

Relevancia de las Funciones Ejecutivas, el *Effortful Control* y la Empatía en el Desempeño Social y Académico de Adolescentes

TESIS DOCTORAL

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A Delfi y Cata

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RESUMEN

La autorregulación del pensamiento, las emociones y la conducta define en gran medida el desempeño escolar de los niños y adolescentes. Entre los diferentes componentes y procesos que involucra la autorregulación, las funciones ejecutivas (FEs) y el *effortful control* (EC) tienen un protagonismo especial en el éxito escolar de los alumnos. Su amplia influencia se debe a que participan en procesos cognitivos de orden superior, como el razonamiento y la toma de decisiones, al mismo tiempo que se movilizan en situaciones interpersonales. Es decir, son requeridos tanto para la resolución de demandas académicas, como para lograr una convivencia pacífica entre compañeros y profesores.

El objetivo de esta Tesis fue profundizar en el conocimiento de las vías de influencia de los procesos de control cognitivo y la empatía sobre el desempeño social y académico. Se estudia la relación de las FEs y el EC con la empatía, y cómo esta relación repercute en el comportamiento social de los alumnos. Además, se avanza en la creación de un modelo predictivo que incorpora las competencias sociales y la integración en el grupo de pares como una de las variables que median la relación entre los procesos de control cognitivo y el rendimiento académico.

Se describen cinco estudios con muestras independientes de alumnos entre 12-14 años, y en uno de ellos también se incorporaron edades inferiores, entre 8 y 11 años de edad. Las FEs se evaluaron mediante pruebas complejas y clásicas (*Trail Making Test*, *Stroop Test*, *Fluidez Verbal*), mientras que el EC se evaluó mediante un autoinforme (EATQ-R; Ellis y Rothbarth, 2001). Del mismo modo, para evaluar la empatía se utilizó la adaptación al castellano (Mestre Escrivá, Navarro, & García, 2004) del *Interpersonal Reactivity Index* (IRI; Davis, 1983). El comportamiento social fue valorado mediante técnicas sociométricas que proporcionaron información sobre las conductas prosociales del alumnado y nominaciones según criterios de aceptación o rechazo, lo cual permitió calcular la preferencia social y el estatus social de los alumnos. Además, en dos estudios, se recabó la valoración del profesorado sobre las competencias sociales de los alumnos (*Escala de Valoración del Profesorado I-S*; Carrión, Hernández, & Gregorio, 1999), y en uno se utilizó una medida sobre la percepción que los estudiantes poseen sobre el clima escolar (Cuestionario del Clima Social en el Centro Escolar; Trianes et al., 2006). Las puntuaciones de desempeño académico se obtuvieron calculando la media de las calificaciones de cada alumno, y en dos de los estudios se combinó esta medida con juicios del profesorado (*Escala de Valoración del Profesorado I-S*; Carrión et al., 1999).

En los diferentes estudios se utilizaron aproximaciones multivariadas con el fin de progresar hacia un modelo predictivo del desempeño escolar en adolescentes. En la primera serie, comprobamos la influencia de las FEs y el EC sobre el rendimiento académico. Los modelos de regresiones y

ecuaciones estructurales confirman que, tanto para alumnas como para alumnos, el rendimiento fue parcialmente explicado por algunas de las medidas complejas de FEs y, en todos los casos, por el EC autoinformado. En segundo lugar, los resultados indican que los estudiantes con mejores recursos de control poseen mayores niveles de empatía disposicional. Además, en los alumnos de secundaria, sus niveles de control cognitivo favorecían conductas prosociales y la aceptación de los compañeros. Parte de esta relación se debía a los beneficios que la autorregulación genera en las relaciones sociales, y parte a la mediación de la empatía.

En una segunda serie de estudios, nos centramos en valorar si las medidas de control cognitivo, empatía y rendimiento académico influían en la percepción que tienen los adolescentes del clima social de los centros escolares y en su estatus social. En uno de los estudios, el análisis de ecuaciones estructurales comprobó que EC y la empatía disposicional facilitan la percepción de un clima escolar positivo, y que esta influencia es más relevante que la generada por el rendimiento académico y las relaciones con los compañeros. En el segundo estudio de esta serie, se combinaron las medidas sociométricas de prosocialidad y preferencia social para conformar grupos de estatus social (*populares-prosociales*, *rechazados-noprosociales*, *controvertidos*, *ignorados* y *promedios*). Los resultados resaltaron el rol de la empatía y el control cognitivo en la conformación de los grupos. Los alumnos *populares-prosociales* obtuvieron los niveles más elevados de preocupación empática, mientras los pertenecientes al grupo de *rechazados-noprosociales* tienen los más bajos. Por otro lado, los alumnos *controvertidos* (con similares nominaciones de aceptación y rechazo) se caracterizaron por obtener los niveles más elevados de impulsividad.

En el último estudio de esta Tesis, se puso a prueba un modelo del rendimiento académico que integraba una vía directa de influencia de las FEs y EC sobre el rendimiento, y otra mediada por la empatía y el comportamiento social. El modelo, que se ajustó a los datos y predijo el 67 % de la varianza del rendimiento académico, sugiere que el control cognitivo se relaciona con el rendimiento académico por una vía directa y otra mediada por el comportamiento social. Nuestros resultados demostraron el fuerte poder predictivo que las relaciones entre iguales poseen sobre el rendimiento académico, y apoyan las propuestas que destacan el valor de las relaciones sociales en la predicción del desempeño escolar.

En el capítulo final, discutimos los resultados incorporando diferentes perspectivas teóricas que sugieren la necesidad de integrar los procesos de control cognitivo, las emociones y las relaciones sociales, con el fin de lograr una comprensión del rendimiento escolar que se ajuste a la realidad compleja que viven los niños y adolescentes en los centros escolares.

Capítulo 1

Introducción

Cualquier sistema educativo de los países occidentales pretende alcanzar numerosos y exigentes objetivos que, básicamente, intentan facilitar el desarrollo y la maduración personal de los niños y jóvenes en un mundo complejo, así como su socialización y culturalización. Alcanzar estos retos nunca ha resultado una tarea fácil. En los momentos actuales, por ejemplo, nuestro sistema educativo debe hacer frente a la disrupción, especialmente en la Enseñanza Secundaria Obligatoria (ESO), a la falta de creatividad o al fracaso escolar (Díaz-Aguado Jalón, Martín Babarro, & Martínez Arias, 2010; PISA, 2012). Conocer los factores que pueden explicar estos fenómenos y ayudar a desarrollar estrategias de intervención para superarlos es un compromiso importante para los investigadores interesados en la intervención educativa.

Desde hace algunos años, numerosos estudios (Blair & Diamond, 2008; Liew, 2011; Rueda, Checa, & Rothbart, 2010) han propuesto que los procesos de control comportamental y cognitivos predicen en gran medida el desarrollo personal y los resultados escolares de niños y adolescentes. En los niveles educativos iniciales, los niños con mejores recursos de control tienen ventajas sobre aquellos que son más impulsivos e incapaces de postergar sus necesidades y comprender que hay otras personas con intereses y deseos que deben ser respetados (Blair & Diamond, 2008). En etapas superiores, además de lo anterior, los niños con mejores recursos cognitivos para ejercer control sobre sus estrategias de aprendizaje y sobre las demandas de razonamientos complejos, tienen ventajas sobre los que no logran autorregular su aprendizaje y fracasan en respetar las normas y rutinas escolares (Eisenberg, Valiente, & Eggum, 2010). Del mismo modo, al finalizar la primaria y comenzar la secundaria, el papel decisivo que adquiere el grupo de pares para el desarrollo emocional y social aumenta las exigencias sobre las estrategias de regulación emocional utilizadas para la comprensión y cooperación con los demás (Shulman et al., 2015). En este sentido, la capacidad de dirigir el

pensamiento, las emociones y el comportamiento en relación a las metas escolares ocupa un lugar central en la adaptación y el éxito en las escuelas, pues a lo largo del trayecto educativo casi todo el currículo va dirigido a ello. La escolarización demanda recursos de control y autorregulación de modo continuado para afrontar los retos académicos y sociales presentes en las escuelas.

Entre los diferentes componentes y procesos que involucra la autorregulación (Hofmann, Schmeichel, & Baddeley, 2012; Sokol & Müller, 2007), numerosos investigadores consideran que el desarrollo de las Funciones Ejecutivas y ciertas predisposiciones temperamentales, como el *Effortful Control*, tienen un protagonismo especial en el desempeño escolar de los estudiantes (Eisenberg, Valiente, et al., 2010; Liew, 2011). Sin embargo, la mayoría de las investigaciones han considerado estos componentes de forma separada. Además, las investigaciones realizadas en instituciones educativas en pocos casos vinculan los procesos de control cognitivo con los socioemocionales. Esta fragmentación también se observa en la evaluación del desempeño escolar. En la mayoría de los casos, el rendimiento académico se ha investigado con independencia de las competencias sociales y las relaciones interpersonales de los estudiantes.

El objetivo de este trabajo es avanzar en la comprensión de las relaciones entre los recursos de control y autorregulación, por un lado, y el rendimiento académico y el comportamiento social de estudiantes preadolescentes, por otro. Entendemos que para comprender el desempeño escolar es tan importante poder predecir el rendimiento académico como las relaciones interpersonales que acontecen en el centro educativo. Además, creemos que el desarrollo de la empatía también tiene especial relevancia en este marco de relaciones. De alguna manera, ésta ubica los recursos de control a un marco

interpersonal. A continuación, delimitamos conceptualmente los tres constructos fundamentales que están presentes en las investigaciones incluidas en la Tesis: Funciones Ejecutivas, *Effortful Control* y Empatía.

1. Funciones Ejecutivas

Con frecuencia se utiliza el término de Funciones Ejecutivas (FEs) para caracterizar un conjunto de funciones y/o procesos que ejercen control cognitivo o comportamental para facilitar la adaptación al entorno y el logro de objetivos (Best, Miller, & Jones, 2009). Suele aceptarse que abarcan una serie de procesos *top-down* activados ante acciones que demandan control (Marino, Jaldo, Luna, Zorza, & Torres, 2015; Miller & Cohen, 2001) y que organizan temporalmente la conducta (Fuster, 2001). El control cognitivo se requiere, por ejemplo, cuando los procesos automáticos son insuficientes para dar respuestas a los estímulos del entorno o cuando las señales afectivas alertan de una discrepancia entre lo esperado de una acción y lo que acontece. En estas situaciones, donde la persona se aleja de sus objetivos, se producen conflictos y/o señales de alerta, y se debe procesar nueva información para ajustar el curso de acción a los requerimientos actuales del entorno y a los objetivos prefijados. Las FEs generan un “espacio cognitivo” que pone a disposición de la toma de decisiones una serie de funciones cognitivas básicas de manera coordinada y flexible (Marino et al., 2015). Según el modelo de “cascadas” (Koechlin & Summerfield, 2007), esta coordinación de control es estratificada se ejerce sobre capas de información motora, contextual, episódica y de señales previas que gradualmente se distancian en el tiempo.

En el ámbito escolar, constantemente se exige a los alumnos que pongan en juego sus FEs. Por ejemplo, son un requisito cuando un alumno debe realizar una tarea escolar (meta) y no cuenta con una respuesta (aprendida, automática, o de control sensoriomotor) que le permita resolver eficazmente las actividades propuestas. En este caso se activan procesos de control cognitivo sobre la información presente en el contexto de la clase, la de episodios previos, sobre las instrucciones actuales de las maestras o maestros, etc., con el fin de diseñar

estrategias para resolver el problema planteado. De esta manera, las FEs generan “espacios cognitivos” que integran la información en el tiempo y dirigen los recursos atencionales, de la memoria y del lenguaje hacia la consecución de la meta. El alumno debe ejercer cierto control voluntario sobre sus estados afectivos y comportamiento, decidir de forma acertada, incorporar algunos elementos de planificación estratégica, aunque sean implícitos, y apoyarse en el monitoreo de la propia acción (Best et al., 2009).

Numerosos teóricos asumen que, para lograr control cognitivo, las FEs se organizan de manera supraordinal en relación al resto de capacidades cognitivas básicas (Lezak, 1995). Esta suposición es consistente con la organización jerárquica de la corteza cerebral humana, donde existe un área de integración localizada en la zona prefrontal que recibe aferencias multimodales del resto del sistema nervioso y envía información de control sobre zonas posteriores y subcorticales (Fuster, 2001; Marino, 2010). También lo es con quienes consideran el funcionamiento cerebral en modo de redes neuronales. Las FEs se sostienen en las conexiones de la corteza prefrontal (CPF) que activan y/o inhiben zonas corticales posteriores y estructuras subcorticales, permitiendo el control de la información, su mantenimiento en la memoria de trabajo y su recuperación según su relevancia en relación a una meta (Olson & Luciana, 2008; Shimamura, 2000).

Desde una perspectiva psicológica, se han desarrollado distintos modelos conceptuales donde se las consideran como un constructo unitario o como un conjunto de procesos independientes (Chan, Shum, Touloupoulou, & Chen, 2008; Tirapu-Ustárrroz, García-Molina, Luna-Lario, Roig-Rovira, & Pelegrín-Valero, 2008). Miyake et al. (2000) integró estas visiones opuestas, sugiriendo que las FEs comprenden unidad y diversidad. En su propuesta, **la inhibición** (control inhibitorio, incluyendo el auto-control y el control de las interferencias),

la memoria de trabajo (MT) y **la flexibilidad cognitiva** son FEs básicas e independientes (Best et al., 2009; Miyake et al., 2000). Cada una de estas funciones tiene su independencia (diversidad), aunque se relacionan entre sí debido a alguna funcionalidad subyacente común (unidad), posiblemente referida a la activación de la información relativa a la meta y su utilización para controlar efectivamente procesamientos de nivel inferior (Miyake & Friedman, 2012). Esta propuesta de unidad y diversidad, ha encontrado apoyo empírico en diferentes momentos del desarrollo, incluyendo la edad preescolar, la preadolescencia y la edad adulta (Best, Miller, & Naglieri, 2011). Por ejemplo, los análisis factoriales utilizados en alguno de estos estudios en la infancia y la adolescencia (Best et al., 2009) demuestran que los valores de diferentes medidas de un componente particular (por ejemplo, la inhibición) conforman una variable latente, mientras que los valores de medidas de distintos componentes (por ejemplo, inhibición y flexibilidad cognitiva), si bien se relacionan, no se agrupan en la misma variable latente. En síntesis, a diferentes edades los resultados apoyan la propuesta de que los componentes comparten cierta funcionalidad subyacente al mismo tiempo que se diferencian.

1.1 Control Inhibitorio, memoria de trabajo y flexibilidad cognitiva

Planteamientos semejantes a los de Miyake y Friedman (2012) sugieren que el control inhibitorio, la memoria de trabajo y la flexibilidad cognitiva se pueden considerar como FEs centrales sobre las que se construyen procesos ejecutivos de orden superior como el razonamiento y la toma de decisiones (Diamond, 2013). Dentro de las FEs centrales (ver Figura 1), el **control inhibitorio** es uno de los componentes fundamentales, aunque no parece un proceso uniforme. Nigg (2000) afirma que se refiere a la capacidad de suprimir una respuesta dominante, automática o prepotente, pero también al control de la interferencia. Diamond

(2013) sugiere que el control inhibitorio abarca el control de la atención y el autocontrol. El primero puede ejercerse sobre la percepción o sobre las representaciones mentales (inhibición cognitiva). A nivel perceptivo, las FEs serían responsables del control atencional (*top-down*) orientado a objetivos y de carácter voluntario, procesos asignados también a la red de atención ejecutiva del modelo de Posner (Posner, Sheese, Odludaş, & Tang, 2006). En el nivel representacional, la inhibición regularía representaciones prepotentes, donde se trataría de resistir a los pensamientos o recuerdos extraños o no deseados (Anderson & Levy, 2009). Por otro lado, el autocontrol está más centrado en el comportamiento y las propias emociones. Se relaciona con la resistencia a las tentaciones (demora en la gratificación) y la baja impulsividad (Hofmann et al., 2012). Estaría implicado en la persistencia en una tarea a pesar de las distracciones y las tentaciones para pasar a otra actividad más interesante o placentera. Si bien estas formas de inhibición parecen dispares, pueden movilizarse de forma simultánea, por ejemplo, cuando se requiere sostener la atención y regular las emociones a fin de adaptar la conducta al contexto o conseguir los objetivos propuestos. Esta perspectiva amplia sobre el control inhibitorio también parece estar presente en el constructo *Effortful Control*, del que nos ocupamos posteriormente.

La **memoria de trabajo (MT)** es otra de las FEs básicas. Se refiere a la capacidad de mantener y manipular la información en la mente, sea de tipo verbal o espacial (Baddeley, 2000). En general, la MT es fundamental para dar sentido a toda actividad que se despliega en el tiempo, permitiendo la relación entre la información almacenada en el pasado con los requisitos presentes de una tarea. De esta manera, es fundamental para comprender o dar sentido al lenguaje, ya sea hablado o escrito, resolver un problema matemático o realizar razonamientos abstractos y complejos. En el ámbito escolar, por ejemplo, la MT permite a los alumnos integrar el conocimiento actual con el adquirido previamente, resolver un problema

o tomar decisiones no impulsivas. Si bien la MT puede depender de procesos de inhibición, como por ejemplo cuando es necesario atenuar las interferencias para retener la información en la mente, alcanza su mayor relevancia en la manipulación de la información (Diamond, 2013; Miyake & Friedman, 2012).

Por último, el tercer componente básico es la **flexibilidad cognitiva**, que se apoya tanto en el control inhibitorio como en la memoria de trabajo y tiene un desarrollo evolutivo más tardío (Best et al., 2009; Best et al., 2011). Se refiere a la capacidad de cambiar o “desplazarse” entre estados mentales, operaciones o tareas. Permite cambiar entre perspectivas espaciales, entre categorías semánticas (Whitney, Kirk, O'Sullivan, Ralph, & Jefferies, 2010), o entre la perspectiva de una visión personal a la de otro individuo (Singer, 2009). En todos estos casos, se requiere inhibir o desactivar nuestra perspectiva anterior y cargar en la MT una diferente. La flexibilidad cognitiva requiere en alguna medida del control inhibitorio y la MT (Diamond, 2013).

Como presentamos en la Figura 1, los tres componentes descritos sustentarían las FEs de orden superior como el razonamiento, la toma de decisiones y la planificación (Collins & Koechlin, 2012; Diamond, 2013). El control inhibitorio, la MT y, en mayor medida, la flexibilidad cognitiva, facilitan la toma de decisiones que requiere la adaptación a contextos cambiantes e inciertos donde se demanda la creación y el monitoreo de nuevas estrategias de comportamiento, cuando las estrategias en curso y los hábitos puestos en acción son pocos eficaces en la resolución de un problema (Collins & Koechlin 2012). Retomando el ejemplo del apartado anterior, un alumno que debe resolver una tarea novedosa inicia un proceso de control que comienza con la inhibición de acciones ineficaces, regula sus emociones e inhibe respuestas prepotentes. Este control, facilita la actualización de información relevante en la

memoria que se combina con nuevos conceptos impartidos posiblemente por su maestra, toma diferentes caminos para resolver su problema y de manera flexible cambia de estrategias en relación a la información previa y contextual. En este sentido, las FEs se relacionan con la creatividad de un alumno pues ayudan a suspender patrones convencionales de pensamiento y actuación, e integrar conocimientos previos en nuevas configuraciones conceptuales de orden superior o pensamientos abstractos. Esta capacidad de razonar, resolver problemas y ver patrones de relaciones entre los elementos también se ha definido como inteligencia fluida. No es de extrañar, entonces, que las medidas de inteligencia fluida estén altamente correlacionadas con las FEs (Duncan et al., 2008; Roca et al., 2009).

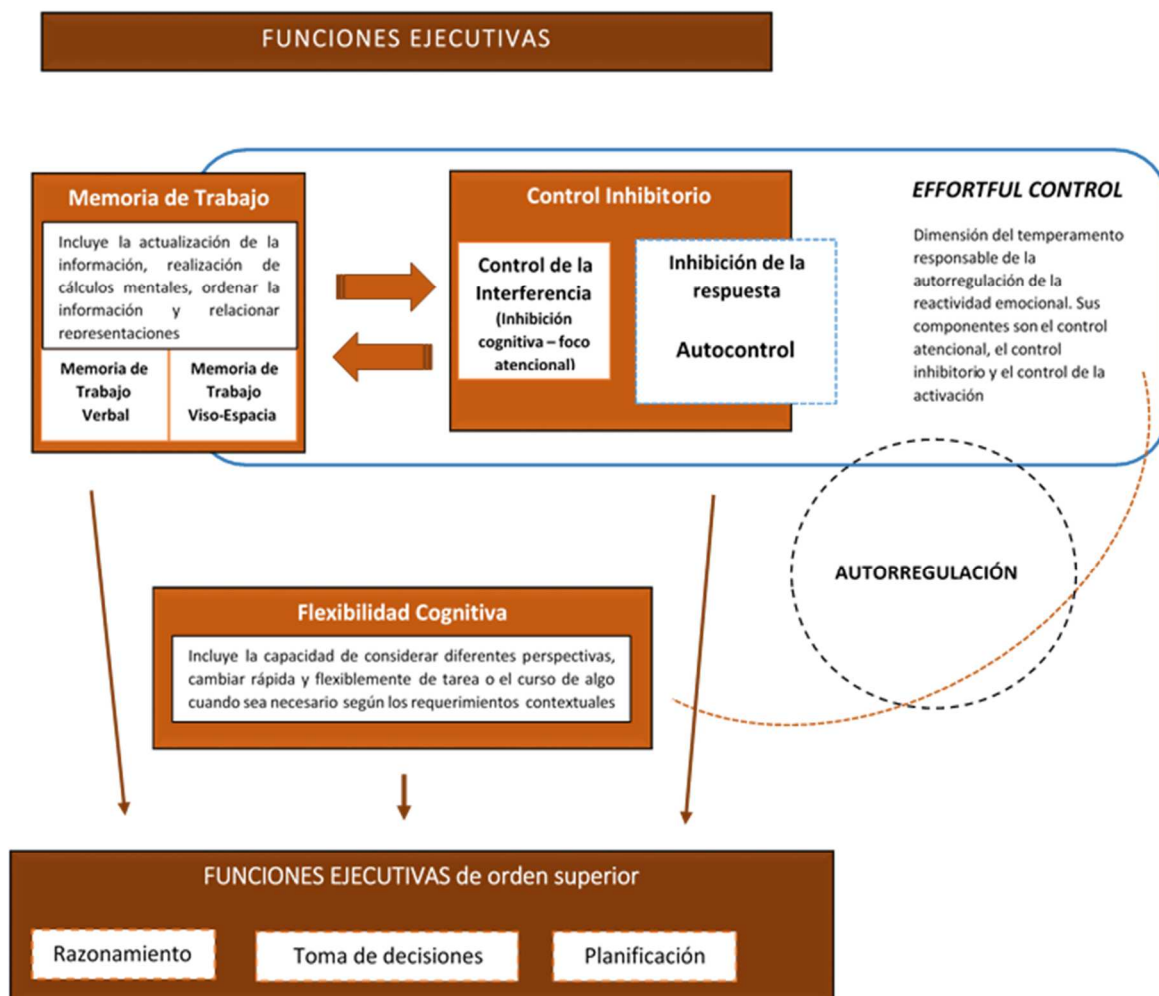


Figura 1. Adaptación de Diamond (2013). Relación de las FEs básicas con las de orden superior y su vinculación con el *Effortful Control*.

