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Sociotipo y políticas asistenciales:
Un nuevo instrumento de
evaluación de las intervenciones
biomédicas y de sociabilización

Departamento
Psicología y Sociología

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Tesis Doctoral

SOCIOTIPO Y POLÍTICAS ASISTENCIALES: UN
NUEVO INSTRUMENTO DE EVALUACIÓN DE LAS
INTERVENCIONES BIOMÉDICAS Y DE
SOCIABILIZACIÓN

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TESIS DOCTORAL

SOCIOTIPO Y POLÍTICAS ASISTENCIALES: Un nuevo instrumento de evaluación de las intervenciones biomédicas y de sociabilización

Presentada por:

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UNIVERSIDAD DE ZARAGOZA

Departamento de Psicología y Sociología
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SOCIOTIPO Y POLÍTICAS ASISTENCIALES:
Un nuevo instrumento de evaluación de las
intervenciones biomédicas y de
sociabilización

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*A mi madre,
te quiero.*

AGRADECIMIENTOS

A lo largo de mi vida siempre me ha interesado de manera especial el individuo, y aunque cursé la licenciatura de biología, esa visión integral del ser humano, donde se junta lo biológico con lo psicológico y lo sociológico siempre ha despertado un interés personal en mi relación cotidiana con “el mundo”. En los últimos años, algunas de las investigaciones en las que he trabajado también me han llevado a poner el foco en el individuo como ente, dejando a un lado la complejidad biológica que lo sustenta, y asimismo me han llevado a la necesidad de comprender la naturaleza social de los seres humanos. Creo que los seres humanos tenemos una naturaleza fundamentalmente social, y que vivimos inmersos en complejas redes sociales que cobran una importancia central a la hora de evaluar nuestra salud, tanto física como mental. También creo que es necesario contribuir a una mejor comprensión de las estructuras y dinámicas de la socialidad humana e incluso proporcionar alguna ayuda práctica cuando la socialidad misma está en crisis, como parece estar sucediendo con la actual "epidemia de soledad" que a día de hoy está afectando a grandes segmentos de población. Por tanto, la elaboración de la presente tesis ha surgido del interés personal, y mi principal reto en esta investigación ha consistido en lidiar con la situación social actual, y encontrar nuevos retos a lo que hacer frente con el fin de paliar esta “epidemia”.

Cabe puntualizar que esta investigación ha sido apoyada por los fondos del Instituto de Salud Carlos III, así como por todo el equipo humano que he ido encontrando lo largo del camino.

Me gustaría expresar el más profundo agradecimiento a mi jefe y “colaborador”, el Dr. Pedro C. Marijuán, que fue el que consiguió contagiarme ese interés por la antropología social, intentando comprender aspectos básicos del individuo que nadie hasta el momento se había planteado estudiar; gracias por compartir conocimiento, risas, equináceas y caramelos. Gracias también a mis directores por guiarme y aconsejarme en este trayecto lleno de aprendizaje. Gracias a gran parte del personal del CIBA (Mónica, María, Dani, Carmen, Elena, Pilar, Eduardo... perdonad, sois tantos que no puedo citaros a todos) por hacer amenos mis días, ya fuera disfrutando entre carcajadas, dándome ánimo, o solucionando problemas. Gracias igualmente a los que aunque no sois CIBA, la investigación del sociotipo os ha ido poniendo en mi camino: Blanca, María, Javier, Yolanda, Jesús...

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Beata Bieniak - Terra Nova

La presente Tesis doctoral, que se ha realizado bajo la modalidad de compendio de publicaciones, incluirá los siguientes trabajos:

- del Moral R, Navarro J, Marijuán PC. The “Sociotype” Approach to Social Structures and Individual Communication: An Informational Exploration of Human Sociality. Information Studies and the Quest for Transdisciplinarity. Unity in Diversity. World Scientific Series in Information Studies: Volume 9. Edited by: Mark Burgin (UCLA), Wolfgang Hofkirchner (Vienna University of Technology, Austria). 2017 pp. 387-412.

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Factor de impacto: 2.81

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Factor de impacto: 3.528

A continuación, se hace constar la autorización de los directores de Tesis, el Dr. Jorge Navarro López y el Dr. Juan David Gómez Quintero, para la presentación de la Tesis en esta modalidad, así como el informe motivado de la Comisión Académica responsable del Programa de Doctorado en Sociología de las Políticas Públicas y Sociales.

AUTORIZACIÓN PARA LA PRESENTACIÓN DE TESIS DOCTORAL POR COMPENDIO DE PUBLICACIONES

Yo, D. Juan David Gómez Quintero, con DNI 73.133.591-P, Profesor Contratado Doctor en la Facultad de Ciencias Sociales y del Trabajo de la Universidad de Zaragoza, y codirector de la tesis doctoral de Raquel del Moral titulada: "Sociotipo y políticas asistenciales: un nuevo instrumento de evaluación de las intervenciones biomédicas y de sociabilización", considero que la tesis que se presenta a depósito reúne los requisitos formales y materiales para ser defendida como tesis doctoral.

Se trata de una investigación original e inédita sobre una problemática actual y pertinente en el campo de las ciencias sociales y de la salud. Por ello, doy el visto bueno para que la tesis doctoral pueda ser depositada.

En Zaragoza, a 19 de septiembre de 2018

Un cordial saludo,

Fdo. Juan David Gómez Quintero

AUTORIZACIÓN PARA LA PRESENTACIÓN DE TESIS DOCTORAL POR
COMPENDIO DE PUBLICACIONES

Yo, D. Jorge Navarro López, con DNI 72.982.189-S, Investigador del Grupo de Bioinformación del Instituto Aragonés de Ciencias de la Salud, y codirector de la tesis doctoral de Dña. Raquel del Moral Bergós titulada: "Sociotipo y políticas asistenciales: un nuevo instrumento de evaluación de las intervenciones biomédicas y de sociabilización", certifico que la tesis que se presenta a depósito ha sido realizada bajo mi dirección en todas las etapas, reflejando con toda fidelidad los resultados obtenidos y que reúne los requisitos formales y materiales para ser defendida como tesis doctoral.

Se trata de una investigación original e inédita sobre una problemática actual y pertinente en el campo de las ciencias sociales y de la salud.

Por todo ello, doy el visto bueno para que la tesis doctoral pueda ser depositada.

En Zaragoza, a 20 de septiembre de 2018



Fdo. D. Jorge Navarro López

INFORME MOTIVADO

La Comisión Académica Programa de Doctorado en Sociología de las Políticas Públicas y Sociales informa favorablemente sobre la solicitud.

Por una parte, valoramos positivamente la calidad de las publicaciones presentadas, acreditada por su factor indexación y factor de impacto. Tres de las publicaciones son artículos en revistas indexadas en JCR, dos de ellas de primer cuartil, con alto factor de impacto. La cuarta publicación es un capítulo de libro en una editorial indexada en Scholarly Publishers Indicators (ICEE), con factor de impacto 0.324.

Por otra parte, también valoramos positivamente la unidad temática de las cuatro publicaciones, en torno a los procedimientos de evaluación y medición de la sociabilidad humana con la ayuda de un concepto novedoso –el “sociotipo”, así como la pertinencia de la tesis para el programa tanto en sus aspectos empíricos como políticos y metodológicos.

Zaragoza, a 21 de septiembre de 2018

A handwritten signature in black ink that reads "Pablo García Ruiz". The signature is written in a cursive style with a horizontal line underneath the name.

Fdo. Pablo García Ruiz

Coordinador

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I.

INTRODUCCIÓN GENERAL

1. EL SOCIOTIPO EN EL CONTEXTO DE LAS POLÍTICAS PÚBLICAS ASISTENCIALES

La presente Tesis pretende aproximarse a las políticas públicas desde un nuevo ángulo: el de la sociabilidad. Está basada en un concepto novedoso, el “sociotipo”, que ha sido acuñado en la investigación del grupo de Bioinformación del Instituto Aragonés de Ciencias de la Salud (IACS) al que esta autora pertenece. Como vamos a argumentar a lo largo de esta Tesis, un análisis en profundidad y una reorientación de las políticas asistenciales resultan apremiantes en la época actual. Desde el estudio teórico y empírico del sociotipo pretendemos contribuir a este debate de interés público. En concreto, se van a abordar las prácticas asistenciales de dos ámbitos: el propiamente socio-asistencial y el de la sanidad. Como veremos, el sociotipo proporciona una nueva perspectiva desde la que se hacen más evidentes determinadas carencias del conjunto de nuestro sistema asistencial.

El régimen de bienestar español, en el que se encajan las políticas asistenciales de sociabilización, tiene su propia historia institucional y social. El Sistema de Servicios Sociales de España es el más joven de los sistemas de protección europeos, desarrollándose intensamente en los últimos treinta años, adquiriendo identidad suficiente para ser reconocido como un instrumento fundamental de nuestro Estado del Bienestar y constituyendo uno de sus pilares, conjuntamente con el sistema de salud, la educación y las pensiones (Rodríguez, 1989; Cordero del Castillo, 2009).

La última crisis que ha sufrido España, y que comenzó en 2008, no solamente es una crisis económica, sino que ha demostrado ser

también una crisis social, institucional, territorial y política (Laparra, 2010; Castells, 2016). Esta crisis no ha favorecido el desarrollo de políticas dirigidas a crear unas sociedades armoniosas, cohesivas e inclusivas que respeten los derechos fundamentales. Las políticas de austeridad, con sus recortes en servicios sociales y bienestar, y su impacto deflacionario en la economía, son incompatibles con la consecución del objetivo de reducción de la pobreza, así como con otros objetivos, como la inclusión social, la igualdad, la eliminación de la pobreza y la cohesión territorial (Rodríguez et al, 2014).

Al mismo tiempo que las sociedades buscan salidas pragmáticas a la crisis actual, que no reduzcan su bienestar ni el marco democrático en que tiene lugar, también están obligadas a mirar a largo plazo, a debatir sobre el futuro de la reforma social en un contexto de mundialización de los problemas sociales. La crisis actual no sólo es coyuntural ni sólo afecta al Estado de Bienestar, sino que también es estructural; supone un cambio de época, un rumbo nuevo en el curso histórico de la reforma social y de las relaciones sociales (Castells, 2011).

En nuestro tiempo, encontramos un cambio significativo en el modo en que se mantienen las relaciones sociales. La intrusión de las tecnologías de la información y la comunicación (TIC), a pesar de muchos otros efectos positivos, ha contribuido a una profunda desintegración social que también está ocurriendo además por otras razones: inestabilidad laboral, crisis económica, marginación de las minorías, expansión urbana, migración, etc. (Putnam, 2000; Stivers, 2004; Turkley, 2011; Inglehart, 2015). En las sociedades actuales, las redes relacionales son aparentemente más extensas y más rápidas, pero a la vez más transitorias y desprovistas de contacto personal, de modo que los individuos corren mayor riesgo de aislamiento social, en particular poblaciones más vulnerables como pueden ser los ancianos

(Turkley, 2011, 2015; Cacioppo and Cacioppo, 2014). Resulta una evidencia que las relaciones disminuidas y las estructuras debilitadas del "capital social" penalizan el desarrollo de la vida cotidiana y disminuyen el bienestar de las personas (Putnam, 2000; Berkman, 2009).

Son múltiples los factores que concurren en la crisis actual, pero no es objeto de esta investigación el analizarlos separadamente. Centrándonos en la dinámica social esencial, el foco lo situaremos en la red global de relaciones que establece el individuo. *Es ahí donde se localiza el objetivo fundamental de esta investigación: la exploración de un nuevo constructo, el Sociotipo, entendido como el conjunto de relaciones sociales en las que se desenvuelve la persona.* Como argumentaremos más adelante, dichas relaciones son necesarias para el bienestar físico y mental de la persona, y deben ser contempladas en profundidad por las nuevas políticas asistenciales.

Este estudio contiene una doble orientación. Por un lado pretende establecer aspectos cualitativos y cuantitativos acerca de la naturaleza social de la persona en consonancia con teorías multidisciplinares recientemente elaboradas ("Hipótesis del Cerebro Social", Allman 1999; Baron-Cohen et al. 1999; Dunbar 2004; Silk 2007; Badcock y Crespi 2008). Y por otro lado, intenta establecer un nuevo indicador, en forma de cuestionario, que sea útil ante lo que se ha convertido en un problema creciente y cada vez más grave de las sociedades contemporáneas: *el aislamiento social* (Cacioppo y Hawkley, 2009; Turkley, 2015; Marijuán et al., 2017). Al respecto, esta Tesis aporta un carácter innovador e inédito, defendiendo la necesidad de una participación activa para solucionar este ya inminente problema social, y estableciendo una actuación intervencionista al aplicar dicho indicador en ámbitos asistenciales y de la sanidad.

El constructo del Sociotipo, como comentaremos en la Memoria, concuerda también con aspectos fundamentales de la Sociología y la Antropología: desde Emile Durkheim, Max Weber, Talcott Parsons, a Franz Boas, Claude Lévi-Strauss, o George Simmel. Como éste último destacó, las formas sociales con frecuencia están desprovistas de todo contenido pragmático, cuando la gente aspira a participar en el “mundo social” como un fin en sí mismo (Simmel, 1971).

Antes de avanzar en materia, a modo de aclaración, creo interesante atender al significado de algunas palabras clave para entender, o más bien no confundir, aspectos centrales de la presente Tesis:

Sociabilidad

1. f. Cualidad de la capacidad social o de relación con las personas
-

Sociabilización

1. f. Acción y efecto, es decir, proceso de la capacidad social
-

Socialidad

1. f. Cualidad de ser social
-

Sociabilización

1. f. Proceso de hacerse social
-

Sociotipo

1. m. Neologismo acuñado por diversos autores (Berry, Marijuán) que hace referencia a la naturaleza evolutiva de la sociabilidad humana
-

Así, el *sociotipo* formaría parte de nuestra naturaleza social estableciendo una tríada definitoria junto con el *genotipo* y el *fenotipo*, y postulando la existencia de una preferencia evolutiva en nuestra especie acerca de unos determinados promedios de interacción social —básicamente realizados en conversación cara a cara. Este nuevo constructo ha sido desarrollado en forma de un cuestionario específico (SOCQ), cuya fundamentación, hipótesis, objetivos y metodología son el objeto empírico de esta investigación (del Moral et al., 2017; Marijuán et al, 2017). A partir de la nueva herramienta, cabe contribuir con procedimientos e intervenciones más precisas al creciente problema del aislamiento que vive nuestra sociedad, y en especial los mayores.

Consecuentemente se pretende introducir el Sociotipo en las actuales políticas asistenciales de sociabilización del mayor en nuestra Comunidad Autónoma. De esta forma se facilitarían nuevos elementos para poder reorientar estas políticas hacia una promoción del envejecimiento activo y saludable, de modo que, por un lado, las personas mayores vivan una vida socialmente más feliz, y que por otro, se perfile una vía que a priori reduzca la carga asistencial para el sistema de salud que se deriva del creciente aislamiento y depresión de los mayores. En ese sentido, el cuestionario que aquí se desarrolla supone una nueva herramienta, con un gran potencial, para la evaluación de las actividades e intervenciones de sociabilización.

Es importante reseñar que el cuestionario de sociotipo (SOCQ) ya se ha aplicado en la práctica clínica (Servicio de Psicodermatología del Hospital de Alcañiz) para valorar la carga psicosocial que causan las enfermedades de la piel en gran parte de los pacientes afectados (Marrón et al., 2017) —trabajo también incluido en la presente Tesis. Como SOCQ y otros cuestionarios han puesto de manifiesto, existe una carencia importante en cuanto a la falta de apoyo psico-social de los pacientes dermatológicos.

De modo similar, el Instituto Aragonés de Servicios Sociales (IASS) está utilizando el cuestionario SOCQ dentro del Programa de Promoción de Autonomía Personal (PAP), destinado a personas dependientes leves y moderadas de grado I y II, con el fin de evaluar la situación social de estos individuos. Paralelamente, desde la Oficina Técnica del Mayor, del Ayuntamiento de Zaragoza, se está llevando a cabo el programa “Nos gusta hablar”, que está implícito en el planteamiento del sociotipo, y codirigido por el grupo de investigación al que pertenece esta autora. De la misma manera, la Residencia de Mayores IASS Borja ha implantado recientemente el programa “Nos gusta hablar” (véase Sección 4.2.).

A la luz de todo lo anterior, este conjunto de actividades supone un indicio claro de *transferencia de la investigación a la sociedad*, estableciendo una relación directa con el Programa de Doctorado de Sociología de las Políticas Públicas y Sociales, que es el que acoge todo el trabajo realizado en esta Tesis.

2. TRABAJOS PRESENTADOS: EL SOCIOTIPO COMO HILO CONDUCTOR

A. THE "SOCIOTYPE" APPROACH TO SOCIAL STRUCTURES AND INDIVIDUAL COMMUNICATION: AN INFORMATIONAL EXPLORATION OF HUMAN SOCIALITY

Este primer trabajo representa los orígenes teóricos y empíricos del constructo del sociotipo. Es un estudio exploratorio que ha tenido como objetivo el desarrollo de una versión preliminar del cuestionario del sociotipo, y que comprende una justificación multidisciplinar de la nueva propuesta teórica y un primer trabajo de campo sobre una muestra de población española joven. De hecho, supone la primera compilación sistemática de cuestiones relacionadas con el nuevo indicador socio-psicométrico, y contiene una primera valoración de los datos empíricos en consonancia con el enfoque teórico. Como se puso de manifiesto a lo largo de este trabajo, es muy difícil investigar niveles de interacción social, pero aún más difícil es medirlos. Precisamente de esta aproximación inicial se obtuvieron las directrices primordiales para el desarrollo futuro del constructo del sociotipo, y gracias a este estudio se confirmó tanto el interés general como el potencial de dicho constructo.

B. LAUGHING BONDS: A MULTIDISCIPLINARY INQUIRY INTO THE SOCIAL INFORMATION PROCESSES OF HUMAN LAUGHTER

Analizar la risa dentro de un contexto más amplio de comunicación social es el objetivo fundamental de este trabajo, en el que aparece la

risa como una herramienta privilegiada de *creación de lazos sociales*. Aunque la risa ha estado ausente del panorama científico, en las últimas décadas el papel de la risa en el comportamiento social ha conocido un importante auge tanto desde las neurociencias como en su conexión con la comunicación verbal y la semántica (Provine, 2000; Szameitat et al, 2009; Hurley et al, 2011; Weems, 2014). Fundamentalmente, la huella neuroquímica que acompaña a la risa marca positivamente los episodios y las relaciones interpersonales y acelera la consolidación de las memorias asociadas a dichas relaciones (“reír juntos”). La risa, al robustecer singularmente las bases sinápticas de los cuadros de memoria en que ha intervenido, deviene un medio ideal para participar en la creación de todo tipo de lazos sociales y grupales: paterno-filiales, juveniles, emparejamientos, coaliciones grupales, alianzas temporales, etc. (Dunbar, 2004; Dunbar & Shultz, 2007; Marijuán, 2009). Es tan potente su rol en la socialización que, de hecho, en el trabajo de campo desarrollado para definir el constructo de sociotipo se incluyeron diversas cuestiones relacionadas con la risa. Y, consecuentemente, dos de ellas fueron seleccionadas por su potencia estadística para la elaboración del cuestionario definitivo.

C. THE “SOCIO TYPE” CONSTRUCT: GAUGING THE STRUCTURE AND DYNAMICS OF HUMAN SOCIALITY

Se trata de la publicación que centra el conjunto de la investigación del sociotipo y esta propia Tesis. En ella se desarrolla un indicador psicométrico, que resulta válido en términos de estructura y lo suficientemente confiable en términos de consistencia interna. Este cuestionario final de sociotipo (SOCQ) lo conforman consistentemente las subescalas *familia, amigos, conocidos*, y otra subescala

estudio/trabajo que se presenta de manera separada, facilitando así la exploración por distintas poblaciones y desde distintos puntos de vista. El cuestionario SOCQ supone un nuevo instrumento de análisis del panorama de la sociabilidad que, por ser intrínseco a nuestra naturaleza, está estrechamente relacionado con nuestra salud tanto física como mental. La convergencia de SOCQ con otros constructos incluidos en el estudio como la soledad, la angustia psicológica, y la personalidad fue satisfactoriamente alta, lo que demuestra su validez y relevancia al encontrarse una serie de correlaciones altamente significativas. Además, como ya se ha comentado, esta nueva herramienta también está resultando sumamente útil como elemento de evaluación de las intervenciones de sociabilización.

D. SOCIOTYPE IN DERMATOLOGY

En esta aplicación del cuestionario de sociotipo (SOCQ) el objetivo es detectar y evaluar la carga psicosocial que causan las enfermedades de la piel. Estas enfermedades dermatológicas pueden conllevar una importante carga psicosocial para aquellos que la sufren. Aunque numerosos estudios han puesto de manifiesto problemas como una menor calidad de vida, mayor ansiedad, depresión, ideas suicidas y otra serie trastornos psicológicos (Hay et al., 2010; Breuer et al, 2015; Marron et al, 2016), a día de hoy todavía no se han desarrollado las herramientas adecuadas para poder evaluar las dificultades de interacción social, o las redes sociales disminuidas que acarrear estos pacientes dermatológicos y que afectan tanto a su bienestar como a su salud mental (Dalgard et al., 2015). Con este objetivo se desarrolló un estudio de campo con 159 pacientes consecutivos del Servicio de Dermatología Clínica del Hospital de Alcañiz invitados a participar en el estudio. Los resultados evidenciaron cómo la severidad de la

patología está fuertemente relacionada con la pérdida de los vínculos sociales, y más específicamente, cómo las dimensiones del SOCQ (familia, amigos, conocidos, y compañeros de trabajo/estudio) ponen de manifiesto los déficits relacionales específicos, pudiendo así proporcionar indicaciones muy útiles a la hora de reorientar las intervenciones sociales de los pacientes. Esta perspectiva supone replantear algunos postulados en las actuales políticas sanitarias, como son una prevención, una atención y un tratamiento que consideren los vínculos y las relaciones sociales como factores esenciales de la calidad de vida.

II.

COPIA DE LAS PUBLICACIONES INCLUIDAS EN ESTA TESIS

Chapter 14

The “Sociotype” Approach to Social Structures and Individual Communication: An Informational Exploration of Human Sociality

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The present work discusses the pertinence of a “sociotype” construct, both theoretically and empirically oriented, based on the conceptual chain genotype-phenotype-sociotype. It suggests the existence of an evolutionary preference in humans for some determined averages of social structure and communicative relationships. Although human individuals become highly adaptive and resilient concerning the implementation of their sociality, a core pattern, or “sociotype” might be delineated for their social structures and relationships. Anthropologically, this construct dovetails with recent developments in origins of language, social networks, and the “Social Brain Hypothesis.” From several points of view, properly framing the sociotype construct and submitting it to empirical testing could be a timely enterprise. In our times, dramatic changes are occurring in the social relationships of entire communities. Economic globalization, new communication technologies, and the demographic transition towards elderly populations are configuring a new panorama of social intercourse, paradoxically characterized by an increasing level of

isolation. Such perceived isolation and feelings of loneliness become an unrewarding condition for individuals, an unwanted state, and also a risk factor for mental health. An empirical search throughout the sociotype lens could provide useful orientations for these problems — a pilot study on the social relationships of young people is herein included.

Keywords: Sociotype; social brain hypothesis; bonding relationships; loneliness; mental health.

1. Introduction

Sociality is an essential trait of the human species — as Aristotle wrote in *The Politics* “man is by nature a political animal” [Fowler and Schreiber, 2008]. Indeed the crucial novelties of our evolutionary and historical past revolve around essential aspects of sociality — e.g. origins of language, emotional communication, group behavior, morals and ethics, religious and legal codes, political institutions, knowledge systems, and so on [Diamond, 1998]. So fluid and culturally diverse are the emerging structures of human sociality that, apparently, they defy any precise classification or quantitative specification. Traditionally, a number of schools of thought have followed culturally-oriented approaches to this ‘open ended’ phenomenon of human sociality [Derridá, 1976; Lévi-Strauss, 1981], while some others have emphasized views closer to biological determinism [Lorenz, 1965; Wilson, 1977]. It is the old conflict between the biological and the political disciplinary points of view, the “nature” versus “nurture” unfortunate dichotomy. Rather unluckily, scientific discussions have also been compounded by the many fields of study involved — anthropological, communicational, neurobiological, ethological, psychological, social, political, philosophical, economical network science, etc. So, instances of convergence

have been scarce. More recently, however, some anthropological and social science approaches have achieved an interesting degree of convergence about fundamentals of human sociality [Chapais 2008, 2011; Sennet, 2012]. Hypothesis such as the “social brain” have also contributed to advance a new bond-centered approach on the evolutionary emergence of human sociality.

The presence of a series of significant regularities in the size and structures of social groups, notwithstanding their remarkable variability, suggests the plausibility of a “deep structure” of social bonding for the human species [Chapais, 2011; Hill *et al.*, 2011]. There seems to be an average of social networking, with very ample upper and lower limits, concerning the number and types of bonding relationships that an individual is able to maintain meaningfully [Dunbar, 2004; Dunbar and Shultz, 2007; Fowler and Schreiber, 2008; Hill *et al.*, 2011]. The finding of networking regularities such as the famous “Dunbar’s number” (150-200 individual acquaintances) would make a lot of evolutionary and anthropological sense.

1.1. *The social brain hypothesis*

The social brain hypothesis has posited that, in primate societies, selection has favored larger brains and more complex cognitive capabilities as a mean to cope with the challenges of social life [Silk, 2007]. In primate societies, a tight correlation has been observed between the size of social groups and the neocortex relative proportion (roughly, “brain size”) (see Figure 1). Actually, the idea of relating brain size with the demands of communication in social life was already hinted by C. Darwin in “The Descent of Man” [1871]. More than a century later, J. Allman and others reconsidered the idea and framed it as a social hypothesis [Allman, 1999]. Also known as the *Machiavellian intelligence hypothesis*, it was more rigorously formulated by R. Dunbar [1996, 2004] and extended into other mental and biomedical fields [Baron-Cohen *et al.*, 1999; Badcock and Crespi 2008]. Although the hypothesis has been criticized from several grounds [Balter, 2012], and it is

unclear whether it can be extended to the generality of mammalian societies, it has gained momentum regarding the evolutionary explanation of the ‘natural’ groups and structures formed in human societies. In the present work, the social brain views have been taken as one of the main references to structurally develop the sociotype hypothesis.

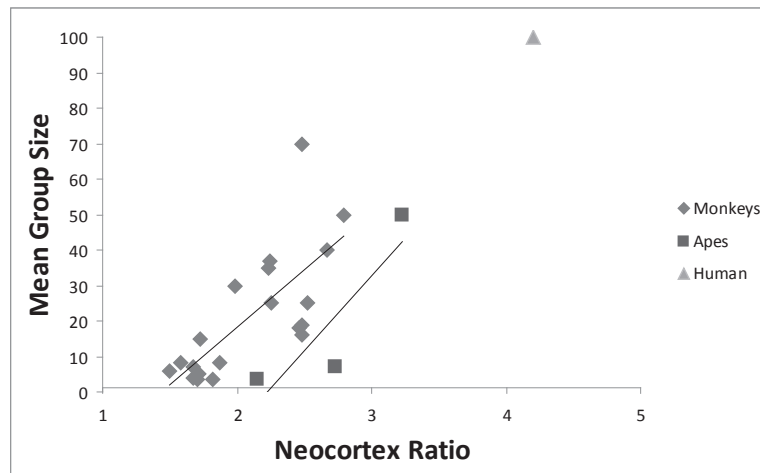


Figure 1. Representation of the mean social-group size in monkeys and apes (ordinates) versus the relative neocortex volume (abscises); in human species both data are disproportionably high. In the figure, diamonds represent monkeys, squares represent apes, and the triangle represents humans. Modified from [Marijuán and Navarro, 2010].

1.2. Further relational and mental health aspects

Nevertheless, the main argument of this chapter will depart from the social brain hypothesis in two important respects. First, the emphasis will be put, not just in the size structures of social groups, but mostly in the communication practices that underlie

the formation and maintenance of the individual’s bonding networks — so, the relational, linguistic activities. In itself, every interpersonal bond is but a “shared memory”, consisting in specialized neural *engrams* that encode a variable number of *ad hoc* behavioral episodes between the individuals, positively or negatively finalized [Collins and Marijuán, 1997]. Thus, being far more than collections of mere recognition events, bonds are ensconced upon synaptic memories that occupy an important quota of cortical space, presumably with each bond’s occupancy depending on its specific contents and ‘strength’. That these bond engrams rely on vast cortical spaces would be in accordance with the relevant multi-area activations produced by social interactions and social evaluations, as observed in different neuroimaging studies [Greene, 2001; Iacoboni 2004; Cacciopo and Patrick, 2008]. Subsequently, the overall cortical conformation and capacity of our species, vastly enlarged regarding other Anthropeida, would greatly influence the really high number of bonds that, comparatively, human individuals can meaningfully sustain. However, like many other brain/mind phenomena, exactly how bonds are made, maintained, differentiated, eroded, finalized, restored, etc. is not sufficiently understood yet — although in all probability it is a species-specific phenomenon.

In many respects, language appears as the essential tool for bond-making in human societies, although not the only one [Dunbar, 1996; Benzoni, 2001; Tomasello, 2008; Desalles, 2007; Marijuán and Navarro, 2010]. The way emotions impinge in social communication and upon language itself represents another distinctive factor of utmost importance [Scherer, 2003; Fiske, 2011]. Also, distinguishing several classes of bonds (related to their strength and to their positive or negative valence) would be important in order to assess their respective relevance within the relational sociotype of the individual. It can be said that bonds claim for their actualization, and linguistic practices claim for their regular realization. Thereafter, the daily conversation/communication budget of each individual has to be apportioned among the different bonding classes of his/her sociotype so that the

talking exercise becomes sufficiently rewarding — providing enough grooming — taking into account the existing diversity of possible encounters and communication channels. Analyzing the different conversation-time distributions could lead to very interesting comparatives: by age, gender, status, professions, cultures, communication channels, etc.

