emotion* (pp. 127–155). Mahwah, NJ: Lawrence Erlbaum Associates.

Silvers, J. A., Buhle, J. T., & Ochsner, K. N. (2013). The neuroscience of emotion regulation: Basic mechanisms and their role in development, aging and psychopathology. In K. Ochsner & S. M. Kosslyn (Eds), *The Handbook of Cognitive Neuroscience*. New York, N.Y.: Oxford University Press.

Simon, J. R. (1969). Reactions toward the source of stimulation. *Journal of Experimental Psychology, 81*, 174–176. doi: 10.1037/h0027448

Spielberger, C.D. (1966). Theory and research on anxiety. In C.D. Spielberger (Ed.), *Anxiety and Behavior.* New York: Academic Press.

Spielberger, C. D. (1999). *State–Trait Anger Expression Inventory-2 (STAXI-2).* Odessa, FL: Psychological Assessment Resources.

Spielberger, C. D., Agudelo, D., & Buela-Casal, G. (2008). *Inventario de Depresión Estado/Rasgo (IDER)* [ST-DEP. State–Trait Depression Inventory]. Madrid, Spain: TEA Ediciones.

Spielberger, C. D., Gorsuch, R. L., & Luschene, R. E. (1970). *Manual for the State–Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychologists Press.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1982). *STAI. Cuestionario de Ansiedad Estado* [STAI. State–Trait Anxiety Inventory]. Madrid, Spain: TEA Ediciones.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Stepper, S., & Strack, F. (1993). Proprioceptive determinants of emotional and nonemotional feelings. *Journal of Personality and Social Psychology, 64*, 211–220. doi: 10.1037/0022-3514.64.2.211

Steptoe, A., O'donnell, K., Marmot, M., & Wardle, J. (2008). Positive affect and psychosocial processes related to health. *British Journal of Psychology, 99*, 211–227. doi: 10.1111/j.2044-8295.2008.tb00474.x

Steyer, R., Mayer, A., Geiser, C., & Cole, D. A. (2015). A theory of states and traits-revised. *Annual Review of Clinical Psychology, 11*, 71–98. doi: 10.1146/annurev-clinpsy-032813-153719

Strick, M., Holland, R. W., Van Baaren, R., & Van Knippenberg, A. (2009). Humor in the eye tracker: Attention capture and distraction from context cues. *The Journal of General Psychology: Experimental, Psychological, and Comparative Psychology, 137*, 37–48. doi: 10.1080/00221300903293055

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*, 643–662. doi: 10.1037/h0054651

Svebak, S. (1974). A theory of sense of humor. *Scandinavian Journal of Psychology,* *15*, 99–107.

Svebak, S. (1996). The development of the Sense of Humor Questionnaire: From SHQ to SHQ-6. *Humor*, *9*, 341–362. doi: 10.1515/humr.1996.9.3-4.341

Tamir, M., Mitchell, C., & Gross, J. J. (2008). Hedonic and instrumental motives in anger regulation. *Psychological Science*, *19*, 324–328. doi: 10.1111/j.1467-9280.2008.02088.x

Thompson, R., Ruch, W., & Hasenöhrl, R. U. (2004). Enhanced cognitive performance and cheerful mood by standardized extracts of Piper methysticum (Kava-kava). *Human Psychopharmacology: Clinical and Experimental*, *19*, 243–250. doi: 10.1002/hup.581

Thomsen, D. K., Mehlsen, M. Y., Olesen, F., Hokland, M., Viidik, A., Avlund, K., & Zachariae, R. (2004). Is there an association between rumination and self-reported physical health? A one-year follow-up in a young and an elderly sample. *Journal of Behavioral Medicine*, *27*, 215–231. doi: 10.1023/B:JOBM.0000028496.41492.34

Thorson, J. A., & Powell, F. C. (1993). Development and validation of a multidimensional sense of humor scale. *Journal of Clinical Psychology*, *49*, 13–23. doi: 10.1002/1097-4679(199301)49:1<13::AID-JCLP2270490103>3.0.CO;2-S

Titze, M. (2009). Gelotophobia: The fear of being laughed at. *Humor: International Journal of Humor Research, 22*, 27–48. doi: 10.1515/HUMR.2009.002

Torres-Marín, J., & Carretero-Dios, H. (2017). Gelotofobia: El lado oscuro del sentido del humor. *Ciencia Cognitiva, 11*, 14-16.

Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology, 86*, 320–333. doi:10.1037/0022-3514.86.2.320

Tugade, M. M., Fredrickson, B. L., & Feldman Barrett, L. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality*, *72*, 1161–1190. doi: 10.1111/j.1467-6494.2004.00294.x

Van den Stock, J., Righart, R., & de Gelder, B. (2007). Body expressions influence recognition of emotions in the face and voice. *Emotion, 7*, 487–494. doi: 10.1037/1528-3542.7.3.487

Van Hooff, J. A., & Preuschoft, S. (2003). Laughter and smiling: The intertwining of nature and culture. In F.B.M. de Waal & P.L. Tyack (Eds.), *Animal social complexity: Intelligence, culture, and individualized societies* (pp. 260–287). Cambridge, MA: Harvard University Press.

Vautier, S. (2004). A longitudinal SEM approach to STAI data: Two comprehensive multitrait-multistate models. *Journal of Personality Assessment, 83*, 167–179. doi:10.1207/s15327752jpa8302_11

Velten, E. (1968). A laboratory task for induction of mood states. *Behaviour Research and Therapy*, *6*, 473–482. doi: 10.1016/0005-7967(68)90028-4

Vico, C., Guerra, P., Robles, H., Vila, J., & Anllo-Vento, L. (2010). Affective processing of loved faces: Contributions from peripheral and central electrophysiology. *Neuropsychologia, 48*, 2894–2902. doi: 10.1016/j.neuropsychologia.2010.05.031

Wadlinger, H. A., & Isaacowitz, D. M. (2006). Positive mood broadens visual attention to positive stimuli. *Motivation and Emotion*, *30*, 87–99. doi: 10.1007/s11031-006-9021-1

Wancke, C. U. (1996). *Der Einfluss unterschiedlicher emotionaler Qualitäten von Sinnsprüchen und des Umgangs mit dem Material auf die aktuelle Befindlichkeit von Probanden* [The influence of sayings of different emotional qualities and the handling of the material on the mood of participants]. Unpublished Master Thesis, Department of Psychology, University of Düsseldorf.

Watson, D., Clark, L. A., & Tellegen, A. (1988a). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070. doi: 10.1037/0022-3514.54.6.1063

Wrench, J. S., & McCroskey, J. C. (2001). A temperamental understanding of humor communication and exhilaratability. *Communication Quarterly*, *49,* 142–159. doi: 10.1080/01463370109385622

Yang, H., & Yang, S. (2014). Positive affect facilitates task switching in the dimensional change card sort task: Implications for the shifting aspect of

executive function. *Cognition and Emotion, 28,* 1242–1254. doi: 10.1080/02699931.2013.879053

Yip, J. A., & Martin, R. A. (2006). Sense of humor, emotional intelligence, and social competence. *Journal of Research in Personality, 40,* 1202–1208. doi:10.2466/PR0.66.1.51-58

Yovetich, N. A., Dale, J. A., & Hudak, M. A. (1990). Benefits of humor in reduction of threat-induced anxiety. *Psychological Reports, 66,* 1–58. doi: 10.2466/PR0.66.1.51-58

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35,* 151–175. doi: 10.1037/0003-066X.35.2.151

Zhou, Y., & Siu, A. F. (2015). Motivational intensity modulates the effects of positive emotions on set shifting after controlling physiological arousal. *Scandinavian Journal of Psychology, 56,* 613–621. doi: 10.1111/sjop.12247

Zillmann, D. (1983). Transfer of excitation in emotional behavior. In J. T. Cacioppo & R. E. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 215–240). New York: Guilford Press

Zweyer, K., Velker, B., & Ruch, W. (2004). Do cheerfulness, exhilaration, and humor production moderate pain tolerance? A FACS study. *Humor, 17,* 85–119. doi: 10.1515/humr.2004.009

Capítulo XI: Anexos

11.1. Adaptación al castellano de la *State-Trait-Cheerfulness-Inventory* (Rasgo)

A continuación podrás ver una serie de frases sobre tu forma de pensar y tu estado de ánimo **en general**. Tu tarea consiste en usar estas frases para describir de manera tan exacta como sea posible tu forma **habitual** de actuar y pensar. Para ello, y después de leer cada frase, tendrás que señalar con una cruz (X) un número del 1 al 4. Cada número se asocia a una de las siguientes opciones de respuesta:

(1) Totalmente en desacuerdo

(2) Moderadamente en desacuerdo

(3) Moderadamente de acuerdo

(4) Totalmente de acuerdo

Por ejemplo:

Soy una persona activa..(1) (2) (3) (4)

Si estás *totalmente de acuerdo* con esta afirmación, es decir, si **en general eres** una persona activa, marca con una cruz (X) el número (4). Si estás *totalmente en desacuerdo*, es decir, si **en general no eres** una persona activa, marca con una cruz (X) el número (1). Marca el número (2) si estás *moderadamente en desacuerdo* con el hecho de que seas una persona activa, o el (3) si estás *moderadamente de acuerdo* con dicha frase.