1.2 Evaluación de las FEs en el ámbito escolar

Es difícil evaluar un componente de las FEs con independencia de los restantes. No se puede establecer una relación unívoca entre una función ejecutiva particular y una tarea determinada. Los resultados de diferentes estudios sobre validez de constructos indican que, en general, hay que considerar los instrumentos de evaluación de las FEs como “impuros” (Marino, 2010; Miyake et al., 2000), debido a que comparten la participación de varias operaciones ejecutivas y cognitivas de forma simultánea, aunque destaque una de ellas como predominante. El uso de las FEs está integrado en el contexto de una tarea determinada (las FEs operan sobre información específica), por lo que su evaluación necesariamente incluye varianza sistemática atribuible a procesos no ejecutivos asociados a ese contexto específico (Miyake & Friedman, 2012). Por ejemplo, cuando se evalúan con la tarea *Stroop*, la información sobre procesos de control inhibitorio está unida a la habilidad de lectura.

Algunos investigadores han distinguido entre tareas simples, que demandan en mayor medida un componente específico de las FEs, o complejas, que implican la coordinación de varios componentes (Best et al., 2011; Miyake & Friedman, 2012). Esto significa que mientras una tarea simple de memoria de trabajo sólo exige mantener la información para evocarla, una compleja como el *Trail Making Test* requiere mantener de modo continuado la información de la demanda, del registro de ejecución, así como la flexibilidad para alternar entre una serie ascendente de números y un conjunto de letras en orden alfabético.

La evaluación de las FEs mediante tareas complejas es una alternativa eficaz para comprender cómo se relaciona el control cognitivo con el comportamiento y el rendimiento escolar (Best et al., 2011). Tanto los dominios académicos (por ejemplo, lengua y matemáticas) como los sociales (por ejemplo, la resolución de conflictos interpersonales)

requieren habilidades complejas, sustentadas en la coordinación de varios componentes de las FEs y no en un solo aislado. En este sentido, si el interés es poder comprender la relación de las FEs con el desempeño escolar (académico y social), una estrategia adecuada sería seleccionar un conjunto de tareas complejas que evalúen la coordinación de las FEs básicas de control inhibitorio, memoria de trabajo y flexibilidad cognitiva (Best, et al., 2011). Deberían ser tareas que mantienen cierta relación funcional con el rendimiento del alumno (Burin, Harris, Burin, Drake, & Harris, 2007).

Por otro lado, también se han hecho recomendaciones sobre la expresión ecológica de las tareas de FEs (Marino, 2010). En algunos estudios no se ha encontrado una relación entre un rendimiento deficiente en pruebas de FEs y dificultades en la vida cotidiana, lo cual ha sido atribuido a la especificidad procesual de las tareas utilizadas (Chan et al., 2008; Semenova, 2005). Es posible que las tareas clásicas, de “primera generación” (Gruber & Goschke, 2004), utilizadas para evaluar las FEs permitan captar la complejidad del procesamiento ejecutivo con mayor validez ecológica. Además, son de aplicación fácil, económica y rápida; ideales para la administración en el ámbito escolar.

La tarea *Stroop*, el *Trail Making Test (TMT)* y las pruebas de Fluidez Verbal seleccionadas para este estudio son de esa primera generación y se consideran complejas. Aunque en cada una predomina una FE, requieren la coordinación y uso de diferentes componentes: evaluar las acciones (actualización de la memoria de trabajo), evitar o eliminar comportamientos no deseados (control inhibitorio) y cambiar el curso de acción (flexibilidad). Al mismo tiempo, algunas de ellas involucran procesos de selección y recuperación de representaciones semánticas para cumplir con las consignas (control ejecutivo semántico), y exigen una elevada carga motivacional para su realización. El valor predictivo sobre el

rendimiento académico que se ha obtenido con este tipo de pruebas es elevado (Best et al., 2011), posiblemente porque las tareas escolares requieren también una motivación elevada y la coordinación de procesos ejecutivos en la resolución de razonamientos abstractos. Por otro lado, las relaciones interpersonales y la regulación de conflictos siempre se apoyan en procesos complejos de autorregulación (Beauchamp & Anderson, 2010).

2. *Effortful Control*

Algunas propuestas teóricas han relacionado el control cognitivo con el temperamento (Rothbart, Ellis, Rueda, & Posner, 2003). Desde esta perspectiva, se entiende la autorregulación como el equilibrio o interacción entre procesos de excitación afectivo-motivacionales y los de control cognitivo encargados de su regulación (Blair & Diamond, 2008; Eisenberg & Spinrad, 2004). Además, esos procesos de ajuste tendrían una base temperamental, es decir, se explicarían por tendencias de base biológica que predisponen al individuo a ciertos niveles de reactividad emocional y control cognitivo (Rothbart et al., 2003; Rothbart, 2004). Las diferencias en reactividad se reflejan en los umbrales, la latencia y la intensidad de la activación de los sistemas cerebrales que controlan las reacciones autonómicas, endocrinas, y las respuestas motoras ante diferentes estímulos. A la postre, estos sistemas reactivos están asociados con los modelos de afrontamiento basados en la aproximación y evitación (Rueda, Posner, & Rothbart, 2005) y son los precursores de los sistemas motivacionales que configuran la personalidad (Rothbart & Ahadi, 1994).

El constructo *Effortful Control (EC)* hace referencia a una dimensión amplia del temperamento relacionada con la capacidad de inhibir una respuesta dominante para realizar una respuesta subdominante (Rothbart, 2007). Los procesos de *cambio y focalización de la atención* según las demandas del contexto, los de *control inhibitorio*, que permiten

suspender una conducta inadecuada, y los de *control de la activación*, que potencian la realización de una acción cuando hay una tendencia fuerte a evitarla, configuran este constructo (Eisenberg, Spinrad, & Eggum, 2010). De modo sencillo, el EC describe la capacidad de los niños y niñas para escoger con esfuerzo una línea de acción bajo condiciones de conflicto, planificar acciones futuras y discernir errores (Rueda & Rothbart, 2009).

El desarrollo del EC ha sido relacionado con la red de atención ejecutiva del modelo atencional de Posner (Posner & Rothbart, 2004), que involucra la corteza cingulada anterior (CCA) y regiones de la corteza prefrontal sobre todo laterales (especialmente dorsolaterales y centromediales PCF) (Fan, McCandliss, Fossella, Flombaum, & Posner, 2005; Rueda, Posner, & Rothbart, 2011). A nivel comportamental, la atención ejecutiva se ha estudiado mediante tareas experimentales que inducen conflictos entre tendencias de respuestas, cuya resolución requiere inhibir una respuesta dominante para ejecutar una respuesta no dominante. Algunos de los paradigmas más conocidos y utilizados son la tarea *Stroop*, la tarea de Flancos y la tarea *Go/No-go* (Eisenberg, Spinrad, et al., 2010). La ejecución en estas tareas se ha relacionado positivamente con el nivel de EC, medido generalmente con escalas de temperamento. Esta covariación sugiere que la red de atención ejecutiva puede sostener la capacidad temperamental de los niños y niñas de controlar voluntariamente su motivación y sus emociones (Posner & Rothbart, 2005).

En las últimas décadas, el estudio del EC en el ámbito escolar ha señalado que esta dimensión del temperamento está directamente vinculada con las competencias necesarias para realizar diferentes actividades escolares (Eisenberg, Valiente, et al., 2010). Esta relevancia se evidencia no sólo porque permiten el sostenimiento y cambio de la atención en la ejecución de tareas académicas, sino también porque facilitan la regulación de las

emociones necesaria para el sostenimiento de las acciones y, especialmente, para un adecuado manejo interpersonal. Cuando los niños y niñas carecen de la capacidad de modular sus respuestas emocionales y motoras tienen mayor predisposición a sufrir diferentes cuadros psicopatológicos y problemas de conducta que afectan sus competencias sociales (Eisenberg, Spinrad, et al., 2010). En este sentido, se ha observado que bajos niveles de EC se relacionan con dificultades en la regulación emocional y con problemas externalizados de conductas (agresividad, ira, etc.), tanto en una edad temprana como en la adolescencia (Dennis, Brotman, Huang, & Gouley, 2007). Del mismo modo, se ha observado que bajos niveles de EC se encuentran en la base de algunas patologías, como es el caso del trastorno por déficit de atención e hiperactividad (Nigg, 2006).

En la mayoría de las investigaciones, el EC se ha evaluado mediante informes de cuidadores sobre las conductas de los niños y niñas. En la niñez temprana se ha utilizado *The Early Childhood Behavioral Questionnaire* (Putnam, Gartstein, & Rothbart, 2006) donde se le pide a los encuestados que valoren la frecuencia de comportamientos específicos de sus hijos en diferentes situaciones típicas de la vida cotidiana. En edades más avanzadas, el EC de los niños se ha evaluado mediante una subescala del *Child Behavior Questionnaire* (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001). Esta escala fue diseñada para los padres, aunque con modificaciones menores se ha utilizado con maestros y maestras de niños que asisten a preescolar y primaria (Eisenberg et al., 2003; Eisenberg et al., 2009b; Valiente, Lemery-Chalfant, & Swanson, 2010b; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). En edades superiores a los 10 años se ha utilizado el *Early Adolescence Temperament Questionnaire–Revised* (EATQ-R; Ellis & Rothbarth, 2001), este cuestionario proporciona información sobre cuatro factores: 1) ‘effortful control’, 2) ‘extraversion/sugency’, 3) ‘netagive affect’ y 4) ‘affiliation’. A su vez, los 16 ítems de *Effortful Control* se distribuyen en los subfactores de

Control Atencional, referido a los componentes más cognitivos del EC, el Control de Activación, relacionado con aspectos motivacionales, y el Control Inhibitorio, una medida vinculada con el autocontrol. En algunas investigaciones (por ejemplo, Kochanska, Philibert, & Barry, 2009), la evaluación mediante escalas se ha combinado con tareas comportamentales creando una evaluación compuesta del EC, y en otras investigaciones (Checa, Rodríguez-Bailón, & Rueda, 2008; Eisenberg et al., 2004; Spinrad et al., 2006), el EC informado por los cuidadores se ha relacionado con medidas comportamentales de control cognitivo. En ambos casos, estas relaciones han brindado pruebas sobre la validez convergente de las escalas de EC.

2.1 Similitudes y diferencias entre FEs y EC

Las FEs y EC son dos aproximaciones al estudio de los procesos y habilidades de control en la infancia y la adolescencia que han recibido especial atención en el ámbito educativo. Tradicionalmente, estos constructos fueron estudiados desde marcos conceptuales diferentes: las FEs desde la neuropsicología y la neurociencia cognitiva, y el EC desde el temperamento y la autorregulación (Liew, 2011; Zhou, Chen, & Main, 2012). Sin embargo, ambos constructos se definen de manera amplia como procesos de control cognitivo que sostienen la autorregulación de la conducta dirigida a objetivos y mantienen entre sí cierto solapamiento, especialmente respecto al control inhibitorio (ver Figura 1).

La capacidad de inhibir respuestas prepotentes o controlar la conducta impulsiva es un componente central de la autorregulación que forma parte de ambos constructos (Carlson & Wang, 2007; Kochanska & Knaack, 2003; Zhou et al., 2012). También los procesos de actualización y monitoreo de la memoria de trabajo, centrales en el funcionamiento ejecutivo, se han vinculado con la red de atención ejecutiva que apoya el EC (Rueda et al., 2011). En el

caso de la flexibilidad cognitiva, aunque no se hallaron investigaciones que la vinculen con el EC, cabe esperar que la capacidad de pasar de una representación a otra según las demandas del contexto esté asociada al cambio atencional, uno de los componentes del EC. Por otro lado, existe una clara coincidencia entre las regiones corticales de las redes neuronales asociadas a las FEs y al EC, específicamente la corteza cingulada anterior y la corteza prefrontal dorsolateral (Fan et al., 2005; Koechlin & Summerfield, 2007; Rueda et al., 2011).

Una diferencia entre ambos constructos es su relación con los procesos emocionales (Blair & Razza, 2007; Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013). En general, la investigación de las FEs se ha centrado principalmente en el control voluntario de procesos cognitivos sin carga emocional, mientras que el EC siempre ha sido conectado con la reactividad emocional. Sólo recientemente se han relacionado las FEs con la regulación emocional y se ha empezado a diferenciar entre FEs “frías” vs. “cálidas” dentro de un continuo de activación afectiva (Hongwanishkul, Happaney, Lee, & Zelazo, 2005). En contraste, desde una perspectiva funcional, tradicionalmente el EC sí se ha vinculado con el comportamiento socioemocional y los estados afectivos de los niños y adolescentes, especialmente en contextos familiares o escolares (Zhou et al., 2012). Posiblemente esto ha influido en las estrategias de evaluación: las FEs con tareas comportamentales en situaciones emocionalmente neutras, y el EC mediante cuestionarios o autoinformes en los que se describen comportamientos cotidianos (Diamond, 2013).

3. Empatía

Gran parte del proceso de socialización de los niños acontece en el centro educativo. A lo largo del periodo escolar, los modos interpersonales reactivos tempranos adquieren flexibilidad, conforme se van ampliando los modelos de referencia y se van asumiendo las

normas y valores del grupo (Hay, Payne, & Chadwick, 2004). Las competencias socioemocionales se van configurando en la edad escolar.

Los procesos y habilidades de control también son relevantes para explicar y predecir las relaciones de convivencia, cooperación, amistad y, a veces, de conflicto que surgen en el colegio. Pero, además de ellos, también son fundamentales los procesos y habilidades empáticas (Eisenberg & Eggum, 2009), todas ellas relacionadas con la capacidad de percibir, compartir y comprender los estados afectivos de los demás (Decety & Jackson, 2004; Singer, 2006). Habitualmente, la empatía facilita conductas prosociales, potencia la necesidad de reducir el malestar de los demás (Eisenberg et al., 1989; Eisenberg et al., 1999) y se asocia con la cooperación y la motivación por la justicia (Decety & Yoder, 2015).

La empatía es un constructo multimodal que abarca, por lo menos, tres componentes (Decety & Jackson, 2004; Decety & Svetlova, 2012): 1) una respuesta afectiva hacia la emoción de otra persona; 2) la capacidad cognitiva de tomar la perspectiva de la otra persona; y 3) algunos mecanismos de regulación que permiten el mantenimiento de la distinción “self/otros”. De los tres, la respuesta afectiva tiene un carácter más automático y se produce por una activación de las zonas neuronales implicadas en la generación de la emoción, lo cual permite que, con frecuencia, se experimente la emoción que siente otra persona (Jackson, Rainville, & Decety, 2006). Al mismo tiempo, los componentes cognitivos responsable del control *top-down* y de la diferenciación entre uno mismo y los demás permiten disminuir el estrés personal y considerar la perspectiva ajena (Decety & Grèzes, 2006; Decety & Svetlova, 2012). El desarrollo del control cognitivo y la mentalización permite a los niños pasar progresivamente del contagio emocional egocéntrico inicial a las respuestas emocionales orientadas hacia los demás, como la preocupación empática (Decety, Norman, Berntson, &

Cacioppo, 2012). En la Figura 2 se ilustra el modo en que las respuestas emocionales de los adultos integran las capacidades cognitivas, que facilitan la toma de perspectiva, y la evaluación del contexto social, que acompaña la conducta, en la comprensión emocional. Estos procesos están soportados parcialmente por redes neuronales que involucran la corteza prefrontal, específicamente las conexiones entre la corteza orbitofrontal, prefrontal medial y prefrontal dorsolateral (Decety, 2011). Algunas de estas áreas, como se ha señalado anteriormente, también se relacionan con las FEs y el EC.

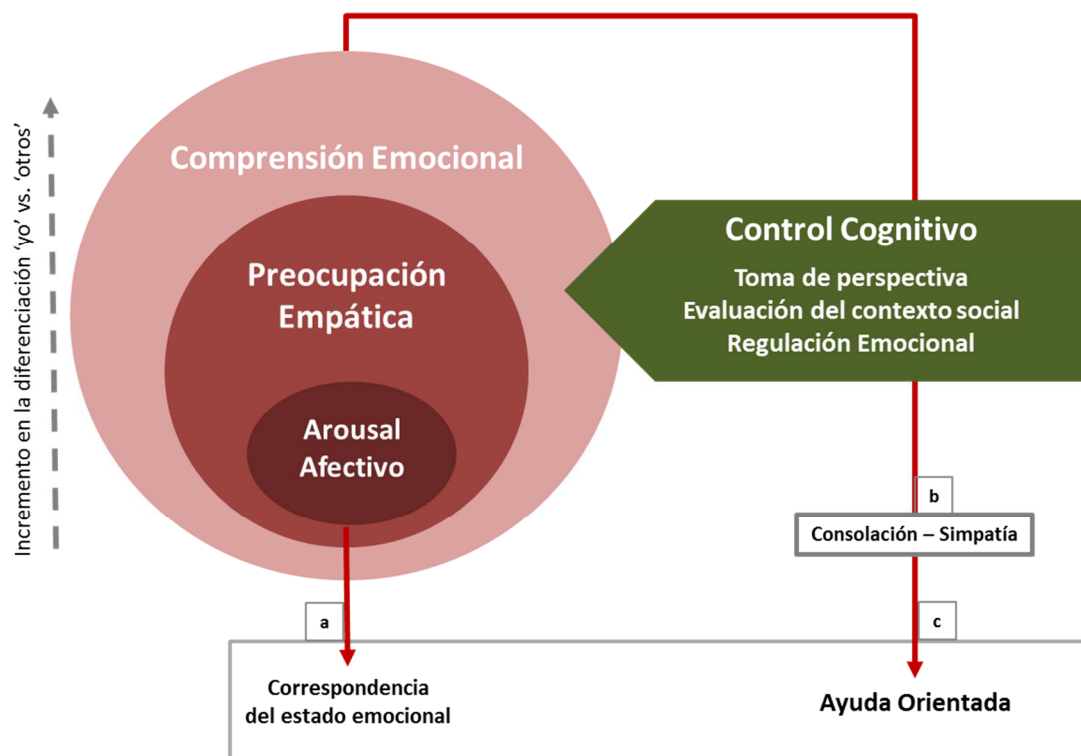


Figura 2. Componentes de la empatía: la respuesta empática contiene una expresión emocional próxima a la emoción que experimentan los demás, respuesta (a) donde los estados emocionales se corresponden. La intervención del control cognitivo permite la toma de perspectiva y la regulación emocional iniciando el proceso de diferenciación 'yo' vs. 'otro' que permite la preocupación empática (respuesta b, de consolación) y en última instancia la comprensión emocional (incluye la perspectiva de los demás y la evaluación del contexto social) que puede derivar considerando diferentes variables mediadoras (miembros de grupos, actitud, predisposición, etc.) en una respuesta de ayuda orientada hacia los demás.

En apoyo al modelo presentado en la Figura 2, diferentes investigadores proponen que las FEs se relacionan con los componentes cognitivos de la empatía. En sus estudios se observó que la flexibilidad cognitiva y la memoria de trabajo (medidas mediante tareas complejas) correlacionan con medidas de empatía cognitiva, evaluada tanto por autoinformes como por tareas comportamentales (Spinella, 2005; Thoma et al., 2011). La flexibilidad cognitiva, al facilitar el cambio de una representación a otra, puede favorecer la toma de perspectiva, es decir, pasar de una perspectiva de primera persona a una de tercera. Los estudios de neuroimágenes funcionales apoyarían estas hipótesis (Decety & Svetlova, 2012; Lamm, Batson, & Decety, 2007). En éstos la capacidad de los niños de leer la mente interactuó con circuitos emocionales mediados por un conjunto de regiones que incluyen la corteza prefrontal medial, la unión temporoparietal derecha y la corteza cingulada anterior, algunas de ellas también vinculadas al control cognitivo y al cambio atencional (Decety & Svetlova, 2012).

También se ha relacionado el EC con la empatía (Eisenberg et al., 2007). Se ha argumentado que los niños con adecuadas capacidades de autorregulación logran modular las emociones generadas al empatizar (Eisenberg & Eggum, 2009). La capacidad de regular las emociones permite que la respuesta emocional se dirija hacia los demás, y no se autofocalice, como forma de regular el estrés o la pena personal (Eisenberg, Eggum, & Di Giunta, 2010). Además, Eisenberg y sus colegas han encontrado que los mayores recursos de EC y de regulación emocional en general producen más respuestas de preocupación empática y conductas prosociales (Eisenberg, Eggum, et al., 2010). Por el contrario, de forma consistente a lo observado en adultos (Batson & Moran, 1999), a menores niveles de EC el desbordamiento emocional y la angustia es mayor, mientras se reduce la preocupación empática (Eisenberg & Eggum, 2009). Estos resultados, como los observados en el caso de las

FEs, avalan una perspectiva de la empatía como un constructo multidimensional donde el control cognitivo juega un rol central en la comprensión empática ajustadas hacia las necesidades de los demás.

La empatía se ha evaluado mediante técnicas de observación (por ejemplo, Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008) y paradigmas conductuales (por ejemplo, Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Thakkar & Park, 2010), aunque en el ámbito clínico y escolar habitualmente se han utilizado autoinformes o cuestionarios dirigidos a familiares y profesorado. En las últimas décadas, los modelos multidimensionales sobre la empatía superaron a las concepciones de un único componente y esto trajo aparejado la creación de técnicas de evaluación que incluyen las dimensiones emocionales y cognitivas. Entre las diferentes escalas multidimensionales, destacan por sus características psicométricas el *Interpersonal Reactivity Index* (IRI; Davis, 1983) y el *Empathy Quotient* (EQ; Baron-Cohen & Wheelwright, 2004). De éstas, el IRI es la escala más utilizada con adaptaciones en países europeos (Limpo, Alves, & Castro, 2013; Mestre Escrivá, Navarro, & García, 2004), asiáticos (Siu & Shek, 2005) y latinoamericanos (Beccaria, Moran, & Zorza, 2013).