Another important aspect in which the present work departs from the social brain hypothesis concerns its empirical, or better, pragmatic orientation. Herein the emphasis will be put on elaborating a construct finally oriented towards mental-health problems, roughly exploring the potential application of the sociotype as an indicator capable of gauging the whole relational networks of the person and how much daily conversation/communication he/she is engaged in a regular basis, so that the corresponding communicational needs are sufficiently covered or not. The contents exchanged are not of much importance. Seemingly, rather than the exchange of functional information, it is trivial conversation, gossiping about social acquaintances which represents the human equivalent of primate *grooming* [Dunbar, 1996; Desalles, 2009].

In what extent could human language be a ‘virtual’ equivalent to physical grooming? It has been claimed that a variety of grooming practices (touching, scratching, tickling, chase playing, wrestling, massaging, etc.) are essential to restore the inter-individual bonds in primate groups and societies [Dunbar, 1996, 2004]. The molecular cocktail involved in these grooming relationships activates the reward system in both parties, groomer and groomee, with effects in stress quenching, immune boosting, and learning consolidation, thus contributing to reinforce synaptic bond memories erased in the behavioral “noise” of these societies. Therefore, human ‘languaging’ would have been evolutionarily co-opted as a virtual system for social grooming, subsequently stimulating in our “social brain” the production of neuropeptides and neurohormones that relieve stress and boost immune system and nervous system [Dunbar, 2004; Nelson and Geher, 2007; Shutt *et al.*, 2007]. The repercussions in daily life cannot be overstated:

talking becomes one of the preferred and most affordable types of mental stimulation. Counting with an appropriate network of relationships with people to talk with becomes a necessity for the wellbeing and mental health of individuals. Having access to and participating in amusing conversations becomes an essential ingredient of our social, psychological, and physical wellbeing feelings.

Notwithstanding a number of recent studies on social networks, technologically oriented, that have tracked vast amounts of interpersonal exchanges [Pentland, 2014], the metrics of the relational structures necessary for mental health and wellbeing have not been properly addressed yet. Hopefully, the progressive delineation of a sociotype concept, pragmatically oriented, and susceptible of both theoretical and empirical demarcation, could contribute to a better understanding of the structures and dynamics of human sociality, and even provide some practical help when sociality itself is in crisis, as seem to be happening with the current “epidemics of loneliness” affecting large population tracts [Oldenburg, 1999; Stivers, 2004; Hawkey and Cacioppo, 2010; Yang and Victor, 2011]. From a biomedical perspective, in spite of the pervasive loneliness and lack of meaningful relationships in contemporary societies, there is a dearth of adequate indicators gauging conversational activities of the individual. Actually, none of the existing questionnaires on the topic (e.g. UCLA loneliness scale, SNI, Duke, SELSA, MOS, SSB, etc.) have addressed the basic, face to face relational phenomena centered by the sociotype.

1.3. Loneliness and its psychobiological consequences

In our times the absence of social bonds has become a common experience: over 80% of children and 40% of those over 65 report feeling alone from time to time. Loneliness levels gradually decline in the middle years of adulthood and increase with age, reaching the maximum around age 70 [Weeks, 1994; Oldenburg, 1999; Pinquart and Sorensen, 2001; Berguno *et al.*, 2004; Cacioppo and Cacioppo, 2014]. As numerous studies have shown,

there is an association between social isolation, primarily perceived isolation, and poor physical and mental health, which cannot be explained away using different health behaviors. Social isolation decreases life years of social species, from *Drosophila* [Ruan & Wu, 2008] to *Homo sapiens* [House *et al.*, 1988]. The lack of social bonds has deleterious effects on health through its effect on the brain, the hypothalamic-pituitary-adrenal (HPA), vascular processes, blood pressure, gene transcription, inflammatory, immune, and sleep quality [Cacioppo and Hawkley, 2009]. Research indicates that perceived social isolation (i.e., loneliness) is a risk factor, and may contribute to poorer cognitive performance, greater cognitive impairment and poorer executive function and an increased negativity and depressive cognition that accentuate sensitivity to social threats [Berkman, 2009]. In fact, loneliness is associated not only with poor physical health; it also includes psychiatric conditions such as schizophrenia and personality disorders, suicidal thoughts, depression and Alzheimer [Berkman, 2009; Wilson *et al.*, 2007; Cacioppo and Hawkley, 2009].

1.4. A growing social problem

In today's societies there is a significant change in the way social relationships are maintained. The intrusion of new information and communication technologies (ICTs), notwithstanding many other positive effects, would have contributed to the important social disintegration that is occurring also for other reasons — work instability, economic crisis, marginalization of minorities, urban sprawl, migration, etc. In our times, relational networks are apparently larger and faster, but more transient and devoid of personal contact, so that individuals are at greater risk of social isolation, particularly the elderly. The diminished relationships and bonding structures of “social capital” penalize the development of daily life and decrease individuals' wellbeing [Putnam, 2000]. The evidence in fast-developing countries is that economic growth and technological development spurred by the ‘information revolution’ have gone hand-in-hand with an increase in mental and behavioral

disorders, family disintegration, social exclusion, and lower social trust [Bok, 2010; Huppert, 2010]. It’s supposed we are living in a society “technologically civilized”, where the ubiquitous presence of Media and ICTs has dramatically altered life styles. But it is unclear the effect that such ICT pervasiveness and overuse are having in our social relationships and quality of life. In what extent could computers, cell phones, and TVs replace our need of face-to-face relationships? Are they facilitators, or surrogates and false substitutes, or both? [Easterbrook, 2003; Stivers, 2004; Roberts, 2014].

In 1950, 4 million Americans lived alone, making up 9% of households; the census data from 2011 show that nearly 33 million Americans are living alone, making up 28% of American households: three hundred per cent increase. The same process is taking place in different countries, for example in Sweden the percentage of households “single” reaches 47%, Britain 34%, 31% in Japan, 29% in Italy and 25% in Russia. Living alone, paradoxically, could symbolize our social need to reconnect [Klinenberg, 2012]. Similarly, mental disorders such as schizophrenia, depression, epilepsy, dementia, alcoholism and other substances abuse constitute 13% of the global disease burden, a percentage that surpasses cardiovascular diseases and cancer [Collins *et al.*, 2011]. European studies estimate that in the period of one year, 165 million people (38% of the population) will develop a mental illness [Wittchen *et al.*, 2011].

In Spain, according to the Time Use Survey (INE, 2010), people spend less and less time to interact physically and face to face. Between 2003 and 2010 participation in social life and fun activities decreased, while the time spent with computers (social networks, information retrieval, computer games) substantially increased, from 17.3% of population in 2003 to 30% in 2011. Socializing and fun activities were performed by 57% of the population, while seven years earlier (2003) these activities were performed by 64.4%. In recent years there has been a significant transfer of social life and collective fun activities to individualized activities such as computer games, Internet, TV watching. In this

regard, it is significant that in Spain and in other countries, suicide rates have increased dramatically in the last three decades.

In the US Census, 1985, the average number of confidants was three; in the 2004 census the average was 2, but the most common figure was *zero* confidants for almost 25% [Cacciopo and Patrick, 2008]. The phenomenon is similar in most Western countries.

In spite of the pervasive epidemics of loneliness and lack of meaningful relationships in contemporary societies, there is a dearth of adequate indicators gauging the social networking and relational activities of the individual. What daily average does he/she talk? With whom? Which channel: face-to-face, by phone, via Internet? How often does he/she socialize? Does he/she exercise alone? This type of questions has to be properly addressed and integrated with the measurement of the social networks around the individual, and further correlated with wellbeing and mental health questionnaires. That's what the sociotype hypothesis aims—and also what a few of the most recent enquiries are beginning to ask for [Pearson, 2015; Servick, 2015].

2. The Sociotype Hypothesis

The term sociotype has already appeared in the literature, though very scantily. In psychology, it has been put into use by a Jungian oriented school, “socionics”, meaning the specific profile attributed to some well-recognized professions: lawyer, policemen, firefighter, etc. [Jung, 1971]. In the biomedical area, Berry [2011] has recently proposed the sociotype as an integrative term covering internal and external factors for the management of chronic disease, imply the integration of bio-psycho-sociology with systems biology. Also, some of the present authors have already utilized the term within the triad genotype-phenotype-sociotype, implying the social-evolutionary meaning herein proposed [Marijuán, 2006, 2009; del Moral and Navarro, 2012].

The sociotype construct is an attempt to cover the social interactions (bonding structures and communication relationships)

that are adaptively demanded by the ‘social brain’ of each individual. In the same way that there is scientific consensus on the validity of the genotype and phenotype constructs for the human species, notwithstanding their respective degrees of variability, a metrics could also be developed applying to the relative constancy of the social environment to which the individuals of our species are evolutionarily adapted. The average brain stimulation coming from relational interactions in that social environment, as we have argued, together with further substitutes and surrogates culturally elaborated, would constitute a mental necessity for the individual’s well being. Thus, the interest of appropriately gauging the bonding structures and communication relationships by means of a questionnaire, or a series of questionnaires, including also the influence of factors related to age, gender, personality, affluence, profession, culture, etc. This sociotype construct could provide relevant help for psychological counseling and early psychiatric intervention.

2.1. *Fundamental hypotheses*

More concretely, developing the sociotype construct would imply addressing and putting into test the following fundamental hypotheses:

1. There exists in human beings a characteristic way to conform the structure and dynamics of social bonds, that probably can be related to the functionality of the main cortical brain structures.
2. It is possible to develop a questionnaire to assess and measure the sociotype’s main dimensions, and to validate it in the general population (quite probably in subpopulations segmented by age).
3. The sociotype can be a useful indicator of mental health and physical health in the population, becoming an adjuvant tool for psychiatric diagnosis and risk assessment of mental illness.

Thereafter, the following objectives have been addressed.

2.2. Central objective

The central goal is establishing a new indicator, based on a standard questionnaire, to collect essential data on the structure of the individual's social bonds, as well as their dynamic update (conversation), and correlate it with other indicators of mental health.

2.3. Secondary objectives

1. Develop a questionnaire that can measure and validate the sociotype concept in the Spanish population.
2. Generalize the sociotype concept and its associated indicators as a general means of social and psychological study.
3. Framing the sociotype as an indicator of mental and general health in the various segments of the population (youth, adults, seniors, and elderly).
4. Demonstrate its use as adjuvant tool for the psychiatric diagnosis and social isolation risk in patients with depression and other mentally disturbing pathologies.

2.4. Pilot study

In order to address both the structural and dynamic aspects of the sociotype construct, a pilot study has been undertaken analyzing the social networks around adolescents. Subsequently, a sociotype questionnaire has been developed, initially tailored for the adolescent population. In this preliminary study we have selected a young population due to the high prevalence and intensity of the feelings of loneliness, actually higher in adolescence and transition to adulthood (16-25 years) than in any other group except the elderly (>80 years) [Pinquart and Sorensen, 2003]. The study in older people has been discarded precisely because most research in loneliness has already been done in older population [Cacioppo

and Hawkley, 2009]. A total of 165 students were interviewed with the preliminary version of the “Sociotype Test” developed by the Bioinformation Group and the Research on Mental Health in Primary Care Group Mental Health Group of IACS. A group of 95 students was recruited from last two courses of High School (16-18 years old), and another group of 70 students was recruited from the first courses of university (19-20 years old).

3. Methodology

3.1. Design

It is an exploratory, observational, cross-sectional study.

3.2. Study population

In this study we had applied a “convenience sampling” [Cohen *et al.*, 2003], where the subjects were students who came from two education centers which we had access. The total sample of students was 165. There were two samples, *Sample_1* was recruited from last two courses of High School, its sample size was $n = 95$ (38.3% men and 61.7% women) and the age average 17.81 (SD = 4.24). *Sample_2* was composed by students from the first course of University, its sample size was $n = 70$ (80% women and 20% men) and the average age was 19.37 (SD = 2.44).

All the individuals were Spanish and none suffered any mental illness that prevented the realization of the task, so they were able to understand and complete the questionnaire. Inclusion criteria were as follows: age 17-25 years, good mastery of Spanish language. Exclusion criteria were: to suffer from severe mental disorder, any clinical or psychological illness that prevented the realization of the test.

Sample_1 was interviewed with the “Sociotype Test” in order to explore both structural and dynamic aspects of social networking, and *Sample_2* was also interviewed with the GHQ-28

(General Health Questionnaire), addressed to relate the social networks with mental health and psychological well-being.

The Ethical Committee of Aragón had previously surveyed the Questionnaire and the Methodology of the Study, as part of the Project FIS PI12/01480.

3.3. Sociotype questionnaire

This preliminary sociotype questionnaire was developed by the Bioinformation and Systems Biology Group and the Research on Mental Health in Primary Care Group of the Aragon Health Sciences Institute. Based on the opinion of experts from different fields of knowledge (e.g., sociology, anthropology, psychiatry/psychology, neuroscience) a set of 6-8 dominions to assess the concept were developed. Using qualitative methods (in-depth interviews, discussion groups, etc.), healthy people and patients with psychiatric and physical disorders were approached to identify about 50 key questions to assess those dominions. Finally, factorial analysis was used to identify the definitive items included in the questionnaire following the usual methods to develop new questionnaires [Montero-Marín and García-Campayo, 2010].

This preliminary version of the Sociotype Questionnaire was made up of 20 items. It included basic socio-demographic questions (age, gender, educational level, family status...), and also questions related to the way relationships are kept (time talking face-to-face, telephone, social networks or other channels). They were requested for the four different layers of social relationships considered (nuclear family, close friends, relatives & parenthood, social acquaintances). The auto-evaluation of sociability, as well as the self-satisfaction level was asked too; and also changes in personal state. The questionnaire showed adequate psychometric properties that will be described in an independent paper.

3.4. GHQ-28 questionnaire

The General Health Questionnaire-28 is a screening tool to detect emotional distress and the risk of developing psychiatric disorders. Through factor analysis, the GHQ-28 considers four subscales: somatic symptoms, anxiety/insomnia, social dysfunction and severe depression.

The scoring method (CGHQ) takes into account the chronicity of psychiatric symptoms. It is superior to the conventional scoring method in yielding a wider range of scores, a more normal distribution and a well validated measure of neurotic illness. We used the validated Spanish version of the questionnaire [Lobo *et al.*, 1986].

3.5. Statistical analysis

Frequency distributions of the qualitative variables were calculated in each category (gender, pets...). Quantitative variables (time talking, number of contacts...) were tested for normal distribution by means of Kolmogorov-Smirnov test, and indicators of central tendency (mean, trimmed mean or median) and dispersion (standard deviation or percentiles) were elaborated. Correlation between social variables and psychological risk factors were performed by means of contrast hypothesis, comparing proportions of qualitative variables (chi-square, Fisher exact test) or by comparison of means of quantitative variables (Student's t, ANOVA). When the distribution wasn't adjusted to normalcy, the U Mann Whitney or Kruskal Wallis tests were used. The analysis was executed by means of the SPSS 15.0 for Windows. A significance level (alpha) of 5% was used to consider statistical significance.

4. Results

Structural and relational data were obtained. In the former, four levels of relationships were distinguished (arguably, three levels

could have been better, as will be discussed in the next section). The results may be seen just in Table 1.

Table 1. Number of people in the different layers of social relationships

| | Mean | SD |
|---------------------------------|-------|-------|
| Nuclear Family | 5.05 | 1.24 |
| Close Friends | 6.02 | 3.23 |
| Relatives&Parenthood | 13.03 | 10.21 |
| Social Acquaintances | 77.06 | 92.85 |

About the relational data, they have been presented in minutes per week, for an easy calculation, and they are aggregated for the whole population (see Table 2). They are also compared by gender (Table 3), in that case including equivalence in hours per day.

Table 2. Conversation time (min/weekly)

| | Mean | SD |
|-----------------------------------|--------|--------|
| Family Face-to-Face | 464.40 | 394.17 |
| Family Phone | 41.52 | 62.65 |
| Couple Face-to-Face | 495.19 | 342.39 |
| Couple Phone | 96.59 | 95.01 |
| Friends Face-to-Face | 492.33 | 380.50 |
| Friend Phone | 69.36 | 80.58 |
| Acquaintances Face-to-Face | 127.10 | 149.57 |
| Acquaintance Phone | 19.89 | 34.48 |

Table 3. Time spent in conversation, by gender. 5% Trimmed mean

| | Minutes per Week | | Hours per Day | |
|-----------------------------------|------------------|--------|---------------|------|
| | Women | Men | Women | Men |
| Family Face-to-Face | 473.89 | 421.11 | 1.13 | 1.00 |
| Family Phone | 58.98 | 31.85 | 0.14 | 0.08 |
| Couple Face-to-Face | 542.64 | 272.22 | 1.29 | 0.65 |
| Couple Phone | 101.34 | 35 | 0.24 | 0.08 |
| Friends Face-to-Face | 518.06 | 593.33 | 1.23 | 1.41 |
| Friends Phone | 108.06 | 29.44 | 0.26 | 0.07 |
| Acquaintances Face-to-Face | 131.81 | 131.11 | 0.31 | 0.31 |
| Acquaintance Phone | 15.83 | 12.96 | 0.04 | 0.03 |

The statistical analysis of the relationship between the most relevant variables in the Sociotype Questionnaire and the General Health Questionnaire-28 is shown in Table 4. The data are corresponded to the four psychiatric subscales, and quite many of them show statistical significance.

Table 4. Relationships between the subscales psychiatric and the variables of interest. Medians (Interquartile Range) are shown for the quantitative variables; Frequency (Percentage) for the qualitative variable. *indicates statistical significance ($p < 0.05$)

| | Somatic Symptoms | | Anxiety & Insomnia | | Social Dysfunction | | Severe Depression | |
|--|------------------|-------------|--------------------|------------|--------------------|----------|-------------------|------------|
| | Not Probably | Probably | Not probably | Probably | Not probably | Probably | Not probably | Probably |
| Gender (women) | 33 (80.5%) | 23 (79.3%) | 21 (77.8%) | 35 (81.4%) | 54 (83.1%)* | 2 (40%)* | 50 (80.6%) | 6 (75%) |
| Almost 3 people you can trust when facing a problem | 39 (95.1%)* | 23 (79.3%)* | 26 (96.3%) | 36 (83.7%) | 59 (90.8%)* | 3 (60%)* | 57 (91.9%)* | 5 (62.5%)* |

(Continued)

Table 4. (Continued)

| | | | | | | | | |
|------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|
| People get in touch – weekly | 53 (90) | 39 (27) | 45 (64)* | 41 (34)* | 42 (40) | 19 (36) | 44 (42.5) | 38 (32.5) |
| Time talking – min/week | 2760 (3555) | 1620 (4270) | 2880 (4620) | 2280 (4020) | 2430 (3965) | 1320 (3200) | 2385 (3927.5) | 1890 (4627.5) |
| Tapas/Café – weekly | 1 (2) | 0 (2) | 2 (3)* | 0 (2)* | 1 (2) | 0 (2) | 1 (2) | 0 (3.25) |
| Go for a walk accompanied – weekly | 3 (4) | 2 (4) | 4 (4.25)* | 2 (4)* | 3 (3)* | 0 (1.5)* | 2.5 (3) | 0.5 (3.5) |
| Sociability Level | 75 (12.5) | 80 (13.5) | 75 (15) | 80 (10) | 80 (10)* | 63 (45)* | 80 (10)* | 55 (39.5)* |
| Satisfaction Personal Relationship | 80 (20)* | 70 (25)* | 80 (20) | 80 (20) | 80 (15) | 80 (43.5) | 80 (15) | 73.5 (60) |

5. Discussion and Comments

To the authors' information, this is the first attempt to identify and measure a construct related with the way that human beings develop and maintain their structure of relational bonds. Neither the emerging structures nor the dynamic relationships have been studied in their mutual interaction yet. As mentioned in the Introduction, the very important changes in the patterns of socialization within the "information societies" demand more sophisticate conceptual apparatuses to better tackle the inherent problems. Although in this discussion we have to refer to preliminary results obtained from a very limited survey, the topics which surface are of general interest and confirm the potential of the sociotype construct.

A number of observations can be made about the social structure depicted in Table 1. Overall, the whole data indicate a pattern of superimposed social structures with a consistent number of 100 members among young people (mean age = 17.81,

SD = 4.24). Certainly this value is not much close to Dunbar’s, but probably it is different due to the fact that the structural pattern at this age is not totally established. Actually the standard deviation for social acquaintances is even higher than the mean itself. A significant number of students responded with pretty low figures, while other referred to several hundreds. So to speak, at this age an independent sociotype is in the making, and for some adolescents that is an unwanted task, while for others an unbridled social excitation reigns. Correlating the type of structural values obtained with personality traits would be quite interesting –to be done in a near future. Besides, the number of layers or levels to distinguish is also an interesting aspect. In some societies, the ‘extended family’ layer makes little sense, while in others it becomes the fundamental strata (power of clans).

In view of the obtained results in Table 2 we confirm the average of 3-4 h of daily conversation time referred in the literature (Dunbar, 2004). We find gender as a fundamental factor (Table 3): women spend 1 hour per day more than men in communication (4.64h women vs. 3.63h men). Obviously these data should be studied in more detail and with larger samples. Although the conversation time is not strictly correlated with any subscale, there is an evidence of higher probability of developing a psychiatric disorder when the talking time is too low. As we have already argued, conversational ‘grooming’ would be essential to our social, psychological and physical well-being.

Attending to the influence of social networks on mental health (see Table 4), we find very interesting correlations: *Severe Depression* is directly correlated with the number of people you can trust when facing a problem, as well as with the sociability level; the same parameters correlate to *Social Dysfunction*, plus gender and going for a walk accompanied, and gender; *Anxiety and Insomnia* also correlates with the number of people you get in touch weekly, going for a walk accompanied, and going out for ‘tapas’ or café weekly; *Somatic Symptoms* and the self-satisfaction with your personal relationships. These results emphasize that loneliness may be a risk factor by interfering with some forms of

psychosocial distress. In this questionnaire the concept of loneliness is considered as a separate entity from social isolation and depression, so these measures of relationships include the distress that an individual may subjectively feel.

As a further step, theoretical network approaches could be applied to the present data. What is the equivalent in terms of structural sociotype of the gain and loss of bonds in the different categories? How the sociotype evolves with age? How resilient is this structure regarding changes in the social environment, e.g., migrations? How do contemporary technological-communication changes affect its dynamics? In what extent could computers, cell phones, and Internet exchanges accelerate our bonding relationships? May all those ICTs gadgets replace our need of face-to-face contact? In what extent is continuous “accessibility” irrespective of the interpersonal environment a disturbing circumstance?

This Pilot Study has shown an intriguing panorama of correlations to be explored carefully, hinting at comparative studies on age and cultural differences. It also conduces to highly debated topics on mental health and psychiatry, such as the therapeutic influence of changing life styles [Walsh, 2011], which have to be urgently addressed by mental health professionals for fostering individual and social well-being, and for preserving and optimizing cognitive function. The social support concept and the so-called “buffering hypothesis” may also be considered under the sociotype angle [Qureshi *et al.*, 2013].

The main limitations of the study are the following: First, the questionnaire used to assess the sociotype is preliminary and should be subject to more thorough validation—but the preliminary results suggest that the construct *exists* and can be measured. Second, sample size is relatively small and not representative of the general population. Future studies with larger populations and including both healthy people and patients with psychiatric and physical disorders are warranted. Third, the concept of sociotype should be related not only with psychological variables but also with more biological variables such as

genetic/epigenetic parameters, neuroimage and immuno-neuro-endocrine explorations, and physiological variables as well, in order to confirm the validity of the construct and the proposed alignment *genotype-phenotype-sociotype*.

In any case, the present work is but an exploratory attempt, and further research on the sociotype topic is under way in a national mental health project (Spanish FIS Project, Carlos III Health Institute).

6. Evolutionary Coda

From the evolutionary point of view, the present “epidemics of loneliness” is nonsense, an arbitrary imposition stemming from both socio-cultural and techno-economic automatisms that are scarcely understood in their self-generating complexity. Much of the burden on health systems, particularly in mental health, derives from social disintegration — the lack of a community in which people can talk and feel connected to each other. It has been proved that people with the most extensive social networks and the highest levels of social engagement have the lowest rates of physical and cognitive decline. But it is very difficult investigating levels of social engagement, and even more measuring them. In some occasions, coining a new scientific concept helps to advance more useful ideas and social policies. The sociotype hypothesis and the preliminary questionnaire herein presented may somehow contribute.

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Conflict of interest statement

None declared.

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Laughing Bonds: A Multidisciplinary Inquiry into the Social Information Processes of Human Laughter

Abstract

Purpose - A new core hypothesis on laughter is presented. It has been built by putting together ideas from several disciplines: neurodynamics, evolutionary neurobiology, social networks, and communication studies. The hypothesis focuses on the social nature of laughter and contributes to ascertain its evolutionary origins in connection with the cognitive and social-emotional functions it performs.

Design/methodology/approach - An in-depth examination of laughter in the social communication context and along the life cycle of the individual is performed. This instinctive behaviour that appears as a 'virtual', non-physical form of 'grooming' would serve as a bond-making instrument in human groups. Further, the neurodynamic events underlying laughter production—and particularly the form of the neural entropy gradients—are congruent with a *sentic* hypothesis about the different emotional contents of laughter and their specific effects on bonding dynamics.

Findings - The new behavioural and neurodynamic tenets introduced about this unusual sound feature of our species justify the ubiquitous presence it has in social interactions at large and along the life cycle of the individual. Laughter, far from being a curious evolutionary relic or a rather inconsequential innate behaviour, should be considered as a highly efficient tool for inter-individual problem solving and for maintenance of social bonds.

Originality/value - Laughter, we will conclude, has been evolutionarily kept and augmented as an optimized tool for unconscious cognitive-emotional problem solving, and at the same time as a useful way to preserve the essential fabric of social bonds in close-knit groups and within human societies at large.

Keywords: laughter, social brain hypothesis, virtual grooming, social bonds, neural entropy, sentic forms.

1. Introduction: the need of new synthetic views

The resurgence of laughter research during last two decades (Provine, 2000) has been very fertile concerning specialized achievements in a number of fields. The exciting developments in neuroimaging, neurophysiological, sound analysis, physiological (respiratory and phonatory), ethological, evolutionary, social communication,

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computational engineering, and biomedical fields have dramatically changed the research panorama. However, the conceptual counterpart of putting together the most relevant strands of thought in order to gain more advanced synthetic views or to establish a new core hypothesis, or a set of hypotheses, has not been sufficiently developed. In this paper we will attempt that conjunction of ideas—though, inevitably, within a rather limited scope of contents. The authors are well aware of, and would like to abide by, Schrödinger’s famous disclaimer: “...*some of us should venture to embark on a synthesis of facts and theories, albeit with second hand and incomplete knowledge of some of them—and at the risk of making fools of ourselves.*” (Cited in Stonier, 1990).

Contemplating the study of laughter, it is curious that parallel to its scientific obscurity during past centuries, it has been ostensibly present in philosophical speculation. Most of the big names of philosophy couldn’t help but expostulating some favourite hypotheses or tentative explanations about that enigmatic phenomenon, apparently exclusive of humans: Plato, Aristotle, Cicero, Quintilian, Hobbes, Kant, Schopenhauer, Spencer, Bergson, etc. (Kozintev, 2012). Actually, some of the ideas they were handling look very close to pretty modern hypotheses, such as superiority, paradox, and incongruence. However, not being able to frame sensible accounts, those approaches were superseded along the advancement of more modern scientific studies, and obscured finally by the mentioned resurgence of laughter research in recent times (Morreal, 1987; Provine, 2000, 2006; Weems, 2014).

In the transition towards scientific approaches, one of the most brilliant research insights corresponded to G. Bateson (1953). In the Ninth Macy conference, his oral presentation related laughter and humour to the presence and voluntary acceptance of paradox, implying that the mental flux or *entropy* generated by the sudden conceptual disorder and the subsequent solution would allow for a new organization of experience and/or new premises for the codification of thoughts. In fact, a sort of “cybernetics of humour” was born with that presentation and with the excited discussion it provoked—for instance, when John Bowman counter-argued that “an electronic buzzer is laughing” (Kadri, 2015). The buzz continued along the conversational and “languaging” explorations of other cybernetic figures (Gordon Pask, Stafford Beer, Heinz von Forster, Humberto Maturana) and still keeps producing interesting literature (Donoso, 2004; Kadri, 2011, 2015). Actually, Bateson’s reference to entropy reproaches the core hypothesis we are attempting herein.

The sounds of laughter, the underlying neurodynamic events, and the myriad ways this phenomenon surfaces in human relationships constitute essential traits for the cohesiveness of the present approach. As a preliminary step in the unifying direction, we will establish a coherent link between the evolutionary roots of human laughter and the natural social context in which language and an intense non-verbal communication took off in human groups (Section 2). Our analysis will be aligned with the “social brain” hypothesis (Allman, 1999, Dunbar, 2004). Later we will briefly examine the communication constraints of language in the life cycle of individuals, providing evidence for laughter’s subservient use as an augmented form of ‘virtual grooming’ and as a bond-making instrument (Section 3). Afterwards, looking at the underlying neurodynamic events, the analysis will focus on variational energy and entropy changes (Section 4). It will be argued that the gradient *form* of the entropy variation is at the essence of the unitary phenomenology of laughter (Collins and Marijuán, 1997). Then, the sound structure of laughter will be analysed, providing support to a *sentic hypothesis* on the informational/emotional content of the different classes of laughter (Section 5). It is a new idea which is also based on some classical works about the

convergence of emotional expression via differentiated sensorimotor channels (Clynes, 1979). Laughter, will be concluded, has been evolutionarily kept and *augmented* as an optimized tool for unconscious cognitive-emotional problem solving, and at the same time it has been used as a way to preserve the essential fabric of social bonds in close-knit groups and within human societies at large (Section 6). Additionally, looking from the biomedical perspective, we will find out that the social-inclusive dimension herein delineated around the “bonds of laughter” becomes useful in order to make sense of the numerous therapeutic applications that laughter has in biomedical settings and even of its potential use as a diagnostic tool in mental health disturbances (Navarro et al., 2014, 2016).