Cuando tengas dificultades para elegir una respuesta, señala la opción que más se aproxime.

En caso de equivocación, tacha la opción elegida, y haz una nueva cruz sobre la opción que elijas.

Por favor, *responde a todas las cuestiones.*

Ya puedes pasar la hoja y comenzar a responder, gracias.

1. Mi estado de ánimo suele ser malo	1	2	3	4
2. Suelo estar serio	1	2	3	4
3. Mi estilo de vida me hace ver lo bueno de los acontecimientos negativos	1	2	3	4
4. Suelo estar atento a los chistes o bromas	1	2	3	4
5. Para sentirme bien conmigo mismo necesito hacer todo lo que tenía planificado para ese día	1	2	3	4
6. Cuando me reúno con mis amigos solemos estar bromeando	1	2	3	4
7. Me desquician esos momentos en los que la gente no para de reírse	1	2	3	4
8. Cuando se analizan asuntos aparentemente simples, a menudo resultan ser más importantes de lo que parecen	1	2	3	4
9. Es bastante fácil hacerme sonreír	1	2	3	4
10. No me gusta estar con la gente que está siempre haciendo tonterías	1	2	3	4
11. Suelo ser bastante formal	1	2	3	4
12. Soy una persona jovial	1	2	3	4
13. Son muchos los días en los que siento que estoy enfadado con el mundo	1	2	3	4
14. Suelo leer la sección de humor en el periódico	1	2	3	4
15. Me comporto de manera desagradable con las personas que no paran de contar chistes	1	2	3	4
16. Las personas que están siempre alegres y contentas me resultan inmaduras	1	2	3	4
17. Me considero una persona reflexiva	1	2	3	4
18. Comparado con los demás puedo resultar gruñón y cascarrabias	1	2	3	4
19. Mi estado de ánimo hace que me resulte difícil pasármelo bien	1	2	3	4
20. Soy una persona feliz	1	2	3	4
21. Necesito pensar detenidamente las cosas antes de actuar	1	2	3	4
22. Me pueden hacer reír con facilidad	1	2	3	4
23. A veces tengo una sensación como de "vacío interior"	1	2	3	4
24. A menudo pienso que la gente debería reírse de sus propios	1	2	3	4

problemas				
25. Planeo las cosas que voy a hacer y tomo mis decisiones pensando en que los resultados me sean útiles a largo plazo	1	2	3	4
26. A menudo me siento abatido	1	2	3	4
27. Me identifico con el refrán "No hay mal que por bien no venga"	1	2	3	4
28. Me resulta innecesario y molesto que exageren al hablarme	1	2	3	4
29. La vida diaria me ofrece numerosas oportunidades para reírme	1	2	3	4
30. Muchas veces pienso, "¡Por favor, no me molestéis hoy!"	1	2	3	4
31. La gente no se da cuenta de la importancia que tienen la mayoría de las cosas que suceden a nuestro alrededor	1	2	3	4
32. Con frecuencia me pregunto por qué la gente gasta su tiempo en actividades que realmente no sirven para nada	1	2	3	4
33. Me parece mal que la gente invierta tanto tiempo y dinero en divertirse	1	2	3	4
34. Cuando estoy angustiado nada consigue alegrarme	1	2	3	4
35. Sonrío a menudo	1	2	3	4
36. Me gusta gastarle bromas a la gente	1	2	3	4
37. En todo lo que hago siempre tengo en cuenta las posibles consecuencias, comparando los pros y contras cuidadosamente	1	2	3	4
38. Cuando los amigos intentan animarme haciendo bromas, a veces llego a ponerme de mal humor	1	2	3	4
39. Creo que incluso de las situaciones más difíciles de la vida pueden obtenerse cosas positivas	1	2	3	4
40. Los que me conocen dicen que siempre parece que estoy pensativo	1	2	3	4
41. A menudo silbo o canto en voz alta por puro placer	1	2	3	4
42. Muchos días pienso, "Hoy me he levantado con mal pie"	1	2	3	4
43. Suelo mostrar mi desaprobación hacia las chiquilladas y tonterías que divierten a algunas personas	1	2	3	4
44. A menudo no quepo en mí de alegría	1	2	3	4
45. A menudo veo graciosas las situaciones más cotidianas	1	2	3	4
46. No me tomo los problemas diarios a la ligera	1	2	3	4