En su versión original, Davis (1983) propone un modelo integral para la empatía, evaluado mediante una escala de 28 ítems divididos en cuatro subescalas, dos que miden componentes emocionales, Preocupación Empática y Malestar Personal, y dos que evalúan componentes cognitivos, Toma de Perspectiva y Fantasía. Cuando estos factores se utilizaron para evaluar la relación de la empatía con diferentes conductas interpersonales que los niños y adolescente desarrollan en el ámbito escolar, los resultados destacaron la relevancia de la dimensión emocional (Caravita, Di Blasio, & Salmivalli, 2009; Jolliffe & Farrington, 2011). En

especial, fue la Preocupación Empática la dimensión que más se ha vinculado con la capacidad de los alumnos para ayudar a los demás y defenderlos, por ejemplo, de posibles situaciones de acoso (Caravita, Blasio, & Salmivalli, 2010). Esto supone que los niños y adolescentes que logran resonar emocionalmente con los demás, modular estas emociones en márgenes tolerables y comprenderlas desde la perspectiva que viven sus compañeros, tienden fuertemente a realizar acciones que calmen la pena o malestar de sus pares.

4. Control cognitivo y comportamiento social entre iguales

Con el término “comportamiento social” solemos referirnos a cualquier conducta de relación entre dos o más personas (Adolphs, 2009). Se puede decir que la mayoría de las conductas de los alumnos en un centro educativo son sociales. Las actividades escolares exigen a los niños y niñas dialogar con otros, compartir experiencias, y comprender las conductas y creencias de los demás. Los niños van configurando su estilo de interacción social en ese marco de relaciones, sea este prosocial o agresivo (Hay et al., 2004).

La relación entre las FEs y el EC con la agresividad ha sido ampliamente documentada, especialmente en sus relaciones con el control inhibitorio, la impulsividad y las dificultades generales en la autorregulación (ver la revisión de Eisenberg, Spinrad, et al., 2010). En contraste, la relación del control cognitivo con las conductas prosociales entre compañeros no ha recibido la misma atención (Luengo Kanacri, Pastorelli, Eisenberg, Zuffianò, & Caprara, 2013).

El término prosocial, en un sentido amplio, se utiliza para designar cualquier acción voluntaria dirigida a beneficiar a otras personas (Penner, Dovidio, Piliavin, & Schroeder, 2005). Hay et al. (2004) propusieron que las FEs y las capacidades de autorregulación sostienen los diferentes estilos de interacción social (prosocial, agresivo, pasivo) y que estos, a su vez,

predicen las posibilidades de integrarse en una red de compañeros. Para estos autores, si un alumno gestiona los conflictos interpersonales mediante la cooperación, interviene en las disputas de los demás para ayudar y es capaz de resolver problemas sociales, es más probable que sea muy bien aceptado por su grupo de pares. Sin embargo, cuando las FEs y las habilidades de regulación emocional y de cognición social (empatía) son más reducidas, los estilos de interacción pasivos o agresivos son más habituales, con repercusiones negativas en la acogida del grupo de iguales.

En apoyo a la propuesta de Hay et al. (2004), las investigaciones sobre estatus social en adolescentes indican que los alumnos rechazados son más agresivos y tienen menos comportamientos prosociales. Los alumnos populares, por el contrario, mantienen más amistades, resuelven positivamente los conflictos y son más hábiles socialmente (Ryan, 2011; Wentzel, Baker, & Russell, 2009; Wentzel & Caldwell, 1997). También se han encontrado

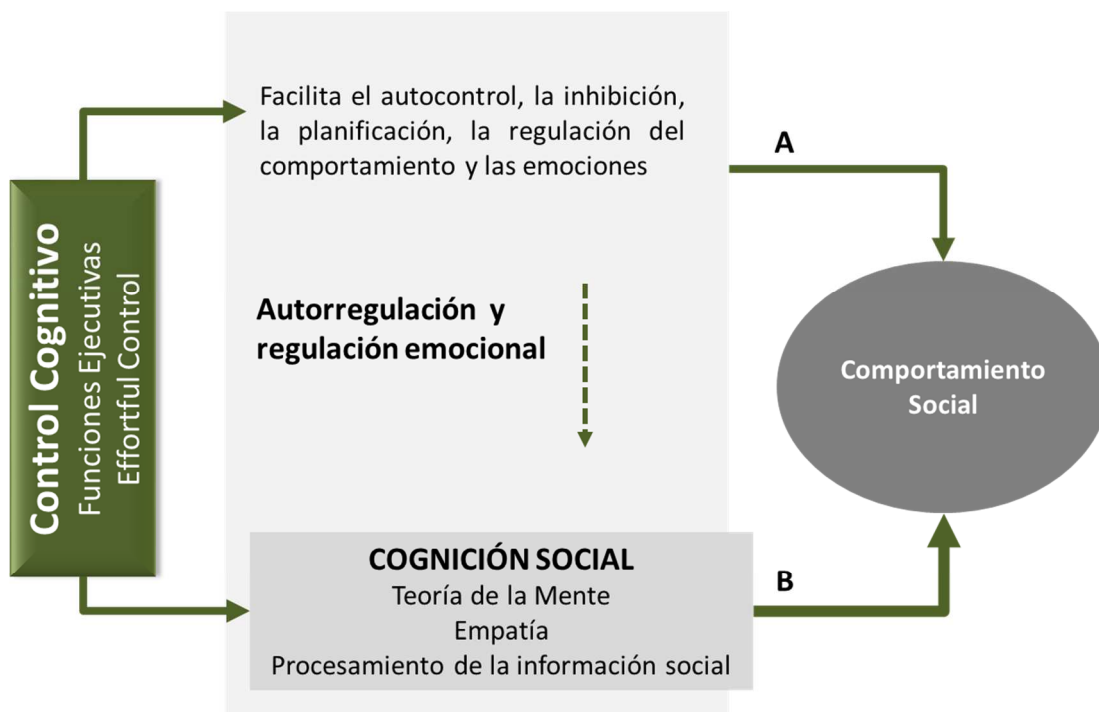


Figura 3. Los procesos de control cognitivo se vinculan con el comportamiento social al posibilitar la autorregulación del comportamiento y las emociones (vía a), y al participar en el procesamiento de la información social (vía b)

relaciones positivas entre las medidas de control cognitivo y empatía con las competencias sociales y la aceptación por parte de los pares (Rueda et al., 2010; Wentzel, Filisetti, & Looney, 2007), aunque no se conocen bien las vías de influencia entre estas variables. En la Figura 3 se propone, considerando los aportes de diferentes autores (Beauchamp & Anderson, 2010; Yeates et al., 2007), dos vías de influencia.

Las FEs y el EC, procesos de control de dominio general, pueden afectar las conductas prosociales y el estatus social de forma directa por su rol fundamental en la autorregulación de las emociones y el comportamiento de los alumnos. Además, tendrían una influencia indirecta a través de la cognición social (empatía). Si bien algunos modelos conceptuales sobre el comportamiento social sugieren esta relación (Adolphs, 2009; Beauchamp & Anderson, 2010; Yeates et al., 2007), en el ámbito escolar aún no se ha contrastado su eficacia predictiva.

Un ejemplo de la vía directa de influencia se puede encontrar en las investigaciones sobre el control inhibitorio, un componente central de las FEs y el EC. Se ha propuesto que el control inhibitorio permite a los niños y adolescentes controlar sus impulsos y deseos egocéntricos, y facilita el comportamiento socialmente aceptado (Eisenberg et al., 2004; Young et al., 2009). Cuando los niños tienen bajos niveles de EC, son menos capaces de inhibir una reacción agresiva (Eisenberg et al., 2009a) y en edades posteriores, estas deficiencias en el autocontrol se asocian con menos elecciones positivas por parte de sus pares (Checa et al., 2008). Asimismo, se cree que el déficit de control inhibitorio es el núcleo de un conjunto de trastornos que Hicks et al. (2004) define dentro del “espectro de externalización”, el cual abarca comportamientos oposicionistas-desafiantes y el déficit de atención/hiperactividad. Los niños que sufren estos trastornos muestran dificultades para limitar la influencia de los estímulos externos y controlar su comportamiento y pensamientos, y suelen mostrar

conductas socialmente inapropiadas y de consecuencias negativas tanto en el aprendizaje escolar como en la relaciones con sus pares (Eisenberg, Valiente, et al., 2010).

La memoria de trabajo y la flexibilidad cognitiva también tienen gran relevancia para afianzar las competencias sociales (Carlson, Claxton, & Moses, 2015; Nilsen & Graham, 2009; Razza & Blair, 2009). Pueden alcanzar gran protagonismo, por ejemplo, al mantener la representación interna del contexto social, seleccionar la respuesta más apropiada según la situación y poder cambiar según el interlocutor o las demandas específicas del contexto externo. La flexibilidad y la capacidad de mantener la información en la memoria también son esenciales en las competencias pragmáticas del lenguaje. Estas requieren hacer un uso adecuado de los aspectos referenciales de la comunicación que exigen la integración de diferentes aspectos de la información como los antecedentes contextuales o la perspectiva de la otra persona (Nilsen & Graham, 2009).

Por último, como se observa en la Figura 3, otra vía de influencia directa depende de las estrategias de regulación emocional que permiten modular o cambiar la valencia de las emociones experimentadas en las relaciones interpersonales. La capacidad de seleccionar estímulos, de cambiar el foco de atención y de resignificar la situación con el fin de aminorar sus efectos emocionales negativos pone en juego varios componentes de control cognitivo. Por ejemplo, dentro de estas estrategias, el *reappraisal* (Ochsner & Gross, 2008) es considerado un mecanismo de regulación emocional cognitiva-lingüística eficaz, con ventajas saludables al compararse con la supresión de la respuesta emocional. Las personas que logran utilizar el *reappraisal* son valoradas positivamente en las relaciones sociales al compararse con aquellas que utilizan la supresión de las emociones como estrategia de regulación (Gross & John, 2003). Además, los niños que regulan sus emociones de forma eficaz tienen más

posibilidades de gestionar los conflictos interpersonales mediante la negociación o la cooperación (Acosta, 2004), conservando sus relaciones sociales de forma positiva. En el ámbito de los conflictos internacionales, las habilidades de *reappraisal* potencian salidas negociadas a los conflictos persistentes y enquistados en el tiempo (Bar-Tal, Halperin, & Pliskin, 2015).

Además de los procesos de control de dominio general que se vinculan de forma directa con el comportamiento social (ver Figura 3), el control cognitivo se integra en dominios específicos del funcionamiento social, que abarcan procesos afectivos comúnmente relacionados con la cognición social, como por ejemplo, la empatía (Beauchamp & Anderson, 2010). Estos procesos cognitivos-emocionales tienen relación continua con la percepción y el procesamiento de los estímulos sociales, y por lo tanto se presentan como una categoría diferente (Beauchamp & Anderson, 2010; Eslinger, Moore, Anderson, & Grossman, 2011). En este dominio específico, se propone que el control cognitivo al favorecer respuestas empáticas se vincula de forma indirecta con el comportamiento social (vía *b* de la figura 3). A pesar de que existe cierto consenso sobre las diferentes vías de relación entre los distintos dominios cognitivos-emocionales y el comportamiento social (Adolphs, 2009; Beauchamp & Anderson, 2010), la evidencia de estas relaciones en el ámbito escolar es escasa. La empatía se asoció al comportamiento prosocial de los alumnos en diferentes edades y situaciones escolares (Dodaj, Sesar, Barisic, & Pandza, 2012; Jolliffe & Farrington, 2011; Loudin, Loukas, & Robinson, 2003; Luengo Kanacri et al., 2013; Wentzel et al., 2007), y también se comprobó su relación con la aceptación por parte de los compañeros (Warden & MacKinnon, 2003). Sin embargo, la mediación de la empatía en la relación del control cognitivo con el comportamiento social no ha sido investigada.

En resumen, si trasladamos este marco de relaciones ilustrado en la Figura 3 al ámbito escolar, significaría que los alumnos con mejores recursos de control cognitivo tienen más posibilidad de mantener relaciones sociales positivas, ya que mejoran su autorregulación y favorecen sus capacidades empáticas. Regular las emociones como la ira, disminuir la impulsividad y poder coordinar acciones dirigidas a objetivos grupales favorece la convivencia, la inserción en el grupo y una percepción positiva del clima social del centro educativo y de las relaciones que en él se desarrollan (Fan, Williams, & Corkin, 2011; Wang, 2009). Del mismo modo, mejores recursos empáticos permiten una mayor comprensión emocional entre compañeros, generan conductas prosociales y favorecen la inclusión en el grupo de pares (Eisenberg, Eggum, et al., 2010; Gini, Albiero, Benelli, & Altoè, 2007).

5. Control Cognitivo y Rendimiento Académico

Las tareas escolares presentan una complejidad que demanda la coordinación de varios procesos cognitivos y conductuales (Best et al., 2011). Pueden exigir la resolución de problemas abstractos o de un análisis matemático, pero también la necesidad de regular las emociones y los estados de ánimo para sostener estrategias de aprendizaje eficaces y relacionarse, por ejemplo, con los profesores de manera exitosa. En todos estos casos, las FEs y el EC parecen guiar estos procesos, facilitando la adaptación y el desempeño escolar (Best et al., 2011; Valiente, Lemery-Chalfant, & Swanson, 2010a; Valiente et al., 2008). Sin embargo, la pregunta sobre cómo se relaciona el control cognitivo con el desempeño académico no ha sido aún aclarada. Como se observa en la Figura 4, existen diferentes aproximaciones conceptuales y metodológicas que intentan esclarecer si la influencia del control cognitivo sobre el rendimiento académico es directa o mediada por otro conjunto de variables.

Un conjunto de hipótesis (propuesta *a* de la figura 4) plantean que las FEs y el EC afectan directamente el rendimiento académico. En apoyo de esta hipótesis, se ha argumentado, por ejemplo, que los déficits en las FEs provocan dificultades para la lectura (Protopapas, Archonti, & Skaloumbakas, 2007), las matemáticas (Blair & Razza, 2007a; Bull & Scerif, 2001) y la redacción (Hooper, Swartz, Wakely, de Kruif, & Montgomery, 2002). Desde este planteamiento las FEs participan en procesos básicos del aprendizaje por lo que su relación no estaría mediada por otras variables.

Vías de influencia	Aproximación conceptual
<p>a</p>	El control cognitivo influye de manera directa sobre el rendimiento académico.
<p>b</p>	El control cognitivo favorece el rendimiento académico al intervenir en proceso cognitivos de orden superior.
<p>c</p>	El control cognitivo influye de manera directa y mediada sobre el rendimiento académico.

Figura 4. Aproximaciones conceptuales y metodológicas sobre la influencia del control cognitivo en el rendimiento académico (adaptado de Hoffman, 2013).

Nota. CC: Control Cognitivo; CcS: Control cognitivo de orden superior; CS: comportamiento social; P: Participación; RA: Rendimiento Académico.

Un segundo conjunto de hipótesis (propuesta *b* de la Figura 4) sugiere que la relación es menos directa y que el control cognitivo tiene efecto debido a su asociación con las habilidades del lenguaje, las capacidades de razonamiento y la metacognición (Diamond, 2013). Apoyando esta idea, se afirma, por ejemplo, que la memoria de trabajo y el control inhibitorio se relacionan con las capacidades de razonar en niños mayores de 10 años (Handley, Capon, Beveridge, Dennis, & Evans, 2004). También se argumenta que niveles bajos de memoria de trabajo se asocian a un deterioro específico del lenguaje y en las

manipulaciones de las representaciones semánticas (Im-Bolter, Johnson, & Pascual-Leone, 2006). Por otro lado, el control cognitivo se ha relacionado con procesos metacognitivos (Fernandez-Duque, Baird, & Posner, 2000) que promueven estrategias de estudio eficaces y se relacionan con la autorregulación del aprendizaje (Zimmerman, 1990). Debido a que el desempeño académico requiere adecuadas habilidades lingüísticas, razonamientos descontextualizados, alta motivación y de la capacidad de reflexionar sobre el propio aprendizaje, todas ellas podrían estar presentes en la relación del control cognitivo y el éxito académico.

Un tercer conjunto de hipótesis que ha recibido especial atención en la última década, sugiere que el comportamiento en el aula puede mediar la relación del control cognitivo y el rendimiento académico. Los alumnos que logran respetar las normas de la clase, comprometerse en las actividades propuestas y participar activamente, generan las condiciones para un adecuado aprendizaje (Liew, Chen, & Hughes, 2010; Posner & Rothbart, 2005; Valiente et al., 2008). Algunos hallazgos indican que la participación de los alumnos en el aula se asocia positivamente con sus calificaciones, y que ésta podría mediar en parte las relaciones entre el EC y la competencia académica (Valiente et al., 2008). Por otro lado, se cree que este compromiso con el aprendizaje depende en gran parte de las relaciones que los alumnos mantengan con sus compañeros y maestros (Eisenberg, Sadovsky, & Spinrad, 2005). Las FEs y el EC se relacionan con las competencias y el ajuste social de los niños y adolescentes. Los alumnos que logran autorregularse tienen una relación menos conflictiva, de mayor calidez y acompañamiento con sus maestros (Liew et al., 2010). Además, los alumnos que son aceptados por sus pares y que mantienen amistades en el tiempo se benefician al ser incluidos en las actividades escolares, logrando mayores oportunidades para aprender y exponerse a los materiales educativos (Wentzel et al., 2009). Este último conjunto de hipótesis sugiere que

el control cognitivo favorece un conjunto de comportamientos en las rutinas escolares y sociales que pueden mediar la relación con el rendimiento académico. Además, no se descarta la posibilidad de un efecto directo como el planteado en las primeras propuestas (propuesta c de la Figura 4). En este sentido, es de esperar que esta sugerencia se aproxime con mayor exactitud a la realidad de los centros escolares donde el éxito académico depende de un conjunto de variables cognitivas, emocionales y sociales, en constante interacción.

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Capítulo 2

Objetivos y Justificación

Las investigaciones que se incluyen en esta Tesis pueden enmarcarse en el conjunto de estudios emergentes que Fischer (2009) ha delimitado con el rótulo “cerebro, mente y educación”, cuyo fin es conocer las diferentes redes neuronales que están involucradas en el control cognitivo, la autorregulación y el desempeño escolar. Desde esta perspectiva, se sostiene que los procesos de control cognitivo son fundamentales para asegurar un desempeño exitoso en el mundo social y en las actividades escolares (Best, Miller, & Naglieri, 2011; Posner & Rothbart, 2005). Los cinco trabajos descritos en la Tesis intentan conocer los procesos y habilidades cognitivas y emocionales que mejoran el desempeño académico (Blair & Diamond, 2008) y promueven una adecuada convivencia escolar (Acosta, 2008; Ruiz, 2010).

Anteriormente hemos presentado el entramado conceptual general en que se apoyan nuestras investigaciones. En éstas proponemos que el control cognitivo regula procesos socioemocionales y favorece por diferentes vías de influencia el rendimiento escolar. Los estudios que describimos incorporan algunos aspectos novedosos a la literatura. En primer lugar, se relaciona el rendimiento escolar con medidas de FE y de EC, no exclusivamente con las medidas de uno de los constructos. Esto nos ha permitido establecer relaciones entre ambos y obtener información respecto a su poder predictivo diferencial sobre el rendimiento académico y el comportamiento social.

En segundo lugar, comprobamos la relevancia que tienen los procesos de control y la empatía en la percepción del clima social escolar, en la configuración del estatus social de los alumnos, y en las conductas prosociales. Evaluamos, por tanto, su poder predictivo en contextos y medidas interpersonales variadas. Además, estudiamos la relevancia de las dos vías de influencia de las FE y el EC sobre el comportamiento social entre pares (ver Figura 5), la que implica los procesos de autorregulación (emocional y conductual) y la que está

mediada por procesos de cognición social como la empatía. Una de nuestras hipótesis centrales es que la empatía incorpora elementos de regulación que pueden ser de gran utilidad para trasladar las habilidades de control cognitivo al ámbito interpersonal.

En cuarto lugar, nos propusimos integrar en un modelo predictivo diferentes vías de influencia de las FEs y EC sobre el desempeño académico. A pesar de que los autores coinciden en la relevancia de incluir el comportamiento social como un mediador entre el control cognitivo y el rendimiento, logrando de esta manera modelos explicativos de mayor validez ecológica sobre el desempeño académico, pocos estudios han comprobado la hipótesis de esta mediación. En una de estas propuestas, Eisenberg, Valiente y Eggum (2010) sugieren un modelo heurístico con dos vías de influencia sobre el rendimiento académico: una directa donde el control cognitivo aporta y coordina los procesos básicos para el aprendizaje, y otra indirecta mediada por las relaciones sociales. Partiendo de esta propuesta, hemos añadido el efecto del control cognitivo sobre el comportamiento social, presumiblemente por favorecer los procesos de autorregulación del comportamiento, y la mediación de los procesos de cognición social empáticos (ver Figura 5). Consideramos que esta propuesta, donde participan mecanismo de control cognitivos y procesos socioemocionales, permite una mejor comprensión y predicción del desempeño escolar.

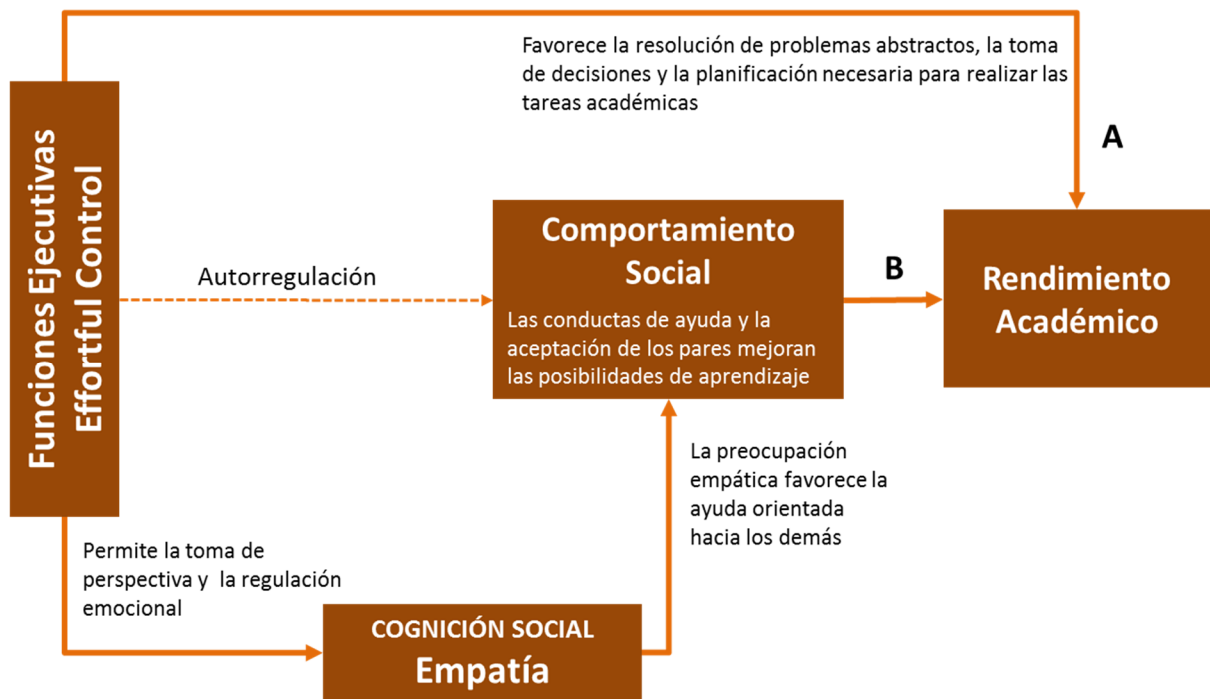


Figura 5. Modelos de dos vías de influencia de las FEs y el EC sobre el rendimiento académico. Adaptación de la propuesta de Eisenberg et al. (2010). El modelo sugiere una vía directa (A) de influencia y una indirecta (B). En la vía B se integran los modelos del comportamiento social donde las FEs y EC favorecen la integración social mediante su relación con la empatía.