2. The evolutionary scenario of human laughter

Classical and recent ethological studies have unambiguously situated laughter within signalling contexts of play and socialization of advanced mammals, especially in relation with the grooming practices of anthropoid primates, but also in rodents and other species (Panksepp, 2005). So, contrary to the opinion of most classical philosophers, we humans are not alone in the instinctive laughing behaviour!

Whether anthropoid ritualized ‘panting’ during play should be considered as the closest antecedent of human laughter is still a matter of debate, though factually settled down (Ross et al., 2009). Anthropoids (chimps) ‘laugh’ mostly when tickled and at chased games, noisily punctuating each inhalation and exhalation; but they are fundamentally unable to modulate a single exhalation and articulate it into discrete notes. What modifications were elaborated upon this primate precursor that made possible the appearance of human laughter? Undoubtedly, they were derived from the systemic adaptations involved in bipedestation, allowing an improved control of breathing by freeing the thorax of the mechanical demands of quadrupedal locomotion –and also freeing the hand with the subsequent emergence of human dexterity techniques, directly fuelling the neocortex expansion too. “In the beginning was the breath” (Provine, 2000).

But new social behaviours were also driving further evolutionary changes of the human species (mostly brain-centred), and they presumably included an increase of group size and the development of articulate communicative language, with decoupling of vocal production from emotions. In parallel, new feeding practices and an improved social sharing of food (including the cultural invention of exodigestion or ‘cooking’) were being developed, as they were needed to compensate for the ‘energy crisis’ that so large a brain was causing in the metabolic budget, probably already at the level of *Homo ergaster* (Allman, 1999; Wrangham, 2009; Pontzer et al., 2016). Actually, an evolutionary trade-off took place between gut tissues and brain tissues: the great expansion of the brain in humans was accompanied by a commensurate reduction in digestive organ weight, almost “gram-by-gram” (Allman, 1999).

Nevertheless, obtaining a 20% surplus of energy from a gut reduced to 50% implied a series of unintended consequences—among them a largely stressed and fragilized gut microbiota or *microbiome*. This microbiome fragility was compensated partially with the mentioned exodigestion practices (cooking) and with the factual incorporation of external microbiomes by previously fermenting the food to be ingested—that’s the case of the most basic “civilization foods”, such as bread, cheese, wine, bier, etc. At the same time, those cultural practices granted relative independence from ecosystems’ immediate affordances (Diamond, 1998). Preparing the food, and more or less

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generously sharing it, became collective enterprises of human groups at the very centre of their daily activities—and supporting the emergence of many other associated ceremonials and cultural practices.

The loss of bodily hair was behaviourally important too, both for heat dissipation in new hunting strategies based on long-distance running needed for the new diet, and for the appearance of new pair-mating behaviors and a stronger parental bonding (Jablonski, 2010). It further facilitated the evolution of new communicative signals, which were also accompanied by many other group communicational adaptations: laughter, crying, smiling and other facial expressions, blush, pallor, enhanced gaze discrimination, unison sense, rhythm, music, dance, etc. (Benzon, 2001).

This is, roughly speaking, the evolutionary context – interwoven tapestry of survival capabilities and communication skills – onto which laughter became so conspicuous a trait in the social information processes of human groups. Indeed with the emergence of language, an evolutionary tipping point was reached, for laughter and for everything else human.

3. The Social Brain hypothesis and the emergence of language as ‘virtual grooming’

In the above evolutionary overlapping of highly consequential positive feedbacks, both of physical and behavioral nature, a crucial correlation occurred between social life and brain development (Dunbar, 1998; Allman, 1999; Badcock and Crespi, 2008). The social brain hypothesis posits that, in primate societies, selection has favoured larger brains and more complex cognitive capabilities as a mean to cope with the challenges of social life (Dunbar 2004; Silk, 2007).

Contrary to conventional wisdom in the cognitive field and neurosciences, which assumes that animal and primate brains deal with basically ecological problem-solving tasks, what the large primate brains would accumulate in their expanded neocortex is not information about ecological happenstances but the computational demands of their complicated storylines: the important memory capabilities invested in other individuals, the ever changing coalitions, the mating alliances, the sharing of resources, the multiple conflicts, and so on. Social networks in primates seem to be very different from those found in most other mammals: they are cognitive, memory-loaded, based on bonded relationships of a kind found only in pairbonds of other taxa (Dunbar and Shultz, 2007).

Maintaining that special structure of social-cognitive bonds relies on grooming practices. “Bonds” are but shared memories: they consist of neural *engrams* encoding behavioural interactions that have been positively finalized (Collins and Marijuán, 1997). When altered in the behavioural “noise” of primate societies, bonds are rebuilt and emotionally restored throughout a variety of grooming practices: touching, scratching, tickling, playing, massaging... up to 20 % of ecological time may be devoted to participation in grooming networks. The molecular cocktail activated by grooming is intriguing and not quite solved yet. Seemingly, it involves neuropeptides and relaxing hormones of the neural reward system, with effects in stress quenching, immune boosting, and also in learning processes (Shutt et al., 2007; Nelson and Heher, 2007). These powerful neurotrophic mechanisms, very similar to those already authenticated for mammalian pairbonding (e.g., oxytocine, AVP), would reinforce the involved synaptic memories and would restore the bonding relationships (Allman, 1999).

Frequent pair-wise grooming in between individuals, however, imposes a strict time limitation regarding group size: depending on diet, 20% of time is the upper ecological limit that grooming can reach. This factor necessarily restricts the size of grooming networks and, thus, of natural groups in primate societies (composed, at most, of a few dozen individuals). So, how could human societies have organized their social 'grooming' within increasingly larger natural groups, of around 150 or 200 individuals? As Dunbar (1998, 2004) has argued, human language was the evolutionary solution.

Analysing the dynamics of group conversation, very robust data have been obtained that are consistent in a variety of cultural and social contexts (Dunbar, 1998, 2004). First, about the number of speakers in the conversation—statistically, the average talking group is of 3-4 individuals, within a maximum 10-12 of preferred clique size. In any non-formal conversation, frequent changes and instabilities occur as successive parties are added: 2, 3, 4, 5, etc. Almost inevitably, as the number of participants increases, the ongoing conversation splits into smaller 'partitions,' very frequently of 2, 3, and 4 individuals; so the average of 3-4 becomes the most probable size of a conversational group. As for the daily budget of conversation, it amounts to an average of 3-4 hours; being "gossiping" and "small talk" preferred contents rather than the exchange of factual information (only 1/3 of time).

According to Dunbar's version of the social brain hypothesis, these conversational data dovetail with the grooming needs of human natural groups, around 3-4 times bigger than other anthropoid societies. Considering small talk as the social grooming of our species, it would provide thrice as much virtual grooming on average than the strictly bilateral physical grooming characteristic of primates. By means of the talking/listening exercise, individuals would impart each other a mental *massage*: amusing themselves, actualizing their relationships, gossiping about absent third-parties... in the long run maintaining the mutual bond. Human social networks so glued by the linguistic nexus will manifest a complex mixture of links: parenthood and family-related "strong bonds" plus many other classes of more labile "weak bonds" (Granovetter, 1973). Curiously, as happens in the biomolecular realm, weak links turn out to be the genuine bonds of social complexity, those in which the growth of civility has been supported (Ikegami, 2005).

Laughter quite often breaks in amidst the talking/listening exchanges. It punctuates sentences as a sort of emotional valuation or as an enigmatic social 'call,' even in deaf people using the hand-sign language (Provine and Emmorey, 2006). In this sense, laughter production, far from interfering with language or competing as a 'low level' process with the higher cognitive functions for access to the fonatory apparatus, becomes itself a *cognitive solution*, marking the occurrence of humorous incongruences as positively finalized items within the ongoing talking/listening exchange, and putting into action augmented grooming mechanisms. Further, what has been called "antiphonal laughter" or the chorus of laughing people (Smoski and Bachoroski, 2003; Smoski, 2004), may be seen as an *effective extension* of the talking massage effects in bigger groups, where the mere size precludes active participation of most individuals in the talk. The laughing together that follows brings the augmented neuromolecular grooming-effects of laughter available to everybody in the group, irrespective of the conversation share.

During conversation exchanges between genders, laughter participates as a *bona fide indicator* gauging the relative advancement of bonding processes in courtship—males usually are providers of laughter, 'groomers,' while females are consumers, 'groomees'

(Provine, 2000). Laughter contributes as well as a most lively tool in the establishment of parentofilial bonds (the babbling-laughing charms that babies and toddlers address to their parents). In general, the occurrence of laughter indicates that successful bonding processes of whatever type are in progress amongst the laughing individuals. It is the case of laughter addressed *against* someone outside the laughing chorus too. It is also the case of the evolutionary relationship between laughter and the “sharing of food.”

Presumably, the pleasurable grooming activities of ‘languaging’ and laughing coevolved as social bonding tools with the pleasurable “sharing of food” brought forth along the exodigestion cultural practices of cooking. In every culture, eating together maintains a ritual significance as a bond-building occasion, usually full of small talk and antiphonal laughter episodes. It is not a remote cultural trait of the past, as in contemporary societies ‘restaurants’ are indeed feeding places, but even more they are group bonding places. The restaurant table in particular becomes a terrific scenario to watch the partitional dynamics of group conversation-transitions and the practice of choral, antiphonal laughter!

4. The abstract neurodynamic ‘stuff’ of laughter

The great variety of stimuli and situations conducing to laughter – physical, chemical, sensorimotor, cognitive, relational, parental, courtship, playful, pathological, etc. – and even more the intriguing neuromolecular repercussions of this innate behavior, become additional factors of complexity in order to systematically study it and to explain its neurodynamics. After almost two decades of neuroimaging works, for instance, almost any brain area has been related to humour and to laughter production. Like in the deepest problems of our cognition, no decisive results have been found regarding a unified neural explanation yet.

Actually, the study of pathological laughter in medicine (Poeck, 1985) pioneered the field over other behavioural and cognitive approaches to ‘normal’ laughter. Lesion studies (e.g., damage to frontal cortex areas) have pinpointed the participation of many specific areas in humour perception and laughter production, and have also dispelled much too simple an assumption. Classical EEG studies have also generated an ample literature on cortical ‘wave’ events accompanying laughter onset and the perception of humorous stimuli (Derks et al., 1997). It has been authenticated that, unlike in emotional responses, relatively confined to specific areas, laughter is associated with activation of numerous regions: left, front, right, and rear of the cortex, as well as the motor areas, cerebellum, limbic system and subcortical nuclei, hypothalamus, etc.

The classical view is that two main neural pathways, relatively independent, are controlling the expression of laughter (Ozawa, 2000; Iwase, 2002; Wild et al., 2003). The former is more “involuntary and emotional”, and involves amygdalar, thalamo-hypothalamic, subthalamic, and dorsal mesencephalon areas; while the latter, more “voluntary and cognitive”, originates in premotor/opercular frontal cortex, and links with the pyramidal tract and brain stem (Goel and Dolan, 2001). As Parvizi et al. (2001) have noted, a more comprehensive scheme can be elaborated that includes the loops associated to the cerebellum and responds better to the cases of pathological laughter. See Figure 1 with a block diagram. Besides, it is interesting that systematic gender differences have been found regarding patterns of activation in cortical, hemispheric, and mesolimbic structures in response to humoristic stimuli (Azim et al., 2005)—the mesolimbic structures activated by laughter and humour include the nucleus accumbens, a key component of the mesolimbic dopaminergic *reward system*,

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which is also involved in the pleasurable effects of physical grooming (Mobbs et al., 2003).

[Figure 1 around here]

Certainly, a unified neurodynamic explanation should integrate the multitude of potentially participating areas and nuclei into functional constructs with behavioural sense. Catchword terms such as “species call”, “false alarm”, “polarity change”, “pathways collision”, “release of tension”, “collapse of strained expectation”, and so on, have been historically proposed by scientists and philosophers to explain the role of laughter either in social, behavioural or neurodynamic grounds (Ramachandran, 1998; Provine, 2000). The point of view advocated here, in the nearness of S. Freud, A. Koestler, G. Bateson, G. Pask, O. Rossler, and others (see Marijuán, 1999), attempts the exploration of the “minimization of incoherent excitation” construct for the explanation of laughter. It means relying on the conceptual track around the minimization (optimization) of structural and functional features of the vertebrate Central Nervous System (CNS). A substantial body of neuroscientific literature, starting with neurophysiologist Ramón y Cajal “Laws of Economy” (1899), has been developed during recent decades, including new ideas on optimality in the dynamics of connectivity among neural assemblies see (Edelman and Tononi, 2000; Marijuán 2001).

Thereafter, most recent approaches to brain dynamics are relying on informational/entropic constructs (Friston, 2010; Carhart Harris et al., 2014; Tozzi and Peters, 2016; Sengupta et al., 2016). Following some of these views, the brain unifies its information processing by means of a distributed free-energy variable (variational energy) based on the coupling of excitation and inhibition, the informational entropy of which is maximized (optimized) in the ongoing search of adapting the sensory-motor states to the environmental demands. Given the mappings, gradients, circuit topologies, and self-organizing rhythms in the couplings between excitation and inhibition, the blind optimization of this brute “neural entropy” produces the outcome of well-fitted states.

In the human context, laughter would have been co-opted as a generalized information-processing tool, a finalizer accompanying the higher-level cortical processing (Collins and Marijuán, 1997). In the most general way, *we laugh abstractly: when a significant neurodynamic constellation coding for some problematic circumstance suddenly vanishes*, i.e., when a relatively relevant behavioural problem becomes unexpectedly channelled in a positive way and vanishes as such problem. Laughter is then spontaneously produced by the subject to display his/her own behavioural competence in an instinctive way. So, the ‘idle’ excitation still circulating in the regular problem-solving of cortical and limbic structures is redirected towards the fonatory apparatus where it produces an unmistakable signature. It is the “call” of the species, a social signal of wellness after successful problem solving, of enjoying an effective mental massage. It is really important than those powerful neurodynamic, neuromolecular, and physiological resources internally mobilized do not imply any extra computational–cognitive burden upon the subject’s ongoing conscious processes (Navarro et al., 2014, 2016).

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This problem-solving role of laughter would make a lot of sense in the really complex social world that the ‘talkative’ human brain has to confront, surrounded by endless sensorimotor, cognitive, behavioural, and relational problems. In the conceptual–symbolic world of language, which is really crucial in the making and breaking of social bonds, emotional–relational problems may dramatically accumulate in extremely short periods of time (Dunbar, 2003, 2004). Thus, it makes a lot of evolutionary sense counting with these ultra-fast, extra-ordinary minimization resources: the information processing power of a hearty laugh, or of bursting out into tears!

Let us emphasize that when we laugh, the inner entropy generated along the optimization process is emitted to the outside, reflecting the occurring evolution of the neurodynamic processing gradients. This very neurodynamic entropy, transformed now in the Shannon-Wiener entropy of laughter sounds, becomes a characteristic difference with the better controlled sounds of spoken language (Bea and Marijuán, 2003), as it can be easily detected. The sounds of laughter appear to be a useful biomedical resource too, e.g., in order to detect systematic differences between the laughter of healthy controls and depressed patients (Navarro et al., 2014; 2016). Those sounds may finally be an amazing window into our most basic informational operations.

5. The sounds of laughter: revisiting the *sentic forms* hypothesis

Laughter and infant crying are two of the more potent, affect-inducing vocal signals (Bachorowski and Owren, 2005); they are “evolutionarily designed” as species-specific relevant auditory stimuli that immediately provoke emotion-related responses in any listener. However, it is still unclear where the auditory emotional clutch localizes inside these innate human sounds. *En passant*, there is an intriguing symmetry between laughter and crying sounds, and also between their affective responses. Perhaps because they respectively imply the *making* versus the *breaking* of social bonds, the beginning of lasting memories versus the loss of important memory constructs?

Far from being a stereotyped signal, laughter becomes one of the most variable acoustic expressions of humans, comparable to language except for the combinatory richness of the latter. Typical laughter is composed of separate elements or ‘calls’ or ‘syllables,’ *plosives*, over which a vibrato of some fundamental frequency F_0 is superimposed (Rothganger et al. 1997). A typical laughter episode may last around one second (or slightly less) and will contain around 5 plosives (most often, in between 2 and 8). An important distinction to make is between “vocalized” and “unvocalized” laughter; even though the former induces significantly more emotional responses in listeners, the latter appears consistently in many laughter records, comprising a large variety of sounds (snort-like, grunt-like, giggles, chuckles, etc.)

In a landmark experimental study, Bachorowski et al. (2001) found that there are around 4.4 calls or plosives within each laughter bout, a single plosive having a duration of 0.11 s and a separating interval of 0.12 s (for voiced laughter). Call or plosive production is denser towards the beginning of laugh bouts, and inter-plosive durations gradually increase over the course of bouts. The average value of the fundamental frequency F_0 for male laughs is 272 Hz (sd = 148) while for females is considerably higher and more variable 405 Hz (sd 193); only for voiced laughs, the respective values are 282 and 421 Hz. Usually F_0 is much higher in laughter than in speech, thus, extremes of male F_0 were found to be as high as 898 and as low as 43 Hz, while female extremes were in between 2083 and 70 Hz. The excursions of F_0 along the bout

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trajectory represent an additional factor of variability, showing contours such as “flat”, “rising”, “falling”, “arched”, “sinusoidal”, etc.

All of the previous elements could form part of the inbuilt cues to *laughter identity*, which have been proposed to play an important role in listener emotional responses (Baworowski and Owren, 2001). In particular, the pitch or *tone* curve described by *F₀*, together with the distribution of plosives, would show consistent differences between laugh forms associated with emotional states of positive and negative valence (Devillers and Vidrascu, 2007). The main trend is that the energy and duration becomes higher for ‘positive’ than for ‘negative’ laugh, and vice versa for the relative presence of unvoiced frames, more frequent in ironic and hostile laughs than in joyful ones. Notwithstanding that, there is not much consensus yet –neither significant hypothesis to put to test– on how the interrelationship between plosives, tones, melodies and other variables of laughter may be systematically involved in encoding and distinguishing the underlying emotional states (Bea and Marijuán, 2003; Bachorowski and Owren, 2008).

At this point, the *sentic forms* hypothesis, framed by M. Clynes in the 70’s, could help in the exploration of new directions for such open questions. If laughter contains inner “melodies” or pitch patterns of emotional character, how could they be structured? Following the sentic paradigm developed around tactile emotional communication by means of exchange of pressure gradients, there appears a set of universal dynamic forms that faithfully express the emotional interactions of the subjects (Clynes, 1979). The universality of these behavioural performances stems out from a common quality, a unique dynamic *essentic form* (or sentic, for short) that conveys the essential interactive information of each emotion. Moreover, irrespective of the sensory modality involved, or of the type of motor expression used, such patterns show a remarkable consistency. The nervous system is built in such a coherent way that it not only executes this dynamic form but also perceives it accurately and precisely. Subsequently, the whole set of sentic forms can be determined experimentally, and be measured, catalogued, etc. by means of the tactile expression of emotions; sentic forms can also be found reliably in musical phrases, facial expressions, and in the visual arts (Clynes, 1988, 1992). See Figure 2.

[Figure 2 around here]

The crucial element to apply the sentic hypothesis to laughter is that the excursions of *F₀* along the succession of plosives are defining the emotional *tone* of the laugh, in correspondence with one or another of the different sentic forms. According to the neurodynamic interpretation herein sketched, the set of variables underlying the different classes of laughter would revolve around a fundamental value: the amount of incoherent excitation instantaneously minimized. That is what the area subtended under the different classes of sentic curves means. It represents the way the excitation gradient of the global entropic variable has been handled, the kind of gradual increase and of sudden decrease suffered. This very trajectory would be manifest by means of the different emotional tones of the *F₀* vibrato superimposed to the plosives. The “idle” excitation redirected toward the fonatory apparatus tells by itself what kind of gradient variation occurred during the brisk outcome of the behavioural episode. Figure 3 represents a sonogram of laughter where one of these sentic forms may be detected.

In the different emotional states compatible with laughter expression, the coherence of their motor manifestations would imply that facial gestures, pitch melodies, and vocalic contents of the laughs should be congruent with each other. Therefore, in the extent to which emotions such as happiness, joy, hostility, timidity or surprise are producing

specific laughing signatures, they should be aligned with the other expressive components, and the resulting commonality should be susceptible of experimental checking relatively easily.

[Figure 3 around here]

6. Conclusions: the consequences of laughter

Laughter is one of the most complex behaviours exhibited by humans. It integrates the innate and the cultural, the emotional and the cognitive, the individual and the social. Any unifying hypothesis is forced to contain an unwieldy heterogeneity of elements, even in order to attempt a very rudimentary synthetic closure. Besides, some of these elements may locate in well-trodden disciplinary paths and are relatively easy to discuss, while others neatly belong to the theoretical-speculative (at the time being) and become relatively disciplinary-independent. All of them, but particularly the latter, are in need of meticulous experimental approaches.

Let us summarize the main arguments herein proposed:

1. Human laughter, derived from primate antecedents, becomes heavily ‘corticalized’ and associated to language, fully participating in this new form of social grooming as the social brain hypothesis has described.
2. Laughter is incorporated in the neuromolecular recompenses of the linguistic virtual grooming, but *augmented*, as it now comprises a heavy physical massage (absent in languaging) and a new form of cognitive reward throughout its ‘automatic’ problem-solving minimization.
3. The behavioural consequence of both the real massage and the extra endorphin reward is that the laugh signal becomes eagerly looked upon in social interactions—mainly in those where some bonding strength or positive memory outcome is desirable.
4. The bonds of laughter, presumably more robust as more laughter episodes accumulate upon them, will accompany the individual all along his/her life cycle: babies, toddlers, playing children, adolescent groups, courtship, parenthood, grandparents, social coalitions, small-talk partners, social sharing of food, etc.
5. Individuals laugh *abstractly*: when a significant neurodynamic constellation coding for some problematic circumstance suddenly vanishes, i.e., when a relatively relevant behavioral or sensorimotor problem becomes unexpectedly channeled in a positive way and vanishes as such problem. Laughter is then spontaneously produced by the subject, always to be displayed to others, instinctively showing the own behavioral competence.
6. The sounds of laughter “encode” the main neural processes participating in the variational energy minimization and entropy optimization of the occasion, leaving a signature of the sentic/emotional state of the individual to be projected to others.
7. Neural entropy, which is generated in the mental flux by the sudden conceptual disorder of the occasion, and the subsequent optimizing solution found, would allow for a new organization of experience and/or new premises for the codification of thoughts—concurring thus with Bateson (1953), but emphasizing that the essential, unconscious target of laughing subjects in the reorganization of their experiences are the social bonds around.

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An intriguing consequence associated to the essential bonding function of laughter is the conveyance of individual *identity*. That's what the bonding is about: a shared cortical memory about positive interactions between *specific* individuals. In the noisy environment of the talkative human groups, the cracking sound of a highly differentiated laugh may be far more recognizable at a distance than any voiced exclamations of the same individual. Besides, it is a social signal of wellness, of bonds in the making –and exhibiting a very conspicuous signature can be interesting and advantageous in group contexts of cooperation/competition and in different stages of the individual's life cycle (e.g. specificity of materno-filial attachments). Thus, in the extent to which laugh would contain emotional signs, as well as individual cues to easily identify each subject – resembling Clynes' "personal pulse"? – a tempting speculation addressed to cyberneticians and theoretical science researchers is that all of this could be done by tuning up on parameters of chaotic attractors in phase space.

Another promising research direction about social consequences of laughter concerns its potential use as an indicator of well-being and mental health (Hasan and Hasan, 2009), and as a diagnostic tool in neuropsychiatric pathologies, when the bonding capability of the individual is close to collapse (Marijuán and del Moral, 2008). An *ad hoc* research proposal elaborated by the authors (Marijuán, 2009) has matured into a biomedical project about laughter as a diagnostic tool in depression and other pathologies, with highly interesting results (Navarro et al., 2014, 2016).

Of course, that this whole social and neurodynamic scheme becomes acceptable as a heuristic device is a highly debatable matter, even more in connection with the neural entropy and the sentic forms hypotheses. But the commonality between these two views is remarkable: the global/local entropic variable comprises the evolution of brute excitation/inhibition coupling, which is shared by the different motor expression capabilities and easily recognizable by all sensory modalities. Clynes himself wrote about laughter as "another sentic form" (Clynes, 1979), or as a *composite* of sentic forms—as we would mean here... Beyond these particulars of laughter, a number of illustrious voices in contemporary neuroscience could be enlisted in support of the need of new synthetic theories about human information processing, which should be capable of a meaningful connection with natural behaviour, perhaps not too distant from these argumentary lines.

Maybe another of the consequences of laughter, of its strategic placement right in the middle of human emotional-cognitive-social processes, as a safety valve of sorts, is that it shall force us to discuss on the contemporary absence of a central neurodynamic theory, so to speak dealing with the "thermodynamic workings" (Tozzi and Peters, 2016) of the whole cerebral cauldron.

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RESEARCH ARTICLE

The “sociotype” construct: Gauging the structure and dynamics of human sociality

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Abstract

Exploring the pertinence of a “sociotype” construct, established along the conceptual chain genotype-phenotype-sociotype, is the essential purpose of the present paper. Further, by following the sociotype’s conceptual guidelines, a new psychometric indicator has been developed in order to gauge the level of social interaction around each individual—the sociotype questionnaire (SOCQ). A first version of this questionnaire has been elaborated by gathering data about the different classes of social bonds (family, friends, acquaintances, and work/study colleagues) in general population and about the dynamic update of these bonds via face-to-face conversation and other modes of interaction. A specific fieldwork was undertaken, involving 1,075 participants, all of them Spanish adults (with diverse social and regional backgrounds). The data obtained were analyzed by means of the correlational method with an analytical cross-sectional design: the number of factors and the consistency and reliability of the resulting scales were evaluated and correlated. The new sociotype indicator resulting from that fieldwork, in spite of its limitations, seems to be valid and reliable, as well as closely associated with widely used metrics of loneliness and psychological distress. It is interesting that the construct noticeably varies throughout the life course and circumstances of individuals, based on their gender and age, and adjusting to the different situations of social networking. This is the first study, to the best of our knowledge, which has tried to reach both a theoretical and an operational formulation of the sociotype construct, by establishing an ad hoc psychometric questionnaire. We think that the information provided by this operational definition opens a new direction of work that could be useful to guide the development and evaluation of programs aimed at improving and strengthening social networking in people at risk, especially for the elderly.

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Introduction

The social nature of our species is one of the few basic consensuses in philosophy and social sciences. As Aristotle wrote in *The Politics*: “man is by nature a political animal” [1, 2].

However, countless divergent interpretations have been developed thereupon, mostly crystallized around the "nature-nurture" dichotomy. In that complicate scenario, the sociotype construct is close to recent attempts at bridging in between the paleo-anthropological, social networking, and "social physics" studies—so to uncover the social interactions (bonding structures and communication relationships) adaptively demanded by the "social brain" of individuals [1, 3, 4].

In the same way that there is scientific consensus on the validity of the *genotype* and *phenotype* constructs for the human species, notwithstanding their respective degrees of variability, a metrics (or a series of different metrics) could also be developed applying to the relative constancy of the *sociotype*—the social environment and social interactions to which the individuals of our species would be evolutionarily adapted. According to the "social brain hypothesis," which will be discussed later, the social environment itself has been the major factor in the evolution of our big brains and our enlarged neuro-cognitive capabilities.

The term sociotype has already appeared in the literature, though rather scantily. Seemingly, it was Bogardus [5] who first used it in order to imply the effects of society on the individual's behavior in a general way, although he did not develop the concept further [6–8]. In psychology, it was put into use by a Jungian oriented school, "socio-nics", meaning specific psychological profiles found in well-recognized professions: lawyer, policemen, firefighter, etc. [9]. Initially based on combinations of four psychic functions, the theory has incorporated combinatoric layers of extra complexity upon the sociotypes or socio-nic types. However, the new use of the term proposed here is closer to the works undertaken by Berry [6] in the biomedical field. He has proposed the sociotype as an integrative term covering internal and external factors for the management of chronic disease, implying the integration of bio-psycho-sociology with systems biology. Independently, some of the present authors have already utilized the term within the triad genotype-phenotype-sociotype, implying the social-evolutionary meaning advocated in the present work [10–13].

From the sociotype perspective, the average brain stimulation coming from relational interactions in the social environment, together with further substitutes and surrogates culturally elaborated, constitutes a mental necessity for the individual's well-being. Specific fieldwork would be needed, then, in order to appropriately gauge what are the average preferences regarding bonding structures and communication relationships in the different social contexts. Some parallels may be found with recent studies in the biomedical literature [14, 15], in social networks [16–18], and in the "social physics" field [4, 19], though the latter are mostly technological and business oriented. In the present study, which also involves a psychometric perspective, we have attempted the development of an applied tool, a sociotype general questionnaire, tentatively including the main influences and factors related to social intercourse. It is a rather limited—but promising—first step. We have also envisioned a series of future studies and questionnaires covering with more specificity essential features such as age, gender, personality, occupation, culture, etc. Advancing in the sociotype construct by means of further applied tools could provide useful instruments for socioeconomic and communicational analysis, as well as for interventions in psychological and mental healthcare domains—additionally contributing to evidence the noxious consequences of the growing social problem of loneliness.