47. La gente que está contenta puede llegar a "sacarme de mis casillas"	1	2	3	4
48. Son muchas las veces en las que me siento mal anímicamente	1	2	3	4
49. Las cosas marcharían mejor si se analizara todo con mayor profundidad	1	2	3	4
50. Me río a menudo	1	2	3	4
51. Me resulta muy difícil pasármelo bien cuando estoy con gente que está divirtiéndose	1	2	3	4
52. No me interesa la gente que invierte su tiempo en fiestas y cosas parecidas	1	2	3	4
53. A veces me siento decaído	1	2	3	4
54. Soy una persona alegre	1	2	3	4
55. Frecuentemente estoy malhumorado	1	2	3	4
56. Cuando me apetece divertirme, sé cómo conseguirlo	1	2	3	4
57. A menudo soy insoportable	1	2	3	4
58. Considero que la mayoría de las situaciones diarias son serias y muy importantes	1	2	3	4
59. Suelo ser de los que cuentan chistes en las reuniones	1	2	3	4
60. No soporto los programas televisivos de humor	1	2	3	4
61. Muchos de los problemas que surgen en la vida diaria tienen su lado positivo	1	2	3	4
62. A menudo tengo un mal estado de ánimo	1	2	3	4
63. Me considero más responsable que la mayoría de la gente que me rodea	1	2	3	4
64. En las conversaciones siempre evito el uso de exageraciones, adornos o rodeos	1	2	3	4
65. Suelo estar de buen humor aunque no tenga motivos para ello	1	2	3	4
66. Con frecuencia el más mínimo contratiempo me hace explotar de rabia	1	2	3	4
67. No comprendo como otros pueden malgastar su tiempo en hacer cosas sin sentido	1	2	3	4
68. Siempre estoy listo para entablar una conversación graciosa o en tono de guasa	1	2	3	4

69. Me enfado más frecuentemente que la mayoría de la gente que me rodea	1	2	3	4
70. Creo que el humor está por todos lados y sólo hace falta prestar atención	1	2	3	4
71. Mi vida diaria está fundamentalmente ocupada por asuntos importantes	1	2	3	4
72. Soy una persona bastante triste	1	2	3	4
73. Normalmente planifico las cosas con mucho tiempo de antelación, poniéndome metas a largo plazo	1	2	3	4
74. Afrontar los problemas tranquilamente hace que nos demos cuenta de que no son tan importantes	1	2	3	4
75. Soy una persona seria	1	2	3	4
76. Disfruto viendo películas de humor	1	2	3	4
77. No suelo pasármelo bien ni en los momentos más divertidos	1	2	3	4
78. Prefiero a la gente que se comunica de manera clara y directa	1	2	3	4
79. Creo que el fracaso es una buena oportunidad para aprender a ser mejor persona	1	2	3	4
80. Normalmente estoy animado	1	2	3	4
81. Debido a mi mal estado de ánimo son muchos los días en los que pienso que lo mejor es quedarme en la cama	1	2	3	4
82. Necesito tener planificado de antemano todo lo que voy a hacer	1	2	3	4
83. Disfruto haciendo reír a mis amigos	1	2	3	4
84. Suelo estar triste	1	2	3	4
85. Me gusta entretener a mis amigos contándoles historias divertidas	1	2	3	4
86. Sólo hago cosas prácticas porque todo lo demás es malgastar el tiempo	1	2	3	4
87. Incluso las situaciones difíciles las abordo con un "espíritu alegre"	1	2	3	4
88. A menudo me siento desganado	1	2	3	4
89. Me molestan ese tipo de personas que están siempre contando chistes	1	2	3	4
90. Cuando hablo con los demás intento tener un intercambio de ideas sobrio y objetivo	1	2	3	4