Por último, compartimos con otros autores (Best, Miller, & Jones, 2009; Best et al., 2011) la necesidad de estudiar el control cognitivo y emocional durante la niñez media y la adolescencia. La mayoría de los estudios sobre la relación del control cognitivo con el éxito escolar se han realizado en la primera infancia y creemos que es conveniente conocer esa relación en edades posteriores. La adolescencia se caracteriza por el desarrollo sostenido de las FEs (Best et al., 2009; Best et al., 2011; Crone, 2009). Durante este periodo los alumnos logran dominar cada vez mejor sus pensamientos y acciones para que sean coherentes con sus objetivos internos. Al mismo tiempo, los adolescentes se involucran en mayor medida en conductas de riesgo y se vuelven cada vez más sensibles a las opiniones y valoraciones de los demás (Shulman et al., 2015). Por otro lado, la empatía, como elemento favorecedor de la convivencia entre iguales, puede adquirir especial relevancia en el marco de las relaciones entre iguales.

Objetivos

Nuestro objetivo general es contribuir a la creación de un modelo predictivo del comportamiento social y el desempeño académico de niños y adolescentes. De manera específica nos proponemos:

- Determinar el poder predictivo que las FEs y el EC poseen sobre el desempeño académico de los preadolescentes. Deseamos comprobar si, al igual que en la niñez (Silva et al., 2011; Valiente et al., 2013), la capacidad de autorregulación favorece un mejor rendimiento. Cabe esperar que potencie la utilización de estrategias de estudios eficaces, la participación en el aula, el respeto a las rutinas escolares y una buena relación con los docentes (Eisenberg et al., 2010) y, por otro lado, facilite los razonamientos más complejos relacionados con las competencias en matemáticas y lectoescritura (Bull & Scerif, 2001; Espy et al., 2004; Lan, Legare, Ponitz, Li, & Morrison, 2011).
- Observar si las medidas FEs y EC se relacionan con las capacidades empáticas de los preadolescentes. Anticipamos que los procesos de control participan en la toma de perspectiva y son centrales en la regulación de las respuestas emocionales experimentadas en las interacciones sociales. Además, se quiere comprobar si el control cognitivo tiene el mismo efecto predictivo en los componentes cognitivos y emocionales de la empatía, y si dichos componentes se relacionan de forma diferente con el comportamiento social de los alumnos.
- Conocer si las medidas de control cognitivo y empatía se relacionan con el comportamiento social. Además, esperamos comprobar si las medidas de control cognitivo predicen las conductas prosociales y la preferencia social de los estudiantes, si esta relación varían según

el nivel de escolaridad primaria y secundaria, y si es directa o está mediada por la empatía disposicional de los adolescentes.

- Evaluar si el control cognitivo, la empatía y el desempeño escolar (social y académico) se vincula con la percepción que los alumnos tienen de la seguridad de su centro escolar y de las relaciones que mantienen con sus profesores. Esperamos reconocer si el control cognitivo y la empatía influyen en la percepción del clima social de los centros escolares.

- Explorar si las medidas de control cognitivo y empatía caracterizan y discriminan el estatus social de los estudiantes. Es decir, si las causas del rechazo o la aceptación social se relacionan con el control cognitivo y las capacidades socioemocionales de los estudiantes. Pensamos que las características distintivas de los grupos *populares-prosociales* (alto estatus) y los *rechazados-noprosociales* (bajo estatus) y las categorías sociométricas clásicas (ignorados, controvertidos y promedios) pueden ser predichas desde esas habilidades.

- Conocer la relación entre las FEs (control inhibitorio, flexibilidad cognitiva, memoria y fluidez verbal) y el EC adolescentes escolarizados. Nos proponemos observar si las medidas proporcionadas con diferentes tareas que evalúan las FEs covarían con las de EC autoinformado, así como su poder predictivo diferencial sobre el resto de medidas: empatía, comportamiento social y rendimiento académico.

- Comprobar si la influencia del EC y las FEs sobre el rendimiento académico es directa o es mediada por variables sociales como proponen algunos modelos conceptuales (Eisenberg et al., 2010). Esperamos que el EC y las FEs influyan directamente sobre el desempeño académico como registraron estudios previos. Por otro lado, esperamos una influencia indirecta por intermedio del comportamiento social entre compañeros, evaluada mediante las conductas prosociales y la preferencia sociales.

Información General sobre Muestras y Medidas

Para alcanzar estos objetivos se realizaron cinco estudios con muestras independientes de estudiantes entre 12-14 años, aunque en uno se incorporaron también de edades inferiores, entre 8 y 11 años de edad. En todos ellos, se sigue una aproximación multivariada con el fin de progresar en un modelo predictivo del desempeño social y el rendimiento académico.

En dos estudios se aplicaron pruebas complejas (*Trail Making Test*, *Stroop Test*, Fluidez Verbal) y clásicas, consideradas de la ‘primera generación’, para evaluar las FEs. Se caracterizan por proporcionar medidas impuras, que comparten la participación de varias operaciones ejecutivas y cognitivas de forma simultánea, aunque se destaca una como predominante. Los componentes evaluados mediante ellas fueron la flexibilidad cognitiva, la memoria de trabajo, el control inhibitorio y la fluidez verbal. Utilizamos estas pruebas porque una de sus ventajas es que tienen mayor validez ecológica, por cuanto en las actividades escolares es frecuente que se utilicen varias capacidades cognitivas a la vez y con demandas complejas de coordinación.

En cuatro estudios se evaluó el EC con el Cuestionario de Temperamento para Adolescentes-revisado, en su versión de autoinforme (*EATQ-R self report*, del inglés *Early Adolescence Temperament Questionnaire – Revised Self Report*; Ellis y Rothbarth, 2001), traducida al castellano por Checa, Rodríguez-Bailón y Rueda (Checa, Rodríguez-Bailón, & Rueda, 2008). Esta escala ha sido empleada en la literatura con poblaciones adolescentes a partir de 10 años (Ellis & Rothbart, 2001). El EATQ-R evalúa cuatro factores del temperamento de adolescentes: ‘effortful control’, ‘extraversion/surgency’, ‘netegative affect’ y ‘affiliation’. En esta Tesis utilizamos la puntuación total de los 16 ítems que recogen información sobre el EC.

En cuatro estudios se evaluó la empatía utilizando la adaptación al castellano (Mestre Escrivá, Navarro, & García, 2004) del *Interpersonal Reactivity Index* (IRI; Davis, 1983). La escala IRI es una de las más utilizadas en la literatura como medida de empatía disposicional (Gini, Albiero, Benelli, & Altoè, 2007; Melchers, Montag, Markett, & Reuter, 2015; Péloquin & Lafontaine, 2010), cuenta con 28 ítems, distribuidos en cuatro subfactores (fantasía, preocupación empática (PE), toma de perspectiva (TP) y estrés personal) que evalúan aspectos específicos de la empatía. Se utilizaron los factores de TP y PE al considerarse una evaluación más ajustada y directa de la empatía (Burkard & Knox, 2004; Gini et al., 2007). El factor de PE, mide respuestas emocionales, como la simpatía y la preocupación ante la experiencia emocional de los demás, y el de TP, evalúa la capacidad cognitiva para adoptar el punto de vista de otra persona en situaciones de la vida cotidiana.

En todos los estudios, el comportamiento social fue considerado como una medida de ajuste social entre iguales, entendido como la capacidad del niño para establecer relaciones positivas con sus compañeros y realizar comportamientos socialmente adaptados (Circk y Dodge, 1994; en Beauchamp & Anderson, 2010). Se utilizaron técnicas sociométricas que proporcionaron información sobre las conductas prosociales del alumnado y nominaciones según criterios de aceptación o rechazo, lo cual permitió calcular la preferencia social y el estatus social de los alumnos. Además, en dos estudios, mediante la valoración del profesorado de los ítems del subfactor Sociabilidad de la *Escala de Valoración del Profesorado I-S* (Carrión, Hernández, & Gregorio, 1999) se agregaron los juicios de éstos sobre las competencias sociales de los alumnos.

Las medidas de desempeño académico se obtuvieron calculando la media de las calificaciones de cada alumno, y en dos de los estudios se combinó esta medida con juicios del

profesorado, obtenidos mediante los ítems del subfactor Inteligencia de la *Escala de Valoración del Profesorado I-S* (Carrión et al., 1999), donde se incluyen evaluaciones sobre las habilidades académicas y la predisposición para el estudio de los estudiantes. De esta manera, las medidas de desempeño social y académico se obtuvieron mediante múltiples informantes y diferentes técnicas de recolección de datos, aumentando la validez de contenido y ecológica de las medidas.

Organización de los artículos

Los estudios se organizan en una serie de cinco capítulos separados, cada uno cuenta con una introducción, metodología y discusión. Los que conforman el Capítulos 3, 4 y 6 han sido publicados, el estudios del Capítulos 5 se encuentra en proceso de revisión y el del Capítulo 7 se ha enviado a una revista para iniciar el proceso de aceptación para publicar. Para facilitar la lectura se han organizado los artículos en tres secciones que se describen a continuación, y un último capítulo concluye la Tesis doctoral con una discusión general en la que se integran los resultados más relevantes.

Sección 1: Funciones Ejecutivas-Effortful Control y Rendimiento Escolar

En nuestro primer estudio (Capítulo 3), se evaluó el poder predictivo de las FEs sobre el rendimiento académico y su influencia sobre medidas de prosocialidad y preferencia social evaluada por los iguales y tutores. Además, se observó si el poder predictivo de las FEs sobre las variables escolares se mantiene estable en los niveles de enseñanza primaria y secundaria. Para tal fin, conformamos dos grupos de alumnos, uno de primaria (8-11 años) y otro de secundaria (12-14 años), y se realizaron modelos predictivos por separado para cada uno de ellos.

En el segundo estudio (Capítulo 4), en lugar de medidas de FEs, se utilizaron valoraciones del EC para comprobar si existía la misma relación predictiva que en el caso de las FEs. Además, avanzamos en comprobar si la relación de los procesos de control cognitivo sobre el rendimiento académico se establecía mediante la empatía y el comportamiento social. Para esto, contrastamos en un modelo de ecuaciones estructurales: 1) si el EC influía sobre el comportamiento social a través de la empatía, 2) si la empatía emocional y cognitiva tenían el mismo poder predictivo sobre el comportamiento social, 3) si la empatía y el comportamiento social mediaban la relación del EC sobre el rendimiento académico o si existía una relación directa. En concreto, comprobamos si la influencia del EC sobre el rendimiento académico era directa y/o mediada por el comportamiento social.

Sección 2: Funciones Ejecutivas-Effortful Control, empatía y Comportamiento Social

En una segunda serie de estudios, nos centramos en valorar si las medidas de control cognitivo, empatía y rendimiento académico influían en el estatus social y la percepción que los adolescentes tienen del clima social de los centros escolares. En el tercer estudio (Capítulo 5), se utilizó el mismo modelo presentado en el segundo estudio (Capítulo 4), añadiendo como variable dependiente la percepción del clima escolar en estudiantes que inician la enseñanza secundaria. Es decir, comprobamos si el EC y la empatía disposicional facilitan la percepción de un clima escolar positivo, y si esas relaciones se deben a la influencia positiva que el EC y la empatía ejercen sobre el rendimiento académico y las relaciones con los compañeros. Utilizamos las mismas medidas que en el resto de los estudios (EC, empatía, rendimiento académico y comportamiento social), mientras que el clima escolar se evaluó mediante una escala de autoinforme sobre el nivel de seguridad percibida en el centro escolar y el nivel de

satisfacción de la relación alumno-profesorado (Cuestionario del Clima Social en el Centro Escolar; Trianes et al., 2006).

En el cuarto estudio (Capítulo 6), se combinaron las medidas sociométricas de prosocialidad y preferencia social para conformar grupos de estatus social (populares-prosociales, rechazados-noprosociales, controvertidos, ignorados y promedios). Por un lado, se caracterizaron los grupos según el rendimiento académico, el control cognitivo (EC e Impulsividad) y la empatía de los estudiantes. Por otro, se identificaron funciones discriminantes para determinar el grado en que estas variables logran diferenciar a los grupos de bajo y alto estatus social.

Sección 3: Modelo integral de las FEs y EC en la predicción del rendimiento académico

En el último estudio (Capítulo 7) ponemos a prueba un modelo predictivo del rendimiento académico. En este caso, respetamos los mismos parámetros de relación que los modelos previos e incorporamos de forma conjunta medidas de EC y FEs. Esto nos permitió observar si las medidas de EC y FEs se solapan o son interdependientes. Del mismo modo, al incorporar medidas de FEs comprobamos si las tareas que evalúan control inhibitorio, flexibilidad cognitiva y fluidez verbal predicen la empatía disposicional. De esta manera, replicando el modelo del estudio dos (Capítulo 4), pero agregando las FEs, evaluamos si el poder predictivo y las relaciones estructurales con el rendimiento académico se modificaban.

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Sección 1

Funciones Ejecutivas-Effortful Control y Rendimiento Escolar

Capítulo 3

Executive Functions as predictors of School Performance and Social Relationships: Primary and Secondary School Students

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ABSTRACT

This study examined the relationship between executive functions (EFs) and school performance in primary and secondary school students aged 8 to 13 years ($N = 146$, $M = 10.4$, 45.8% girls). EFs were evaluated using the Trail Making Test (TMT), Verbal Fluency (VF), and the Stroop Test. Students' GPAs and teachers' assessment of academic skills were used to measure school performance. To evaluate the students' social behavior, participants were asked to rate all their classmates' prosocial behavior and nominate three students with whom they preferred to do school activities; teachers also provided evaluations of students' social skills. EF measures explained 41% ($p = .003$, $f^2 = .694$) of variability in school performance and 29% ($p = .005$, $f^2 = .401$) of variance in social behavior in primary school students. The predictive power of EFs was found to be lower for secondary school students, although the TMT showed significant prediction and explained 13% ($p = .004$, $f^2 = .149$) of variance in school performance and 15% ($p = .008$, $f^2 = .176$) in peer ratings of prosocial behavior. This paper discusses the relevance of EFs in the school environment and their different predictive power in primary and secondary school students.

Keywords: executive functions, school performance, prosociality, social preference.

INTRODUCTION

Executive Functions (EFs) represent a heterogeneous set of metacognitive processes that direct behavior towards a goal, organize sub-goals, consider future behaviors, and are globally related to planning and problem-solving (Diamond, 2013; Pessoa, 2009). They depend on working memory, inhibitory control, and cognitive flexibility, which are considered to be their basic processes (Miyake et al., 2000). Overall, EFs control cognitive functions and regulate basic abilities such as attention, memory, semantic processing, and affective processes so that behavior flexibly adapts to different situations and demands.

EFs encompass metacognitive operations that are highly useful at school (Blair & Diamond, 2008). They may be used to develop abstract thinking (e.g., to solve logic problems) or to facilitate social behavior (e.g., respecting turn-taking in conversations) (Best, Miller, & Naglieri, 2011; Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006). Further, it has been observed that some executive operations are specifically related to certain academic domains: working memory has been linked to mathematics performance and cognitive flexibility to the language domain (van der Ven, Kroesbergen, Boom, & Leseman, 2012). Nonetheless, these relations may vary depending on the students' age. Best et al. (2011) reported that correlations between EFs and performance in mathematics and language were stronger at ages 5–6 and 8–9 than in the years in between, i.e. 6–8, and remained stable during adolescence. Generally speaking, it has been proposed that building EFs has a positive impact on students' achievement. What is more, students repeating a school year, or belonging to socially and culturally disadvantaged groups may benefit from EF training (Thorell, Lindqvist, Bergman Nutley, Bohlin, & Klingberg, 2009).

Associations have also been found between EFs and social behavior, and a large number of studies have linked problems in executive functioning to social adjustment problems. A limited working memory capacity, low levels of inhibitory control, and diminished semantic executive control negatively affect social interactions, thus fostering reactive aggressiveness (Ellis, Weiss, & Lochman, 2009) and impulsivity (Romer et al., 2009). In children and adolescents, a deficit in EF development is associated with behavioral problems and disruptive behaviors (Jacobson, Williford, & Pianta, 2011; Riggs, Blair, & Greenberg, 2004). This association is not explained by intelligence (Mahone et al., 2002) or some sociodemographic variables like ethnic group (Hughes & Ensor, 2008; Morgan & Lilienfeld, 2000). In the study by Jacobson et al. (2011) the EFs measures significantly predicted emotional reactivity, self-control, criminal behavior and social relation difficulties in children who were advancing to secondary school, regardless of intelligence or some sociodemographic aspects.

Furthermore, although the relation between EFs and helpfulness towards classmates and peer acceptance (Hay, Payne, & Chadwick, 2004) has been less studied, it is known that EFs do play an important role in self-control of behavior and emotional self-regulation (Blair & Diamond, 2008; Checa, Rodríguez-Bailón, & Rueda, 2008; Eisenberg, Valiente, & Eggum, 2010; Riggs et al., 2006; Rueda, Checa, & Rothbart, 2010). In early adolescence, students with a higher level of effortful control show greater empathy (Zorza, Marino, de Lemus, & Acosta, 2013) and are more likely to be accepted and chosen by peers (Checa et al., 2008). Overall, EFs are closely linked to the cognitive and affective processes involved in social cognition (Adolphs, 2009; Razza & Blair, 2009).

The purpose of this study was to determine the predictive power of EFs for school performance, social preference among peers and prosocial behaviors, and to ascertain whether it remains the same between primary and secondary school. The predictive power of EFs on school performance may be more important during the early years of primary education than in later years (Altemeier, Abbott, & Berninger, 2008). Transition from one school level to another requires significant cognitive and social adjustment, and students have to adapt not only to the new school's size and space, but also to new procedural rules, changes regarding peer and class grouping, and greater personal responsibility (Jacobson et al., 2011; Steinberg, 2005). Further, unlike primary education, peer acceptance and preference criteria in secondary school are not influenced by adults' opinions (parents, teachers) to the same extent. In secondary school, students are more independent and may apply more heterogeneous criteria than in primary school (Rodkin, Farmer, Pearl, & van Acker, 2000). Considering the institutional and psychological changes involved in the transition from primary to secondary school, our study seeks to observe whether the EFs relate to the school variables in the same or in a different way according to school level. Therefore, two separate studies will be carried out for each level.

The tasks applied to evaluate EFs in this study—TMT, Verbal Fluency, and the Stroop Test—assess working memory, inhibitory control and cognitive flexibility, and are considered to be 'first generation tests' (Gruber & Goschke, 2004). Notably, all these tests require engagement in several executive and cognitive operations simultaneously, although only one predominates in each task. One of the advantages attributed to these classic tests is that they have greater ecological validity (Chan, Shum, Toulopoulou, & Chen, 2008), given that various cognitive skills are often simultaneously used and coordinated when performing school activities.

The predictive power of EFs was expected to be greater for school performance than for social behavior variables and further, to remain the same for school performance between primary and secondary school students. It was also expected to be positive for students' social preferences and peer-assessed prosocial behavior, and likewise, for teachers' perceptions of social skills, particularly at primary school. If these assumptions were confirmed, a battery of simple and easy-to-deliver tasks would be obtained to provide significant predictions of academic performance and social achievement that could be used as general indices of achievement and school adjustment.

METHOD

Participants

The participants for the study were children from two state schools in the city of Granada (Spain): a primary school (58.9% of total sample) and a secondary school (41.1%). Mean age of participants was 10.9 years ($SD = 1.4$); 45.8% of participants were girls. Primary school students were currently in third ($N = 19$), fourth ($N = 21$), fifth ($N = 21$) or sixth grade ($N = 25$). The remaining students were in their first year of secondary school ($N = 60$) and were in two different classes ($N = 30$ in each class). Students who had repeated a school year were not included. The correlation between age and grade was very high ($r = 0.96$, $p < .001$); hence, age and grade level analyses were considered to be interchangeable. The majority of the 3rd grade primary school students were 8 years old, and the 1st grade secondary school students were 12.

The socioeconomic status of the participants, measured according to level of their parent's education and income, was similar, i.e. middle–low. The majority of children were Caucasian born in Spain. Latin American immigrants accounted for only 5.4% of participants.

Consent was obtained from school principals and parents and the study received ethics approval by the committee responsible.

Executive Function Measures

Trail Making Test (TMT). The classic Reitan and Wolfson paper-and-pencil version was delivered (Lezak, 1995). The TMT consists of two parts (A and B); in each, participants are required to connect 25 circles placed randomly on an A4 size sheet of paper, in sequential order, as quickly as possible, without lifting the pencil from the paper. Circles in part A are numbered from 1 to 25; in part B, circles are numbered from 1 to 13, and lettered from A to L. Part B requires participants to alternate between numbers and letters in sequential order, i.e., 1 – A – 2 – B, etc. Errors were pointed out immediately by the test deliverer, and the score for each part of the test was taken from the time (in seconds) it took them to complete the task. Performance time was measured with a stop watch. The two parts of the test provide information about numerous processes: perceptive processes, motor processes, cognitive flexibility, working memory, sustained attention and processing speed (Sánchez-Cubillo et al., 2009). Specifically, part B is more related to cognitive flexibility (Kortte, Horner, & Windham, 2002).

Verbal Fluency (VF). Three tests were delivered in which participants were required to say as many words as possible in one minute (Piatt, Fields, Paolo, & Tröster, 1999). In the first test, the request was semantic (naming animals); in the second, grammatical (naming verbs); and in the third, phonological (words starting with the letter P). The total number of valid words produced in each test was noted down. In the semantic test, neither supraordinate categories such as 'fish' or 'birds', nor subordinate categories such as 'dog breeds' were taken into account. Responses were digitally recorded and tests were delivered in counterbalanced

order. The VF tests have been related to numerous EFs: information monitoring, working memory, sustained attention, inhibitory control, cognitive flexibility, and to executive control of semantic processing (Koren, Kofman, & Berger, 2005; Marino, Acosta Mesas & Zorza, 2011). This relationship depends on demand. When it is semantic, the EFs implication is lower than when it is verbal or phonological.