Evolutionary roots

Examining the evolutionary roots of the sociotype is necessary for an in-depth comprehension of the new construct. Indeed the crucial novelties of our evolutionary/historical past have revolved around communication matters —e.g. origins of language, emotional expression, group behavior, morals and ethical rules, counting and writing systems, economic and political

organizations, knowledge systems, modern media, and so on [20–22]. So fluid and culturally diverse are all the emerging structures of human sociality that, apparently, they defy any precise classification or quantitative specification. However, the presence of a series of significant regularities in the size and structures of social groups, notwithstanding their remarkable variability, suggests the plausibility of a “deep structure” of social bonding for the human species [23–24].

There seems to be an average of social networking, with very ample upper and lower limits, concerning the number and types of bonding relationships that an individual is able to maintain meaningfully. The finding of networking regularities such as the famous “Dunbar’s number” (around 150–200 individual acquaintances) would make evolutionary and anthropological sense [1, 3, 24–27]. These relational findings, integrated within the “social brain hypothesis”, which was originally known as the “Machiavellian intelligence hypothesis” [28], would project an extended clutch on the roots of human sociality, on the origins of language, and on many other traits of social and cultural life. Specifically, the social brain hypothesis has posited that, in primate societies, natural selection has favored larger brains and more complex cognitive capabilities as a means to cope with the challenges of social life [27, 29–32]. Thereafter, due to the overall cortical conformation and brain capacity of our species, vastly enlarged regarding other Anthroidea, we are able to maintain a really high number of social bonds, meaningfully shared and sustained with the abundant members of our oversized groups. However, like many other brain/mind phenomena, exactly how ‘social bonds’ are made, maintained, differentiated, eroded, restored, finalized, etc. is not sufficiently understood yet—in all probability it is both a universal phenomenon related to crossing some threshold of neuronal complexity and a species-specific phenomenon related to the singularities of the different brains [33].

In the evolution of human societies, language appears as the essential tool for bond-making, although not the only one [29, 34–38]. Human languaging, more often than denotative, becomes cohesive, consensual, identity maker—and above all, a source of mental stimulation. The regular practice of ‘interesting’ conversations induces in our social brain the production of neuropeptides and neurohormones that relieve stress and boost immune system and nervous system’s function [25, 39, 40]. While talking, the specific contents exchanged are often not so important. Rather than the exchange of functional information, it is trivial conversation, gossiping about social acquaintances, what represents the human closest equivalent to grooming exchanges and bond-restoration practices in primate groups [29,36]. Indeed talking may be considered as a new form of grooming in human societies, and comparatively—in energy and physical grounds—it is *virtual*.

The mental necessity of conversation

Thereafter, the repercussions in human daily life of this new form of virtual grooming can hardly be overstated: talking becomes one of the preferred and most affordable types of mental stimulation. Counting with an appropriate network of people to talk with becomes a necessity for the well-being and mental health of individuals. Having access to, and participating in, amusing conversations becomes an essential ingredient for our social, psychological, and physiological life. The way the different emotions related to social interactions impinge upon language itself and are rearranged within this new channel of expression represents another factor of utmost psychological importance [41–43]. Also, distinguishing several classes of bonds (related to their strength and to their positive or negative valence) turns out to be important in the conversational rewards obtained, as well as in the distinctiveness and degree of surprise of the circulated information, particularly regarding the mentioned preference for the whereabouts of social acquaintances and the importance of the speaker’s own image. The

individual fitness within the social group is always at the stake, with relevant gender differences in communication goals and strategies [25, 36, 44, 45].

Within our cognitive dynamics, bonds and conversation are paramount. It can be said both that social bonds claim for their actualization and that linguistic practices claim for their regular realization as well. Both behavioral propensities are reinforcing each other. In fact, the daily conversation/communication budget of each individual has to be apportioned among the different classes of bonds of his/her sociotype so that the talking exercise becomes sufficiently rewarding—provides enough grooming—and that new fitness opportunities may be explored, taking into account the existing diversity of possible encounters and the available communication channels.

The structural and dynamic aspects we are distinguishing in the sociotype (classes of bonds and talking-time budgets) are but two different facets of a unitary social adaptation phenomenon performed by each individual along his/her life. The adaptive sociotype may be conceived as closely following the phenotype's trajectory along the arch of life—beginnings, development, maturity, and senescence. Analyzing the respective bond structures and conversation-time distributions in these differentiated stages could lead to very interesting comparatives: not only by following the developmental age, but also by taking into account personality, gender, status, professions, cultures, etc.

The sociotype and the growing problem of loneliness

A number of recent studies on social networks, technologically oriented, have tracked vast amounts of interpersonal exchanges [4, 17, 19, 46], but the metrics of the relational structures necessary for personal well-being and mental health have hardly been addressed yet. Hopefully, the progressive delineation of a sociotype construct, susceptible of both theoretical and empirical demarcation, might contribute to a better understanding of the structures and dynamics of human sociality, and might provide some practical help when sociality itself is in crisis, as seems to be happening with the current "epidemics of loneliness" affecting large population tracts and particularly the elderly [47–53].

At a social/economic scale, the diminished relationships and bonding structures of "social capital" would penalize the activities of daily life and would decrease the individual's well-being [17, 48, 54]. The evidence in fast-developing countries is that economic growth and technological development spurred by the 'information revolution' have gone hand-in-hand with an increase in behavioral disorders, family disintegration, social exclusion, and lower social trust [55, 56]. In the 1985 US Census, the average number of confidants was three; in the 2004 Census the average was 2, but the most common figure was zero confidants for almost 25% [57]. The phenomenon is similar in most Western countries, where the ubiquitous presence of Media and of information and communication technologies (ICTs) has dramatically altered life styles. In recent years, there has been a significant transfer of social life and collective entertainment activities to individualized activities such as computer games, Internet, TV watching, and the new online social networks. However, it is unclear the effect that such ICTs pervasiveness and overuse are having in our social relationships and quality of life. In what extent could computers, cell phones, and TVs replace our need of face-to-face relationships? [45, 49, 58–61]. The balance between positive and negative factors is not settled yet. It is at least significant that depression and suicide rates have increased dramatically in the last three decades; and that mental disorders nowadays represent a global disease burden that surpasses cardiovascular diseases and cancer [62–64].

From a psychological and biomedical perspective, in spite of the pervasive loneliness and lack of meaningful relationships in contemporary societies, there is a dearth of adequate

indicators gauging the conversational activities of the individual. Actually, none of the existing questionnaires on related topics (e.g. UCLA loneliness scale, MSPSS, SNI, Duke, SELSA, MOS, SSB, Zimet, de Jong, etc.) seems to be centered in the basic, face-to-face relational phenomena focused by the sociotype. Precisely, this is the kind of information that a few of the most recent enquiries are beginning to ask for [65, 66].

The present study

Subsequently, the empirical part of the present study has tried to develop a new psychometric indicator related to the social interactions 'adaptively' demanded by the social brain of each individual. By means of a specific survey, different kinds of psychosocial data were gathered around the structure of individuals' social bonds and on their dynamic update via conversation. According to criteria frequently used in other studies [most important sources have been: 4, 29, 47, 48, 57, 67, 68], we distinguished between three main relational scenarios: the own residence, public spaces, and the workplace (or study). We also distinguished between four types of relationships: family, close friends, acquaintances, and work/study colleagues [in contraposition to the three levels in 67]. This division has oriented the basic structure of the new psychometric indicator. Essentially, the present study—and its related fieldwork—has aimed to develop an accurate and applicable operationalization of a sociotype-inspired psychometric indicator, evaluating its structure, internal consistence, and convergent validity.

We have also aimed to assess the sociotype's explanatory power to account for loneliness and psychological distress, throughout the relationships with UCLA and GHQ-12 measures, both considered as individual's well-being metrics likely influenced by the sociotype outcomes; and additionally we have explored possible differences due to age, personality, and gender. Overall, the following working hypotheses have been considered:

1. The sociotype can be measured with appropriate psychometric features as a general unique dimension, and also by means of specific sub-domains; the statistical analysis has to show both a confirmative factor structure and a robust internal consistency for the total scale and for the sub-domains.
2. The sociotype scale should converge with the other constructs related to psychological states of loneliness and distress (UCLA, GHQ-12), demonstrating its validity and relevance by means of a high, significant correlation.
3. The sociotype scale should correlate with the different dimensions of personality, positively with extraversion and negatively with neuroticism and psychoticism (the lie dimension could be more complex, depending on the different domains).
4. The sociotype scale would change across the successive stages of life, with different sub-scales increasing/decreasing their levels throughout the life course, and expecting an overall decline for the elderly.
5. According to gender, the sociotype sub-scales could show significant differences: traditionally, a stronger social network for males in terms of work/study colleagues would be expected, while for females the stronger networking should appear in terms of family.

Given that the general human need to connect—to which the sociotype refers—seems to be a universal adaptive trait [29], an open exploratory question would concern the relative constancy of the overall sociotype measure. It could be hypothesized as being caught in a similar range of variability for most individuals, although strongly biased in its constitutive sub-domains by gender and age, and by different personal, social and cultural factors and

influences—see for instance the “epidemics of loneliness” that affects more intensely the elderly in modern societies. The sociotype means the endless adaptation to the different possibilities of social intercourse around the individual.

Shedding light on all these structural differences and social influences would permit a better characterization of the structure and dynamics of human sociality, guiding the implementation of public programs aimed at strengthening social networking.

Material and methods

Study design

The structure of the study was based on the correlational method with an analytical cross-sectional design. The whole measurements were obtained by means of the self-assessment technique, using a set of questionnaires via Internet, complemented with face-to-face interviews as well.

Participants

Most of the participants accessed the survey via Internet, but around 15% were face-to-face interviews (for the elderly), intentionally trying to cover for the different gender, age, and status characteristics. In all cases, the inclusion criteria were age >18 years, being able to read and write Spanish, and not suffering from severe physical or mental disorders. The final number of participants ($n = 1,075$) exceeded the validity evaluation criterion [69], resulting in a sample that was psychometrically adequate for the study. The main characteristics of the sample are presented in Section 3.

Procedure and ethics statement

In order to hypothesize the structure of the sociotype model, we started with a qualitative study looking for the main characteristics of social networking and conversational habits in different ages, by means of semi-structured interviews (involving narratives of personal experiences, moods, appreciation of new communication technologies, etc.). See (S2 and S3 Files). This qualitative study involved 45 interviews (conveniently diversified by age, gender and class) [70]. A total of 45 participants were recruited (26 female and 19 male), with a mean age of 60.4 (SD = 22.26); they were intentionally selected to try to cover the referred socio-demographic characteristics. All of these participants signed an informed-consent form approved by the Ethical Committee of Aragón, Spain (CEICA). The interviews were recorded and transcribed by the interviewer herself (Raquel del Moral). These records were subject to content analysis by three researchers (Raquel del Moral, Pedro C. Marijuán, and Jesús Montero-Marín), who independently identified the emerging categories according to which the generality of the topics could be encoded [71]. The broad frameworks of the possible sociotype interactions were tentatively identified. Next, we attempted to determine which conceptual aspects of the sociotype were typical of these frameworks. We empirically defined each of the emerging categories by discussing their ability to capture the different interactions. The appropriate adjustments were made by consensus to ensure that each definition would be comprehensive and exclusive of the others [72].

That initial qualitative experience provided a number of data about how the theoretical notion of the sociotype was felt in different personal circumstances and social domains. Subsequently, a preliminary pilot fieldwork was developed applying a convenience sampling to 165 subjects, all of them students from two education centers, which were interrogated using a very preliminary draft-model [12]. As a result of these works, and in consonance with the

above cited literature, we proposed the emergent dimensions of 'family', 'friends', 'acquaintances', and where applicable 'study or work mates', as the main factors that a sociotype basic definition should include. Further, a series of 32 selected questions were proposed to conform the initial version of the "Sociotype Questionnaire" (SOCQ), which will be described below in its developmental process and final version.

The duration of the complete survey was approximately half an hour. Each of the participants was presented with an initial description of the survey (with an informed consent form), which introduced the aims of the study, the advantages/disadvantages of participating, and notification that the data would be processed anonymously (S4 File). An online platform gave support to the completion of the survey and data collection (<http://www.surveymonkey.com>). A research psychologist administered the questionnaires performed in the face-to-face format (for most elderly participants); afterwards the collected data were dumped on the online platform (S1 Table).

The Ethical Committee of Aragón (CEICA) had previously approved this study (Act: CP13/2014). All the participants provided their informed consent before completing the survey, either by reading the project information and providing verbal consent (face-to-face format), or by explicitly accepting the study conditions (online platform). Given the procedure followed and the kind of generic data requested, the anonymity of the participants in the survey was granted.

Measurements

- Background variables: The survey recorded a set of socio-demographic variables providing a general view of the social circumstances of participants, such as: sex, age, relationships ('with partner/married', 'single', 'separate/divorced', 'widow/widower'), convivance ('alone', 'partner', 'partner and children', 'other family', 'friends', 'residence'), place ('rural', 'urban'), education ('no studies', 'primary', 'high school', 'university'), employment ('student', 'unemployed', 'employed', 'retired'), salary ('<Minimum Wage', '1–2 MW', '2–4 MW', '>4 MW'), social satisfaction (using a Visual Analogical Scale–VAS, from 0 to 100).
- Sociotype Questionnaire (SOCQ): Subjects were asked a set of 32 items, assessing the quality of their relationships with 'family', 'friends', 'acquaintances', and 'study/work' mates (8 questions for each one). The first three domains were proposed as subscales of a general sociotype factor, and the fourth one was proposed as an independent scale, to be used when applicable (in this case, 49,5% employed and 11,3% students). The items were developed by a multidisciplinary expert panel (including biologists, psychologists and sociologists), who included the main characteristics of each domain by consensus. The wording of the items was guided by a table of content specifications, enabling their fit, conceptual validity, and representativeness. The number of items was over-dimensioned to select those with the best psychometric properties. In order to counteract the effects of response styles and biases, the survey utilized a forced-choice response format, rating the degree of agreement with each of the statements, some of them in reverse score, using a Likert-type scale with 6 response options, from 0 (never) to 5 (always). See (S1 File).
- General Health Questionnaire (GHQ-12): This is the most extensively used screening instrument to measure psychological distress, being attractive because of its brevity (12 items) [73]. Its psychometric properties have been studied in several countries [74], applying to various types of population, e.g., elderly [75] and urological patients [76]. We used the Spanish validated version [77, 78], with $\alpha = 0.76$. The correction was conducted assigning values from 0 to 3 to the different possible answers (S5 File).

- The Revised UCLA Loneliness Scale (RULS): This widely used questionnaire consists in a one-dimensional 20-item scale, designed to measure subjective feelings of loneliness and social isolation [79]. It is a revised version of the original UCLA Loneliness Scale [80]. The Spanish validated version herein used counts with adequate psychometric properties, $\alpha = 0.94$ [81]. Participants rate each item on a Likert-type scale ranged from 1 (never) to 4 (often). See (S6 File).
- Eysenck Personality Questionnaire-Revised (EPQ-R): This questionnaire measures three major dimensions that account for most of the variance in personality [82]. The EPQ-R is an excellent choice to represent the personality domain. This measure has proven useful for numerous applications in human resources, career counseling, clinical settings and biomedical research. A validated Spanish version of this questionnaire was used, with adequate psychometric properties [83]. The EPQ-R scales are: 'extraversion' ($\alpha = 0.82$), 'neuroticism' ($\alpha = 0.86$), 'psychoticism' ($\alpha = 0.73$), and 'lie' ($\alpha = 0.76$). The total number of items forming the Spanish version of EPQ-R is 83, and they are answered assigning 'yes' or 'not' (S7 File).

Statistical analysis

Means (SD) and frequencies (percentages) were calculated on the socio-demographic data. From the proposed items of the sociotype questionnaire, we selected those with the best discrimination coefficient (item-rest coefficient) in their respective domain, taking into account the criterion of ≥ 0.30 from the Classic Test Theory point of view [84]. To analyze the factor structure, we randomly split the sample into two halves: the first sub-sample ($n_1 = 538$) for the initial Exploratory Factor Analysis (EFA), and the second sub-sample ($n_2 = 537$) for the Confirmatory Factor Analysis (CFA). Mardia's coefficients [85] were estimated to evaluate items' distribution in multivariate terms. Polychoric correlation matrices, especially developed for the analysis of relationships between polytomous categorical variables, were calculated; KMO index as a measure of sampling adequacy, and Bartlett's test of sphericity to check if there is enough redundancy between the items to be summarized with a few number of factors, were verified [86], ensuring beforehand that the determinant of the matrices were greater than 0.00001 in order to discard possible problems of multi-collinearity [87].

We used parallel analysis [88] to identify the number of factors, replacing the raw data by optimal implementation based on minimum rank factor analysis after generating 500 random correlation matrices [89]. A factor is significant if the associated eigenvalue is bigger than that corresponding to a 95th percentile of the eigenvalues derived from the random dataset. This method is the best solution to decide the number-of-factors-to-retain [90, 91]. The unweighted least squares (ULS) was the method used for factor extraction in the EFA, in view of its demonstrated robustness, especially when working with polychoric matrices [92]. The rotation method was Promax ($k = 4.00$), given the correlated solution expected, using raw varimax as clever rotation start. To select the items to be included in each factor, we used the criterion of loadings $w > 0.5$ [93], and we used the Item Response Theory (IRT) parameterization by the multidimensional normal-ogive graded response model, which is derived from the assumption of normally distributed measurement error [94], with an ≥ 0.65 as criterion to interpret the pattern of item discriminations. The percentage of explained variance in each item by means of communality values (h^2) was calculated. We tested the appropriateness of fit by using the goodness of fit index (GFI) and the root mean square of standardized residuals (RMSR), which are explained below. From the proposed items, we selected those with the best discrimination coefficient in their respective domain, taking into account the Classic Test Theory point of view [84], and using the criterion of item-rest correlations ≥ 0.30 in the corresponding domain.

We examined the absolute and incremental fit of the emergent SOCQ model by confirmatory factor analysis, applying unweighted least squares, and using the GFI, the adjusted goodness-of-fit index (AGFI), the root mean square of standardized residuals (RMSR), the normed-fit-index (NFI), and Bollen's relative-fit-index (RFI). GFI and AGFI refer to explained variance and values >0.90 are acceptable [95]. RMSR is the standardized difference between the observed and the predicted covariance, indicating good fit values <0.08 [96]. NFI measures the proportional reduction in the adjustment function when going from null to the proposed model and is considered acceptable when >0.90 [97]. RFI takes into account the discrepancy for the model evaluated and for the baseline model and it is very good close to 1 [98]. Standardized factor saturations (λ and γ), from an analytical point of view of the models, were also considered.

We examined the internal consistency of the scales using congeneric, tau-equivalent and parallel models of reliability [99]. The congeneric model is the least restrictive and assumes that each individual item measures the same latent variable, with possibly different scales, degrees of precision, and magnitude of error. The tau-equivalent model implies that individual items measure the same latent variable on the same scale and with the same degree of precision, but with possibly different degrees of error. The parallel model is the most restrictive model; it assumes that all items must measure the same latent variable on the same scale, with the same degree of precision and with the same amount of error. In order to reach parsimony, we chose the more restrictive model that fit good enough with the data, applying the ULS method [100]. The reliability value was calculated by squaring the implied correlation between the composite latent true variable and the composite observed variable, to arrive at the percentage of the total observed variance that was accounted for by the true variable [100]. Item-rest and mean item-rest correlations were also calculated to assess the degree of relationship among the finally selected items.

We used the SOCQ dimensions as independent variables in multivariate linear regression models, in order to assess the contribution of the sociotype construct to explain 'loneliness' and 'psychological distress', controlling the possible influence of the personality traits. Previously, we evaluated the degree of association regarding all the constructs, by means of Spearman's R coefficients. Standardized beta coefficients were used to assess the individual contribution of each variable, and the Wald test was used to evaluate their significance. Adjusted multiple determination coefficients ($R^2_{y.123}$) were also calculated to observe their grouped explanatory power, and their significance was assessed by means of analysis of variance [101]. Partial correlation coefficients ($R_{y3.12}$) –to indicate the correlation between two variables when the effect of the other variables included in the equation are removed– and semi-partial correlation coefficients ($R_{y(3.12)}$) –the square of which shows the increase in the coefficient of determination after including a specific variable in a model, partialising the influence of the other included variables– were also calculated. The basic assumptions of the regression models were evaluated by using the K-S test over the conditional distribution of the residuals to ensure they were normally distributed, by the Durbin-Watson test to rule out possible autocorrelations in the error terms (adequate with a roughly value = 2.00), and by the tolerance values (1- the squared multiple correlation of a given regressor with the remaining), to discard co-linearity problems [101].

Student's t-test for independent measurements were used to contrast possible differences in the SOCQ dimensions by sex, and the one-way ANOVA in the case of age (groups: '18–30 years', '31–45 years', '46–65 years' and '>65 years'). The basic assumptions of both contrasts (independence, normality and heterocedasticity) were revised. All the tests used were bilateral ($\alpha < 0.05$). Packages SPSS v19, FACTOR v10, and AMOS v20 were used to conduct the statistical analysis.

Results

Socio-demographic characteristics of participants

A total of 1,075 participants completed the study. All of them were Spanish (with diverse regional backgrounds), 66.8% females and 33.2% males, between the ages of 18–95 years (Mean = 49.79; SD = 21.47), 52.3% of them with partner or married and 25.6% singles, 87.8% living in an urban context, 58% with university studies, 49.7% employed, and 28.1% retired. The main socio-demographic characteristics of all the participants are shown in [Table 1](#).

Exploratory Factor Analysis (EFA)

[Table 2](#) shows the features of the 16 general SOCQ items finally selected according to the method previously described based on the Classical Theory of Tests ($n_1 = 538$) [Maridia's = 37.66 ($p < 0.001$); KMO = 0.80; Bartlett's = 2,927.40 ($p < 0.001$)]. Parallel analysis

Table 1. Characteristics of the study participants (n = 1,075).

| | |
|--|---------------|
| Sex, females (%) | 718 (66.8) |
| Age, Md (SD) | 49.79 (21.47) |
| <i>Stable relationship (%)</i> | |
| with partner/married | 562 (52.3) |
| single | 275 (25.6) |
| separate/divorced | 63 (5.8) |
| widow/widower | 175 (16.3) |
| <i>Convivance (%)</i> | |
| Alone | 264 (24.6) |
| partner | 290 (27.0) |
| partner and children | 255 (23.8) |
| other family | 170 (15.8) |
| friends | 60 (5.5) |
| residence | 36 (3.3) |
| <i>Place (%)</i> | |
| Rural | 131 (12.2) |
| Urban | 944 (87.8) |
| <i>Education (%)</i> | |
| no studies | 157 (14.6) |
| primary | 151 (14.0) |
| high school | 142 (13.2) |
| university | 625 (58.2) |
| <i>Employment (%)</i> | |
| student | 122 (11.3) |
| unemployed | 117 (10.9) |
| employed | 534 (49.7) |
| retired | 302 (28.1) |
| <i>Salary (%)</i> | |
| <Minimum wage (MW) | 256 (23.8) |
| 1–2 MW | 389 (36.2) |
| 2–4 MW | 332 (30.9) |
| >4 MW | 98 (9.1) |
| Social satisfaction (VAS 0–100), Md (SD) | 72.52 (21.35) |

Md = Mean; SD = Standard Deviation; Number and percentage (%). MW = 650€

<https://doi.org/10.1371/journal.pone.0189568.t001>

Table 2. Psychometric features of the SOCQ by using Exploratory Factor Analysis*.

| General SOCQ | Mn | SD | a ₁ | a ₂ | a ₃ | h ² | w ₁ | w ₂ | w ₃ |
|---|------|------|----------------|----------------|----------------|----------------|----------------------|----------------------|----------------------|
| Friends | | | | | | | | | |
| 5. I speak and relate with my friends | 3.44 | 1.48 | 2.06 | -0.14 | 0.21 | 0.81 | 0.89 | -0.06 | 0.09 |
| 6. I have friends to tell and share problems | 3.45 | 1.65 | 2.24 | -0.17 | 0.13 | 0.83 | 0.92 | -0.07 | 0.06 |
| 7. I consider important to maintain relationships with friends | 4.14 | 1.39 | 2.09 | -0.03 | 0.02 | 0.81 | 0.90 | -0.01 | 0.01 |
| 8. I have fun and laugh with my friends | 3.59 | 1.41 | 1.46 | 0.16 | -0.20 | 0.68 | 0.82 | 0.09 | -0.11 |
| Family | | | | | | | | | |
| 1. I speak and relate with my family | 4.39 | 0.97 | -1.37 | 2.12 | 0.04 | 0.81 | -0.16 | 0.94 | 0.02 |
| 2. My family is important for me | 4.74 | 0.76 | -0.30 | 2.24 | 0.23 | 0.83 | -0.12 | 0.91 | 0.10 |
| 3. The family members care about me | 4.49 | 1.00 | -0.06 | 1.35 | -0.01 | 0.64 | -0.04 | 0.81 | -0.01 |
| 4. I have fun and laugh with my family | 3.65 | 1.20 | 0.35 | 0.73 | -0.16 | 0.43 | 0.26 | 0.55 | -0.12 |
| Acquaintances | | | | | | | | | |
| 9. I speak and relate comfortably with acquaintances | 3.61 | 1.19 | 0.08 | 0.16 | 0.84 | 0.47 | 0.06 | 0.12 | 0.61 |
| 10. It costs me make conversation with people I do not know (r) | 3.19 | 1.33 | -0.02 | -0.10 | 0.75 | 0.34 | -0.01 | -0.08 | 0.61 |
| 11. It is easy for me to win support from acquaintances | 2.29 | 1.48 | 0.08 | -0.10 | 0.66 | 0.24 | 0.08 | -0.09 | 0.52 |
| 12. Relations with my acquaintances are forced (r) | 3.53 | 1.05 | -0.03 | 0.06 | 0.82 | 0.42 | -0.02 | 0.05 | 0.63 |
| % of variance (real-data) | | | | | | | 38.70 | 18.80 | 13.90 |
| % of variance (95% percentile of random) | | | | | | | 22.10 | 16.90 | 13.10 |
| Sociotype at work/studies | | | | | | | | | |
| | | | | | Mn | SD | a₁ | h² | w₁ |
| 13. I speak and relate satisfactorily with my peers | | | | | 3.87 | 1.17 | 1.25 | 0.61 | 0.78 |
| 14. I have personal trust in my peers | | | | | 3.34 | 1.31 | 1.32 | 0.64 | 0.80 |
| 15. When talking with peers they take me into account | | | | | 3.48 | 1.27 | 1.31 | 0.63 | 0.79 |
| 16. I feel valued by my peers | | | | | 3.45 | 1.20 | 1.04 | 0.52 | 0.72 |
| % of variance (real-data) | | | | | | | | | 82.5 |
| % of variance (95% percentile of random) | | | | | | | | | 66.9 |

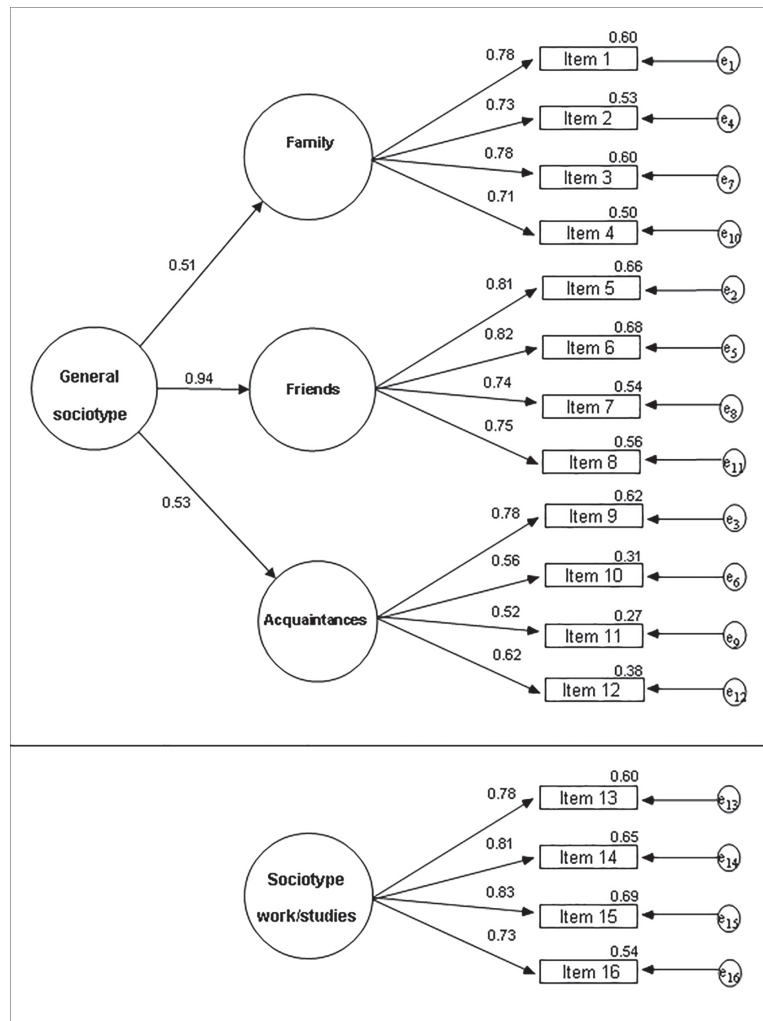
*SOCQ exploratory measurement model from sub-sample 1 (general sociotype n₁ = 538; sociotype at work/studies n = 328). Mn = mean. SD = standard deviation. w₁, w₂ & w₃ = weights on the first-order factors. h² = communality. a₁, a₂ & a₃ = IRT discrimination. r = reverse score.