91. Con frecuencia me digo a mí mismo que no he tenido un buen día	1	2	3	4
92. Disfruto bromeando o contando chistes cuando estoy con gente	1	2	3	4
93. Incluso las cosas aparentemente sin importancia tienen que ser tratadas seria y responsablemente	1	2	3	4
94. Suelo ver como graciosas cosas que el resto de la gente no ve	1	2	3	4
95. Me encanta estar en una de esas reuniones donde la gente no para de contar chistes	1	2	3	4
96. Suelo sentirme bien aún sin motivos	1	2	3	4
97. Si uno no tiene claro para qué sirve lo que está haciendo, seguramente es que no sirve para nada	1	2	3	4
98. Normalmente soy el que anima las reuniones	1	2	3	4
99. Perder el tiempo haciendo cosas por hacerlas es una estupidez	1	2	3	4
100. Me siento mal cuando no hago las cosas tal y como las tenía planeadas	1	2	3	4
101. Me gusta ser concreto y directo cuando hablo con los demás	1	2	3	4
102. Si me siento mal, nadie lo puede cambiar	1	2	3	4
103. Normalmente tengo un humor excelente	1	2	3	4
104. A menudo me pregunto por qué la gente no es clara en lo que quiere decir	1	2	3	4

11.2. Adaptación al castellano de la *State-Trait-Cheerfulness-Inventory* (Estado)

A continuación podrás ver una serie de frases sobre lo que puedes estar pensando y sintiendo **JUSTO EN ESTE MOMENTO**. Tu tarea consiste en usar estas frases para que de manera tan exacta como sea posible, nos describas tus pensamientos y sentimientos **ACTUALES.** Para ello, y después de leer cada frase, tendrás que marcar con una cruz (X) un número del 1 al 4. Cada número significa lo siguiente:

(1) Totalmente en desacuerdo

(2) Moderadamente en desacuerdo

(3) Moderadamente de acuerdo

(4) Totalmente de acuerdo

En el siguiente ejemplo:

Estoy bajo de ánimos.. (1) (2) (3) (4)

Si estás *totalmente de acuerdo* con esta afirmación, es decir, si **JUSTO EN ESTE MOMENTO** te encuentras bajo de ánimos, marca con una cruz (X) el número (4). Si estás *totalmente en desacuerdo*, es decir, **SI AHORA** no estás bajo de ánimos en absoluto, marca con una cruz (X) el número (1). Marca el número (2) si estás *moderadamente en desacuerdo* con la frase, o el (3) si estás *moderadamente de acuerdo* con ella.

Cuando tengas dificultades para elegir una respuesta, señala la opción que más se aproxime.

En caso de equivocación, tacha la opción elegida, y haz una nueva cruz sobre la opción que elijas

Por favor, revisa el cuestionario antes de entregarlo para asegurarte de que no te dejas nada sin contestar.

Ya puedes empezar a responder, gracias

1. Estoy de mal humor	1	2	3	4
2. Me noto predispuesto hacia temas serios	1	2	3	4
3. Estoy contento	1	2	3	4
4. Estoy triste	1	2	3	4
5. Tengo cosas importantes en la cabeza	1	2	3	4
6. Estoy alegre	1	2	3	4
7. Estoy reflexivo	1	2	3	4
8. Ahora podría reírme de cualquier cosa	1	2	3	4
9. Estoy cascarrabias	1	2	3	4
10. Estoy en uno de esos momentos donde todo se ve con seriedad	1	2	3	4
11. Me siento como con chispa	1	2	3	4
12. No tengo ganas de nada	1	2	3	4
13. Estoy pensativo	1	2	3	4
14. Estoy malhumorado	1	2	3	4
15. Tengo pensamientos "profundos"	1	2	3	4
16. Me siento fenomenal	1	2	3	4
17. Estoy de un humor pésimo	1	2	3	4
18. Estoy serio	1	2	3	4
19. Estoy divirtiéndome	1	2	3	4
20. Estoy irritable	1	2	3	4
21. Estoy en uno de esos momentos donde veo el lado divertido de las cosas	1	2	3	4
22. Noto que estoy en uno de esos momentos donde uno intenta analizar su situación de forma objetiva y seria	1	2	3	4
23. Me encuentro como en una nube/flotando	1	2	3	4
24. Estoy bajo de moral	1	2	3	4
25. Estoy refunfuñón	1	2	3	4
26. Estoy encantado	1	2	3	4
27. Me siento abatido	1	2	3	4
28. Estoy preparado para realizar con seriedad lo que tenga que hacer	1	2	3	4
29. Tengo ganas de divertirme	1	2	3	4
30. Me noto inclinado a actuar con formalidad	1	2	3	4