Stroop Test. A two-part version of this test was delivered (Lezak, 1995). In the first part of the test (C), participants were given an A4 sheet of paper with 112 color-printed (blue, green, red, and black) words denoting colors (blue, green, red, and black). All words were printed in a different color from the color designated by the word. Participants were required to read the written word as quickly as possible. In the second part of the test (CP), participants were again given an A4 sheet of paper with the same number of words, designating colors as before, and also printed in different colors from the color designated by the word; participants were required to say the color in which the words were printed. Performance time was measured with a stop watch. Performance in each part of the test was scored by dividing the number of correct answers by the number of seconds taken to complete the test. Answers are usually correct in part C while in part CP errors are more frequent. The latter requires more inhibitory control resources as the involuntary tendency to read the word and answer by naming the color in which it is written should be inhibited. The performance of this task has been related to inhibitory control processes (Garon, Bryson, & Smith, 2008; Jurado & Rosselli, 2007).

School Performance Measures

Grade Point Average. The Grade Point Average (GPA) achieved at the end of the school year by each student was obtained, including all relevant subjects taken. Despite the lack of

correspondence between the subjects taught at primary school level and those taught at secondary school, this mean performance index nonetheless allows comparative analysis.

Teacher-perceived academic capacities. All class tutors¹ completed the *Intelligence-Socialization Teacher Rating Scale* (Carrión, Hernández, & Gregorio, 1999) to evaluate each of their students. The scale comprised 24 items, scored from 1 to 10 (maximum), to assess students' Intelligence, Socialization, and Respect for Authority. Intelligence (I-TRS) was included as a factor in order to obtain additional information about the participants' academic capacities, given that it provides information on each student's academic skills and their potential to successfully perform school tasks (e.g., “the ability to put learned knowledge into practice”), as perceived by the class tutor. Reliability of this scale is very high ($\alpha = .94$).

Measurement of social behavior among peers

Social preference. Each student received a list with the names of all their classmates. Students were asked to choose three classmates with whom they preferred to share school activities and spend their free time. Students were also required to choose three classmates with whom they would prefer not to share these activities. Participants were assured complete confidentiality of their replies. The social preference score for each student was based on three calculations (Maassen, van Boxel, & Goossens, 2005). First, the sums of positive and negative nominations were calculated. Second, adjusted numbers of positive and negative nominations were obtained by dividing each of the two aforementioned sums by the total number of students in the class, minus one. Third, the adjusted number of negative nominations was subtracted from the adjusted number of positive nominations.

¹ In the Spanish educational system, each class has a tutor who is a teacher from the school. The tutor is responsible for each student's follow-up regarding academic performance and social behavior. Also, the tutor informs each student's family about their progress or difficulties.

Peer-assessed and teacher-perceived prosocial behavior. Participants had to rate on a scale from 1 to 5 (maximum) how much each classmate helped fellow students when the latter experienced learning difficulties or interpersonal conflicts at school (López Sánchez, 2006). The total sum of scores given to each student by peers was obtained and subsequently divided by the number of students in the class, minus one. Additionally, as previously described, class tutors completed a separate *Intelligence-Socialization Teacher Rating Scale* (Carrión et al., 1999) to evaluate each of their students. The Socialization (S-ITR) factor, which evaluates each student's social integration and cooperative attitude toward classmates (e.g., “the ability to cooperate positively with peers in settling disputes peacefully”), was included as an index of prosocial behavior. Reliability of this factor is also very high ($\alpha = .93$).

Procedure

Three months before the end of the school year, the questionnaires to obtain information on social preference and prosocial conduct were delivered collectively in class and the EF-related tasks were delivered individually in a quiet, calm environment in each school. The *Intelligence-Socialization Teacher Rating Scale* (Carrión et al., 1999) was completed by class tutors one month before the end of the school year, without their being informed of their students' scores on the EF tests or on questionnaires. Students' grades in all subjects were obtained at the end of the school year.

RESULTS

Data Analyses

In the first place, descriptive analyses and comparisons between the primary and secondary school samples were carried out with a *t* test. In the second place, the scores on EF tests were standardized (z scores) for each grade level to enable comparison of performance by group/age. Furthermore, a Pearson correlational analysis was carried out between the EFs measures, the academic performance measures, and the social behavior measures. In the third place, to make the analyses simpler, an exploratory factor analysis was performed following the main component method, with Quartimax oblique rotation, using a scree plot as the factor extraction method, in order to determine the latent structure of the correlation matrix of the EFs, academic performance and social behavior measures. Finally, regression analyses were conducted in each level to test the predictive power of EF scores for school performance and social behavior. The analyses were performed with IBM SPSS Statistics v. 20.

Preliminary Analyses

The mean and standard deviations, the *t* test results for the EF task and the questionnaires for each group are included in Table 1. Secondary school students obtained higher scores than primary school students in all EFs measures. Differences in academic achievement were not significant. Differences between primary and secondary school peer tests of social behavior were not found. Lastly, teacher perceived prosocial behavior was higher in primary school students than in secondary school.

Table 1. Descriptive statistics and mean differences analysis between primary and secondary school.

	Primary		Secondary		<i>t</i>	<i>p</i>	95% CL		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
VF- Animals	14.69	5.00	16.44	5.13	-2.31	.022	-3.24	-.25	.044
VF- Letter P	8.71	3.52	10.13	3.47	-2.69	.008	-2.45	-.38	.042
VF- Verbs	10.64	5.09	15.52	5.94	-6.37	.000	-6.38	-3.37	2.04
TMT- A	47.61	18.04	39.19	14.04	2.82	.006	2.52	14.32	2.85
TMT-B	114.57	52.26	98.98	35.05	2.36	.019	2.57	28.60	5.72
Stoop-c	1.91	.36	2.08	.31	-2.97	.003	-.27	-.05	.46
Stroop-cp	.77	.18	.85	.18	-2.63	.009	-.14	-.02	.17
Grade Average point	5.90	2.16	6.26	1.62	-1.16	.248	-.96	.25	8.84
Academic Capacities	7.06	1.67	6.72	2.07	.98	.328	2.52	14.32	3.33
TP-prosocial	7.01	1.50	6.36	1.79	2.16	.033	.05	1.25	2.04
PA-Prosocal	3.32	2.02	3.21	.51	.69	.485	-.21	.44	6.84
Social preference	.004	.27	.029	.129	-.76	.447	-.08	.03	21.58

Note. VF: Verbal Fluency; TMT-A: Trail Making Test (Part A); TMT-B: Trail Making Test (Part B); TP: Teacher-perceived; PA: Peer-assessed.

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

Analysis of EF measures

Table 2 shows the Pearson correlations between the measures obtained from the EF-related tasks, the majority of which were significant, particularly between sub-parts of the same test. The factor analysis showed the existence of three latent variables that explained 69% of variance, and which corresponded to each of the different tasks: the three VF tests, the two parts of the TMT, and the two parts of the Stroop Test. VF tests explained 37% of variance, TMT 19%, and Stroop 13%.

Analysis of school performance measures

The Pearson correlation between the GPAs and the class tutor assessments of students' academic skills (I-TRS) was high throughout the sample ($r = 0.77, p = .001$), and also when students were divided into primary ($r = 0.81, p = .001$) and secondary school ($r = 0.74, p = .001$); accordingly, a factor analysis was performed using data from all participants. The result indicated that a single factor accounted for most of the total variance (88.6 %). There was also a strong correlation between this factor and the two achievement measures ($r = .94$ in both cases).

Table 2. *EF measure correlation matrix*

	TMT-B	VF- A	VF- LP	VF- V	Stroop C	Stroop CP
TMT- A	.420**	-.291**	-.286**	-.329**	-.255*	-.273*
TMT-B		-.160	-.276*	-.274*	-.327**	-.436**
VF- A			.504**	.322**	.125	.186*
VF- LP				.433**	.191*	.248**
VF- V					.096	.206*
Stroop C						.517**

Note. TMT-A: Trail Making Test (Part A); TMT-B: Trail Making Test (Part B); VF-A = Verbal Fluency, Animals; VF-LP: Verbal Fluency, letter P; VF-V: Verbal Fluency, Verbs.
* $p < .05$. ** $p < .01$.

Analysis of social behavior measures

When the same method of analysis was applied to social behavior measures of the total sample, significant correlations were found between all values. However, when primary school students were differentiated from secondary school students, the correlation pattern changed. Pearson correlations remained moderate to high between all measures for primary students, while for secondary school students a high correlation ($r = .61, p < .01$) was found solely between peer-evaluated prosocial behavior and the social competence scores provided

by class tutors (S-TRS). The correlation between scores for peer-evaluated social preference and social competence scores provided by class tutors (S-TRS) was not significant ($r = .17$). In the light of these results, separate exploratory factor analyses were performed for primary and secondary school students to include the three measures, and repeating the factor extraction procedure.

In primary school students, a single factor for Social Behavior explained the variance (76,5 %) of the three measures, which were strongly correlated to this factor (peer-evaluated prosocial behavior = 0.90; peer social preference = .63; and S-TRS = .786). In secondary school students, however, two factors were obtained: the first (Prosocial Behavior) explained 61.4 % of variance and included peer-evaluated prosocial behavior and S-TRS scores; the second (Social Preference), which explained 27.8 % of variance, was saturated with peer social preference scores

Multiple Regression Analysis

Table 3 shows the correlation matrix of EFs measures and academic and social performance. The factors obtained from the previous factor analyses were used for regression analysis. EF-related variables were included as predictor variables: TMT (A and B), VF (animals, verbs, and the letter P), and the Stroop test (Stroop-C and Stroop-PC). Academic Performance and Social Behavior were included as dependent variables for primary school students; School Performance and the two factors associated with social behavior at secondary school level, i.e. Prosocial Behavior and Social Preference, were included for secondary school students.

Table 3. *Correlation matrix of EFs measures and academic and social performance*

	Primary					Secondary				
	GAP	AC	TP-P	PA-P	SP	GAP	AC	TP-P	PA-P	SP
VF- Animals	.14	.20	.19	.12	.22	.04	.10	.08	.12	.12
VF- Letter P	.12	.29*	.18*	.13	.09	.05	.12	.24*	.25**	.06
VF- Verbs	.58**	.52**	.21*	.19	.32*	.40**	.43**	.38**	.22*	.10
TMT- A	-.48**	-.45**	-.21*	-.15	-.08	-.21*	-.22	-.11	-.30*	-.03
TMT-B	-.54**	-.50**	-.48**	-.48**	-.50**	-.42**	-.32*	-.33*	-.32**	-.12
Stoop-c	.42**	.33*	.32*	.23	.24*	.18	.03	.06	.07	.04
Stroop-cp	.43**	.38*	.38*	.34*	.26*	.21	.03	.11	.15	-.12

Note. GAP: Grade Average Point; AC: Academic Capacities; TP-P: Teacher-perceived prosocial; PA-P: Peer-assessed prosocial; SP: Social preference; TMT-A: Trail Making Test (Part A); TMT-B: Trail Making Test (Part B); VF: Verbal Fluency.

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

The first hierarchical regression analyses were performed to determine the predictive power of EF measures for academic performance. As shown in Table 4, in the primary student sample, all EF tests produced significant values, with TMT showing the greatest predictive power. The final model explained 41% of variance in School Performance. In the secondary school sample, a significant model was also obtained, although only the TMT showed significant predictive power. This model explained 13% of variance.

The second set of analyses was made to determine the predictive power of EFs for Social Behavior. All EF- and student age-related factors were included as predictor variables. In the primary school sample, the model was significant for the TMT and the Stroop task (see Table 4), and the TMT showed greater predictive power (explaining 29% of variance). Two regression models were used for secondary school level: the first, to predict the Prosocial

Conduct factor, and the second, the Social former being more predictive and that which explained 15% of variance. However, neither model predicted Social Preference².

Table 4. Multiple regression analysis: EF predictors of School Performance and Social Behavior for each grade level.

DV	Grade level	Predictor	β	p	R^2	F
<i>School Performance</i>	Primary	TMT	.47	.000	.41	19.4**
		Stroop	.28	.001		
		VF	.20	.035		
	Secondary	TMT	.38	.003	.13	4.82**
<i>Social Behavior (prosocial & social preference)</i>	Primary	TMT	.41	.000	.29	15.23**
		Stroop	.35	.000		
<i>Prosocial Behavior</i>	Secondary	TMT	.35	.001	.15	5.30 **
		VF	.26	.034		
<i>Social Preference</i>	Secondary	<i>Model not significant</i>				

Note. TMT: Trail Making Test; VF: Verbal Fluency; Stroop: Stroop Test.

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

² A Hierarchical Multiple Regression Analysis was carried out in order to confirm whether the influence of EFs on social behavior is independent from gender and academic achievement. The prosocial behavior of all students was included a dependent variable. In the first part, gender was included, in the second one the Academic Performance measures, and in the third one the EF measures. The results of the first model were significant, $R^2 = .04$, $\beta = .20$, $F = 5.82$, $df = 1,134$, $p = .017$. In the second one, a change in the adjustment is obtained, $R^2 = .23$, $F = 20.08$, $df = 2,133$, $p < .001$. The change is also significant when including the EF measures, $R^2 = .28$, $F = 17.11$, $df = 3,132$ $p = .004$, being the TMT scores the ones with most predictive power ($\beta = .241$). The predictive power of the EFs, especially of the TMT, remains independent from gender and Academic Performance.

DISCUSSION

The results confirmed that the EFs were related to school performance in children and pre-adolescents. Furthermore, they predicted social behavior in primary and secondary school students, with important nuances depending on grade level. The TMT showed the greatest predictive power of the EF tasks. EFs explained 41% of the variance in school performance in primary school and 13% of the variance in secondary school students. In primary school, EFs explained 29% of the variance in Social Behavior while in secondary school they only predicted Prosocial Behavior (15% of variance), but not Social Preference.

The predictive power of the EF measures used in this study was similar to the findings reported by other studies which used a greater number of tasks to evaluate the EFs. In addition, they were predictive of social behavior regardless of academic performance, especially at primary school. Naglieri and Das (1997) found a similar correlation ($r = 0.49$) between EF measures and overall academic performance but they used a greater number of tasks. This study explains approximately 41% of variance in school performance in primary students and the tasks used were simple and quick to deliver. The tasks require engagement and the coordination of several EF components that are fundamental to responding to the academic demands associated with mathematics (Lan, Legare, Ponitz, Li, & Morrison, 2011) and literacy (Monette, Bigras, & Guay, 2011). It may be that the use of tasks that contain more than one component of EFs allow such a high correlation.

The variance that the EFs explain for academic performance and social behavior is limited. Apart from the EFs, other factors also influence them. Study habits, class participation or teacher-student relationship are also highly relevant for the students' academic performance (Eisenberg et al., 2010; Valiente, Swanson, & Lemery-Chalfant, 2012). Empathy

has a direct influence on the students' interpersonal relationships (Immordino-Yang, 2011; Valiente, Lemery-Chalfant, & Swanson, 2010; Zorza, Marino, & Mesas, 2015), which improves their immersion in the classroom. It is possible that the predictive power of the EFs on academic performance and on social behavior increases when these variables are added in a multicausal way.

In both primary and secondary school students, the factor comprising the two TMT sub-tests reported the highest predictive values for school performance. The TMT-B evaluates working memory and set shifting, while TMT-A is associated mainly with visual search speed (Sanchez-Cubillo et al., 2009). They also require a good motor performance. Accordingly, it might possibly be the most 'complex' of all the tasks used. Abstract reasoning and planning are basic requirements for many school tasks, and they are skills that depend on working memory and cognitive flexibility (Diamond, 2013). The lower predictive power of execution observed in the TMT among secondary school students may be due to the fact that these cognitive skills have been partially automated at that age (Best et al., 2011).

The predictive power of EFs for social behavior was lower than for school performance; however, it remained significant, particularly in primary school students. In addition, the TMT was the task that reported the greatest predictive value, thus confirming that working memory and cognitive flexibility are basic processes associated not only with academic abilities, but also with regulation of behavior in general (Diamond, 2013). The direct associations found between EFs and social behavior suggest that socio-emotional processes and reactions are partially regulated by EFs (Beauchamp & Anderson, 2010; Riggs et al., 2006). Empathy and emotional regulation are enhanced by effortful control (Schultz, Izard, Stapleton, Buckingham-Howes, & Bear, 2009) and students' prosocial behavior, and their acceptance or

rejection by peers is associated with their capacity to empathize and regulate their emotions (Zorza et al., 2013).

In the secondary school student group, the predictive power of EFs for social behavior was lower. Besides, VF performance predicts prosocial behavior significantly, which had not been observed in primary school. It is possible that the varied EFs involved in the VF tests are more relevant after childhood since pre adolescents widen their emotional regulation strategies in interpersonal situations (Steinberg, 2005). During childhood, inhibitory control is usually used to regulate reactive aggression or impulsive behavior (Hay et al., 2004). During adolescence, social cognition abilities widen (Blakemore & Choudhury, 2006) and the use of more cognitive affective regulation strategies, such as reappraisal (Gross, 2008), which are probably more related to the semantic control required in VF tests, gradually increases.

On the other hand, of the EFs measures predicted peer social preference among secondary school students. Unlike in childhood, secondary school students value attributes which are more influenced by adolescents' own subcultures. Characteristics such as playing a sport, looking fit, taking care of one's appearance, and being cool may be more relevant than good school performance (Rodkin et al., 2000). When a peer has low executive control resources and shows impulsive and aggressive behaviors, the teenager does not necessarily reject them (Stormshak et al., 1999). Rejection might require behaviors that make interpersonal relationships extremely difficult, such as when there is deficit of attention and hyperactivity or externalizing behavior problems (Hay et al., 2004; Stormshak et al., 1999).

The global measures of EFs used in this study, especially the TMT, may be useful for making rapid assessments in large groups of students in order to obtain information about whether it would be advisable to foster self-control activities that lead to better academic

performance and coexistence at school. They could also be used to make a quick evaluation of the efficiency of educational intervention programs. The predictive power of EF complex tasks in both the academic and social domain may be due to the fact that they involve several executive processes simultaneously and are associated with self-regulation processes or effortful control (Diamond, 2013; Pessoa, 2009). These tasks give them greater ecological significance (Chan et al., 2008), particularly in a school environment where complex demands require motivational effort and emotional regulation from students. The new generation of EF tests such as the tests described by Chan et al. (2008) provide more precise information on EFs specific elements, and can be used for a more specific evaluation of certain students, but they can have lower predictive power for the global performance school measures (Best et al., 2011). Finally, generalization about these proposals should be cautiously made. The participants' sample is small. Besides, they belong to a middle-low socio-economic level and to Spanish public schools located in quite large cities. Future investigations will require the confirmation of the same pattern of relationships in bigger samples and from different socio-cultural contexts.

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Capítulo 4

Academic Performance and Social Competence of Adolescents: Predictions based on Effortful Control and Empathy

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ABSTRACT

This study explored the predictive power of effortful control (EC) on empathy, academic performance, and social competence in adolescents. We obtained self-report measures of EC and dispositional empathy in 359 students (197 girls and 162 boys) aged between 12 and 14 years. Each student provided information about the prosocial behavior of the rest of his/her classmates and completed a sociogram. At the end of the school year, we calculated the mean grade of each student and the teacher responsible for each class completed a questionnaire on the academic skills of his/her students. The study confirmed the existence of a structural equation model (SEM) in which EC directly predicted academic performance and social competence. Additionally, empathic concern partially mediated the effect of EC on social competence. Finally, social competence significantly predicted academic performance. The article discusses the practical applications of the model proposed.

Keywords: effortful control, empathy, academic performance, peer relationships.

INTRODUCTION

In Western countries, academic performance and school cohabitation are two major concerns of scientists, citizens, and politicians. Reports are regularly published on students' knowledge at the end of compulsory education (PISA, 2010) and school cohabitation (Díaz-Aguado Jalón, Martín Babarro, & Martínez Arias, 2010). These topics have been explored from heterogeneous and multidisciplinary approaches. In the areas of psychology and neuroscience, cognitive development and socio-emotional development have been associated with cognitive control processes (Posner & Rothbart, 2005), emotional self-regulation, and empathy (Decety & Svetlova, 2012; Eisenberg, Spinrad, & Eggum, 2010). There is empirical evidence that individual differences in attentional control influence students' adaptation to both academic and social school demands (Checa, Rodríguez-Bailón, & Rueda, 2008) and that academic performance and socio-emotional adjustment can be improved by providing training in control and self-regulation skills (Rueda, Checa, & Rothbart, 2010).

Since children start attending school, they are continually expected to reach curricular goals and develop a broad range of skills that cannot be achieved without the mediation of the control processes that are part of the executive function. At the same time, in the context of interpersonal relationships with teachers, schoolmates, and parents, students experience many affective and emotional states. Such states must be properly managed and regulated according to the demands of the time and the normative frameworks of the group (Acosta, 2008a). The transition from childhood to adolescence and later to maturity is characterized by the consolidation of personal autonomy and independence. All this progress is mediated by the strengthening of control skills (Crone, 2009).

Many theorists and researchers have found a positive relationship between effortful control (EC) on one side and academic performance and good social adjustment on the other

(see reviews by Liew, 2012; Rueda et al., 2010). EC is a basic dimension of temperament that mediates between voluntary control of behavior and regulation of emotional reactivity (Derryberry & Rothbart, 1997). It is related to the efficiency of executive attention in changing and focusing attention, inhibiting inappropriate behaviors (inhibitory control), activating or performing an action when there is a strong tendency to avoid it (activation control), and with information integration and action planning (Eisenberg, Valiente & Eggum, 2010). The processes involved in EC partially overlap with those involved in the executive function (Liew, 2012). In fact, EC seems to be mainly supported by some regions of the prefrontal cortex – particularly the anterior cingulate cortex (Posner, Rothbart, Sheese, & Tang, 2007) – that are also part of the neural network that supports executive control.

Some studies have directly predicted academic performance and social behavior from EC. Liew, McTigue, Barrois, and Hughes (2008) obtained measures of effortful control and academic performance from 6-year-old children in a longitudinal study performed during three consecutive years. They found positive correlations between control measures and literacy and math achievement in the first year. Checa et al. (2008) reported that adolescents with better control resources also had higher academic performance, particularly in math, and were preferred by their classmates in sociometric tests. Cermakova, Moneta & Spada (2010) reported a relationship between self-reported attentional control measures and the learning strategies of a group of college students. They found that students with more control resources organized their time better and used a more elaborate and comprehensive strategy.