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identified three factors, explaining 69.8% of the variance. F₁ presented topics associated with 'friends', F₂ with 'family', and F₃ with 'acquaintances'. The Schmid-Leiman second order factor solution presented the values of F₁ = 0.55, F₂ = 0.67 and F₃ = 0.54. The model presented appropriate fit (GFI = 0.99; RMSR = 0.04). Table 2 also shows the characteristics of the SOCQ at work/studies items (n = 328) [Mardia's = 9.24 (p<0.001); KMO = 0.82; Bartlett's = 350.70 (p<0.001)]. Parallel analysis identified one factor, explaining 69.9% of the variance. F₁ presented topics related to 'mates at work/studies'. The model presented appropriate fit (GFI = 1.00; RMSR = 0.03).

Confirmatory Factor Analysis (CFA)

The characteristics of the general SOCQ matrix (n₂ = 537), were: Mardia's = 33.28 (p<0.001); KMO = 0.84; Bartlett's = 3,140.90 (p<0.001). Fig 1 shows the general SOCQ structure using CFA from an analytical and standardized point of view. The three first order factors turned out to be highly influenced by a general second order factor (G), with loadings over F₁ = 0.51, F₂ = 0.94, and F₃ = 0.53, and explaining 73.7% of the variance. The item loadings with regard to their respective latent factor were high (from 0.52 to 0.82). The general SOCQ structure presented adequate fit indices with no using correlations between the error terms (GFI = 0.99; RMSR = 0.05; AGFI = 0.98; NFI = 0.98; RFI = 0.97). The characteristics of the SOCQ at work or studies matrix (n = 328) were: Mardia's = 11.29 (p<0.001); KMO = 0.82; Bartlett's = 1,003.78



*SOCQ measurement model and standardized estimations from sub-sample 2 (general sociotype n=537; sociotype at work/studies n=328). The circles represent latent constructs and the rectangles are observable variables. The factor weightings (λ) are over the one-way arrows, the percentage of explained variance for each observable variable (R^2) over the boxes.

Fig 1. Analytical perspective of the SOCQ by using confirmatory factor analysis.

<https://doi.org/10.1371/journal.pone.0189568.g001>

($p < 0.001$). Fig 1 also shows the SOCQ at work/studies structure by using CFA. The only one factor explained 71.7% of the variance, with loadings from 0.73 to 0.83. The SOCQ at work/studies structure presented adequate fit with no using correlations between the error terms (GFI = 0.99; RSMR = 0.02; AGFI = 0.99; NFI = 0.99; RFI = 0.99).

Reliability models of the SOCQ

Table 3 shows the reliability models tested for the SOCQ. All the scales and sub-scales fitted better with the congeneric model, being the estimates obtained of $R = 0.81$ for the 'general SOCQ', $R = 0.81$ for 'family', $R = 0.90$ for 'friends', $R = 0.71$ for 'acquaintances', $R = 0.87$ for 'work/studies'. The average of item-rest values for the 'general SOCQ' was 0.52, being of 0.64 for the 'family' sub-scale, of 0.77 for the 'friends' sub-scale, of 0.45 for the 'acquaintances' sub-scale, and of 0.72 for the 'work/studies' sub-scale.

Explanatory power of the SOCQ regarding loneliness and psychological distress

The SOCQ factors showed important associations with the other constructs (Table 4).

The explanatory power of the regression models was very high (Table 5). 'Loneliness' was explained ($R^2 = 0.62$; $p < 0.001$) by 'family' (Beta = -0.24; $p < 0.001$), 'friends' (Beta = -0.29; $p < 0.001$), 'acquaintances' (Beta = -0.18; $p < 0.001$), 'extraversion' (Beta = -0.17; $p < 0.001$),

Table 3. Fix indices for the reliability models of the SOCQ.

| Scales/Factors | R | CMIN | NPAR | GFI | AGFI | RSMR | NFI | RFI |
|----------------------------------|------|----------|------|------|------|------|------|------|
| <i>General SOCQ</i> | | 108.89 | 27 | 0.99 | 0.98 | 0.05 | 0.98 | 0.97 |
| Congeneric | 0.81 | 2,081.98 | 24 | 0.93 | 0.91 | 0.15 | 0.88 | 0.85 |
| Tau-equivalent | 0.80 | 7,771.96 | 13 | 0.75 | 0.71 | 0.19 | 0.54 | 0.53 |
| Parallel | 0.80 | 9,422.95 | 2 | 0.70 | 0.69 | 0.18 | 0.44 | 0.52 |
| <i>Family</i> | | | | | | | | |
| Congeneric | 0.81 | 0.55 | 8 | 0.99 | 0.99 | 0.01 | 0.99 | 0.99 |
| Tau-equivalent | 0.81 | 23.91 | 5 | 0.99 | 0.99 | 0.05 | 0.99 | 0.99 |
| Parallel | 0.81 | 168.77 | 2 | 0.95 | 0.94 | 0.06 | 0.90 | 0.92 |
| <i>Friends</i> | | | | | | | | |
| Congeneric | 0.90 | 11.16 | 8 | 0.99 | 0.99 | 0.02 | 0.99 | 0.99 |
| Tau-equivalent | 0.90 | 268.36 | 5 | 0.99 | 0.97 | 0.08 | 0.98 | 0.97 |
| Parallel | 0.90 | 482.94 | 2 | 0.97 | 0.97 | 0.04 | 0.96 | 0.97 |
| <i>Acquaintances</i> | | | | | | | | |
| Congeneric | 0.71 | 7.19 | 8 | 0.99 | 0.99 | 0.02 | 0.99 | 0.98 |
| Tau-equivalent | 0.70 | 52.71 | 5 | 0.99 | 0.98 | 0.05 | 0.95 | 0.95 |
| Parallel | 0.70 | 362.65 | 2 | 0.94 | 0.93 | 0.08 | 0.68 | 0.76 |
| <i>Sociotype at work/studies</i> | | | | | | | | |
| Congeneric | 0.87 | 5.36 | 8 | 0.99 | 0.99 | 0.02 | 0.99 | 0.99 |
| Tau-equivalent | 0.87 | 18.38 | 5 | 0.99 | 0.99 | 0.03 | 0.99 | 0.99 |
| Parallel | 0.87 | 30.27 | 2 | 0.99 | 0.99 | 0.04 | 0.99 | 0.99 |

R = Reliability; CMIN = minimum value of the discrepancy; NPAR = number of parameters being estimated; GFI = Goodness of Fit Index; RSMR = Root Mean Square of the Standardized Residuals; AGFI = Adjusted Goodness of Fit Index; NFI = Normed Fit Index; RFI = Relative Fit Index.

<https://doi.org/10.1371/journal.pone.0189568.t003>

Table 4. Relationships of the SOCQ dimensions with the other constructs.

| | Mn | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------------------|-------|-------|
| 1. General SOCQ (0–60) | 44.82 | 8.27 | | | | | | | | | | |
| 2. Work/studies (0–20) | 13.87 | 3.93 | 0.50* | | | | | | | | | |
| 3. Family (0–20) | 17.28 | 3.16 | 0.65* | 0.37* | | | | | | | | |
| 4. Friends (0–20) | 14.98 | 4.94 | 0.82* | 0.46* | 0.33* | | | | | | | |
| 5. Acquaintances (0–20) | 12.55 | 3.39 | 0.64* | 0.31* | 0.19* | 0.26* | | | | | | |
| 6. Loneliness (20–80) | 34.74 | 10.68 | -0.71* | -0.48* | -0.49* | -0.56* | -0.46* | | | | | |
| 7. Psychological distress (0–36) | 12.14 | 6.05 | -0.42* | -0.29* | -0.26* | -0.34* | -0.29* | 0.52* | | | | |
| 8. Extraversion (0–19) | 11.91 | 4.50 | 0.62* | 0.29* | 0.23* | 0.57* | 0.44* | -0.54* | -0.38* | | | |
| 9. Neuroticism (0–23) | 9.91 | 5.54 | -0.33* | -0.25* | -0.23* | -0.23* | -0.26* | 0.51* | 0.57* | -0.30* | | |
| 10. Psychoticism (0–23) | 4.41 | 3.04 | -0.25* | -0.22* | -0.30* | -0.16* | -0.10* | 0.26* | 0.17* | -0.09 [‡] | 0.21* | |
| 11. Lie (0–18) | 10.60 | 4.10 | -0.05 | -0.03 | 0.03 | -0.24* | 0.19* | -0.02 | 0.05 | -0.21* | -0.01 | -0.06 |

Mn: mean; SD: standard deviation. The rest of values are Spearman's correlations.

* p<0.001.

‡ p<0.01. Possible range in brackets

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'neuroticism' (Beta = 0.29; p<0.001) and 'psychoticism' (Beta = 0.05; p = 0.040). 'Psychological distress' was explained ($R^2 = 0.42$; p<0.001) by 'family' (Beta = -0.08; p = 0.005), 'friends' (Beta = -0.09; p = 0.009), 'acquaintances' (Beta = -0.08; p = 0.010), 'work/studies' (Beta = -0.15; p<0.001), 'extraversion' (Beta = -0.10; p = 0.005), 'neuroticism' (Beta = 0.45; p<0.001). It was possible to accept the basic assumptions needed to go ahead with the regression, with tolerance values from 0.55 to 0.85.

Differences in SOCQ according to sex and age

As we can see (Table 6), males presented higher scores in 'work/studies' than females [(Mn = 10.28; SD = 6.90) vs. (Mn = 8.99; SD = 7.35); p = 0.005]; while females did it in 'family' [(Mn = 17.01; SD = 3.18) vs. (Mn = 17.46; SD = 3.10); p = 0.027]. In terms of age, the SOCQ-general, 'friends' and 'work/studies' showed a decreasing trend (p<0.001), 'acquaintances' showed an increasing trend (p<0.001), and 'family' did not show differences among age groups (p = 0.333). 'Social satisfaction', measured by the VAS, did not show significant changes either by sex (p = 0.217) or by age (p = 0.262). The general assumptions of independent groups to develop the analyses were fulfilled.

Discussion

This is the first study, to the best of our knowledge, that has tried to reach both a theoretical and an operational approach to the sociotype construct, as portraying and delimiting the fundamental structure of social relationships of a person [11–13]. The relative constancy of a compound of relational layers and their associated dynamics of actualization would accompany

Table 5. Regression models for the SOCQ with regard to loneliness and psychological distress.

| Loneliness | R_{y,123} | R²_{y,123} | F (df₁ / df₂) p^a | Se | DW | p^b |
|-------------------------------|----------------------------|--------------------------------------|--|-----------|-------------|----------------------|
| | 0.78 | 0.62 | 176.21 (8 / 907) <0.001 | 6.72 | 1.88 | 0.217 |
| | R_{y(3,12)} | R_{y(3,12)} | B (95% CI) | Se | Beta | p^c |
| <i>Intercept</i> | | | 65.40 (61.52–69.28) | 1.98 | | <0.001 |
| family | -0.33 | -0.22 | -0.83 (-0.99 –0.68) | 0.08 | -0.24 | <0.001 |
| friends | -0.34 | -0.22 | -0.63 (-0.75 –0.52) | 0.06 | -0.29 | <0.001 |
| acquaintances | -0.22 | -0.14 | -0.54 (-0.69 –0.38) | 0.08 | -0.18 | <0.001 |
| work/studies | 0.03 | 0.02 | 0.04 (-0.04–0.12) | 0.04 | 0.03 | 0.328 |
| Extraversion | -0.20 | -0.13 | -0.41 (-0.54 –0.28) | 0.07 | -0.17 | <0.001 |
| Neuroticism | 0.39 | 0.27 | 0.56 (0.48–0.65) | 0.04 | 0.29 | <0.001 |
| Psychoticism | 0.07 | 0.04 | 0.16 (0.01–0.32) | 0.08 | 0.05 | 0.040 |
| Lie | -0.09 | -0.06 | -0.17 (-0.30 –0.05) | 0.07 | -0.07 | 0.008 |
| Psychological distress | R_{y,123} | R²_{y,123} | F (df₁ / df₂) p^a | Se | DW | p^b |
| | 0.64 | 0.42 | 80.16 (8 / 907) <0.001 | 4.67 | 1.95 | 0.137 |
| | R_{y(3,12)} | R_{y(3,12)} | B (95% CI) | Se | Beta | p^c |
| <i>Intercept</i> | | | 17.00 (14.30–10.69) | 1.37 | | <0.001 |
| family | -0.09 | -0.07 | -0.15 (-0.26 –0.05) | 0.06 | -0.08 | 0.005 |
| friends | -0.09 | -0.07 | -0.11 (-0.19 –0.03) | 0.04 | -0.09 | 0.009 |
| acquaintances | -0.09 | -0.07 | -0.14 (-0.24 –0.03) | 0.05 | -0.08 | 0.010 |
| work/studies | -0.15 | -0.12 | -0.13 (-0.18 –0.07) | 0.03 | -0.15 | <0.001 |
| Extraversion | -0.09 | -0.07 | -0.13 (-0.22 –0.04) | 0.05 | -0.10 | 0.005 |
| Neuroticism | 0.48 | 0.41 | 0.50 (0.44–0.56) | 0.03 | 0.45 | <0.001 |
| Psychoticism | -0.02 | -0.02 | -0.03 (-0.14–0.08) | 0.06 | -0.02 | 0.552 |
| Lie | -0.05 | -0.04 | -0.07 (-0.16–0.02) | 0.05 | -0.05 | 0.136 |

R_{y,123} = multiple correlation coefficient. R²_{y,123} = coefficient of multiple determination.

p^a = p value for variance analysis associated with the regression. Se = standard error. DW = Dubin-Watson value.

p^b = p value for K-S test for normality contrast on residuals. R_{y(3,12)} = partial correlation coefficient. R_{y(3,12)} = semi-partial correlation coefficient.

B = regression slope. CI = confidence interval. Beta = standardised slope.

p^c = p value of Wald test result.

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each individual along the advancement of his/her life cycle. Given the orientation herein followed toward the use of this new indicator in areas of mental health and general well-being, the other accompanying questionnaires are related to loneliness, psychological distress, and personality dimensions; they have contributed to delimit and establish the horizon of this first applied exploration.

We have found that the proposed psychometric indicator was valid in terms of structure and reliable enough in terms of internal consistency. A general scale was established consisting of the subscales family, friends, acquaintances, and another separate subscale was formed by co-workers/study colleagues (the latter subscale to be applied when necessary), all of them explaining a high percentage of variance. The rationale for separating the work subscale is merely operational: around half of the study population is either retired (elderly), or unemployed, or does not enter into the labor market. All the considered scales and subscales fitted better with the congeneric model of reliability, suggesting that, while consistent, they seem to be measured with different degrees of precision and different amounts of error. This would mean that the SOCQ definition, in terms of items and components, seems extensive enough in order to be referred to several interrelated facets (such as group membership, talking cliques, caring and supporting, trusting, laughing, shared values, close relationships), which might be

Table 6. SOCQ differences according to sex and age.

| Variable (range) | SEX | | p ^a | AGE | | | | p ^b |
|---|-------------------|---------------------|----------------|--------------------------|--------------------------|--------------------------|------------------------|----------------|
| | male (n = 357) | female (n = 718) | | 18–30 years (n = 241) | 31–45 years (n = 290) | 46–65 years (n = 256) | >65 years (n = 288) | |
| SOCQ-general (0–60) Mn (SD) | 44.48 (8.27) | 44.97 (8.27) | 0.825 | 46.33 (6.96) | 45.54 (6.75) | 44.70 (8.61) | 43.04 (9.78) | <0.001 |
| Family (0–20) Mn (SD) | 17.01 (3.18) | 17.46 (3.10) | 0.027 | 17.33 (3.04) | 17.31 (2.79) | 16.92 (3.80) | 17.38 (2.94) | 0.333 |
| Friends (0–20) Mn (SD) | 14.90 (4.79) | 15.14 (4.94) | 0.454 | 17.16 (3.04) | 15.99 (3.53) | 15.09 (4.06) | 12.50 (6.50) | <0.001 |
| Acquaintances (0–20) Mn (SD) | 12.60 (3.31) | 12.53 (3.42) | 0.778 | 11.77 (3.40) | 12.16 (3.15) | 12.78 (2.91) | 13.29 (3.75) | <0.001 |
| Work/studies (0–20) Mn (SD) | 10.28 (6.90) | 8.99 (7.35) | 0.005 | 13.39 (5.07) | 12.09 (5.78) | 11.31 (6.12) | 1.72 (4.87) | <0.001 |
| Social satisfaction (VAS 0–100) Mn (SD) | 73.75 (20.01) | 71.95 (21.93) | 0.217 | 73.40 (19.16) | 74.14 (19.63) | 70.38 (21.69) | 71.98 (24.23) | 0.262 |

^a t-contrast for independent groups.

^b one-way analysis of variance (ANOVA).

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studied in isolation in future works. This seems to be in agreement with the plurality of factors involved in other approaches, such as loneliness [79], emotional and social loneliness [68], perceived social support [67], and “social capital” [48, 54], providing a complementary psychosocial background to the latter notion.

The convergence of SOCQ with other constructs included in the study such as loneliness, psychological distress, and personality was satisfactorily high, demonstrating its validity and relevance by means of a number of significant correlations. Inverse relationships statistically significant were found between loneliness and the overall SOCQ, as well as with all the sociotype subscales. The same happened in the relationships between psychological distress and the SOCQ scale and subscales. It would reinforce the idea of a strong social network associated with less psychological distress (anxiety, depression) and reduced feelings of loneliness, as well as the idea of social/personal support perceived as a moderator between the sociotype and health variables [6, 7, 45, 57]. Interestingly, in the correlation between the SOCQ and personality dimensions, extraversion acquired a positive valence, while neuroticism and psychoticism were negatively correlated. The lie dimension correlated negatively with friends, and positively with acquaintances, which is reasonable in psychological terms and also seems to agree with “the logic of deceit and self-deception in human life” [102]. In general, the higher the sociotype scores, the better prospects regarding loneliness and psychological distress. Indeed the correlation values found were surprisingly elevated. But the interpretation of these correlations is far from direct, as always happens when causation is tentatively inferred from correlation. So, in order to facilitate further exploration from other points of view we have included the whole data gathered.

When using multivariate models that included personality traits, we observed that the different SOCQ components were differently connected to loneliness and psychological distress, but significant relationships were maintained as a whole and a large amount of variance was explained for both constructs. The regression model of loneliness was showing an important impairment of social networking in terms of family, friends, and acquaintances, as well as significant associations with personality traits such as extraversion, neuroticism, psychoticism and lie (negatively correlated in extraversion and lie, and positively in neuroticism and

psychoticism). It may be interesting that lie's higher scores correlate with lower scores in loneliness: the adaptive value of lies in social intercourse is well established, although complex tradeoffs between individual reputations and group subcultures are inevitably involved [43, 102]. Similarly, although less strongly, psychological distress was explained by impaired social networking in terms of family, friends, acquaintances, and also co-workers or study colleagues, involving the personal traits of extraversion and neuroticism—the first one negatively correlated, and the second positively.

It is also worth noting that a positive sociotype at work/study does not seem to influence on negative feelings of loneliness, for the deterioration of the other sociotype dimensions (family, friends, and acquaintances) acquires greater relevance in this case [47, 49, 103]. Conversely, deterioration of sociotype at work/study seems to greatly contribute to psychological distress, even gaining more relevance than the other sociotype dimensions [13, 60, 104]. A working hypothesis might be that strengthening overall sociotype dimensions (family, friends, acquaintances) would play a protective role against feelings of isolation, perhaps by perceived social support [103, 105]; while specifically strengthening the sociotype dimension at work/studies could be useful to prevent the psychological distress associated with chronic job stress. Therefore, improving the sociotype in the workplace through group dynamics [4] could be an effective strategy contributing to prevent, for instance, burnout syndrome [104]. As stated, other interpretations would be feasible, and the data of the study are freely available to tentatively support them (S1 Table).

Regarding the relationship between perceived social support [67] and sociotype, in spite of their superficial similarity, there is an important difference between them. The former has an implicit sense of dependence, of vulnerability, of counting with alien support for covering personal needs; while the sociotype refers to unmediated relationships, to spontaneous talking, to a sense of empowerment while the subject carries her/his relationships autonomously. Presumably, the degree of relationship between both constructs will strongly depend on the level of autonomy of the subject, e.g., in the age ranks of the elderly, both constructs will show more differences for relatively "young" elderly, while for the oldest segments (or "fourth age") there will be more similarity. In any case, that interrelationship would imply a dedicated fieldwork (premature in the present developmental stage of the sociotype indicator).

In gender analysis, males showed a stronger social network in terms of coworkers or study colleagues, while in females the most important networking was in terms of family. This result is far from unexpected, given the deep cultural and social factors involved as well as the distinct relational strategies and reproductive interests [13, 44, 45]. In terms of age, we found significant differences among youth, midlife, maturity, and elderly life stages concerning the overall sociotype, as well as the subscales of friends, acquaintances, and work/study colleagues. It is interesting that the acquaintances subscale reaches the highest scores in the last stage (elderly) and the lowest in the first stage (youth); while for the general sociotype and the other subscales the highest scores appear in the first stage and the lowest scores appear in the last stage. It can be argued that for the elderly, friends and family gradually disappear from the relational scene, and their social interrelationship becomes progressively restricted to the casual and weak [51, 52, 106, 107]. However, alternative explanations would be available, for example it could be that the scale is optimally designed to capture the kinds of friends/family interactions that younger adults have more frequently. All we can say from the data is that mean ratings on the SOCQ are lower among older compared to younger adults for friends/family and higher among older compared to younger adults for acquaintances. Notwithstanding that, the family subscale did not show significant changes along the different stages of life, possibly due to the generational replacement occurring within the family network set. Future studies on the respective structures and conversation times involved will delimit the extent and interrelationships of these age-

related phenomena. The perceived social self-satisfaction showed no differences according to sex or ages either.

As for limitations of the present empirical study, the main one was that it was reduced to just one country and to subjects sharing a relatively homogeneous culture—but it is hardly inevitable in a first exploration, and further multicultural studies are envisioned. Also, the intentionality of the sample, which nevertheless yielded strata balanced between all age groups (a variable of considerable importance in initially shaping the sociotype construct), and finally resulting in a considerable sample size above one thousand participants. Obviously, there is also the need of further separate studies by using adequate designs to test the essential sociotype determinants—mainly age, gender, personality, social environment, culture. As a first step in that direction, a quantitative study of the relational structures and estimated conversation times will be undertaken by the authors based on the other quantitative data gathered in this fieldwork (work in progress). Nevertheless, in the statistical analysis of the present study, all the procedures respected the true nature of the variables and complied with other metric assumptions necessary to carry out the various analyses.

The central message of this study should be understood within the *genotype-phenotype-sociotype* cord discussed at the Introduction [6, 7, 10–13]. The potential for social connection is in our genes, and it is in the development of this social potential where the integral mental and physical health of our bodies is ensconced. The problem to properly situate such a global construct within the very center of our social nature is that too many other factors and influences are crisscrossing thereby. Those confounding factors represent conceptual difficulties to disentangle, but at the same time they constitute the most important directions for future sociotype advancement.

Among those future directions, there is firstly the nature of the interpersonal bond and the different classes of social bonds [108, 109], which includes the bonding cognitive dynamics, the specific memory investment, and the asymmetric equivalences among bonds [4]; secondly, the centrality of conversation in the making and breaking of human bonds [25, 103]; thirdly, the inevitable gender differences in both social bonding and relational/reproductive interests [44]; and fourthly, the phenotype-sociotype tight interrelationship during the life course of each individual as well as the potential epigenetic consequences of individual failures in social environments [7]. Other directions closer to our times would be: the role of new communication technologies in revolutionizing the sociotype mix of individuals [59, 60, 110]; the traditional social and cultural schemes for work-leisure distribution and their present disruption [48, 54]; the importance of social networks in health and disease, and their potential role in the sustainability of the health care system [14]; the contemporary epidemics of loneliness and depression, particularly among the elderly, and the difficulties of the resocialization interventions [107]; and so on and so forth.

All those intractable problems and complicate circumstances of social life that surround the sociotype participate in its fluid conformation. In the extent to which the proposed psychometric indicator could be properly delimited and diversified throughout future studies (to insist: the present study is but a first pilot step), an increasing number of applied topics might benefit from this new way of thinking.

Conclusions

Operationally, the new indicator resulting from the present fieldwork seems to be valid and reliable, as well as closely associated with well validated metrics of loneliness and psychological distress. Reflecting the whole sociotype construct, the new psychometric indicator noticeably varies throughout the life course and circumstances of individuals, based on their gender and

age, and adjusting to the different personal conditions of social networking. We think that the information already provided by this first operational definition around the sociotype construct, in spite of its preliminary nature, could be useful to guide the development and evaluation of programs aimed at improving and strengthening deteriorating social networks in people at risk, given their demographic characteristics (no family, no job, domestic violence, orphans, migrants, etc.) or depending on age (the vulnerability of children or young people, and especially the elderly).

Supporting information

S1 Table. Data of the study. Data obtained from the self-completed questionnaires of the survey.
(XLSX)

S1 File. Sociotype questionnaire (SOCQ). English version of the "Sociotype Questionnaire" (SOCQ).
(DOC)

S2 File. Interview guide (English). English version of the interview guide for the qualitative study.
(DOC)

S3 File. Interview guide (Spanish). Spanish original of the interview guide for the qualitative study.
(DOC)

S4 File. Guide of survey's questions. English version of all the questions included in the survey.
(DOCX)

S5 File. General Health Questionnaire (GHQ-12). Measurement of psychological distress.
(PDF)

S6 File. Revised UCLA Loneliness Scale (RULS). Measurement of loneliness and social isolation.
(PDF)

S7 File. Eysenck Personality Questionnaire-Revised (EPQ-R). Measurement of the major personality dimensions.
(PDF)

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LETTER TO THE EDITOR

The sociotype in dermatology

Editor

Skin diseases can be the cause of a significant psychosocial burden for those who suffer them. A number of studies have considered issues such as a lower quality of life, increased anxiety, depression, suicidal ideation and other psychological disorders.¹⁻³ However, adequate means for evaluating social interaction difficulties, diminished social networks and the impoverished conversational exchanges that affect the well-being and mental health of the individual have not been sufficiently developed.

A number of recent studies have addressed the psychological consequences of skin diseases, both in a general sense and with regard to different conditions.⁴⁻⁷ Results have indicated that inadequate treatment and the failure of preventative strategies are often the result of a poor evaluation of the psychosocial factors that may aggravate symptoms and prolong the recovery process.⁸

The sociotype construct – and its accompanying questionnaire – aims to analyse the social interactions (bonding structures and communication relationships) that are adaptively demanded by the ‘social brain’ of the individual.⁹

The aim of this pilot study was to determine whether the psychosocial burden caused by skin diseases could be detected by a Sociotype Questionnaire (SOCQ); 170 consecutive patients seen at the dermatological outpatient clinic, at Alcañiz Hospital in Spain, were invited to participate in the study. Eleven refused participation due to lack of time to complete the questionnaires, leaving a study sample of 159. The dermatologist examined all the participants and registered the diagnosis and the severity of their skin condition. Patients were invited to complete some sociodemographic questions, the sociotype test and other complementary tests on loneliness, general health and personality.

The SOCQ has 16 items that evaluate the quality of relationships through the dimensions of ‘Family’, ‘Friends’, ‘Acquaintances’ and ‘Study/Work Colleagues’ (four questions for each dimension). It uses a Likert-type scale with six response options from 0 (never) to 5 (always). The SOCQ is pending publication.