Other studies have also explored the possibility that direct relationships between EC and academic performance may be mediated by social behavior. Valiente, Lemery-Chalfant, Swanson, and Reiser (2008) assessed the social skills of children aged between 7 and 12 years

based on their participation in class and their relationship with their teachers. They found that children's social skills partially mediated the relationship between children's EC and their mean academic grades at the beginning and the end of the school year. In a subsequent longitudinal study, Valiente et al. (2011) obtained data from a children sample at three different points in time. At the age of 6 years, they assessed children's EC using parents' reports and inhibitory control using a behavioral task. Two years later, they assessed children's social functioning based on reports from parents and teachers. Finally, at the age of 12 years, they included academic performance in their assessments. Using a structural equation model, the authors confirmed that social functioning fully mediated the relationship between EC and academic performance. This relationship was not explained by any other variables such as sex, age, or socio-economic level.

All this evidence highlights the importance of control processes in academic performance and social competence throughout children's development from childhood to late adolescence. However, other dispositions or skills are also particularly relevant in this type of predictions, particularly regarding social behavior. On the one hand, EC has also been associated with empathy (Eisenberg et al., 2007; Valiente et al., 2004). On the other hand, numerous studies have associated empathy with the display of prosocial behavior and the maintenance of a good network of interpersonal relationships (De Waal, 2008; Rimé, 2009).

Empathy refers to individuals' ability to understand and respond to the affective experiences of others (Decety & Jackson, 2004) and plays a central role in social relationships. It allows two people – or a group of people – to share their affects, understand each other's feelings, show interest in each other's concerns, and often help each other (Singer & Lamm, 2009). It involves a great deal of interrelated cognitive and affective processes (Shamay-

Tsoory, Aharon-Peretz, & Perry, 2009). The most important of these are 1) empathic concern, which is probably shared with other species (Decety & Svetlova, 2012) and mediates affective activation, and 2) perspective taking, which makes it possible to consider someone else's point of view. All these processes are deployed when human beings establish links with other people, whether they are strangers, friends, classmates, colleagues, parents, or intimate partners, among others (Singer, 2009). Some of these processes are closely linked to cognitive control (Barkley, 2001). In an empathic situation, the distinction between 'self' and 'other' is maintained and evoked emotions are regulated to prevent emotional overreaction (Decety & Jackson, 2006). From a neuroanatomical point of view, empathic regulation processes are supported by connections among the orbitofrontal cortex, the medial prefrontal cortex, and the dorsolateral prefrontal cortex (Decety, 2011), which are also mobilized in other circumstances that require cognitive control.

Some studies have explored whether empathy is supported by cognitive control and self-regulation skills. Valiente et al. (2004) found a relationship between EC, dispositional empathy, and situational empathy and discomfort in children aged between 4 and 8 years exposed to video segments. They found that EC was negatively correlated with personal discomfort and positively correlated with children's dispositional empathy. Eisenberg et al. (2007) obtained similar results in a longitudinal study with 6-year-old children assessed every two years, five times in total. In that study, high levels of EC were positively correlated with participants' empathic responses and negatively correlated with participants' impulsiveness.

There is abundant empirical evidence of the relationship between empathy, prosocial behavior, and social skills (Eisenberg, Eggum, & Di Giunta, 2010). This relationship has been found to persist throughout individuals' development. Eisenberg et al. (1999) published a study in which participants were assessed from the ages of 4 to 22 years, approximately. At

early ages, assessments were based on the observation of participants' prosocial behaviors with their classmates and information provided by parents about such behaviors and children's empathic skills. At later ages, the authors administered self-report questionnaires and obtained reports from classmates. Results showed a strong continuity in prosocial behavior over time and a close relationship between such behavior and empathy. Spinrad and Eisenberg (2009) also found that students who showed concern about the emotions of others and exhibited prosocial behaviors were better accepted by their schoolmates and more positively rated by adults.

There is currently a growing interest to identify whether the various components of empathy differentially influence social behavior (Batanova & Loukas, 2011). Caravita, Di Blasio, and Salmivalli (2009) found that the empathic concern of primary and secondary education students was positively correlated with helping behaviors toward victims of bullying, particularly among friends. By contrast, perspective taking in high-status students was associated in some cases with intimidating behaviors toward others. Jolliffe and Farrington (2006) conducted a study with secondary education students. They found that affective empathy, a construct that is equivalent to empathic concern but not to cognitive perspective taking, differentiated between abusive and non-abusive adolescents, regardless of sex. In that study, affective empathy was higher in non-abusive adolescents. Recently, Batanova and Loukas (2011) found that, in 14-year-old adolescents, high levels of empathic concern were negatively correlated with aggressive behaviors exhibited by them one year later. Perspective taking was positively correlated with subtle strategies of control and interpersonal dominance.

The studies described above suggest the existence of close relationships between EC on one side and empathy, academic performance, and social competence on the other. They

also highlight the importance of empathic processes in social behavior. However, much less is known about the possible relationships between EC and empathy in the simultaneous prediction of academic performance and interpersonal relationships. EC-related skills are likely to have a general effect on empathy. Yet, the relationship between empathy and academic performance and the mediating effect of EC predictions on interpersonal relationships are not clear.

Eisenberg et al. (2010) proposed two pathways of influence of control processes on academic performance. One pathway links them directly, while the other postulates that academic performance is indirectly influenced through social competence (see Figure 1 part A). On the one hand, effective control processes guarantee a good achievement of academic demands. On the other hand, relationships among peers and between students and teachers and the motivation to participate in school activities also lead to better academic performance when such cognitive control resources are present. Although empirical data (Valiente et al., 2011) confirmed the model in a longitudinal study with children aged between 6 and 12 years, it would be good to corroborate it at older ages or higher educational levels. The first years of secondary school play a key role in adolescents' socialization and future academic performance (Wentzel & Caldwell, 1997). Between the age of 10 and 12 years, interpersonal relationships increasingly revolve around the peer group and often prevail over family relations. At these ages, a great deal of emotional support comes from peers and personal identity becomes consolidated in the framework of these relationships (Parker & Asher, 1993). During adolescence, the relationships between EC, academic performance, and social competence may be different from those observed at earlier ages, particularly the influence of social competence on academic performance. The links between peer relationships and academic performance may be closer during childhood than at later stages.

Given the close relationships between EC and empathy as well as between empathy and prosocial behaviors and good interpersonal relationships, it seems appropriate to include empathy as another relevant construct in the prediction of such relationships. It is important to clarify whether the effects of EC on social competence require the presence of a high level of dispositional empathy or not. EC resources alone are likely to be insufficient to successfully predict social competence without the presence of empathy to link them to the interpersonal sphere.

The aim of this study was to test a predictive model of academic performance during adolescence (see Figure 1 part B). Based on the proposal made by Eisenberg, Spinrad et al. (2010), we expected EC to predict academic performance both directly and through the mediation of social competence. Our main goal was to verify whether peer judgments of both interpersonal preference and prosocial behaviors are positively correlated with academic performance during adolescence, as has been observed at earlier ages. We also hypothesized that the influence of EC on social competence is mediated by adolescents' dispositional empathy. Yet, as explained above, this relationship has been found to differ according to the affective and cognitive components of empathy (Batanova & Loukas, 2011; Caravita et al., 2009; Jolliffe & Farrington, 2006). We expected empathic concern to have greater predictive power than perspective taking. The following measures were obtained to test the model: self-report measures of EC and empathy, measures of social competence provided by classmates, and academic performance, computed from teachers' reports and participants' mean grades at the end of the school year (8 months after assessing EC and empathy).

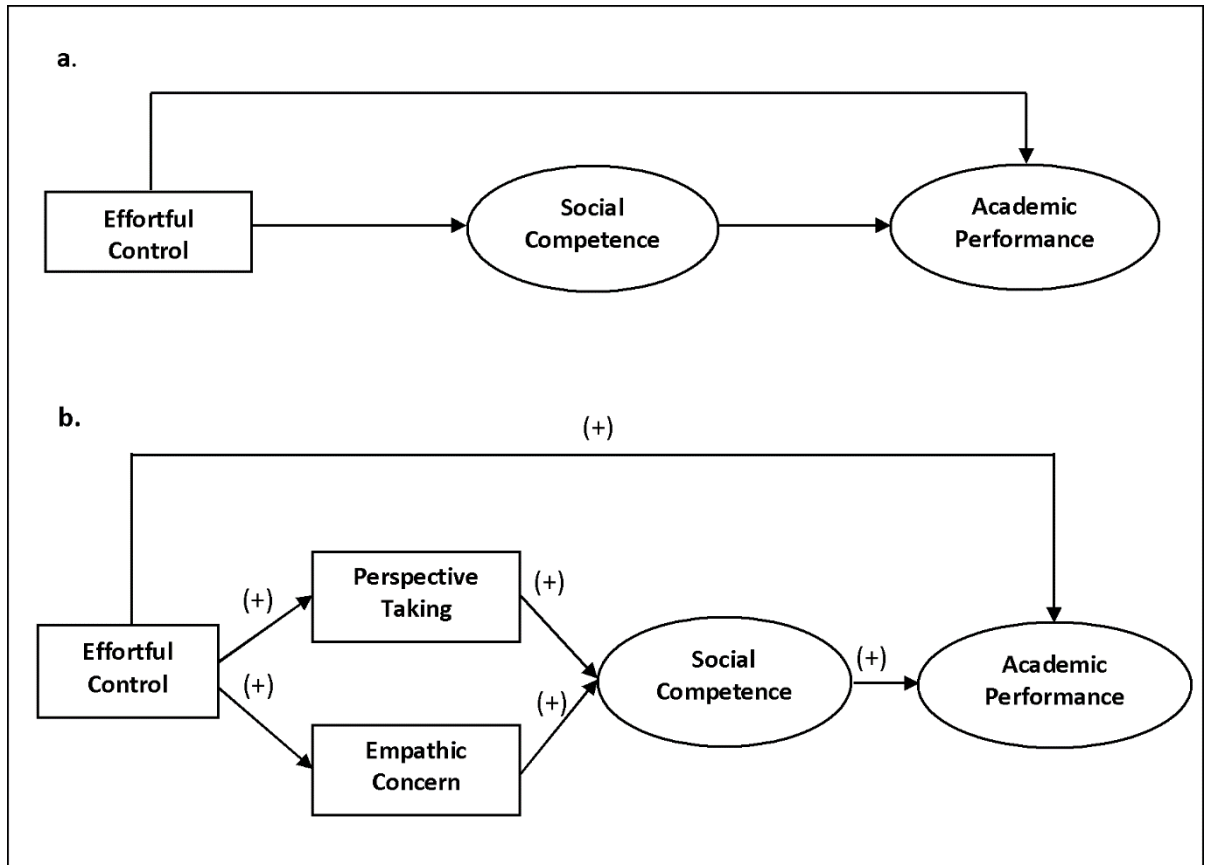


Figura 1. Proposal adapted from Eisenberg, Valiente, and Eggum (2010) on the positive relationships between Effortful Control, Social Competence, and Academic Performance (part A). Model verified in this study (part B) including Dispositional Empathy as a mediator of the influence of Effortful Competence.

It was decided to test the fit of the model with structural equation modeling (SEM). This method was expected to reveal the functional relationships among the variables and assess the equivalence between the covariance measures derived from the model and those obtained from the data (Bentler, 1988). The aim was not to use such results to draw causal relationships among the variables. Instead, we intended to use the pattern of relationships confirmed among the variables to learn more about the constructs present in the model and to formulate recommendations aimed at improving educational intervention.

METHOD

Participants

The sample consisted of 359 students (197 girls and 162 boys) attending four public secondary education schools in the city of Granada, Spain. Participant age ranged between 12 and 14 years. Mean age was 12.47 years ($SD = .73$) for girls and 12.50 years ($SD = .74$) for boys. Students came from families of medium to low socio-economic and cultural status. Participation was voluntary, with the consent of parents.

Questionnaires and measures

Effortful control. EC was evaluated using the Early Adolescence Temperament Questionnaire – Revised Self Report (EATQ-R self report; Ellis & Rothbarth, 2001), translated into Spanish by Checa et al. (2008). In the literature, this scale has been used with adolescent populations from the age of 10 (Ellis & Rothbart, 2001). The EATQ-R evaluates four factors of temperament in adolescents: ‘effortful control,’ ‘extraversion/surgency,’ ‘negative affect,’ and ‘affiliation.’ In this study, we used the total score of the 16 items that collected information about ‘effortful control’ ($\alpha = .69$), composed of three sub-factors: ‘activation control’ (e.g., “If I have a hard assignment to do, I get started right away”), ‘attention’ (e.g., “It is easy for me to really concentrate on homework problems”), and ‘inhibitory control’ (e.g., “I can stick with my plans and goals”). Items were rated on a Likert scale from 1 (almost always untrue of you) to 5 (almost always true of you). In the present study, internal consistency ($\alpha = .73$) was similar to that reported in previous studies (Valiente et al., 2008).

Empathy. Empathy was assessed with the Spanish adaptation (Mestre Escrivá, Frías Navarro, & Samper García, 2004) of the Interpersonal Reactivity Index (IRI) (Davis, 1983). This is one of the scales most widely used in the literature as a measure of dispositional empathy.

It includes 28 items grouped into four sub-factors: empathic concern, perspective taking, fantasy, and personal distress. As in previous studies (Batanova & Loukas, 2011; Gini, Albiero, Benelli, & Altoè, 2007), the present study included scores of perspective taking and empathic concern, the two dimensions that provide the most accurate and direct measurement of empathic resources. The factors fantasy and personal distress have sometimes led to ambiguous interpretations and show low correlations with behavioral and brain activation measures (Decety & Lamm, 2009). Empathic concern evaluates whether an individual responds affectively to the emotional experience of others (“I often have tender, concerned feelings for people less fortunate than me”). Perspective taking provides information about individuals’ cognitive ability to see something from someone else’s perspective in everyday situations (“I try to look at everybody’s side of a disagreement before I make a decision”). Items were rated on a Likert scale from 1 (does not describe me well) to 5 (describes me very well). In the Spanish version, Mestre Escrivá et al. (2004) confirmed the factor structure reported by Davis (1983), with internal consistency indices (Empathic Concern: $\alpha = .65$; Perspective Taking: $\alpha = .56$) that were similar to those of the present study (Empathic Concern: $\alpha = .59$; Perspective Taking: $\alpha = .63$).

Prosocial behaviors. Following the proposal made by López Sánchez (2006), an adapted sociogram was used to obtain information about students’ prosocial behaviors. Each participant evaluated the extent to which his/her classmates helped him/her in various situations (i.e., schoolwork, sadness or concern, conflict with other schoolmates). Responses were provided on a Likert scale from 1 (not helpful) to 5 (very helpful).

Social preference. This variable was assessed using the following sociometric procedure: from their class list, students selected the three classmates they would most like

to carry out various school or leisure activities with and the three classmates they would least like to carry out these activities with. Following the method proposed by Newcomb, Bukowski, and Patte (1993), each participant's number of positive and negative nominations was divided by the number of students in his/her class. The index of social preference was obtained by subtracting the adjusted score of negative nominations from that of positive nominations. To reduce the number of decimals, 10 was added to the result.

Academic skills. Teachers completed the *Escala de Valoración del Profesor I-S* (I-S Teacher Assessment Scale) (Clemente Carrión, Albiñana Hernández, & Doménech Gregori, 1999), composed of 24 items assessing students' Socialization, Respect for Authority, and Intelligence. Each teacher rated his/her students on a scale from 1 (minimum) to 10 (maximum). This study only includes the measures of the sub-factor Intelligence, which assesses teachers' perception of their students' academic skills and school readiness (e.g., "their ability to implement what has been learned"). The internal consistency of this factor was very high both in the study sample ($\alpha = .98$) and that initially used for the original validation of the questionnaire.

Mean grades. Academic performance was measured by calculating each student's mean grades in June, at the end of the school year. The remaining measures were obtained about 8 months earlier during the same school year.³

³ To verify that the mean grade was a consistent index of performance that did not fluctuate depending on the school or the teachers, direct scores in each subject were transformed into a z scale and the mean grade was obtained in this scale. Correlations between the mean of the direct grades used in the study and the mean grades on the z scale were .843. Moreover, the correlations between grades in some subjects such as Natural Science (.889), Social Science (.866), Spanish (.869) and Math (.875) transformed into the z scale and direct mean grades of all subjects were also very high.

Procedure

Participants were given a booklet in which the self-report questionnaires were presented in random order. They were informed that the data would be treated confidentially and were given verbal and written instructions on how to complete each questionnaire. The booklets were completed during school hours in a group session that lasted about 40 to 50 minutes in the first term of the school year (October and early November). At the end of the school year, the school management provided a list the final grades of each participant and the teacher responsible for each class completed the scale that assessed students' academic skills.

RESULTS

Preliminary analyses

Participants' means and standard deviations for each variable are shown in Table 1. Results of the correlation analysis among them are shown in Table 2. EC was positively correlated with all the other variables, although the highest correlation was found with academic performance and the lowest correlation was found with the index of social preference. Empathy scores also showed positive relationships with academic performance and peer judgments of prosocial behavior. Such judgments and social preference scores were also positively correlated with academic performance scores. As expected, a positive high correlation was found between students' mean grades and their academic skills as rated by their teachers. These correlation patterns suggested that it was appropriate to test the mediation relationships proposed in the model.

Table 1. Means and standard deviations of the measures obtained in the study as a function of gender

Variables	Girls		M	Boys	
	M	SD		SD	SD
Effortful control	10.64	1.64	10.36	1.52	
Perspective taking	23.89	4.78	21.59	4.44	
Empathic concern	25.67	5.20	22.98	4.54	
Prosocial behavior	3.23	.66	2.92	.65	
Social preference	10.03	.12	9.99	.15	
Mean grades	6.43	1.83	5.75	1.73	
Academic skills	6.94	2.18	6.16	2.24	

Table 2. Pearson correlations among the measures obtained in the study

Variables	2	3	4	5	6	7
1. Effortful control	.31**	.20**	.22**	.24**	.41**	.36**
2. Perspective taking		.51**	.19**	.07	.21**	.22**
3. Empathic concern			.22**	.12*	.23**	.23**
4. Prosocial behavior				.52**	.44**	.39**
5. Social preference					.28**	.24**
6. Mean grades						.87**
7. Academic skills						-

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

Evaluation of the models

The predictions of the model were tested with structural equation modeling (SEM) using the AMOS statistical package, version 18.0. The high positive correlations found between students' mean grades and their academic skills as rated by their teachers justified the creation of a latent variable for Academic Performance. Applying the same criterion, another latent variable was created for Social Competence, composed of peer judgments of prosocial behavior and the index of social preference. Moreover, given that Perspective Taking and Empathic Concern are related factors of empathy, a single multidimensional construct, and their measure errors may be related, we added a covariance between the error terms of these variables. The Kolmogorov Smirnov (K-S) test was performed for each of the variables in the model to determine whether the assumption of normality was met. All values were non-significant, which indicates that the assumption was met.

Results of the analysis of Model 1 indicated adequate fit, $\chi^2 = 98.826$, $df = 10$, $p = .001$; $\chi^2/df = 9.887$; $RMSEA = .158$ ($PCLOSE = .000$), $CFI = .902$, $NFI = .893$. As expected, a significant relationship was found between the error terms of Perspective Taking and Empathic Concern. As hypothesized, EC positively and significantly predicted Academic Performance ($\beta = .33$, $p < .001$), Perspective Taking ($\beta = .31$, $p < .001$; $R^2 = .10$), and Empathic Concern ($\beta = .20$, $p < .001$; $R^2 = .04$). The prediction that Social Competence would influence Academic Performance was confirmed ($\beta = .43$, $p < .001$). Students whose prosocial behaviors were positively rated by their peers and who were chosen by them to perform various school-related activities had higher Academic Performance. In addition, the predictive relationships of the model revealed the influence of Empathy on Social Competence. Social competence was predicted by students' Empathic Concern ($\beta = .20$, $p < .005$) but not by Perspective Taking, the cognitive

dimension of empathy ($\beta = .11$). In Model A, EC and dispositional empathy predicted 7% of the variance in Social Competence, which in turn predicted 32% of the variance in Academic Performance.

The evaluation of the model's modification indices suggested a possible direct relationship between EC and the components of the latent variable Social Competence. EC is likely to influence Social Competence not only indirectly through the mediation of empathy but also directly. As explained in the introduction, numerous studies have provided evidence of the positive relationship between EC on one side and social skills and a decrease of behavioral problems among children and adolescents on the other (Eisenberg, Spinrad et al., 2010). Students with high levels of EC are likely to have better school adjustment and be more positively rated by their peers. For these reasons, a parameter considering the direct influence of EC on Social Competence was included in Model 2. Results of the analysis confirmed that EC directly predicted Social Competence ($\beta = .19, p < .005$), Empathic Concern ($\beta = .20, p < .001; R^2 = .04$), and Perspective Taking ($\beta = .31, p < .001; R^2 = .04$), and Academic Performance was still influenced by EC ($\beta = .31, p < .001$) and Social Competence ($\beta = .42, p < .001$) (see Figure 2). In addition, they showed a better fit of the model, $\chi^2 = 6.034, df = 9, p = .736; \chi^2/df = .670; RMSEA = .000 (PCLOSE = .972), CFI = 1.000, NFI = .993$, which explained 10% of the variance in Social Competence and 34% of the variance in Academic Performance. A comparison of the models using the chi-square difference test, $\Delta\chi^2 = 10.674, p < .001$, confirmed that Model 2 had better goodness-of-fit indices. Both models were also compared using the Akaike information criterion (AIC, Akaike, 1974). The second had a lower AIC than the first one, which shows it had a better fit.⁴

⁴ In this model, predictions of Perspective Taking and Empathic Concern on Social Competence were independent. These two measures had moderate reliability, partly because of the formative nature of the scales.

Finally, given the direct influence of EC on Social Competence and the low predictive power of the latter on Perspective Taking and Empathic Concern, we wanted to verify whether the predictive power and fit of the model were adequate when the relation between EC and dispositional empathy was not considered. Consequently, the correlation parameters between EC and the measures of dispositional empathy were removed from Model 3. Results of the analysis showed inadequate fit indices, $\chi^2 = 42.755$, $df = 11$, $p = .001$; $\chi^2/df = 3.887$; $RMSEA = .090$ ($PCLOSE = .010$), $CFI = .965$, $NFI = .954$, $AIC = 90.755$, confirming the need to maintain the relationship between EC and dispositional empathy.

In short, Model 2 (see Table 3) had the best fit indices. The hypothesis that EC has a positive influence on Academic Performance both directly and indirectly through the mediation of Social Competence was confirmed in this model. In addition, EC seems to influence Social Competence both directly and through the mediation of Empathic Concern (see Figure 2).

Table 3. Fit indices for each model assessed with structural equation modeling

	χ^2	Df	CFI	NFI	RMSEA	AIC	$\Delta\chi^2$
Model 1	16.71	10	.99	.98	.04	66.71	10.67*
Model 2	6.03	9	1.00	.99	.00	58.03	
Model 3	42.75*	11	.96	.95	.09	90.75	36.72*

Note. df = Degrees of freedom; CFI = Comparative Fit Index; NFI = Bentler-Bonett Normed Fit Index; $RMSEA$ = Root Mean Square Error of Approximation; AIC = Akaike information criterion. $\Delta\chi^2$ decrease in Model 2 compared to models 1 and 3, respectively.

* $p < .05$.

Therefore, to ensure the consistency of the prediction of Empathy on Social Competence, a latent variable was created for empathy, composed of these two measures. The results of the analysis also confirmed the adequate fit of the model, $\chi^2 = 10.58$, $df = 10$, $p = .39$; $\chi^2/df = 1.05$; $RMSEA = .01$ ($PCLOSE = .88$), $CFI = .99$, $NFI = .98$.

To assess the mediation of Empathic Concern, we assessed the indirect conditional effect of EC on Social Competence using the bias corrected and accelerated (BCa) Bootstrapping method with 2000 resamples (Preacher & Hayes, 2008). The effect of EC on Empathic Concern (*a path*) was $\beta = .64, p < .001$, the direct effect of Empathic Concern on Social Competence (*b path*) was $\beta = .03, p < .001$, the total effect of EC on Social Competence (*c path*) was $\beta = .12, p < .001$, and the direct effect of EC on Social Competence (*c' path*) was $\beta = .09, p < .005$. The Sobel test, which assumes normality for indirect effects, indicated significant values for the *ab path*, $z = 2.45, p < 0.01$, whereas the BCa method obtained a significant confidence interval, between 0.009 and 0.04 (95%). These results suggest the existence of partial mediation. Although the total effect was low, it remained significant when controlled by the mediator. This confirms that EC has direct and indirect effects (mediated by Empathic Concern) on the prediction of Social Competence in adolescents.

A multi-group SEM was performed to assess whether gender was a moderator in Model 2. This was done because some differences were found between the mean scores of boys and girls and there is controversy about the influence of gender on academic performance (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). We computed another model where we forced the loadings of each factor, regressions, and covariates so that they would be the same in both groups. There is no moderation if an equivalence is found between boys and girls (Byrne, 2001). The resulting model showed adequate fit, $\chi^2 = 31.280, df = 28, p = .305; \chi^2/df = 1.117; RMSEA = .018 (PCLOSE = .974), CFI = .996, NFI = .965$. The difference in χ^2 (15.711), with 10 degrees of freedom, was not significant ($p = .108$), which shows that the proposed model is fit both for girls and boys between 12 and 14 years.

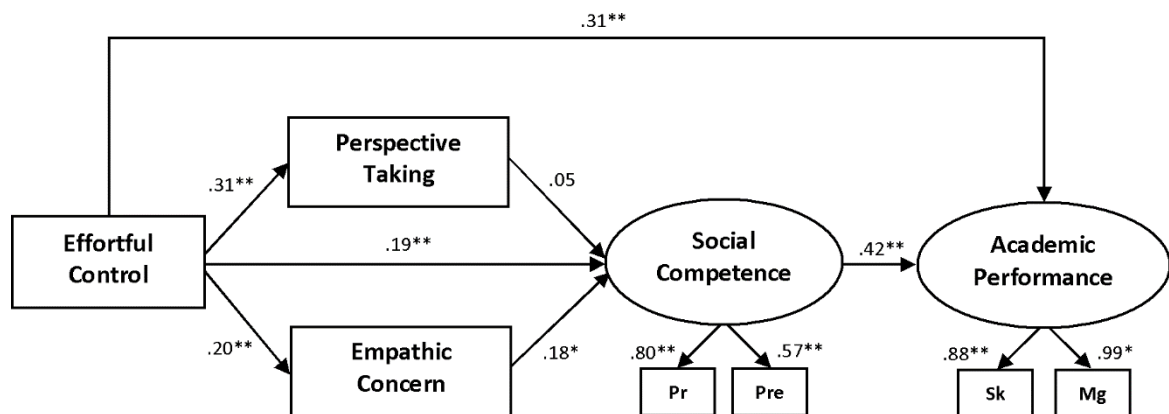


Figura 2. Verified structural equation model considering the influence of Effortful Control, Empathic Concern, Perspective Taking, and Social Competence on Academic Performance. $\chi^2 = 6.03$, $df = 9$, $p = .74$; $\chi^2/df = .67$; $RMSEA = .000$ ($PCLOSE = .97$), $CFI = 1.000$, $NFI = .99$. The model explained 34 % of the variance in Academic Performance.

DISCUSSION

Results confirmed the influence of cognitive control processes on academic skills and performance (Eisenberg, Valiente, & Eggum, 2010; Rueda et al., 2010). Most research in this area has focused on children or has taken the form of longitudinal studies with children from 6 to 12 years (Valiente et al., 2011), neglecting older ages or higher education levels. One of our main objectives was to find out whether EC remains a direct determining factor on the academic performance of adolescents from 12 to 14 years attending secondary education. This was confirmed by our results. We also wanted to explore whether the indirect influence of EC through social competence is mediated by dispositional empathy. This hypothesis was also confirmed.

The relationship between voluntary control of behavior and good academic performance in adolescents may be the result of two factors: EC promotes the skills needed for good learning but also encourages behaviors that facilitate an adequate response to academic demands. Attentional control, one of the components of EC, promotes the cognitive

processes that are necessary for good learning. Students' ability to focus on the relevant aspects of academic contents as well as their flexibility when manipulating mental representations and performing complex reasoning tasks is likely to facilitate their understanding and performance at school (Rueda et al., 2010).

Attentional control is known to influence cognitive processes that are key for learning. In addition, we also believe adolescents high in EC have good academic performance because they have good academic habits and ongoing motivation for achievement. It should be noted that the present study not only assessed academic performance using students' mean grades but included a measure of the teacher's opinion on each student's academic skills. This ensured a broader and multi-dimensional assessment of academic performance, as recommended in this type of studies (Eisenberg, Valiente et al., 2010). In the questionnaire, the teacher reported whether the student paid attention in class, did his/her homework, and had a good disposition for learning, among other issues. Results showed a positive correlation between EC and all these behaviors. Activation control and inhibitory control, two components of EC, are key for students to be able to organize, plan, and maintain the behaviors that contribute to good learning and performance, and to inhibit their tendency to exhibit distractive behaviors. The literature has reported that students with adequate EC levels respond positively to school demands, use better learning strategies (Cermakova et al., 2010), participate in class, and are more committed to school (Eisenberg, Valiente et al., 2010; Valiente et al., 2008). By contrast, students low in EC often cannot adapt to the rules and functioning of schools, increase the negative perception of their performance, lose motivation, and exhibit disruptive behaviors (Eisenberg, Valiente et al., 2010).

As hypothesized, supporting the model proposed by Eisenberg et al. (2010), we obtained evidence that the effect of EC on academic performance is not only direct but also

indirect and mediated by social competence. Recent studies with children have confirmed that EC leads to better academic performance by improving students' interpersonal relationships with peers and teachers and increasing their participation in class (Valiente et al., 2008). Our study obtained evidence that, during early adolescence, EC also predicts prosocial behaviors and peer acceptance and social competence also plays a relevant role in the prediction of academic performance. Control resources are likely to facilitate the compliance of relationship rules of the peer group and the school itself, contributing to maintaining the links between adolescents and academic interest. Our results agree with those of other studies (Wentzel, 2003) that have shown a better performance in students who are accepted and feel they are members of the peer group than those who are ignored or rejected. Group exclusion or problems with peer relationships can have a negative influence on students' interest and participation in class, reducing their academic motivation.

Our results partially confirm the prediction that dispositional empathy mediates the effect of EC on social behavior. The model with the best fit showed a direct influence of EC on social competence and an indirect influence mediated by empathy. The fit disappeared when the relationship between EC and empathy was not considered (Model 3). This shows the need to consider the relationship between EC and dispositional empathy in the prediction of students' social behavior. This relationship confirms that control and empathic processes are jointly mobilized in the interpersonal domain (Decety & Svetlova, 2012; Eisenberg et al., 2007; Lamm, Batson, & Decety, 2007). Emotional self-regulation may also be of great relevance in this framework of relationships (Eisenberg & Eggum, 2009; Lamm et al., 2007). Future studies should provide more insight on this matter.

As hypothesized and in accordance with previous studies (Caravita et al., 2009; Gini et al., 2007), empathic concern was found to significantly predict social competence, whereas

perspective taking did not. The ability to adopt the perspective of others and understand their affects does not necessarily lead to prosocial behaviors (Jolliffe & Farrington, 2006; Batanova & Loukas, 2011). These results should be used when developing intervention strategies to prevent violence and bullying. Promoting only the cognitive elements of empathy without getting students to experiment emotional states does not seem to be enough to foster non-violent or prosocial behaviors.

Results indicate that predictive relationships are not moderated by gender. Data on EC were similar to those obtained by Valiente et al. (2011). These authors also found that the effect of EC on academic performance and social competence was independent of student gender. As regards empathy, the literature has often attributed greater empathic resources and a closer relationship between dispositional empathy and prosocial behavior to older girls (Wentzel et al., 2009). This data pattern was also observed in our sample. Girls obtained slightly higher scores in empathy and prosocial behavior than boys. However, the model was not moderated by this variable. Relationships among empathy, interpersonal behavior, and gender are complex (Decety & Svetlova, 2012). Different results have been reported depending on the age of participants and the method use to assess empathy (Garaigordobil, 2009) or the relevant interpersonal behavior measured. Jolliffe and Farrington (2006) found that adolescent girls with low empathy scores exhibited indirect bullying behaviors, but this relationship was not observed in boys. In boys, lower affective empathy resources were associated with direct physical or verbal abuse. From a practical perspective, this finding suggests that interventions aimed at strengthening positive interpersonal relationships among adolescents should be based on promoting empathy, particularly its affective elements, but also general behavioral control skills. Among boys, who usually have more

limited empathic resources than girls, activities and habits aimed at consolidating these control processes would be particularly valuable.

One of the limitations of our study is the fact that the EC and empathy measures were only assessed with self-reports. As far as possible, these processes and skills should be assessed with behavioral measures and information provided by peers, family members, and/or teachers to ensure they have greater validity and robustness. In any case, the correlation patterns among these measures and between them and measures of academic performance and social competence as well as the results of the models compared granted them considerable robustness.

Results of this study can be useful to design intervention programs aimed at improving academic performance and school cohabitation. Given the relevance of EC in the prediction of academic performance, we recommend that students with attention difficulties receive training to strengthen attentional control and executive functions. Various studies have found improvements in concentration and intelligence after such interventions (Klingberg, Forssberg, & Westerberg, 2002). Moreover, training should begin at an early age (Rueda et al., 2004). As discussed by Posner and Rothbart (2005), the executive attention network plays a key role in school activities and demands. Yet, this relationship often goes unnoticed. Families and teachers should systematize and adjust their demands to ensure that, from an early age, children start to develop the habits and skills that make up the executive functions and provide individuals with the necessary resources to tackle school demands successfully.

Furthermore, the relationship between EC and empathy and the influence of both on social competence and of the latter on academic performance suggest that interventions that address these three areas are better than those restricted to one of them. Self-regulation

should be promoted not only from an intra-individual approach but also in social situations that allow including empathic processes and interpersonal demands (Wentzel, Baker, & Russell, 2009). Social behavior and personal objectives gradually develop around the acquisition of solid and stable moral criteria based on the ability to understand one's own emotions and thoughts as well as those of others (Eisenberg, 2000). Experiences of blame and shame and their good management in the interpersonal domain and play a key role in regulation of social behavior, compliance with regulatory frameworks, and the prevention of violent behaviors (Tangney, Stuewig, & Mashek, 2007) and require empathic processes. Individuals' ability to manage emotional and behavioral responses in harmony with the needs of others and the compromises of being part of a group are necessary to achieve the "moral reciprocity" required for a peaceful coexistence (Ortega, 2007).

Programs specifically aimed at promoting empathy and self-regulation (Solomon, Battistich, Watson, Schaps, & Lewis, 2000; Spinrad & Eisenberg, 2009) have sometimes been opposed to those that recommend more comprehensive educational actions addressing these issues as well as academic ones (Eisenberg et al., 2010). Our results suggest that a framework of positive interpersonal relationships and a good atmosphere in class and at school contribute to good academic performance. Schools should systematically try to ensure the academic curriculum is met and promote a good social climate that facilitates its achievement. It seems unnecessary to focus concerns exclusively on progress in declarative knowledge about the various subjects. It is also important to provide spaces and resources for socio-emotional learning. This can accommodate recent concerns about the acquisition of emotion understanding and regulating skills as well as more traditional activities dealing with academic motivation, democratic management of rules and values, and regulation of interpersonal conflict (Acosta, 2008b).

Finally, the results of the study support the development of educational actions promoting the use of autonomy, independence, and self-control resources to maintain a positive framework of interpersonal relationships and social climate in the classroom and promote good academic performance as well.

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Sección 2

Funciones Ejecutivas-Effortful, Empatía y Comportamiento Social

Capítulo 5

The Influence of Effortful Control and Empathy on Perception of School Climate

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ABSTRACT

The purpose of this study was to determine the predictive power of effortful control (EC) and empathy for perception of school climate. Self-report measures of EC, dispositional empathy, and perception of school climate were obtained for 398 students (204 females) aged 12 to 13. Sociometric status was peer-evaluated, and academic achievement was based on students' final grades at the end of the school year. The structural equation model that was developed confirms the influence of EC and empathy on perception of school climate. The model manages to explain 39% of the variance in perception of school climate, and confirms that for males and females alike the predictive power of EC and empathy is greater than for other variables studied such as academic achievement and sociometric status. Further, EC and empathy are found to have a positive influence on academic achievement. The importance of developing activities to foster EC and empathy in order to facilitate interpersonal relationships and enhance perception of the school climate is discussed.

Keywords: effortful control, empathy, academic performance, peer relationships, school climate.

INTRODUCTION

Knowledge of the factors that foster a good social climate in schools is a subject of great interest in most western countries (Díaz-Aguado Jalón et al. 2010; Thapa et al. 2012). The perception of a positive school climate is related to lower levels of aggression and violence in schools (Goldstein et al. 2008; Meyer-Adams and Conner 2008), reduces behavioural problems (Wang 2009; Loukas and Murphy 2007; Loukas and Robinson 2004), enhances academic achievement (Jia et al. 2009; Wang and Holcombe 2010), and facilitates a student's learning and healthy development (Thapa et al. 2012). It is not surprising, therefore, that education professionals are implementing classroom and school activities that ensure a positive school climate.

The definitions of school climate have been heterogeneous. School climate is defined by the perceptions of the school interpersonal relationships and the organizational framework, norms, and values that regulate such relationships (Cohen et al. 2009). Reviews by Tapha et al. (2012) and Zullig et al. (2010) relate climate to order, safety, and discipline; positive social relationships; efficient teaching and learning strategies; and personal identification with the school. This multidimensional nature of the concept is also found when identifying the factors that influence school climate. From an organizational point of view, specific socio-demographic characteristics related to a positive or hostile school climate have been analyzed. On a more psychological level, individual student or teacher characteristics, which co-vary with improvement or deterioration of the climate, have been studied (Fan et al. 2011). Research has shown that both socio-structural and individual factors affect the perception of school climate, although the latter are more relevant (Vieno et al. 2005). In this

paper, we investigate the predictive power of effortful control and empathy over the perception of school climate.

Social Adjustment, Academic Achievement and Perception of School Climate

Individual factors that are negatively related to perceptions of school climate include the frequency of aggressive behaviour and poor academic achievement (Suldo et al. 2008). The aggressive behaviour displayed by students (either as perpetrators or victims) predicts a negative perception of the psychosocial climate at their school (Meyer-Adams and Conner 2008). They see their school as less safe and feel less satisfied with its social climate than students who do not undergo such aggressive experiences (Goldstein et al. 2008). As regards academic performance, Fan, Williams, and Corkin (2011) reported that students repeating a grade or students with behavioural problems, perceived teacher-student relationships less positively. Further, students with behavioural problems also perceived school rules of coexistence and discipline as less fair and clear.

These individual characteristics, which affect the perception of school climate negatively, coincide with those that predict difficulties in school adjustment. Aggressiveness, behavioural problems and poor academic achievement are major obstacles to students adjusting well to school demands (Eisenberg et al. 2010c) and lead to conflicts with peers and teachers (Nurmi 2012). The question is whether the variables that are positively related to academic achievement and social behaviour also positively predict perceptions of a good social climate. Several studies have found positive relationships between effortful control (EC) and empathy, and academic achievement and social adjustment (see reviews Rueda et al. 2010; Eisenberg et al. 2010c; Liew 2011; Fernández-Vilar and Carranza 2012). It is possible that these individual factors are also positively related to the perception of a good school climate.

EC, Empathy and Perception of School Climate

EC is a basic dimension of the temperament that mediates voluntary control over behaviour and the regulation of emotional reactivity (Derryberry and Rothbart 1997). EC is related to the efficiency of executive attention to shift and focus attention (attentional control), inhibit inappropriate behaviours (inhibitory control) and activate or implement an action when there is a strong tendency to avoid such action (activation control). It is also associated with information integration and action planning (Eisenberg et al. 2010c; Diamond 2013). Longitudinal studies have shown that the EC measure of first-grade students predicts literacy achievement two years later (Liew et al. 2008). Further, low EC levels are linked to high levels of impulsiveness, aggressiveness, and disruptive behaviour four years after the initial evaluation (Eisenberg et al. 2009). In adolescents, Checa, Rodríguez-Bailón and Rueda (2008) reported that students who have better control resources also attain higher levels of academic achievement, particularly in mathematics, and are preferred by peers in sociometric tests.

Although there is abundant information on the positive relationship between EC and academic achievement (Eisenberg et al. 2010c), very few studies have focused directly on its influence on the perception of school climate. Silva et al. (2011) observed that EC is associated with positive attitudes to school in preschoolers. These authors suggest that children with a high level of EC have better relationships with their teachers, which duly fosters a positive attitude to school. Loukas and Robinson (2004) and Loukas and Murphy (2007) found that low EC levels increase the risk of behavioural problems in pre-adolescents, but positive perceptions of school climate (cohesion and satisfaction) protect them from this risk.

However, these studies do not specifically analyze whether EC predicts the perception of school climate, or whether there is some mediating factor in this relationship.

Empathy is another variable that has been positively related to school adjustment although it has been scarcely explored in studies on climate perception. Empathy is defined as a cognitive-emotional process that enables understanding of another's affective experiences (Decety and Svetlova 2012; Eisenberg et al. 1994). It encompasses affective, cognitive and emotion-regulating elements. Literature reports that empathy facilitates pro-social behaviour and good interpersonal adjustment (Rimé 2009; De Waal 2008). The ability to empathize has been linked to lower levels of relational aggression (Loudin et al. 2003) and to greater peer acceptance (Wentzel et al. 2007). Empathy is also closely related to EC. In a study on children aged 4 to 8, Valiente et al. (2004) reported that EC is positively related to dispositional empathy in children. Eisenberg et al. (2007) found similar results in a longitudinal research with children under 6 that were evaluated five times, every two years. The individual differences in the growth of EC were related to empathic concern in early and middle adolescence. Similarly, Zorza et al. (2013) found that EC positively predicts dispositional empathy among students aged 12 to 14, and empathy partially mediates the effect of EC on academic achievement.

Although there are few studies linking empathy to school climate, it is expected that empathy affects a student's perception of school climate positively. In one of the few studies which link empathy to social climate, Ruiz et al. (2009) observed positive co-variations between these two variables in adolescents aged 11 to 16. These authors postulate that the ability to empathize affects the perception of the school climate, given that it leads to better attitudes towards institutional authority and reduces violent behaviour among peers.

The Present Study

The purpose of this study is to determine the influence of EC and dispositional empathy on school climate perception among students starting secondary education. We predict that EC and dispositional empathy facilitate a positive perception of school climate (see Figure 1), and we wish to determine whether these relationships are due to (a) the positive influence of EC and empathy on academic achievement and peer relationships (sociometric status), (b) the direct influence of EC and empathy on climate, or (c) both a and b. In addition, we will contrast if the relations between academic achievement and school climate could be reversed (Jia et al. 2009).

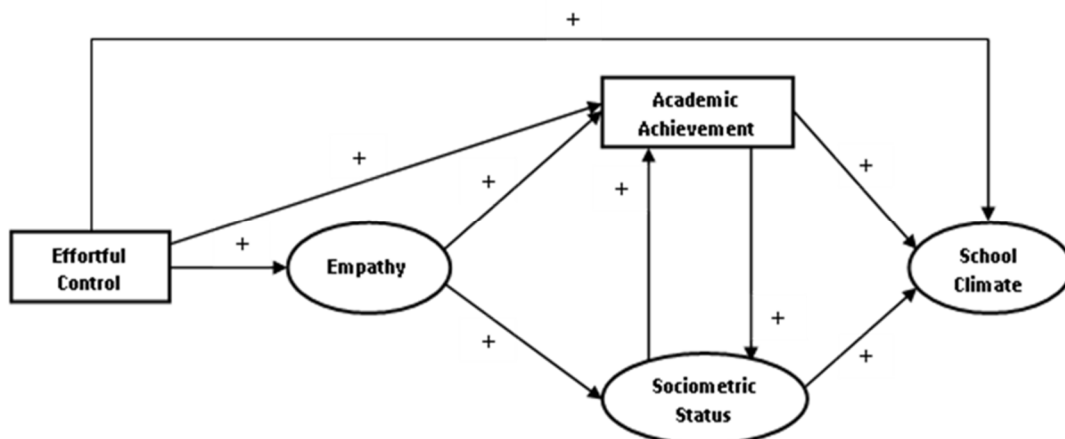


Figure 1. Conceptual model of the influence of effortful control and dispositional empathy on perception of school climate, mediated by academic achievement and sociometric status.

Further, given that the literature points to gender differences in academic achievement (Valiente et al. 2008) and in other variables included in the model (Wentzel et al. 2007), we wish to determine whether the predictive power of EC and empathy for school climate is the same in males as in females. Confirmation of these predictions will increase our knowledge on the individual factors that determine perception of a positive school climate.