Table 1 shows the sociodemographic data of our sample, and Table 2 offers the results of the factorial analysis of the 16 questions of the SOCQ. All the items in the four dimension (Family, Friends, Acquaintances and Work/Study colleagues) obtained positive weights with the exception of question number 3 in the Acquaintances dimension. The questionnaire is internally robust (Cronbach’s alpha = 0.83). The diagnostic severity of dermatological diseases seems to have an important effect on the social lives of those that suffer them. Our results suggest that diagnostic

Table 1 Sociodemographic data

| | |
|--|--------------|
| Sex, women (%) | 103 (64.8) |
| Age, mean (SD) | 38.09 (16.6) |
| Skin disease (%) | |
| Plaque psoriasis | 47 (29.6) |
| Acne | 19 (11.9) |
| Alopecia | 10 (6.3) |
| Hand eczema | 7 (4.4) |
| Neurodermatitis | 18 (11.3) |
| Melanocytic nevus | 58 (36.5) |
| Severity (%) | |
| Asymptomatic | 41 (27.3) |
| Mild | 84 (56.0) |
| Moderate | 15 (10.0) |
| Severe | 10 (6.7) |
| Civil status (%) | |
| Married/cohabiting | 81 (50.9) |
| Single | 68 (42.8) |
| Separated/divorced | 5 (3.1) |
| Widow | 5 (3.1) |
| Residence (%) | |
| Living alone | 14 (8.8) |
| With a partner | 40 (25.2) |
| With partner and sons | 46 (28.9) |
| With family members | 53 (33.3) |
| With friends | 4 (2.5) |
| Other | 2 (1.3) |
| Education (%) | |
| No school certificate but able to read and write | 9 (5.7) |
| Basic education | 45 (28.3) |
| High school | 72 (45.3) |
| University | 31 (19.5) |
| Other | 2 (1.3) |
| Employment (%) | |
| Student | 36 (22.6) |
| Homemaker | 22 (13.8) |
| Unemployed receiving benefits | 2 (1.3) |
| Unemployed not receiving benefits | 14 (8.8) |
| Employed | 70 (44.0) |
| Not working due to ill health | 2 (1.3) |
| Retired | 9 (5.7) |
| Other | 4 (2.5) |
| Income level (%) | |
| Minimum wage (MW) | 56 (38.9) |
| 1-2 MW | 69 (43.4) |
| 2-4 MW | 16 (11.1) |
| >4 MW | 3 (2.1) |

Table 2 Factorial analysis of Sociotype Questionnaire

| General Sociotype Questionnaire (SOCQ) | Mean | SD | h^2 | w_1 | w_2 | w_3 |
|--|------|------|-------|-------------|-------------|-------------|
| Family | | | | | | |
| 1. I speak and relate to my family | 4.49 | 0.91 | 0.54 | 0.07 | 0.72 | -0.03 |
| 2. My family is important to me | 4.85 | 0.49 | 0.32 | 0.01 | 0.59 | -0.07 |
| 3. My family members care about me | 4.67 | 0.76 | 0.47 | -0.11 | 0.71 | 0.04 |
| 4. I have fun and laugh with my family | 4.13 | 1.02 | 0.35 | 0.01 | 0.57 | 0.02 |
| Friends | | | | | | |
| 5. I speak and relate to my friends | 4.03 | 1.12 | 0.58 | 0.72 | 0.1 | -0.01 |
| 6. I have friends to talk to and share problems | 4.01 | 1.28 | 0.49 | 0.75 | -0.06 | -0.07 |
| 7. I feel it is important to maintain relationships with friends | 4.54 | 0.93 | 0.41 | 0.68 | -0.09 | -0.01 |
| 8. I have fun and laugh with my friends | 4.25 | 0.9 | 0.4 | 0.57 | 0.04 | 0.08 |
| Acquaintances | | | | | | |
| 9. I speak to, and comfortably relate to, my acquaintances | 3.88 | 1.07 | 0.29 | 0.16 | 0.2 | 0.33 |
| 10. It is hard for me make conversation with people that I do not know | 3.25 | 1.32 | 0.39 | -0.07 | 0.01 | 0.65 |
| 11. It is easy for me to gain the support of acquaintances | 2.64 | 1.49 | 0.06 | 0.17 | 0.12 | 0.58 |
| 12. Relationships with my acquaintances are difficult | 3.8 | 1.05 | 0.66 | 0.02 | -0.08 | 0.83 |
| Work/Study Colleagues | | | | | | |
| 13. I speak to, and satisfactorily relate to, my peers | | | 4.1 | 1.17 | 0.55 | 0.74 |
| 14. I trust my peers | | | 3.58 | 1.23 | 0.67 | 0.82 |
| 15. In conversations, my peers listen to my opinions | | | 3.68 | 1.19 | 0.49 | 0.70 |
| 16. I am valued by my peers | | | 3.72 | 1.18 | 0.52 | 0.72 |

Scoring: 0 (never) to 5 (always) for all items except numbers 10 and 12 that had a 'reverse' score: 5 (never) to 0 (always). The general SOCQ covers all items and is made up of four subscales: 'Family' (items 1-4), 'Friends' (5-8), 'Acquaintances' (items 9-12) and 'Work/Study Colleagues' (items 13-16). Figures in bold indicate significant values

severity is related to the loss of social bonds, as evidenced by the reduced social networks of patients with a severe skin disease.

The SOCQ and the complementary quantitative questions provide evidence on the psychosocial burden that dermatological patients suffer. More specifically, the dimensions of the sociotype, Family, Friends, Acquaintances and Work/Study Colleagues, may provide valuable indications as to the social interventions that will be most beneficial for the patients.

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III.

MEMORIA DE INVESTIGACIÓN

1. FUNDAMENTOS MULTIDISCIPLINARES

Esta tesis tiene un contenido esencialmente multidisciplinar, por lo que para comprender cómo se ha encauzado resulta ineludible desarrollar sus distintos fundamentos desde las ciencias naturales y sociales.

1.1. EL SOCIOTIPO Y NUESTRA NATURALEZA SOCIAL

El *sociotipo* forma parte de la naturaleza social de nuestra especie, estableciendo una tríada definitoria junto con el *genotipo* y el *fenotipo* (del Moral y Navarro, 2012; del Moral et al., 2017; Marijuán et al., 2017). Basándonos en dicha triada conceptual, y alineado con la "Hipótesis del Cerebro Social" (Allman, 1999; Dunbar, 2004), el constructo del sociotipo aboga por la existencia de una preferencia evolutiva en nuestra especie acerca de unos promedios determinados de interacción social, básicamente realizados en conversación cara a cara (del Moral y Navarro, 2012; del Moral et al., 2017). De la misma manera que hay consenso científico sobre la validez de los constructos genotipo y fenotipo para la especie humana, a pesar de sus respectivos grados de variabilidad, podrían también desarrollarse métricas específicas respecto a la constancia relativa del entorno social a la que los individuos de nuestra especie están adaptados evolutivamente: el sociotipo. La estimulación cerebral media que se genera a través de las interacciones relacionales en ese entorno social, junto con otros sustitutos y sucedáneos elaborados culturalmente, constituiría una auténtica necesidad mental para el bienestar de la persona.

De hecho cada persona establece su propio "mix" de relaciones diarias entre sus distintos círculos de relación. Según la personalidad y según las distintas culturas (y también es fundamental el género) se establece una notable convergencia de valores entre el número medio de relaciones sociales de las personas en sus distintos círculos (básicamente: familia, amigos, conocidos, relaciones de trabajo o estudios) y también en el tiempo que se dedica a hablar (preferiblemente cara a cara). Es el destacado "número de Dunbar", que estima en 150-200 los conocidos con los que una persona se relaciona de manera estable (Dunbar, 2004).

El sociotipo se desarrolla a la par del desarrollo físico de la persona, a lo largo de su ciclo de vida, existiendo sociotipos característicos para la adolescencia, la juventud, la edad adulta y para las personas mayores. Constituye un arco que se va desarrollando en paralelo al ciclo de vida (Berry y De Geest, 2012). En la adolescencia se empieza a construir un sociotipo propio diferenciado de los padres y la familia (con cambios dramáticos y una explosión de amistades e interacciones), que luego durante la juventud y la madurez se consolida alrededor de los promedios antes mencionados, hasta la vejez en la que prácticamente el sociotipo colapsa. En cada etapa el sociotipo manifiesta rasgos críticos y problemas específicos para llegar hasta un desarrollo acorde con las preferencias de cada individuo. En cada caso concreto, el sociotipo depende también, aparte del género y la edad, del tipo de personalidad, la profesión, la clase social, el lugar de residencia (urbano/rural), el medio cultural, el estado de salud. En los distintos estudios de campo realizados se pueden apreciar con claridad algunas de estas diferencias (del Moral y Navarro, 2012; del Moral et al., 2017; Marijuán et al., 2017).

1.2. EL SOCIOTIPO DESDE LA PERSPECTIVA SOCIOLÓGICA Y DE COMUNICACIÓN

Es necesario destacar que el objetivo central de esta tesis no es en absoluto ajeno a la perspectiva sociológica. Sociólogos clásicos como Emile Durkheim ya se aproximaron a estas cuestiones cuando apuntaron a los comportamientos básicos que tejen las sociedades humanas: la "solidaridad mecánica" entre los miembros de las sociedades a través de vínculos sociales basados en sentimientos comunes y valores morales compartidos (Durkheim, 1895), pero estos puntos de vista se desarrollaron hacia la macroestructura, lejos de contemplar una cuantificación micro-sociológica. Críticas similares podrían dirigirse a los trabajos de otros sociólogos clásicos como Max Weber y Talcott Parsons, que se acercaron a los principios básicos de la sociabilidad desde direcciones alternativas (Weber, 1905; Parsons, 1951). Sin embargo, George Simmel se centró en la relación social *per se*, en la sociabilidad y en su ausencia: la soledad. A comienzos del siglo XX, fue uno de los primeros sociólogos en describir la situación paradójica del "ser moderno": "uno en *ninguna parte* se siente tan *solo* y perdido como en la *multitud metropolitana*" (Simmel, 1903, p.640). En otro de sus trabajos (Simmel, 1971), afirmaba que las formas sociales desarrolladas se vuelven autónomas y que no cumplen ningún fin práctico, simplemente por la razón de las formas sociales en sí mismas. Alegaba que son relaciones de socialidad meramente "recreativas", y que por tanto están desprovistas de cualquier tipo de consideración práctica en el momento en el que el individuo aspira a participar en el "mundo" de la sociedad como un fin en sí mismo.

Los antropólogos clásicos también se preocuparon por abordar los aspectos fundamentales de nuestra sociabilidad (Boas, 1911, Malinowski, 1944, Mead, 1964, Lévi-Strauss, 1981). Hay que destacar

que en las últimas décadas un vasto corpus de literatura paleoantropológica y evolutiva se ha desarrollado en torno a la aparición de la sociabilidad y el lenguaje humano a partir del Suborden Anthrozoidea (Allman, 1999, Baron-Cohen et al., 1999; Badcock y Crespi, 2008; Hill et al., 2011). Los trabajos de Robin Dunbar, por ejemplo, han cubierto una variedad de aspectos relacionados con el tamaño "natural" de las redes sociales y los orígenes del lenguaje (Dunbar, 1996, 2004).

Estudios enfocados directamente a las redes sociales, desarrollados por Mark Granovetter, Peter Killworth, y Russell Bernard entre otros han abordado a los vínculos sociales, y han obtenido datos cuantitativos relevantes sobre las redes sociales de los individuos (Granovetter, 1973; Wellman, 1988; Killworth et al., 1990). Sin embargo, estos enfoques no han llegado a explorar el mantenimiento y la actualización de tales estructuras de vinculación social, quizá con una excepción tópica—diferencias de género en los los lazos sociales y en la conversación. Es un tema que ha surgido con fuerte interés tanto público como científico (Lakoff, 1975, James y Drakich, 1993; Litosseliti, 2006; Mehl et al., 2007).

En términos más generales, el renovado interés por los estudios de comunicación ha llevado a una serie de trabajos sobre aspectos relevantes de la conversación en las estructuras sociales (análisis del discurso, semiótica, pragmática, política, etc.). Por ejemplo, Ronald Inglehart (2000, 2015) incluyó diferentes variables en *World Values Survey* para medir la frecuencia con que las personas hablan con sus familiares y amigos, para obtener así información sobre la comunicación interpersonal en 60 países. Usando el modelo y la base de datos de Inglehart, Mira Sotirovic y Jack M. McLeod (2001) analizaron las tendencias de la participación política y la discusión interpersonal. Sin embargo, hasta la última década, las estimaciones de

las conversaciones naturales durante un período prolongado de tiempo han permanecido ausentes (Mehl et al., 2007).

Las tecnologías de la información y comunicación (TICs) también han reavivado el interés por los intercambios personales, incluidas las métricas de los lazos sociales, y han producido una gran cantidad de datos experimentales, aunque a menudo están más centrados en el uso del teléfono móvil o en la interacción a través de nuevas tecnologías *per se* (Pinheiro, 2011; Grandjean, 2016). Paralelamente, una serie de trabajos de Ciencias de Redes han cubierto los tamaños, distribuciones y otras muchas características de las redes sociales en contextos muy diferentes: empresas, barrios, ciudades, regiones, países, salud, etc. (Barabási, 2003; Strogatz, 2001; Fowler y Christakis, 2008). Un trabajo relevante sobre el flujo de comunicación en organizaciones complejas y grupos profesionales también se ha llevado a cabo por Alex P. Pentland bajo el paradigma de "Física Social" (Pentland, 2014). "*Quién se relaciona con quién*" se convierte en un importante indicador de la distribución de relaciones de poder efectivas y de la eficiencia del trabajo en equipo dentro de organizaciones complejas.

Como se puede apreciar en esta breve compilación, numerosos trabajos en importantes y muy diversas líneas de investigación están abordando aspectos esenciales de las relaciones interpersonales y la comunicación humana. Sin embargo, quizá el aspecto más relevante en lo que se refiere a los problemas de las sociedades contemporáneas, particularmente los países avanzados, tiene que ver con la pérdida de los lazos sociales: el aislamiento social, y de forma esencial, el aislamiento social percibido.

2. AISLAMIENTO SOCIAL Y POLÍTICAS ASISTENCIALES

2.1. EL AISLAMIENTO, UN PROBLEMA CRECIENTE

La necesidad de comunicarnos es perentoria, deriva de nuestra propia naturaleza social, y la soledad es una de las situaciones más difíciles de sobrellevar para el ser humano. Sentirse excluido no sólo se refleja en el cerebro con la misma activación en áreas similares que el dolor físico, sino que además va acompañado de un sentimiento semejante (Berkman, 2009; Hawkley y Cacioppo, 2010; Cacioppo y Cacioppo, 2014). La soledad, entendida como aislamiento social percibido, es un problema creciente. En esta era de la información, donde los individuos están hiperconectados mediante las nuevas tecnologías, paradójicamente ha disminuido el número de relaciones sociales satisfactorias, y el tiempo que dedican a hablar cara a cara las personas (Turkley, 2011, 2015).

En las sociedades actuales hay un cambio significativo en el modo en que se mantienen las relaciones sociales. La evidencia en los países en rápido desarrollo es que el crecimiento económico y el desarrollo tecnológico impulsados por la "revolución de la información" han ido de la mano con un aumento de trastornos mentales y del comportamiento, de mayor desintegración familiar y exclusión social, y de menor confianza social (Bok 2010; Huppert, 2010). Se supone que vivimos en una sociedad "tecnológicamente civilizada", donde la omnipresencia de los medios de comunicación y las TICs ha alterado dramáticamente los estilos de vida. Pero no está claro el efecto que tal inclusión y el uso excesivo de las TICs están teniendo en nuestras

relaciones sociales y calidad de vida. ¿En qué medida podrían los ordenadores, los teléfonos móviles y los televisores reemplazar nuestra necesidad de relaciones cara a cara? ¿Son facilitadores, sustitutos, o falsos sucedáneos? ¿Tal vez ambos? (Easterbrook, 2003; Roberts, 2014). Las nuevas tecnologías de la información y la comunicación (TICs), aunque cuentan con muchos efectos positivos, han ido acompañadas de una significativa desintegración social. En nuestros días, las redes de relaciones son artificialmente más extensas y rápidas, pero más transitorias y desprovistas de contacto personal, de modo que estas relaciones disminuidas y las estructuras debilitadas del "capital social" acaban penalizando el desarrollo de la vida cotidiana y disminuyen el bienestar de las personas (Putnam, 2000; Putnam et al., 2004).

En 1950, 4 millones de estadounidenses vivían solos, constituyendo el 9% de los hogares; sin embargo los datos del censo de 2011 muestran que casi 33 millones de estadounidenses viven solos, lo que representa el 28% de los hogares estadounidenses —un aumento de trescientos por ciento (Klinenberg, 2012). El mismo proceso se está llevando a cabo en diferentes países, por ejemplo en Suecia el porcentaje de hogares "unipersonales" alcanza el 47%, Gran Bretaña 34%, 31% en Japón, 29% en Italia y 25% en Rusia. Vivir solo, paradójicamente, podría simbolizar nuestra necesidad social de volver a conectar (Klinenberg, 2012). En nuestro país aunque la cifra es menor, es igualmente alarmante, ya que según la Encuesta Continua de Hogares del 2017 (INE, 2018) en España un 25,4% de los hogares son unipersonales, dato que respecto al año anterior ha sufrido un incremento relativo del 1,1%.

De manera equivalente, en el Censo de los Estados Unidos de 1985 el número promedio de confidentes era de tres; mientras que en el censo de 2004 el promedio fue de 2, pero la cifra más común fue *cero*

confidentes para casi el 25% (Cacciopo y Patrick, 2008). Alarmantemente, el fenómeno es similar en la mayoría de los países occidentales. Hasta tal punto que la soledad es ya un asunto de Estado en el Reino Unido y en otros países. La primera ministra británica, Theresa May, ha creado recientemente una Secretaría de Estado contra la Soledad¹. Se trata de un problema que afecta a más de nueve millones de británicos, de los cuales, según una encuesta de junio de 2016, alrededor de 200.000 personas no habían hablado con nadie desde hacía más de un año.

En España, según la Encuesta de Uso del Tiempo (INE, 2010), las personas dedican cada vez menos tiempo a interactuar físicamente y cara a cara. Entre 2003 y 2010 la participación en la vida social y actividades lúdicas disminuyó, mientras que el tiempo dedicado a computadoras (redes sociales, recuperación de información, juegos de computadora) aumentó sustancialmente, desde el 17,3% de la población en 2003 hasta el 30% en 2011. En los últimos años ha habido una transferencia significativa de la vida social y actividades de diversión colectiva a actividades individualizadas tales como juegos de computadora, Internet, ver televisión, móviles, etc. En este sentido, puede que sea significativo que en España y en otros países, las tasas de suicidios hayan aumentado dramáticamente en las últimas tres décadas.

Se puede afirmar que a escala internacional encontramos diversos indicadores relacionados con la infelicidad en alza (depresión, ansiedad, suicidios, familias desestructuradas), mientras que indicadores de la felicidad como pueden ser la satisfacción con la vida, el bienestar o la satisfacción personal, están situados hoy día por

¹ Noticia publicada en el periódico El Mundo, a fecha 17 de Enero de 2018.

debajo de los valores de décadas anteriores —este fenómeno lo ha ilustrado dramáticamente el autor Robert D. Putnam en su obra magistral *Bowling Alone* (Putnam, 2000): “Por numerosas razones, la vida es más fácil en una comunidad dotada de un stock sustancial de capital social” (Putnam, 1995: 67).

2.2. CONSECUENCIAS BIOMÉDICAS DE LA SOLEDAD

La soledad tiene un impacto directo biomédico y asistencial. Como numerosos estudios han demostrado, existe una asociación entre el aislamiento social, principalmente el aislamiento percibido, y la mala salud física y mental que no pueden explicarse con los diferentes comportamientos de salud. El aislamiento social disminuye los años de vida de las especies sociales, de *Drosophila* (Ruan y Wu, 2008) a *Homo sapiens* (House et al., 1988). La falta de vínculos sociales tiene efectos deletéreos sobre la salud a través de su efecto sobre el cerebro, los procesos hipotalámico-hipofisario-suprarrenal (HPA), los procesos vasculares, la presión arterial, la transcripción de genes, la inflamación, el sistema inmunológico y la calidad del sueño (Cacioppo y Hawkey, 2009).

Las investigaciones indican que el aislamiento social percibido (es decir, la soledad) es un factor de riesgo y puede contribuir a un desempeño cognitivo más pobre, mayor deterioro cognitivo y una función ejecutiva más pobre, así como a un aumento de la negatividad y cognición depresiva que acentúan la sensibilidad a las amenazas sociales (Berkman, 2009). De hecho, la soledad se asocia no sólo con una mala salud física; también incluye trastornos psiquiátricos como la esquizofrenia y los trastornos de la personalidad, pensamientos

suicidas, depresión y Alzheimer (Berkman, 2009; Cacioppo y Hawkey 2009).

Así, no es de extrañar que trastornos mentales como la esquizofrenia, la depresión, la epilepsia, la demencia, el alcoholismo y otras sustancias constituyan el 13% de la carga global de morbilidad, un porcentaje que supera las enfermedades cardiovasculares y el cáncer (Collins et al., 2011). Estudios europeos estiman que en el período de un año, 165 millones de personas (38% de la población) desarrollarán una enfermedad mental (Wittchen et al., 2011), en la mayor parte de los casos exacerbada por el creciente aislamiento de segmentos enteros de la población.

La “epidemia de la soledad” ya supera a la obesidad como amenaza para la salud. Y es la depresión la que se sitúa en primer lugar como enfermedad incapacitante, afectando de manera fundamental a las personas de la tercera edad, lo que acarrea un importante gasto sanitario (Collins et al., 2011). Pero no se trata sólo del impacto específico de la depresión, pues en general todas las enfermedades conllevan una cierta carga psicológica y social a la que no se le suele prestar atención asistencial. En el caso concreto de pacientes dermatológicos, la aplicación del cuestionario de sociotipo ha evidenciado la retracción social que sufren estos pacientes, mostrando con frecuencia un deterioro cuantificable (Marrón et al., 2017).

2.3. NECESIDAD DE UN NUEVO ENFOQUE EN LAS POLÍTICAS ASISTENCIALES

Dadas las tendencias demográficas y el aumento de esperanza de vida, el segmento de población de mayor edad está aumentando de forma considerable, y aún lo va a hacer más, con el consiguiente incremento de costes en el sistema sanitario estatal. Por lo que claramente se hace precisa una reorientación de las políticas asistenciales para que promuevan el envejecimiento activo y saludable con el objetivo, primero, de que las personas mayores vivan una vida más feliz y autosuficiente y, segundo, que se reduzca la carga para el sistema de salud. Por todo ello, se hace preciso tener una visión más ajustada de las relaciones sociales del mayor, esto es, del “sociotipo geriátrico.”

Desde la conceptualización del Sociotipo se pueden contemplar nuevos métodos para promover la interacción social y los hábitos de vida saludables: organización de reuniones sociales y actividades conjuntas, promoción de las relaciones sociales en torno a actividades lúdicas, dieta saludable, ejercicio físico, terapias de rehabilitación cognitiva y emocional, etc. De hecho, buena parte de la intervención a nivel municipal, autonómico y estatal se centra en la promoción indirecta de la sociabilización a través de actividades regladas.

Un aspecto importante en la evaluación de intervenciones es la falta de indicadores adecuados acerca de cambios en la sociabilización y la adquisición de nuevas pautas de relaciones. En esta faceta de evaluación el cuestionario del sociotipo puede contribuir significativamente a la correcta evaluación de las intervenciones. Ello es esencial puesto que las barreras a la participación social de los ancianos en las intervenciones colectivas son múltiples.

Evidentemente, la problemática actual, tanto por su extensión como por su intensidad, reclama un cambio profundo en las políticas asistenciales. No se trata tan solo de garantizar la sostenibilidad sanitaria y asistencial, que está en entredicho, pues es obvio que el sistema actual es insostenible; sino también la búsqueda de una mayor calidad de vida en un aspecto fundamental de nuestra naturaleza social. Son muchos y muy profundos los cambios que han experimentado nuestras sociedades (sociodemográficos, culturales, tecnológicos, económicos, etc.). Y frente a ello deben diseñarse nuevas modalidades asistenciales y de intervención social con criterios más apegados a los problemas de fondo, a las nuevas posibilidades tecnológicas, y que a la vez resulten más susceptibles de evaluación. Contribuir a esta nueva orientación es el objetivo esencial del Cuestionario del Sociotipo (SOCQ), cuya metodología se describe a continuación.

3. METODOLOGÍA

El desarrollo de un proyecto multidisciplinar complejo como es el caso de la presente Tesis, ha de aunar diferentes metodologías en base a los diferentes objetivos de cada uno de los trabajos de investigación. En concreto, debe entenderse que los dos primeros artículos han servido para establecer el constructo de sociotipo en sus fases iniciales. El siguiente paso metodológico, ya en el tercer artículo, ha consistido en un estudio cualitativo para poder formular en profundidad una hipótesis sobre la estructura del modelo de sociotipo. A dicho estudio le ha seguido el desarrollo psico-sociométrico del cuestionario y la validación del mismo a través de un amplio trabajo de campo, y un exhaustivo análisis estadístico de los datos obtenidos. Y por último, en el cuarto artículo, se ha aplicado el cuestionario SOCQ en el ámbito sanitario, más específicamente, se va a demostrar cómo las relaciones sociales conforman un factor fundamental del riesgo de aislamiento y deterioro de salud, y cómo el cuestionario desarrollado es lo suficientemente sensible como para detectar en el ámbito clínico aquellos casos de retracción social.

3.1. HIPÓTESIS Y OBJETIVOS

Las *hipótesis centrales de la investigación* han sido:

- Los cambios sociales actuales deben conllevar nuevas políticas asistenciales que contemplen el creciente problema del aislamiento.

- Los elementos básicos de creación de lazos sociales del individuo deben ser susceptibles de medida.
- Analizar el papel de la risa como herramienta facilitadora de relaciones sociales es conveniente.
- El desarrollo de un cuestionario que mida el concepto de sociotipo es viable, así como su validación en población española.
- El sociotipo es un indicador de salud mental y salud general de la población.
- En psicodermatología, el sociotipo es un indicador útil para detectar a los pacientes que se retraen socialmente por la visibilidad de sus lesiones.

Una vez planteadas las hipótesis, como *objetivos específicos* de esta Tesis se pretende:

- Promover cambios en las políticas asistenciales que permitan una mejor adaptación de estas políticas a la situación social actual.
- Generalizar el concepto de sociotipo y su indicador como medio general de estudio psicológico y social.
- Desarrollar un cuestionario capaz de medir el concepto de sociotipo y validarlo en población española comprendida entre 18-80 años de edad.
- Correlacionar dicho cuestionario de sociotipo (SOCQ) con otros indicadores utilizados en el ámbito de la salud mental.
- Evaluar la utilidad de cuestionario de sociotipo para la detección de malestar emocional y deterioro en la calidad de vida de pacientes del ámbito clínico, en concreto, de pacientes dermatológicos.

3.2. PROCEDIMIENTOS METODOLÓGICOS DE LAS PUBLICACIONES

A. THE "SOCIOTYPE" APPROACH TO SOCIAL STRUCTURES AND INDIVIDUAL COMMUNICATION: AN INFORMATIONAL EXPLORATION OF HUMAN SOCIALITY

En este estudio piloto se ha llevado a cabo la exploración de las redes sociales en torno a los adolescentes. Se ha seleccionado un población joven debido a la alta prevalencia y la intensidad de sentimientos de soledad que sufren; en comparación con otros grupos de edad, exceptuando los ancianos (> 80 años), los valores más elevados se encuentran en la adolescencia y en la transición a la edad adulta (16-25 años) (Pinquart y Sorensen, 2003).

Estamos ante un estudio exploratorio, observacional y transversal. Para el análisis de las relaciones sociales en población joven se aplicó un muestreo de conveniencia (Cohen et al., 2003), donde los sujetos provenían de dos centros educativos distintos. El número total de estudiantes fue 165, que se repartieron en dos muestras: la Muestra_1, con un tamaño muestral de $n = 95$ (38.3% hombres y 61.7% mujeres) y una edad media de 17.81 (SD = 4.24) fue reclutada de los dos últimos cursos del Instituto; la Muestra_2, compuesta por estudiantes del primer curso de Universidad tenía un tamaño muestral de $n = 70$ (80% mujeres y 20% hombres) y una edad media de 19.37 (SD = 2.44).

Todos los individuos eran españoles y ninguno sufría ningún trastorno mental o enfermedad que impidiera la realización de la tarea, por lo que pudieron comprender y completar el cuestionario sin dificultad. La Muestra_1 fue entrevistada con el "Test de Sociotipo" con el fin de explorar aspectos estructurales y dinámicos de la red social, y a la Muestra_2 además del "Test de Sociotipo" también se le

administró el GHQ 28 (Cuestionario de Salud General), con el objetivo de relacionar los lazos sociales con el bienestar psicológico y la salud mental.

El *Cuestionario de Salud General GHQ 28* es una herramienta de 28 ítems usada para detectar angustia emocional y riesgo de desarrollar trastornos psiquiátricos. A través del análisis factorial, el GHQ-28 considera cuatro subescalas: 'síntomas somáticos', 'ansiedad / insomnio', 'disfunción social' y 'depresión severa'.

Esta versión preliminar del "*Test de Sociotipo*" estaba compuesta por 20 ítems, donde se incluían preguntas sociodemográficas básicas (edad, sexo, nivel educativo, estado familiar,...), y también preguntas relacionadas con dinámica con la que se mantienen las relaciones sociales (tiempo hablando cara a cara, teléfono, redes sociales u otros canales). También se autoevaluó la sociabilidad y el nivel de autosatisfacción; de la misma manera, se preguntó por cambios en la situación personal.

Aportaciones de la doctoranda: este artículo ha sido realizado por el grupo de investigación al que pertenece esta autora. Su participación en los mismos ha consistido en:

- Revisión bibliográfica
- Colaboración en el diseño de la metodología
- Preparación de la documentación y tramitación de la evaluación positiva del Comité de Ética de la Investigación de la Comunidad de Aragón(CEICA) y obtención de los Consentimientos Informados firmados por los participantes
- Realización de trabajo de campo
- Procesamiento de datos y análisis estadístico

- Colaboración en la discusión general y preparación del manuscrito
- Discusión de las revisiones recibidas y elaboración de la versión definitiva

B. LAUGHING BONDS: A MULTIDISCIPLINARY INQUIRY INTO THE SOCIAL INFORMATION PROCESSES OF HUMAN LAUGHTER

En esta publicación se compilaron las diferentes hipótesis existentes sobre la risa, y se desarrolló una nueva hipótesis acerca de su rol social, singularizando su papel en la creación de lazos sociales. Este artículo debe considerarse más bien como un “position paper” que pretende orientar la investigación de la risa en el ámbito social, y conectar con el conjunto de la investigación del sociotipo. Además, esta publicación ha ido acompañada de un importante trabajo experimental en el que se ha aplicado el análisis computacional de la señal acústica de la risa como herramienta auxiliar para el diagnóstico y categorización de los distintos grados de depresión (Navarro et al, 2014; del Moral et al, 2014), evidenciando la importancia de su papel como indicador en el ámbito social y biomédico (Hasan y Hasan, 2009).

Como se concluye en este artículo, la risa se ha mantenido evolutivamente como herramienta optimizada para la resolución inconsciente de problemas cognitivo-emocionales, al mismo tiempo también se ha establecido como forma útil para preservar el tejido esencial de los vínculos sociales en grupos muy cohesionados, y dentro de las sociedades humanas en general.

Los nuevos principios presentados, tanto conductuales como neurodinámicos, a cerca de esta inusual característica acústica de nuestra especie justifica la presencia omnipresente que tiene en nuestras interacciones en redes sociales de forma general, y en especial a lo largo del ciclo de vida del individuo. La risa, lejos de ser una curiosa reliquia evolutiva o un comportamiento innato intrascendente, debe ser considerada como una herramienta altamente eficiente para la resolución de problemas entre individuos y para el mantenimiento de los vínculos sociales.

Aportaciones de la doctoranda: este artículo ha sido realizado en su totalidad por el grupo de Bioinformación del IACS, al que pertenece esta autora. Su participación en los mismos ha consistido en:

- Recopilación bibliográfica
- Colaboración en la conceptualización y en la elaboración de las hipótesis esenciales
- Colaboración en el trabajo experimental relacionado con el papel de la risa en las relaciones sociales y como indicador de salud mental y bienestar del individuo
- Colaboración en procesamiento de datos y análisis estadístico
- Contribución a la discusión general y preparación del manuscrito
- Discusión de las revisiones recibidas y preparación de la versión definitiva

C. THE "SOCIOYPE" CONSTRUCT: GAUGING THE STRUCTURE AND DYNAMICS OF HUMAN SOCIALITY

Dado que este es el estudio fundamental de la Tesis, la metodología aplicada también ha tenido una complejidad mayor que las anteriores. La estructura del estudio se basa en un método correlacional, con un diseño transversal. El trabajo se inició con un *estudio cualitativo* que buscaba las principales características de las redes sociales y los hábitos de conversación en diferentes edades, mediante entrevistas semiestructuradas (que incluían narraciones de experiencias personales, estados de ánimo, apreciación de nuevas tecnologías de comunicación, etc.). Este estudio cualitativo involucró 45 entrevistas (convenientemente diversificadas por edad, sexo y nivel socioeconómico). Se reclutó un total de 45 participantes (26 mujeres y 19 hombres), con una edad media de 60.4 (SD = 22.26); todos ellos fueron seleccionados intencionalmente para tratar de cubrir las características sociodemográficas mencionadas. Esa experiencia cualitativa inicial sirvió para proporcionar una serie de datos sobre cómo se contempla la noción teórica del sociotipo en diferentes circunstancias personales y dominios sociales.

Para elaborar el constructo y evaluar su validez se emprendió un *estudio cuantitativo* donde los participantes fueron seleccionados mediante muestreo estratificado, hasta alcanzar un número final ($n = 1.075$) que excede el criterio de evaluación de validez, y que resulta en una muestra que ha sido psicométricamente adecuada para el estudio. La totalidad de los datos se obtuvo mediante autoevaluación, utilizando un conjunto de cuestionarios a través de Internet, complementado con entrevistas cara a cara. Los cuestionarios utilizados fueron:

- *Variables de contexto*: Se exploraron una serie de variables sociodemográficas que proporcionaron una visión general de las circunstancias de los participantes, como fueron: sexo, edad, estado civil, convivencia, educación, nivel socioeconómico, satisfacción social (Escala Visual Analógica VAS, de 0 a 100).

- *Cuestionario de sociotipo (SOCQ)*: A los sujetos se les preguntó un conjunto de 32 cuestiones/ítems, evaluando la calidad de sus relaciones en las dimensiones "familia", "amigos", "conocidos" y compañeros de "estudio / trabajo" (8 preguntas para cada una). Los primeros tres dominios se propusieron como subescalas de un factor general de sociotipo, y el cuarto fue propuesto como una escala independiente, para ser utilizado cuando sea aplicable (en este caso, 49,5% de la muestra eran empleados y 11,3% estudiantes). Los ítems fueron desarrollados por un panel multidisciplinar de expertos (incluidos biólogos, psicólogos y sociólogos) que incluyó por consenso las principales características de cada dominio. La redacción de los ítems se rigió por una tabla de especificaciones de contenido, que permitió su ajuste, validez conceptual y representatividad. La cantidad de ítems estuvo sobredimensionada con el fin de seleccionar aquellos con las mejores propiedades psicométricas. Para poder contrarrestar los efectos de los sesgos y los diferentes estilos de respuesta, la encuesta utilizó un formato de respuesta de elección forzada, calificando el grado de valoración con cada una de las declaraciones, algunos de ellos con puntuación inversa, usando una escala tipo Likert con 6 opciones de respuesta, desde 0 (nunca) a 5 (siempre).

- *Cuestionario de Salud General (GHQ 12)*: Este es el instrumento de detección más utilizado medir la angustia psicológica, ya que resulta atractivo debido a su brevedad (12 ítems) (Goldberg et al., 1997). Sus propiedades psicométricas han sido estudiadas en varios países, y se ha aplicado a diversos tipos de población, por ejemplo, ancianos y

pacientes urológicos. Se utilizó la versión española validada (Lobo et al., 1986; Sánchez-López y Dresch, 2008), que cuenta con un $\alpha = 0.76$. La corrección se realizó asignando valores de 0 a 3 a las diferentes respuestas posibles.

- *Escala Revisada de Soledad UCLA (RULS)*: Este cuestionario ampliamente utilizado consiste en una escala unidimensional de 20 ítems, que ha sido diseñada para medir sentimientos subjetivos de soledad y aislamiento social (Russell et al., 1980). Es una versión revisada de la Escala de Soledad UCLA original (Russell et al., 1978). La versión validada en español que aquí se emplea cuenta con unas propiedades psicométricas adecuadas, siendo su $\alpha = 0,94$ (Vazquez y Jimenez, 1994). Los participantes califican cada ítem en una escala tipo Likert que va de 1 (nunca) a 4 (a menudo).

- *Cuestionario Eysenck de Personalidad (EPQ-R)*: Este cuestionario mide tres dimensiones principales que explican la mayor parte de la variación en la personalidad (Eysenck et al., 1985). El EPQ-R es una elección muy apropiada para incorporar el dominio de la personalidad. Esta medida ha demostrado ser útil para numerosas aplicaciones en recursos humanos, orientación profesional, entornos clínicos o investigación biomédica. Se utilizó una versión del cuestionario validada en español, que cuenta con unas propiedades psicométricas adecuadas (Ribes, 1995). Las dimensiones del EPQ-R son: 'extraversión' ($\alpha = 0,82$), 'neuroticismo' ($\alpha = 0,86$), 'psicoticismo' ($\alpha = 0,73$) y 'mentira' ($\alpha = 0,76$). El número total de elementos que forman la versión en español de EPQ-R es 83, y se responden asignando 'sí' o 'no'.

Una plataforma *online* dió apoyo a la finalización de la encuesta y a la recopilación de datos (www.surveymonkey.com). La estructura factorial del cuestionario fue evaluada mediante Análisis Factorial Exploratorio (EFA). El número de componentes se decidió usando los criterios de Kaiser (Kaiser, 1960), que requiere eigenvalues superiores a 1. Se empleó el criterio de peso factorial >0.5 para determinar los ítems que se han de adscribir a un determinado factor. El porcentaje de varianza explicada en cada ítem por su factor de pertinencia se calculó mediante el α de Cronbach y la relación con el criterio

mediante r de Pearson. Los tests de contraste calcularon con el test t-Student para medidas independientes o mediante los valores z asociados al test U de Mann-Whitney dependiendo de la hipótesis de normalidad. Los análisis se realizaron mediante el paquete estadístico SPSS versión 16.

Los modelos de confiabilidad probados para el SOCQ mostraron una alta robustez. Todas las escalas y subescalas han encajado mejor con el modelo congénico, siendo las estimaciones obtenidas de $R = 0.81$ para la 'SOCQ' general, $R = 0.81$ para *familia*, $R = 0.90$ para *amigos*, $R = 0.71$ para *Conocidos*, $R = 0.87$ para *trabajo/estudios*. Es decir, el α de Cronbach obtenido es de 0.81 para el SOCQ general, y de 0.82 cuando se contempla la dimensión extra de trabajo/estudio. Por otra parte, la media de los valores de los restos de los ítems para el SOCQ general fue de 0.52, siendo de 0.64 para la subescala *familia*, de 0,77 para la subescala *amigos*, de 0,45 para la subescala *conocidos*, Y de 0.72 para la subescala *trabajo/estudio*.

Aportaciones de la doctoranda: este artículo ha sido realizado por el grupo de Bioinformación, al que pertenece esta autora, en colaboración con el Grupo de Investigación en Salud Mental en Atención Primaria. Su participación en los mismos ha consistido en:

- Colaboración en la elaboración de la memoria del proyecto para la convocatoria del Instituto de Salud Carlos III, FIS 2012, para la obtención de financiación
- Revisión bibliográfica
- Contribución a la hipótesis inicial de la necesidad de establecer un nuevo constructo psico-social que recoja las relaciones personales y las correlacione con el estado de salud del individuo
- Colaboración en el diseño de la metodología

- Tramitación de la aprobación de la metodología del estudio por el Comité de Ética de la Investigación de la Comunidad de Aragón (CEICA) y obtención de los Consentimientos Informados firmados por los participantes
- Desarrollo del estudio cualitativo (entrevistas estudio cualitativo, registro, transcripción y colaboración en ordenar la información, colaboración en el análisis de contenido y conceptualización)
- Desarrollo del estudio cuantitativo
- Colaboración en procesamiento de datos y análisis estadístico
- Contribución a la discusión general y preparación del manuscrito

D. SOCIOTYPE IN DERMATOLOGY

El objetivo de este estudio era determinar si la carga psicosocial causada por enfermedades de la piel podía ser detectada mediante el Cuestionario de Sociotipo (SOCQ). Los pacientes se reclutaron de forma consecutiva en el Servicio Clínico de Dermatología del Hospital de Alcañiz, hasta alcanzar un número final de $n = 159$, número de participantes adecuado para el estudio piloto. Las principales características de la muestra fueron adultos de etnia europea entre las edades de 18-95 años (media = 38.09, SD = 16.58), todos españoles (con diversos antecedentes regionales), 64.8% mujeres, 50.9% con pareja o casada, 19.5% con estudios universitarios y 45.3% con empleo. Cada paciente fue examinado por un dermatólogo que registró el diagnóstico. Se incluyeron casos de psoriasis, acné, alopecia, eccema, neurodermitis y nevus (estos últimos, al no ser severos, actuaron como "controles").

El cuestionario se completó gracias a una plataforma en línea a través de Internet (www.surveymonkey.com), e incluyó una batería de cuestionarios compuesta por:

- *Preguntas sociodemográficas básicas*: sexo, edad, estado civil, residencia, nivel educativo, situación laboral y nivel socioeconómico.

- El *Cuestionario de Salud General (GHQ 12)*: cuestionario de 12 ítems que detecta angustia psicológica.

- La *Escala de Soledad UCLA Revisada (RULS)*: cuestionario unidimensional de 20 ítems diseñado para medir sentimientos subjetivos de soledad y aislamiento social.

- El *Cuestionario Eysenck de Personalidad (EPQ-R)*: cuestionario que por medio de 83 ítems propone cuatro dimensiones 'Extraversión', 'Neuroticismo', 'Psicoticismo', y 'Mentira' para explicar la mayoría de las variaciones de personalidad.

- El *Cuestionario de Sociotipo (SOCQ)*: cuestionario que mide mediante 16 ítems el grado de interacción en la red de relaciones sociales de la persona por medio de cuatro dominios: 'familia', 'amigos', 'conocidos' y compañeros de 'estudio / trabajo'.

Además se incluyeron otras 16 preguntas complementarias sobre otros aspectos de las relaciones sociales, y 15 preguntas cuantitativas sobre contactos sociales, tiempos de conversación, momentos de risa, canales de comunicación preferidos, sociabilidad, etc.

Obviamente también se registró el diagnóstico dermatológico. Los cuestionarios fueron autoadministrados y alternativamente, cuando fue necesario, mediante entrevistas personales con la ayuda de un

psicólogo de investigación o una enfermera del hospital. Dado que las respuestas de los sujetos se obtuvieron a través de la autoevaluación, los datos del estudio cuentan con un posible sesgo subjetivo.

El análisis estadístico de este estudio se realizó con el software SPSS (IBM SPSS Statistics para Windows, Versión 19.0). Se obtuvieron correlaciones de Spearman entre las características psicológicas más importantes de los pacientes dermatológicos (medidos por UCLA, GHQ-12 y Eysenck), y las dimensiones del sociotipo, teniendo en cuenta sus posibles factores de confusión (variables sociodemográficas: sexo, estado civil, nivel socioeconómico y gravedad del diagnóstico).

Aportaciones de la doctoranda: este artículo ha sido realizado por el grupo de Bioinformación, al que pertenece esta autora, en colaboración con el Grupo de Psicodermatología. Su participación en los mismos ha consistido en:

- Colaboración en el diseño de la metodología
- Preparación de la documentación y tramitación de la evaluación positiva del Comité de Ética de la Investigación de la Comunidad de Aragón (CEICA), y obtención del Consentimiento Informado de los pacientes
- Procesamiento de datos y análisis estadístico
- Colaboración en la elaboración y publicación del artículo
- Discusión de las revisiones recibidas y preparación de la versión definitiva

CONFIDENCIALIDAD DE LOS DATOS Y ASPECTOS ÉTICOS DE LOS TRABAJOS PRESENTADOS

Los resultados de los distintos estudios que se han llevado a cabo a lo largo de esta Tesis han sido utilizados únicamente con fines de investigación; los datos obtenidos son confidenciales y en ningún caso han sido cedidos a terceros, remitiéndonos a la Ley Orgánica 15/99 de Protección de Datos de Carácter Personal. Todos los estudios han cumplido con los requisitos éticos necesarios y han contado con el certificado favorable del Comité de Ética de la Investigación de la Comunidad de Aragón (CEICA) para su realización.

4. CONCLUSIONES: UNA NUEVA PERSPECTIVA PARA LAS POLÍTICAS DE SOCIABILIZACIÓN

4.1. CONCLUSIONES

El conjunto de estos trabajos supone el *primer estudio empírico*, hasta donde conocemos, que trata de alcanzar una definición tanto teórica como operativa del constructo de sociotipo, delimitando la estructura esencial de relaciones sociales de la persona (Marijuán, 2009; del Moral y Navarro, 2012). La constancia relativa de las distintas capas relacionales y su dinámica de actualización constituiría una de las características esenciales que acompañan a cada individuo a lo largo de su ciclo de vida. Dada la orientación empírica aquí seguida se facilita el uso de este nuevo indicador en áreas de salud mental y bienestar general, así como su combinación con otros constructos relacionados con la soledad, el sufrimiento psicológico y las dimensiones de la personalidad, que también han contribuido a delimitar y establecer el horizonte en esta primera exploración.

- *El cuestionario de sociotipo obtenido es válido en términos de estructura, y suficientemente fiable en términos de consistencia interna.* Se ha establecido una escala general consistente en las subescalas familiares, amigos, conocidos, y otra subescala separada formada por compañeros de trabajo/colegas de estudio (esta última a ser aplicada cuando sea pertinente), explicando todas ellas un alto porcentaje de varianza.

- Todas las escalas y subescalas han encajado con el modelo congénico de fiabilidad probado, lo que sugiere que la definición del SOCQ, en términos de elementos y componentes, parece suficientemente extensa para referirse a varias facetas interrelacionadas (como la pertenencia, el habla, el cuidado, el apoyo, la risa, la confianza, los valores, las relaciones) que podrían estudiarse en trabajos futuros.
- El constructo de sociotipo también ha mostrado estar estrechamente relacionado con métricas ya validadas de soledad y angustia psicológica. El constructo varía notablemente a lo largo del curso de la vida y las circunstancias de los individuos, basándose en su género y edad, e incluyendo las diferentes situaciones personales, culturales y socioeconómicas de las redes sociales.
- El análisis de género, dados los factores culturales y sociales implicados, así como los distintos intereses relacionales y reproductivos (Pinker 2008, 2014), ha encontrado, como era de esperar, diferencias significativas en cuanto a las dimensiones del sociotipo referidas a los distintos ámbitos de relación.
- La segmentación por edad muestra diferencias significativas entre la juventud, la etapa adulta, la madurez y la senectud en relación con el sociotipo general, así como con las subescalas de amigos, conocidos y compañeros de trabajo. Sin embargo, las puntuaciones en familia no mostraron cambios significativos a lo largo de las diferentes etapas de la vida, posiblemente debido al reemplazo generacional que ocurre dentro del conjunto de la red familiar.
- En el caso de los ancianos, los amigos y los conocidos desaparecen gradualmente de la escena relacional, y su interrelación social se ve

reducida progresivamente a lo casual y a lo débil, como ya se ha demostrado en otros trabajos (Yang y Victor, 2011; Berkman, 2009; Steptoe et al., 2013; Cacioppo y Cacioppo, 2014).

La importancia potencial de esta clase de estudios en las políticas asistenciales se evidencia en la propia evolución de los programas sociales y las intervenciones que actualmente se implementan, tanto a nivel municipal como regional, nacional y europeo. En ese sentido, el cuestionario que aquí se desarrolla (SOCQ) supone una nueva herramienta para colaborar en la evaluación de las actividades e intervenciones de sociabilización. Consideramos que la información proporcionada por la definición operativa del constructo de sociotipo, a pesar de su carácter preliminar, podría ser útil para guiar el desarrollo y la evaluación de estos programas destinados a mejorar y/o fortalecer las redes sociales de las personas en riesgo, dadas sus características demográficas (sin familia, ni trabajo, huérfanos, inmigrantes, etc.) o debido a la edad (vulnerabilidad de niños o jóvenes, y especialmente los ancianos).

4.2. PERSPECTIVAS DE FUTURO

El mensaje central de este estudio tiene que ser entendido dentro de la triada genotipo-fenotipo-sociotipo (Berry, 2011; Marijuán, 2009; del Moral y Navarro, 2012). La conexión social ya reside potencialmente en nuestros genes, y es en el desarrollo de esta conexión donde se asienta nuestra salud, tanto mental como física. Situar adecuadamente el constructo en el centro de nuestra naturaleza social conlleva el problema de que se entrecruzan demasiados factores, pero aunque esos factores de confusión representan dificultades conceptuales, al

mismo tiempo establecen las direcciones más importantes que se deben seguir para avanzar en el sociotipo. Hecho que concuerda con la pluralidad de factores que contiene el enfoque del "capital social" (Putnam, 2000; Putnam et al., 2004), con lo que se proporciona una base psicosocial más clara a esa noción.

Entre las direcciones de trabajo futuras hay que destacar, en primer lugar, la naturaleza de los lazos interpersonales y los diferentes tipos de lazos sociales (Granovetter 1973, 2005), incluyendo la dinámica cognitiva de los lazos, la inversión específica de la memoria y las equivalencias asimétricas entre los lazos sociales (Lazer, 2009; Pentland, 2014); la centralidad de la conversación en la creación y ruptura de los lazos humanos (Dunbar, 2004; Turkley, 2015); las inevitables diferencias de género tanto en los vínculos sociales como en los intereses relacionales/reproductivos; la estrecha interrelación entre fenotipo-sociotipo durante el curso de vida de cada individuo, así como las posibles consecuencias epigenéticas de los desastrosos/exitosos entornos sociales (Berry y De Gest, 2012); el papel de las nuevas tecnologías de la comunicación que revolucionan el mix de sociotipos individuales (Roberts, 2014; Keen, 2015); los esquemas sociales y culturales para la distribución del trabajo y del ocio y su actual desorganización (Putnam 2000; Putnam et al. 2004); el papel de las redes sociales en la salud y la enfermedad (Fowler y Christakis, 2008); las epidemias contemporáneas de soledad y depresión (Cacioppo y Cacioppo, 2014).

De alguna manera, todos esos problemas intratables, derivados de las complejas circunstancias de la vida social, rodean al sociotipo y lo conforman. A medida que el constructo aquí propuesto vaya siendo debidamente delimitado y diversificado (a lo largo de estudios futuros, dado que la presente Tesis es sólo un primer paso), un número

creciente de temas podrían beneficiarse de esta nueva forma de pensar.

Dentro de esta reflexión social, se considera ineludible que se fomenten nuevas formas de actuar en lo que a las políticas asistenciales actuales se refiere, ya que se necesitan intervenciones exclusivamente enfocadas a la sociabilización del individuo. Como se ha demostrado a lo largo de esta investigación, la preservación y el fomento de los lazos sociales son aspectos estrechamente relacionados con la calidad de vida y el bienestar. Por ello una de las líneas clave a desarrollar en futuros proyectos de I+D+i en este ámbito ha de ser el estudio/evaluación de nuevas políticas asistenciales e intervenciones centradas en la sociabilización.

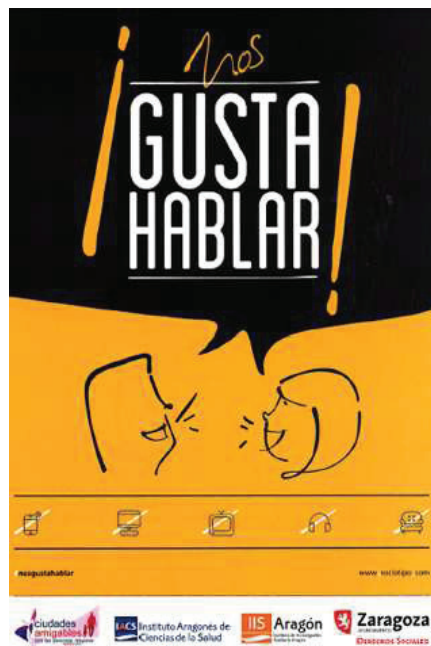
4.3. APLICACIÓN A LA EVALUACIÓN DE LAS INTERVENCIONES DE SOCIABILIZACIÓN

El Instituto Aragonés de Servicios Sociales (IASS) ya está utilizando el cuestionario SOCQ dentro de su Programa de Promoción de Autonomía Personal (PAP), que está destinado a personas dependientes leves y moderadas de grado I y II—siendo prioridad el grado I. El programa requiere trabajar de forma especializada y centrada en la atención de la persona. Los objetivos principales que persigue son los de alargar la dependencia en los usuarios y mejorar su calidad de vida a través de la intervención de fisioterapeutas, terapeutas ocupacionales y trabajadores sociales que potencian su capacidades físicas, cognitivas, ocupacionales y sociales. El programa empezó en Noviembre de 2016, y desde Octubre de 2017 se ha incorporado el Cuestionario de Sociotipo (SOCQ) dentro de los indicadores con los que evalúan a sus usuarios cuando acceden al PAP

por primera vez. Está previsto hacer un seguimiento del sociotipo, a pesar de ser un cuestionario de reciente implantación en el Programa, y periódicamente se va a reevaluar la situación de los participantes respecto a sus relaciones sociales.

También hay que destacar en el marco del Sociotipo la iniciativa “Nos Gusta Hablar” (NGH), proyecto que pretende favorecer espacios de encuentro y diálogo especialmente enfocado a los mayores. Esta iniciativa se ha realizado en colaboración con el Ayuntamiento de Zaragoza, más concretamente con la Oficina Técnica del Mayor, de ahí que se esté llevando a cabo en los Centros de Convivencia para Mayores de Santa Isabel y de Terminillo, con la intención de seguir implantándolo gradualmente en otros centros. Se trata de un espacio permanente y de entrada libre donde cualquier vecino, y especialmente las socias y socios del Centro de Convivencia, pueden acudir a mantener una buena conversación. De manera muy similar, “Nos Gusta Hablar” también se está llevando a cabo en la residencia de Mayores de Borja, que pertenece al Instituto Aragonés de Servicios Sociales.

Este proyecto se enmarca dentro de los objetivos del Plan de Ciudades Amigables con las Personas Mayores, que promueve el Ayuntamiento de Zaragoza, tales como promover un envejecimiento activo y saludable, paliar estados de soledad y promocionar una imagen positiva de las personas mayores en nuestra ciudad.



Desde su inauguración en el Centro de Mayores de Santa Isabel (Noviembre de 2017), y con reciente implantación en el caso del Centro de Convivencia de Mayores de Terminillo, esta iniciativa está teniendo una muy buena acogida tanto ciudadana como mediática. A continuación se recopilan algunas de las noticias que han aparecido en diversos medios de comunicación:

- *“El centro de Mayores de Santa Isabel acoge el primer espacio para conversar.”* El Periódico de Aragón, 18/11/2017

http://www.elperiodicodearagon.com/noticias/aragon/centro-mayores-santa-isabel-acoge-primer-espacio-conversar_1243398.html

- *"El Ayuntamiento pone en marcha el primer espacio 'Nos Gusta Hablar' en el Centro de Mayores Santa Isabel."* La Vanguardia Aragón, 18/11/2017

<http://www.lavanguardia.com/local/aragon/20171118/432980675903/el-ayuntamiento-pone-en-marcha-el-primero-espacio-nos-gusta-hablar-en-el-centro-de-mayores-santa-isabel.html>

- *"A los mayores de Santa Isabel les gusta hablar."* Heraldo de Aragón, 07/12/2017

<https://www.heraldo.es/noticias/aragon/zaragoza-provincia/zaragoza/2017/12/07/a-los-mayores-santa-isabel-les-gusta-hablar-1212468-301.html>

- *"El Ayuntamiento pone en marcha el primer espacio 'Nos Gusta Hablar' en el Centro de Mayores Santa Isabel."* 20 minutos, 18/12/2017

<https://www.20minutos.es/noticia/3190658/0/ayuntamiento-pone-marcha-primero-espacio-nos-gusta-hablar-centro-mayores-santa-isabel/>

- *"Investigadores alertan en un estudio sobre una 'epidemia de soledad'."* Heraldo de Aragón, 18/12/2017

<https://www.heraldo.es/noticias/sociedad/2017/12/18/investigadores-alertan-estudio-sobre-una-epidemia-soledad-1214648-310.html>

- *“La falta de relaciones sociales cara a cara, factor de riesgo para la salud.”* Heraldo de Aragón, 20/12/2017

<https://www.heraldo.es/noticias/aragon/2017/12/20/la-falta-relaciones-sociales-cara-cara-factor-riesgo-para-salud-1214990-300.html>

- *Aragón noticias. Aragón Televisión 30/01/2018, min. 17.40*

<http://alacarta.aragontelevision.es/informativos>

CODA: Como se comentaba en la Introducción de la Tesis, con este trabajo se pretende contribuir a las actuales políticas públicas desde el ángulo de la sociabilización, gracias al constructo del Sociotipo que se ha elaborado en esta investigación. A día de hoy, aparte del trabajo teórico, hemos conseguido dar un pequeño paso al colaborar con dos importantes instituciones de nuestra Comunidad, consiguiendo que se replanteen algunas de sus intervenciones de sociabilización dadas las evidencias científicas surgidas al respecto. Pero lo cierto es que esto es sólo el comienzo, y que quedan muchos temas por explorar, y mucho trabajo por realizar. Espero a día de hoy que la investigación recogida en esta tesis sea productiva para el Programa en Sociología de las Políticas Públicas y Sociales, para la Escuela de Doctorado y, en último término, para la Universidad de Zaragoza. Confío también en que la línea que en esta Tesis se empieza a vislumbrar, pueda expandirse y continúe siendo fructífera en el futuro.

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ANEXOS

- ANEXO 1. MATERIAL DEL ESTUDIO CUALITATIVO
- ANEXO 2. MATERIAL DEL ESTUDIO CUANTITATIVO
- ANEXO 3. CUESTIONARIO SOCQ (ESPAÑOL)

ANEXO 1.

MATERIAL DEL ESTUDIO CUALITATIVO

A continuación se incluye la guía de la entrevista que se siguió para la realización del *estudio cualitativo* del Sociotipo.

ENTREVISTA SOCIOTIPO

PARTICIPANTE:.....

Hola, buenas tardes.

Antes de nada quería darte las gracias por el interés que has mostrado a la hora de participar en este estudio y por dedicar parte de tu tiempo a charlar sobre algunos temas. Mi nombre es Raquel y, como sabes, estamos aquí porque estamos llevando a cabo una investigación sobre temas relativos a las relaciones entre las personas.

Creemos que tu opinión es muy importante y, por eso, me gustaría animarte a hablar libremente y a comentar todo lo que te parezca oportuno. Todas las opiniones son importantes y van a ser tenidas en cuenta. Se trata de que vayamos hablando de las cosas que vayan surgiendo.

Como todo lo que comentemos va a ser importante y no es posible tomar nota de todo, si no tienes inconveniente, vamos a grabar la conversación para que luego podamos escucharla con más tranquilidad.

En cualquier caso, te garantizo que todo va a ser tratado de forma anónima y confidencial, de tal modo que no es necesario que digas tu nombre ni ningún otro dato que pueda identificarte. Estas conversaciones suelen durar aproximadamente una hora, pero también dependerá un poco de las cosas que vayamos hablando.

¿Tienes alguna pregunta o duda al respecto?

1. Me gustaría empezar a hablar, por ejemplo, sobre lo que piensas respecto a la utilización de las Nuevas Tecnologías como forma de mantener relaciones sociales.

Explorar:

| | |
|--------------------------------|--|
| Interacción cara a cara vs. NT | |
| Posibilidades expresivas | |
| Reflexividad vs. espontaneidad | |
| Relaciones virtuales | |

2. ¿Cómo mantienes tus relaciones sociales?

Explorar:

| | |
|--|--|
| Canales de comunicación | |
| Aspectos positivos | |
| Dificultades asociadas | |
| Dedicación a través del habla o de otras actividades | |
| Niveles de satisfacción | |

3. ¿Con qué personas sueles relacionarte de forma habitual?

Explorar:

| | |
|------------------------------|--|
| Tipos de relación | |
| Cantidad de personas | |
| Calidad de las interacciones | |

4. ¿Cómo son tus relaciones personales?

Explorar:

| | |
|---------------------------------------|--|
| Qué esperas de ellas | |
| Niveles de satisfacción | |
| Sentimientos ligados a las relaciones | |

| | |
|------------------------------------|--|
| Sentimientos ligados a los canales | |
|------------------------------------|--|

ANEXO 2.

MATERIAL DEL ESTUDIO CUANTITATIVO

En este anexo se incluye la batería de cuestionarios utilizados para la encuesta del estudio cuantitativo.

Estudio de relaciones sociales (Sociotipo)

El objetivo de este proyecto es el estudio de las relaciones sociales del individuo (sociotipo). Es un tema importante de cara al problema social del aislamiento que en nuestros días afecta a un sector creciente de la población. Queremos estudiarlo sobre vuestras propias experiencias, con quienes os relacionáis y en qué circunstancias, por lo que os agradeceremos que contestéis las preguntas que figuran a continuación. También os preguntaremos sobre algunos otros temas relacionados (salud, personalidad).

Todos los datos serán tratados de forma confidencial, y serán utilizados únicamente con fines de investigación. Para participar solo hace falta ser mayor de 18 años, y aceptar participar. La duración de la prueba es aproximadamente de unos 20 minutos.

Si estas interesada/o en participar en este estudio solo tienes que responder a las preguntas que van a ir apareciendo en este link.

Agradecemos de antemano tu colaboración.

Grupo de Bioinformación, en cooperación con el Grupo de Salud Mental y el Grupo de Psicodermatología, del Instituto Aragonés de Ciencias de la Salud (IACS) y del Instituto de Investigación Sanitaria Aragón (IIS).

1. ¿Está de acuerdo en participar en el estudio?

- Sí
- No

Estudio de relaciones sociales (Sociotipo)

Datos personales

2. Sexo

- Hombre
- Mujer

3. Edad

4. Lugar de residencia

5. Estado civil

- Casado/a o Emparejado/a
- Soltero/a
- Separado/a o Divorciado/a
- Viudo/a

6. Convivencia

- Domicilio solo/a
- Domicilio con la pareja
- Domicilio con pareja e hijo/s
- Domicilio de familiares
- Domicilio con amigos
- Residencia
- Otros (especificar)

7. Nivel de estudios

- No sabe leer ni escribir
- No ha cursado estudios pero sabe leer y escribir
- Graduado escolar
- Estudios secundarios (BUP, bachillerato superior, COU, PREU, FP II)
- Estudios universitarios
- Otros (especificar)

8. Situación laboral

- Estudiante
- "Sus labores"
- Desempleado/a Con subsidio
- Desempleado/a Sin subsidio
- Empleado/a
- Empleado/a pero está de baja laboral
- Jubilado/a
- Incapacitado/a Invalidez permanente
- Otros (especificar)

9. Tipo de contrato en el lugar de trabajo (Solamente Empleados)

- Funcionario/a
- Contrato indefinido
- Contrato temporal de menos de 6 meses
- Contrato temporal de más de 6 meses
- Contrato temporal sin especificar duración (obra y servicio, o similar)
- Trabajador de una empresa de trabajo temporal (ETT)
- Trabaja sin contrato
- Trabaja por su cuenta (autónomos, empresarios, profesionales liberales)
- Otra relación contractual (especificar)

10. Nivel de ingresos

- < Salario Mínimo interprofesional (SMI-650 euros)
- 1-2 SMI
- 2-4 SMI
- > 4 SMI

Estudio de relaciones sociales (Sociotipo)

Cuestionario de relaciones sociales (SOCIOTIPO)

Le invitamos a que rellene este cuestionario con el fin de recoger datos sobre su estructura de relaciones personales e integración social. Básicamente queremos conocer con cuántas personas se relaciona usted y cuánto habla con ellas (en los distintos ámbitos: familiar, amistades, trabajo, conocidos), además de la satisfacción obtenida a través de dichas relaciones y sus distintas circunstancias.

Por favor, tómese el tiempo que necesite y responda abiertamente a cada una de las preguntas. Si le es difícil estimar alguna respuesta, sobre todo al intentar cuantificar los tiempos, tome como referencia la última semana, y ponga lo que le parezca más razonable.

Estudio de relaciones sociales (Sociotipo)

Relaciones con la familia

Indique la frecuencia con la que se dan las siguientes situaciones en sus relaciones familiares (pareja, familia nuclear y familia directa):

11. Habla y se relaciona con su familia

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

12. Su familia es importante para Vd.

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

13. Le cuesta entenderse con su familia

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

14. Los miembros de su familia se preocupan por Vd.

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

15. Tiene un compañero/a sentimental que le da apoyo

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

16. Se divierte y se ríe con su familia

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

17. Sabe afrontar los problemas y conflictos en su familia

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

18. Está satisfecho con el estatus y modo de vida de su familia

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

19. ¿Con cuántos familiares (pareja, familia nuclear y familia directa) mantiene un contacto regular ?

20. ¿Podría estimar cuánto tiempo habla en persona con ellos? Indique el total diario aproximado.

| | | | | | | |
|-------------|--------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 ó menos de 1/2 hora | alrededor de 1 hora | 2 horas | 3 horas | 4 horas | más de 4 horas |
| DIARIAMENTE | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

21. ¿Habla o se comunica con ellos también a través de otros medios (teléfono, whatsapp, internet, etc.)?

- Sí, utilizo otros medios
- No, nunca utilizo otros medios

22. Indique el tiempo total (en minutos) para los distintos medios de comunicación que utilice:

| | |
|----------------|----------------------|
| Teléfono (voz) | <input type="text"/> |
| Whatsapp | <input type="text"/> |
| Internet | <input type="text"/> |

Estudio de relaciones sociales (Sociotipo)

Relaciones con los amigos

Indique la frecuencia con la que se dan las siguientes situaciones en sus relaciones con las amistades (aquellas personas con las que tiene vínculos de afecto, intimidad, confianza, gustos compartidos, etc.):

23. Habla y se relaciona con los amigos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

24. Tiene amigos con los que contar y compartir problemas

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

25. Considera importante mantener las relaciones con sus amistades

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

26. Con las prisas y el estrés no encuentra tiempo para sus relaciones

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

27. Está abierto a establecer nuevas amistades

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

28. Sus amigos le consideran una persona habladora

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

29. Se divierte y se ríe con los amigos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

SOCIOTIPO Y POLÍTICAS ASISTENCIALES

30. Los amigos le han servido para situarse socialmente

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

31. ¿Podría estimar con cuántos amigos mantiene un contacto regular?

32. ¿Podría estimar cuánto tiempo habla en persona con ellos? Indique el total semanal aproximado.

| | | | | | | |
|--------------|--------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 ó menos de 1/2 hora | alrededor de 1 hora | 2 horas | 3 horas | 4 horas | más de 4 horas |
| SEMANALMENTE | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

33. ¿También habla o se comunica con ellos a través de otros medios (teléfono, whatsapp, internet, etc.)?

- Sí, utilizo otros medios
- No, nunca utilizo otros medios

34. Indique el tiempo semanal aproximado (en minutos) para los distintos medios de comunicación que utilice:

| | |
|----------------|----------------------|
| Teléfono (voz) | <input type="text"/> |
| Whatsapp | <input type="text"/> |
| Internet | <input type="text"/> |

Estudio de relaciones sociales (Sociotipo)

Relaciones en el estudio o en el trabajo

Indique la frecuencia con la que se dan las siguientes situaciones en sus relaciones de trabajo o en el estudio (en el caso de que no trabaje ni estudie, pero colabore regularmente con alguna asociación, grupo, ONG o similar, conteste también a estas preguntas):

35. Habla y se relaciona satisfactoriamente con los compañeros de trabajo o estudio

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

36. Tiene confianza personal en sus compañeros

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

37. Cuando habla con sus compañeros siente que le hacen caso

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

38. También se relaciona con ellos fuera del ámbito educativo/laboral

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

39. Sus actividades en el trabajo (o estudio) le resultan estimulantes

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

40. Se siente incómodo con el trabajo en equipo, lo prefiere individual

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

41. Se siente valorado profesionalmente por sus compañeros

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

SOCIOTIPO Y POLÍTICAS ASISTENCIALES

42. Está satisfecho con la posición que ha alcanzado, se corresponde con su auténtica valía

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

43. ¿Con cuántos compañeros de trabajo está en contacto regularmente?

44. ¿Cuánto tiempo habla en persona con ellos, en el trabajo? Indique el tiempo diario total aproximado.

| | | | | | | |
|-------------|--------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 ó menos de 1/2 hora | alrededor de 1 hora | 2 horas | 3 horas | 4 horas | más de 4 horas |
| DIARIAMENTE | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

45. ¿También habla o se comunica con ellos a través de otros medios (teléfono, whatsapp, internet, etc.)?

- Sí, utilizo otros medios
- No, nunca utilizo otros medios

46. Indique el tiempo diario (en minutos) para los distintos medios de comunicación que utilice:

| | |
|----------------|----------------------|
| Teléfono (voz) | <input type="text"/> |
| Whatsapp | <input type="text"/> |
| Internet | <input type="text"/> |

Estudio de relaciones sociales (Sociotipo)

Relaciones con los conocidos

Indique la frecuencia con la que se dan las siguientes situaciones en sus relaciones con conocidos (personas a las que conoce por su nombre, sabe sobre su vida y suele saludarlas; puede tener trato o comunicación con ellas, pero no llega a tener amistad; pueden ser vecinos, antiguos compañeros de trabajo, compañeros de asociaciones o clubs, de vacaciones, relaciones sólo por Internet, etc.):

47. Habla y se relaciona cómodamente con sus conocidos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

48. Le cuesta entablar conversación con gente que no conoce

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

49. Le es fácil pedir pequeños favores a sus conocidos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

50. Las relaciones con los conocidos le resultan forzadas

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

51. Prefiere hablar a escuchar al relacionarse con otros

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

52. Le gusta introducir el humor en las relaciones con los conocidos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

SOCIOTIPO Y POLÍTICAS ASISTENCIALES

53. Le preocupa dar una buena imagen ante los demás

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

54. Prefiere relacionarse con gente de su nivel social o más alto

| | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

55. ¿Podría estimar cuántos conocidos tiene? Indique un número

56. ¿Cuánto tiempo habla en persona con ellos? Indique el total semanal aproximado.

| | | | | | | |
|--------------|--------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | 0 ó menos de 1/2 hora | alrededor de 1 hora | 2 horas | 3 horas | 4 horas | más de 4 horas |
| SEMANALMENTE | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

57. ¿También habla o se comunica con ellos a través de otros medios (teléfono, whatsapp, internet, etc.)?

- Sí, utilizo otros medios
- No, nunca utilizo otros medios

58. Indique el tiempo semanal aproximado (en minutos) para los distintos medios de comunicación que utilice:

| | |
|----------------|----------------------|
| Teléfono (voz) | <input type="text"/> |
| Whatsapp | <input type="text"/> |
| Internet | <input type="text"/> |

Estudio de relaciones sociales (Sociotipo)

Otras relaciones sociales

Indique la frecuencia con la que se dan las siguientes situaciones en su vida social:

59. Asiste a actos sociales, culturales, deportivos o espectáculos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

60. Asiste a ceremonias y servicios religiosos

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

61. Colabora con algún grupo, ONG, asociación o club

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

62. Se dedica a alguna afición intelectual o hobby que le llene

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

63. Acostumbra a salir a cafeterías, restaurantes, bares, salas de fiesta, etc

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

64. En su tiempo libre lo que suele hacer es ver la TV

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

65. Le preocupa profundamente su situación económica actual

| NUNCA | RARA VEZ | A VECES | A MENUDO | CASI SIEMPRE | SIEMPRE |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

SOCIOTIPO Y POLÍTICAS ASISTENCIALES

66. En el caso de que tenga mascota ¿se siente vinculado emocionalmente a ella?

NUNCA RARA VEZ A VECES A MENUDO CASI SIEMPRE SIEMPRE

67. ¿Podía estimar cuantas veces ríe a lo largo del día, por ejemplo en el día de ayer?

- 0 veces
- entre 1-4
- entre 4-8
- entre 8-12
- 20 ó más

68. A continuación por favor, valore de 0 a 100 su grado de sociabilidad

69. Valore su satisfacción personal con las relaciones sociales de 0 a 100

Estudio de relaciones sociales (Sociotipo)

GHQ-12

Lea cuidadosamente estas preguntas y marque la opción con la que más identificado se sienta. Nos gustaría saber si usted ha tenido algunas molestias o trastornos y cómo ha estado de salud en las últimas semanas. Queremos saber los problemas recientes y actuales, no los del pasado.

70. ¿Ha podido concentrarse bien en lo que hace?

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------------|
| Mejor que lo habitual | Igual que lo habitual | Menos que lo habitual | Mucho menos que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

71. ¿Sus preocupaciones le han hecho perder mucho sueño?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

72. ¿Ha sentido que está desempeñando un papel útil en la vida?

| | | | |
|--------------------------|-----------------------|----------------------------|----------------------------------|
| Más útil que lo habitual | Igual que lo habitual | Menos útil que lo habitual | Mucho menos útil que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

73. ¿Se ha sentido capaz de tomar decisiones?

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------------|
| Más que lo habitual | Igual que lo habitual | Menos que lo habitual | Mucho menos que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

74. ¿Se ha notado constantemente agobiado y en tensión?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

75. ¿Ha tenido la sensación de que no puede superar sus dificultades?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

76. ¿Ha sido capaz de disfrutar sus actividades normales de cada día?

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------------|
| Más que lo habitual | Igual que lo habitual | Menos que lo habitual | Mucho menos que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

77. ¿Ha sido capaz de hacer frente a sus problemas?

| | | | |
|---------------------------|----------------------------|-----------------------------|-----------------------------------|
| Más capaz que lo habitual | Igual de capaz lo habitual | Menos capaz que lo habitual | Mucho menos capaz que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

78. ¿Se ha sentido poco feliz y deprimido?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

79. ¿Ha perdido confianza en sí mismo?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

80. ¿Ha pensado que usted es una persona que no vale para nada?

| | | | |
|-----------------------|------------------------|--------------------------|---------------------------|
| No, en absoluto | No más que lo habitual | Algo más que lo habitual | Mucho más que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

81. ¿Se siente razonablemente feliz considerando todas las circunstancias?

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------------|
| Más que lo habitual | Igual que lo habitual | Menos que lo habitual | Mucho menos que lo habitual |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Estudio de relaciones sociales (Sociotipo)

Test UCLA soledad

Por favor, conteste a las preguntas marcando la respuesta con la que más se identifique dada la situación planteada en cada pregunta.

82. Sintonizo (me llevo bien) con la gente que me rodea

A MENUDO A VECES RARA VEZ NUNCA

83. Me falta compañía

A MENUDO A VECES RARA VEZ NUNCA

84. No tengo a nadie con quien yo pueda contar

A MENUDO A VECES RARA VEZ NUNCA

85. Me siento solo/a

A MENUDO A VECES RARA VEZ NUNCA

86. Me siento parte de un grupo de amigos/as

A MENUDO A VECES RARA VEZ NUNCA

87. Tengo muchas cosas en común con la gente que me rodea

A MENUDO A VECES RARA VEZ NUNCA

88. No tengo confianza con nadie

A MENUDO A VECES RARA VEZ NUNCA

89. Mis intereses e ideas no son compartidos por las personas que me rodean

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

90. Soy una persona abierta (extrovertida)

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

91. Me siento cercano/a a algunas personas

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

92. Me siento excluido/a, olvidado/a por los demás

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

93. Mis relaciones sociales son superficiales

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

94. Pienso que realmente nadie me conoce bien

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

95. Me siento aislado/a de los demás

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

96. Puedo encontrar compañía cuando lo necesito

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

97. Hay personas que realmente me comprenden

| | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| AMENUDO | A VECES | RARA VEZ | NUNCA |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

98. Me siento infeliz de estar tan aislado/a

AMENUDO A VECES RARA VEZ NUNCA

99. La gente está a mi alrededor pero no siento que esté conmigo

AMENUDO A VECES RARA VEZ NUNCA

100. Hay personas con las que puedo charlar y comunicarme

AMENUDO A VECES RARA VEZ NUNCA

101. Hay personas a las que puedo recurrir

AMENUDO A VECES RARA VEZ NUNCA

Estudio de relaciones sociales (Sociotipo)

Cuestionario de Eysenck

Por favor, conteste cada pregunta marcando el Sí o el No que le siguen. No hay preguntas correctas o incorrectas, ni preguntas con trampa. Trabaje rápidamente y no piense demasiado en el significado exacto de las mismas.

102. ¿Realiza muchas actividades de tiempo libre?

- Sí
 No

103. ¿Se para a pensar las cosas antes de hacerlas?

- Sí
 No

104. ¿Su estado de ánimo sufre altibajos con frecuencia?

- Sí
 No

105. ¿Es una persona conversadora?

- Sí
 No

106. ¿Se siente a veces desdichado/a sin motivo?

- Sí
 No

107. ¿Daría dinero para fines caritativos?

- Sí
 No

108. ¿Alguna vez ha querido llevarse más de lo que correspondía en un reparto?

Sí

No

109. ¿Es usted una persona más bien animada o vital?

Sí

No

110. ¿Le afectaría mucho ver sufrir a un niño/a o a un animal?

Sí

No

111. ¿Se preocupa a menudo por cosas que no debería haber dicho o hecho?

Sí

No

112. Si usted asegura que hará una cosa, ¿siempre mantiene su promesa, sin importarle las molestias que ello podría ocasionar?

Sí

No

113. ¿Habitualmente, es capaz de liberarse y disfrutar en una fiesta animada?

Sí

No

114. ¿Es una persona irritable?

Sí

No

115. ¿Le tiene sin cuidado lo que piensen los demás?

Sí

No

116. ¿Alguna vez ha culpado a alguien por algo que había hecho usted?

- Sí
 No

117. ¿Se siente fácilmente herido/a en sus sentimientos?

- Sí
 No

118. ¿Son todos sus hábitos buenos y deseables?

- Sí
 No

119. ¿Tiende a mantenerse apartado/a en las situaciones sociales?

- Sí
 No

120. A menudo, ¿se siente harto/a?

- Sí
 No

121. ¿Ha cogido alguna vez alguna cosa (aunque no fuese más que un alfiler o un botón) que perteneciese a otra persona?

- Sí
 No

122. ¿Para usted, los límites entre lo que está bien y lo que está mal son menos claros que para la mayoría de la gente?

- Sí
 No

123. ¿Le gusta salir a menudo?

- Sí
 No

124. ¿Es mejor actuar como uno/a quiera que seguir las normas sociales?

Sí

No

125. ¿Disfruta hiriendo a las personas que ama?

Sí

No

126. ¿Tiene a menudo sentimientos de culpabilidad?

Sí

No

127. ¿Habla a veces de cosas de las que no sabe nada?

Sí

No

128. ¿Prefiere leer a conocer gente?

Sí

No

129. ¿Diría de sí mismo/a que es una persona nerviosa?

Sí

No

130. ¿Tiene muchos amigos/as?

Sí

No

131. ¿Se ha enfrentado constantemente a sus padres?

Sí

No

132. ¿Es usted una persona sufridora?

- Sí
 No

133. Cuando era niño/a, ¿hacía en seguida las cosas que le pedían y sin refunfuñar?

- Sí
 No

134. ¿Se ha opuesto frecuentemente a los deseos de sus padres?

- Sí
 No

135. ¿Se inquieta por cosas terribles que podrían suceder?

- Sí
 No

136. ¿Alguna vez ha roto o perdido algo que perteneciese a otra persona?

- Sí
 No

137. ¿Generalmente toma la iniciativa al hacer nuevas amistades?

- Sí
 No

138. ¿Los deseos personales están por encima de las normas sociales?

- Sí
 No

139. ¿Diría de sí mismo/a que es una persona tensa o muy nerviosa?

- Sí
 No

140. Por lo general, ¿suele estar callado/a cuando está con otras personas?

- Sí
 No

141. ¿Cree que el matrimonio está anticuado y debería abolirse?

- Sí
 No

142. ¿Es usted más indulgente que la mayoría de las personas acerca del bien y del mal?

- Sí
 No

143. ¿Puede animar fácilmente una fiesta aburrida?

- Sí
 No

144. ¿Se siente intranquilo/a por su salud?

- Sí
 No

145. ¿Alguna vez ha dicho algo malo o desagradable acerca de otra persona?

- Sí
 No

146. ¿Le gusta cooperar con los demás?

- Sí
 No

147. ¿Le gusta contar chistes e historias divertidas a sus amigos/as?

- Sí
 No

148. ¿La mayoría de las cosas le son indiferentes?

- Sí
 No

149. De niño/a, ¿fue alguna vez descarado/a con sus padres?

- Sí
 No

150. ¿Le gusta mezclarse con la gente?

- Sí
 No

151. ¿Se preocupa si sabe que hay errores en su trabajo?

- Sí
 No

152. ¿Se lava siempre las manos antes de comer?

- Sí
 No

153. ¿Casi siempre tiene una respuesta "a punto" cuando le hablan?

- Sí
 No

154. ¿Se siente a menudo apático/a y cansado/a sin motivo?

- Sí
 No

155. ¿Ha hecho alguna vez trampas en el juego?

- Sí
 No

156. ¿Le gusta hacer cosas en las que tiene que actuar rápidamente?

Sí

No

157. ¿Es (o era) su madre una buena mujer?

Sí

No

158. ¿A menudo toma decisiones sin pararse a reflexionar?

Sí

No

159. ¿A menudo siente que la vida es muy monótona?

Sí

No

160. ¿Alguna vez se ha aprovechado de alguien?

Sí

No

161. ¿Le preocupa mucho su aspecto?

Sí

No

162. ¿cree que la gente pierde el tiempo al proteger su futuro con ahorros y seguros?

Sí

No

163. ¿Alguna vez ha deseado morirse?

Sí

No

164. ¿Evadiría impuestos si estuviera seguro/a de que nunca sería descubierto/a?

Sí

No

165. ¿Puede organizar y conducir una fiesta?

Sí

No

166. ¿Trata de no ser grosero/a con la gente?

Sí

No

167. Después de una experiencia embarazosa, ¿se siente preocupado/a durante mucho tiempo?

Sí

No

168. Generalmente, ¿reflexiona antes de actuar?

Sí

No

169. ¿Sufre de los "nervios"?

Sí

No

170. ¿A menudo se siente solo/a?

Sí

No

171. ¿Hace siempre lo que predica?

Sí

No

172. ¿Se siente fácilmente herido/a cuando la gente encuentra defectos en usted o en su trabajo?

- Sí
 No

173. ¿Es mejor seguir las normas de la sociedad que ir a su aire?

- Sí
 No

174. ¿Alguna vez ha llegado tarde a una cita o trabajo?

- Sí
 No

175. ¿Le gusta el bullicio y la agitación a su alrededor?

- Sí
 No

176. ¿Frecuentemente improvisa decisiones en función de la situación?

- Sí
 No

177. ¿Se siente a veces desbordante de energía y otras muy decaído/a?

- Sí
 No

178. ¿A veces se deja para mañana lo que debería hacer hoy?

- Sí
 No

179. ¿La gente piensa que es usted una persona animada?

- Sí
 No

180. ¿La gente le cuenta muchas mentiras?

- Sí
 No

181. ¿Se afecta fácilmente por según qué cosas?

- Sí
 No

182. Cuando ha cometido una equivocación, ¿está siempre dispuesto a admitirlo?

- Sí
 No

183. Cuando tiene mal humor, ¿le cuesta controlarse?

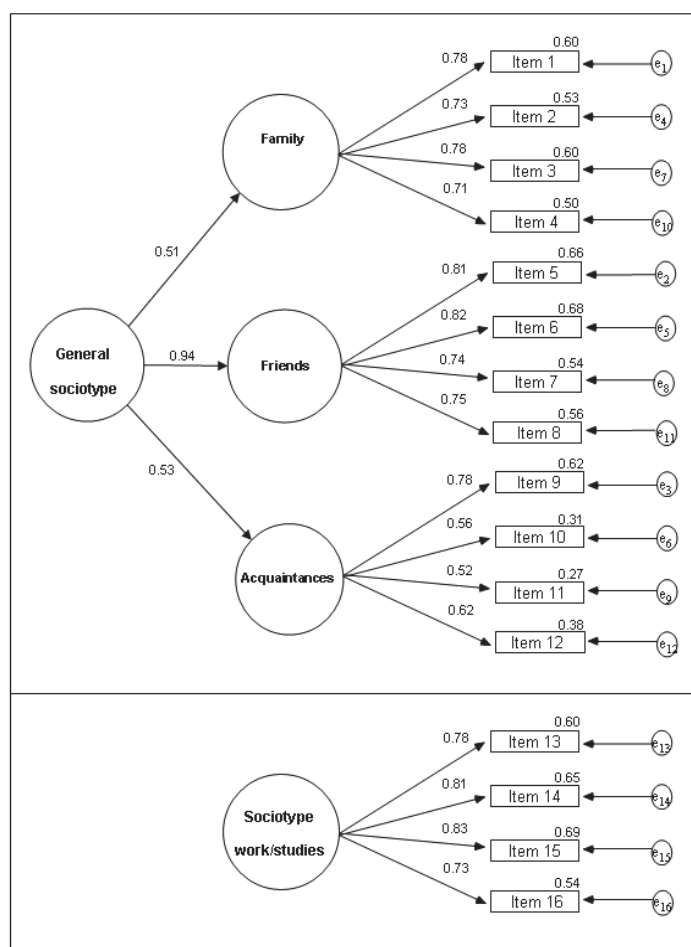
- Sí
 No

184. ¿Cree que los planes de seguros son una buena idea?

- Sí
 No

Se aporta también, un gráfico del *análisis factorial* donde se representan las correlaciones entre las variables observadas en términos de factores (número menor de variables no observadas).

Figure 1: Analytical perspective of the SOCQ by using Confirmatory Factor Analysis*



*SOCQ measurement model and standardized estimations from sub-sample 2 (general sociotype $n=537$; sociotype at work/studies $n=328$). The circles represent latent constructs and the rectangles are observable variables. The factor weightings (λ) are over the one-way arrows, the percentage of explained variance for each observable variable (R^2) over the boxes.

ANEXO 3.

CUESTIONARIO SOCQ (ESPAÑOL)

Como último anexo se incluye la versión española del cuestionario final de Sociotipo.

Versión Española del "Cuestionario de Sociotipo" (SOCQ)

(Población general)

La siguiente serie de preguntas sirve para evaluar las relaciones con su familia, amigos, conocidos y compañeros de trabajo/estudio. Lea detenidamente cada pregunta y marque con una X la opción que mejor representa cómo se siente, qué hace y qué piensa acerca de sus relaciones sociales. No hay respuestas correctas o incorrectas. En cualquier caso, por favor NO DEJE NINGUNA PREGUNTA SIN CONTESTAR.

| | Nunca | Casi nunca | A veces | A menudo | Casi siempre | Siempre |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. Habla y se relaciona con su familia | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. Su familia es importante para Vd. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. Los miembros de su familia se preocupan por Vd. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. Se divierte y se ríe con su familia | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. Habla y se relaciona con los amigos | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. Tiene amigos con los que contar y compartir problemas | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. Considera importante mantener las relaciones con sus amistades | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. Se divierte y se ríe con los amigos | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. Habla y se relaciona cómodamente con sus conocidos | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10.* Le cuesta entablar conversación con gente que no conoce | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. Le es fácil conseguir el apoyo de sus conocidos | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12.* Las relaciones con los conocidos le resultan forzadas | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. Habla y se relaciona satisfactoriamente con los compañeros | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. Tiene confianza personal en sus compañeros | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 15. Cuando habla con sus compañeros siente que le hacen caso | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 16. Se siente valorado profesionalmente por sus compañeros | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Puntuación

Las respuestas se puntúan de 0 (nunca) a 5 (siempre) para todos los items, excepto el nº 10 y el 12 (*) que tienen una puntuación inversa de 5 (nunca) a 0 (siempre). El cuestionario general (SOCQ) cubre todos los items y está compuesto por 4 subescalas: 'familia' (items 1 a 4), 'amigos' (items 5 a 8), 'conocidos' (items 9 a 12) y colegas de 'trabajo/estudio' (items 13 a 16).

IV.

APÉNDICE

INFORMACIÓN ÚTIL DE LAS PUBLICACIONES QUE SE RECOGEN EN LA TESIS

- del Moral R*, Navarro J, Marijuán PC. The “Sociotype” Approach to Social Structures and Individual Communication: An Informational Exploration of Human Sociality. *Information Studies and the Quest for Transdisciplinarity. Unity in Diversity. World Scientific Series in Information Studies: Volume 9.* Edited by: Mark Burgin (UCLA), Wolfgang Hofkirchner (Vienna University of Technology, Austria). 2017, pp. 387-412.

https://doi.org/10.1142/9789813109001_0014

Indice Scholarly Publishers Indicators (ICEE): 0.324

Orden en el Ranking SPI (2014): 186 de 258

- Navarro J, del Moral R, Marijuán PC*. Laughing bonds: a multidisciplinary inquiry into the social information processes of human laughter. *Kybernetes* 2016, 45:8.

Factor de impacto JCR: 0.811

Factor de impacto-5 años: 0.664

Área temática: Computer Science, Cybernetics

Cuartil: Q4

- Marijuán PC*, Montero-Marín J, Navarro J, García-Campayo J, del Moral R*. The “sociotype” construct: Gauging the structure

and dynamics of human sociality. PLoS ONE 2017, 12(12): e0189568.

<https://doi.org/10.1371/journal.pone.0189568>

Factor de impacto JCR: 2.81

Factor de impacto-5 años: 3.394

Área temática: Multidisciplinary Sciences

Cuartil: Q1

- Marron SE, del Moral R, Navarro J, Lamas S, Marijuán PC, Tomas-Aragones L*. The Sociotype in Dermatology. Journal of the European Academy of Dermatology and Venereology 2017, Nov 14. doi: 10.1111/jdv.14696

Factor de impacto JCR: 3.528

Factor de impacto-5 años: 3.263

Área temática: Dermatology

Cuartil: Q1