METHOD

Participants

Participants comprised 398 students (204 females, 190 males) aged 12 to 13, from four state secondary schools (school A = 95, school B = 102, school C = 98, school D = 103) in the city of Granada (Spain); the mean age was 12.47 ($SD = 0.73$) for females, and 12.50 ($SD = 0.74$) for males. The socio-economic status of families (levels of parental education and income) attending the four schools was similar, i.e. middle-low. The majority of the students were Caucasian children, born in Spain; only 15% were Latin American immigrants. Participation was voluntary, and parental consent was obtained. Thirty-two participants were excluded (14%) from the analysis because they did not complete all the questionnaires.

Questionnaires and Measurements

Effortful control. EC was assessed using the *Early Adolescence Temperament Questionnaire–Revised Self-Report* (EATQ-R self report; Ellis and Rothbart 2001), translated into Spanish by Checa et al. (2008). This scale has been used in the literature with adolescent populations aged 10 and over (Ellis and Rothbart 2001). The EATQ-R measures four factors of temperament in adolescents: effortful control, extraversion/surgency, negative affect and affiliation. In this study, we used the total score of the 16 items designed to obtain information on effortful control ($\alpha = .72$), comprising three sub-factors: activation control (e.g., “If I have a hard assignment to do, I get started right away”); attentional control (e.g., “It is easy for me to really concentrate on homework problems”); inhibitory control (e.g., “I can stick to my plans and goals”). Items were rated on a Likert-type scale ranging from 1 (almost always untrue of you) to 5 (almost always true of you). In this study, internal consistency ($\alpha = .73$) was similar to that reported in previous studies (Valiente et al. 2008).

Empathy. Empathy was measured using an adapted Spanish version (Mestre Escrivá et al. 2004) of the *Interpersonal Reactivity Index* (Davis 1983), which assesses dispositional empathy using 28 items divided into four sub-factors: empathic concern, perspective taking, fantasy, and personal distress. This study includes the scores for perspective taking and empathic concern, the two dimensions that provide the most accurate and direct information on empathic resources (Decety and Lamm 2009). Empathic concern evaluates whether a person responds affectively to another's emotional experience ("I often have tender, concerned feelings for people less fortunate than me"). Perspective taking provides information on the cognitive capacity to look at everyday situations from another point of view ("I try to look at everybody's side of a disagreement before I make a decision"). Items were rated on a scale ranging from 1 (does not describe me well) to 5 (describes me very well). In the Spanish version, Mestre Escrivá et al. (2004) confirmed the factor structure identified by Davis (1983), with similar internal consistency indices to those in this study (Empathic Concern: $\alpha = .68$; Perspective Taking: $\alpha = .72$).

Academic achievement. The grade point average (GPA) of each participant, at the end of the course, was included as a measure of academic achievement. The GPA was calculated on grades obtained in the following subjects: Mathematics, Spanish Language, Foreign Language (English), Social Studies (History), Science (Biology), Physical Education, and Drawing/Music. Grades for each subject may vary on a scale from 0 to 10. A student is considered to have passed a subject when their grade is 5 or higher. This achievement scale is not biased by the teacher/school awarding the grade. The correlation between the mean raw score used in this study and the mean grade obtained after transformation to a z-score was .84.

Sociometric status. Sociometric status was evaluated using a sociometric procedure and a prosocial behaviour rating scale. In the *sociometric procedure* (Rodríguez Pérez 2005), each student selected three peers from a list of their classmates with whom they were willing to do school or recreational activities, and likewise, three classmates with whom they would not like to do these activities. The number of positive and negative nominations for each student was divided by the number of students in the class to obtain group-size-adjusted absolute scores. The final score on *social preference* was obtained for each student by subtracting the adjusted number of negative nominations from the number of positive nominations. Additionally, following the method proposed by Newcomb, Bukowski and Patte (1993), students were asked to evaluate each classmate on a single scale according to how much help they provided in different situations (doing assignments, when feeling sad or worried, and in conflict situations with other classmates). These assessments of *prosocial behaviour* were made on a Likert-type scale ranging from 1 (provides very little help) to 5 (provides a lot of help), and were standardized for each class.

Perception of school climate. To evaluate perception of school climate, the Questionnaire to Assess School Social Climate (Trianes et al. 2006) was distributed to participants. The questionnaire was constructed based on the items in the California School Climate and Safety Survey (Furlong et al. 2005). It includes a total of 14 items that are grouped into two factors, and rated on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The first factor assesses perceptions of helpful behaviour, respect, safety, and feeling comfortable at school (7 items, e.g., “People at this school care about each other”); the second factor assesses satisfaction with student-teacher relationships (7 items, e.g. “If I need help, my teachers help me”). Factor reliability in both cases was adequate (related to school, $\alpha = .73$; related to teaching staff, $\alpha = .77$) and was similar to that observed in previous

studies. Raw scores were transformed to z-scores in order to control the influence of the school variable.

Procedure

Booklets in which self-reports and sociometric questionnaires were presented in random order were distributed to students from the different class-groups participating in the study. Prior to distribution, participants were informed that any information provided would be treated confidentially and were given written and verbal instructions on how to complete the questionnaires. Self-reports and sociometric questionnaires were completed during the first term of the school year (in November), during a regular class period, in a 25-30 minute group session, supervised by this study's authors. At the end of the school year (in June of the following year), students completed the school climate scale. The GPAs for each participant were obtained from official school records.

RESULTS

Data analyses

First, a descriptive and correlational analysis of all variables was made. Then, the predictions proposed in the initial predictive model (Figure 1), and in the models subsequently developed, were tested with Structural Equation Modelling (SEM), using AMOS statistical software, version 18.0. Finally, a mediation and moderation gender analysis was made in order to attain a better understanding of the predictive variables. The script PROCESS (Hayes 2013) was used to evaluate mediations, using bootstrap method with 2000 resamples, and the OLS/ML method to calculate the confidence intervals (CI), set at 95%, and corrected following the "bias corrected" method. A multiple-group SEM analysis was performed to determine whether gender is a moderator in the model proposed for P-SC.

Preliminary analyses

Participants' means and standard deviations for each of the variables are shown in the first (females) and second (males) columns of Table 1. Results of the correlation analysis are shown in the third and following columns. It can be seen that EC is positively correlated to measures of empathy, academic achievement, prosociality, and perception of school climate. Scores on perspective taking are also positively correlated to academic achievement and school climate. Empathic concern is positively correlated to perspective taking, prosocial behaviour, social preference, and school climate. Lastly, academic achievement, prosocial behaviour and school climate are positively correlated. These correlation patterns suggested that it was appropriate to test the predictions proposed in the model.

Table 1. Means, standard deviations, and Pearson correlations among the measures obtained in this study

Variable	F	M	PT	EmC	AA	SP	PB	SC-S	SC-T
	M (SD)	M (SD)							
EC	10.20 (1.63)	10.24 (1.59)	.22**	.16**	.37**	.09	.17**	.36**	.36**
PT	21.69 (3.71)	21.22 (4.43)		.42**	.15**	.06	.09	.29**	.35**
EmC	24.44 (5.06)	22.58 (4.63)			.22**	.10**	.14**	.16**	.24**
AA	6.19 (1.75)	5.66 (1.75)				.29**	.39**	.23**	.26**
SP	.03 (.14)	.02 (.15)					.62**	.11**	.05
PB	3.06 (.54)	2.94 (.60)						.19**	.15**
SC-S	26.46 (6.48)	25.84 (6.00)							.62**
SC-T	21.36 (5.03)	21.59 (4.96)							-

Note. EC = effortful control; PT = perspective taking; EmC = empathic concern; AA = academic achievement; SP = social preference; PB = prosocial behaviour; SC-S: school-related social climate; SC-T: teacher-related social climate. * $p < .05$. ** $p < .01$

Considering that the correlations among the majority of sub-factors in each questionnaire were high, some latent variables were created to simplify the analysis. The high positive correlations between perspective taking and empathic concern suggested that a latent variable is created for empathy. Based on the same criterion, a further latent variable was created for perception of school climate (P-SC), composed of the perception of helpful behaviour among classmates and safety at school, and the perception of satisfaction in the teacher-student relationship. The third latent variable, sociometric status, was composed of the social preference index and the assessments of prosocial behaviour.

Predicting Perception of School Climate

The results obtained from the analysis of the initial predictive model, in which EC and empathy are related to P-SC, mediated by academic achievement and sociometric status, were not satisfactory, indicating poor model fit: $\chi^2 = 106.28$, $df = 15$, $p = .000$; $\chi^2/df = 7.09$; $RMSEA = .12$, $CFI = .87$, $NFI = .86$. However, model modification indices suggested the convenience of including a direct relationship of EC and empathy with P-SC. In the following two models, these two direct relationships were included successively. There is evidence that students with good EC resources are more respectful of school norms and respond more positively to school demands (Eisenberg et al. 2010c; Rueda et al. 2010). Therefore, it is possible that EC has a direct positive influence on perception of the school environment and on teacher-student relationships, without the need for mediation of academic achievement or sociometric status. As shown in Table 2, Model 2, which includes a direct relationship between EC and P-SC, shows a good fit and improves the fit indices of the first model. EC continued to have a direct influence on academic achievement ($\beta = .35$, $p < .001$), empathy ($\beta = .31$, $p < .001$), and a high predictive power for P-SC ($\beta = .41$, $p < .001$). When the direct

relationship between EC and P-SC was included, the prediction of academic achievement for P-SC decreased from $\beta = .27, p < .001$, (Model 1) to $\beta = .12, p < .05$, (Model 2), and prediction of social status for P-SC was similar ($\beta = .11, p < .10$).

Despite the good fit of the second model, modification indices continued to suggest a possible improvement from the inclusion of a direct effect of empathy on academic achievement and P-SC. As explained in the introduction to this paper, empathic abilities foster cooperation and intergroup relations (Eisenberg et al. 2010a; Hoffman 2008). It is possible that these abilities not only influence positive peer assessment, but also facilitate school adjustment and the establishment of positive student-teacher relationships, thus improving the perception of social climate. A direct relationship between empathy, P-SC and academic achievement was included in Model 3. Model fit, $\chi^2 = 17.52, df = 12, p = .13; \chi^2/df = 1.46; RMSEA = .03, CFI = .99, NFI = .97$, was better than for previous models (see Table 2). Empathy had a positive influence on academic achievement ($\beta = .15, p < .05$), and P-SC ($\beta = .41, p < .001$), although it no longer had a direct influence on sociometric status. In this model, the predictive value of EC for P-SC shifted from $\beta = .40$ to $\beta = .24 (p < .001)$; the effect of academic achievement decreased from $\beta = .12$ to $\beta = .07$, and that of sociometric status from $\beta = .11$ to $\beta = .06$. Significance was not reached in either case ($p > .05$).

Finally, the fourth model was tested. Academic achievement was predicted by school climate and sociometric status. There is evidence to suggest that the perception of positive relations between peers and teachers enhances academic achievement. The fit of the model was good, $\chi^2 = 23.23, df = 13, p = .039; \chi^2/df = 1.78; RMSEA = .04, CFI = .98, NFI = .97$, but lower than Model 3.

In summary, Model 3 includes direct relationships between EC and empathy, and P-SC, and manages to explain 39 % of their variance. Besides the aforementioned direct effects (see Figure 2), EC was observed to have an indirect predictive power of .16 for P-SC, making a total of .45. Empathy had a total predictive power of .42 for P-SC, showing a minimal direct relationship. When the direct effects of EC and empathy were taken into consideration, the influence of academic achievement and sociometric status on the P-SC decreased significantly. Overall, the third model enabled us to corroborate the positive influence of EC on empathy measures ($R^2 = .10$), and the prediction of both measures for academic achievement ($R^2 = .16$). Empathy and academic achievement predict sociometric status ($R^2 = .18$); however, contrary to expectations, the influence of sociometric status on academic achievement is not significant.

Table 2. Fit indices for each of the models assessed using structural equation analysis

	χ^2	Df	CFI	NFI	RMSEA	AIC	$\Delta\chi^2$
<i>P-SSC</i>							
Model 1	106.28	15	.87	.86	.12	164.28	-
Model 2	58.61	14	.94	.92	.09	118.61	47.67*
Model 3	17.52	12	.99	.97	.03	81.52	41.09*
Modelo 4	23.23	13	.98	.97	.04	85.23	-

Note. P-SSC = Perception of School Social Climate. Model 2 compared to Model 1; Model 3 compared to Model 2. The difference test χ^2 confirmed that Model 3 had better goodness-of-fit indices. The same result was obtained using the Akaike information criterion (AIC): Model 3 had the lowest values, which shows it had a better fit.

* $p < 0.01$

Mediation analysis

The model with the best fit contains mediations that require analysis in order to attain a better understanding of the predictive variables. In the third model (see Figure 2), there is a

direct effect of empathy on sociometric status, and a further indirect effect through the mediation of academic achievement that was not taken into consideration in our first model (mediation 1: empathy → academic achievement → sociometric status).

Furthermore, EC has a direct influence on academic achievement and through the mediation of empathy (mediation 2: EC → empathy → academic achievement). In mediation 1, EC was included as co-varied. The effect of empathy on academic achievement (a path) was $\beta = .16$, $p < .001$, $t = 3.15$ ($p < .001$, $df = 395$); the direct effect of academic achievement on sociometric status (b path) was $\beta = .37$, $p < .001$, $t = 7.33$ ($p < .001$, $df = 394$); the total effect of empathy on sociometric status (c path) was $\beta = .12$, $p = .027$, $t = 2.21$ ($p < .001$, $df = 394$); and the direct effect of empathy on sociometric status (c' path) was $\beta = .06$, $p = .23$, $t = 1.17$ ($p < .001$, $df = 394$). This resulted in a predictive model of the socio-metric status where $R = .39$, $R^2 = .15$, $F = 24.28$, $df = 395$, $p < .001$. The indirect effect of empathy through academic achievement was .061 (CI: 0.028 and 0.097). Results obtained from the Sobel test show significant values for path ab, $z = 3.59$, $p < .001$; the BCa method shows a significant confidence interval between 0.0006 and 0.002 (95%). Therefore, the influence of empathy on sociometric status was significantly mediated by academic achievement. Empathy positively influenced academic achievement, and those students with good school grades are the ones more selected by their peers.

In mediation 2, the effect of EC on empathy (a path) was $\beta = .23$, $p < .001$, $t = 4.72$ ($p < .001$, $df = 395$); the direct effect of empathy on academic achievement (b path) was $\beta = .34$, $p < .001$, $t = 7.24$ ($p < .001$, $df = 395$); the total effect of EC on academic achievement (c path) was $\beta = .49$, $p < .001$, $t = 10.24$ ($p < .001$, $df = 395$); and the direct effect of EC on academic achievement (c' path) was $\beta = .37$, $p < .001$, $t = 8.10$ ($p < .001$, $df = 395$). This resulted in a

predictive model of academic achievement where $R = .40$, $R^2 = .16$, $F = 38.57$, $df = 395$, $p < 0.001$. The indirect effect of EC on academic achievement mediated by empathy was .034 (CI: 0.013 a 0.067). The test assuming normality for indirect effects (Sobel) was significant, $z = 2.58$, $p < .01$, and method BCa provided a significant confidence interval between 0.012 and 0.076 (95%). Thus, EC has a direct positive influence on academic achievement and also an indirect positive influence through empathy.

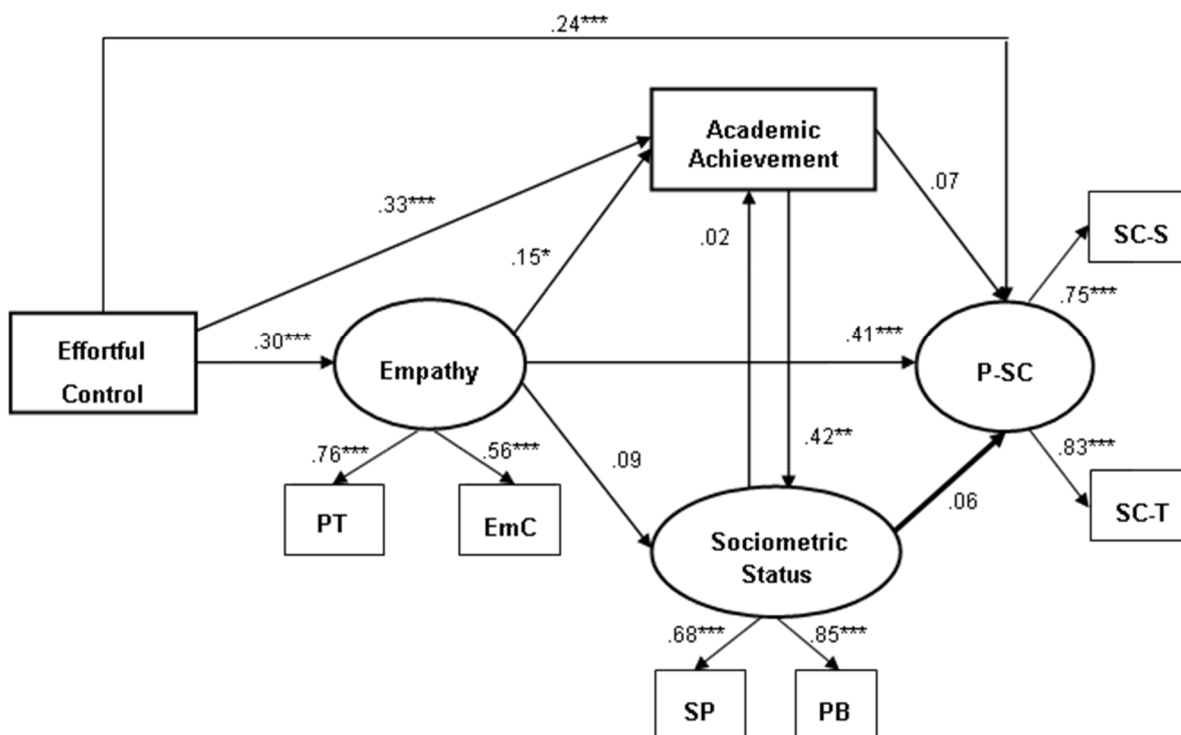


Figure 2. Analysis of a structural equation model taking into consideration the influence of *effortful control* and *empathy* on *academic achievement*, *sociometric status*, and *perception of school climate*. Model 3 showed an adequate fit, $\chi^2 = 17.52$, $df = 12$, $p = .13$; $\chi^2/df = 1.46$; $RMSEA = .03$, $CFI = .99$, $NFI = .97$, and explained 39% of the variance in the *perception of school climate*. PT: perspective taking; EmC: Empathic Concern; SP: social preference; PB: prosocial behaviour; SC-S: school-related social climate; SC-T: teacher-related social climate; P-SC: perception of school climate. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Gender moderation analysis

Given that some variation was found between the mean grades of male and female students, and that there is some controversy over the influence of gender on academic achievement and empathy (Jordan et al. 2006; Valiente et al. 2008), a 'restricted' model was computed in which all factor loadings and regressions were forced to be equal across both groups. The resulting model had a good fit: $\chi^2 = 40.20$, $df = 28$, $p = .06$; $\chi^2/df = 1.117$; $RMSEA = .03$, $CFI = .98$, $NFI = .95$. The difference between the 'unrestricted' model (no parameter constraints) and the 'restricted' model: $\chi^2 (14.32)$ with 12 degrees of freedom, was not significant ($p = .280$), indicating that the model proposed for P-SC fits the data well for both males and females aged 12 to 14; thus, it can be stated that gender does not moderate the effect (Byrne 2001).

DISCUSSION

The main purpose of this research was to test a structural equation model of the influence of EC and empathy on perception of school climate. A further aim was to determine whether such influence was mediated by students' academic achievement and sociometric status. The model also enabled us to examine whether the positive relationship cognitive control has with empathy and academic achievement, previously observed in younger children (Liew et al. 2010; Eisenberg et al. 2010a; Eisenberg et al. 2010c; Rueda et al. 2010; Checa et al. 2008; 2003), persists at the start of secondary education. The analyses supported the direct influence of EC and empathy on the perceptions of school climate at the start of secondary education. At the same time, the model corroborated that EC influences academic achievement directly, and through the mediation of empathy.

The direct positive relationship between EC and the students' perception of the school environment and of their rapport with teachers can be explained by the results of other studies that found a significant co-variation between EC and some measures of social behaviour (Fernández-Vilar and Carranza 2012). Preschoolers with adequate EC resources have fewer conflicts and warmer relationships with their teachers (Myers and Morris 2009; Liew et al. 2010; Valiente et al. 2012; Silva et al. 2011). Behavioural problems and disruptive behaviour in class are found more frequently among children and adolescents with low levels of EC (Eisenberg et al. 2010b). These behaviours, which are differentially associated with varying levels of EC, may provoke diverse reactions in peers and teachers, determining the perception of school climate. As some authors suggest, students with behavioural problems and disruptive behaviour receive less personal and academic support from their peers (Valiente et al. 2008) and have more conflicts with their teachers (Nurmi 2012). In this negative interpersonal context, it is likely that their motivation to participate in class activities is diminished, causing a negative effect on their desire to attend school (Valiente et al. 2012). Ultimately, this attitude might foster a more negative perception of school climate.

Besides being directly related to climate perception, the influence of EC on perception of school climate would follow two paths. In the first case, even though it was previously suggested that EC would foster a more positive perception of climate as a result of better achievement and better adjustment to the school demands (Rueda et al. 2010), the current study did not find support for this indirect path. In the second case, EC would influence social skills and/or cognitive-emotional processes such as empathy (Eisenberg et al. 2010b), which are strongly linked to the interpersonal relationships style that unfold at school (Eisenberg et al. 2010c). According to the results reported in this study, the influence of the second path through empathy is supported. Future longitudinal studies might explain the causal

relationships and define the relative weight of each of these variables on predicting school climate.

Numerous studies have reported positive relationships between EC and student academic achievement (Valiente et al. 2011; Zorza et al. 2013). It is possible that EC encompasses a large part of the control and self-regulation resources required for successful learning and adjustment to the institutional school demands. Attentional control helps focus on the relevant aspects of academic content and enhances flexibility in using the mental representations and complex reasoning required by school assignments (Rueda et al. 2010). Thus, EC facilitates the use of efficient learning strategies (Cermakova et al. 2010) and the acquisition of appropriate academic habits (Zorza et al. 2013). Furthermore, students who are capable of controlling their behaviour probably conform more efficiently to school norms and routines, are more engaged in their activities, and keep themselves motivated to perform less appealing tasks; all of which enables them to attain better academic achievement (Eisenberg et al. 2010c).

The link between school achievement and climate perception that has been observed in some studies (Fan et al. 2011) takes on fuller significance in the global framework of the relationships confirmed by this study. When the direct relationship of EC to perception of school climate was included in the model, the influence of academic achievement on climate decreased considerably. On the other hand, as Model 4 revealed, students who perceive relationships with peers and teachers positively show better academic achievement. Therefore, the relationship between school climate and academic achievement could be considered bi-directional. Future longitudinal studies might explain the causal relationships and define the relative weight of each of these variables on predicting school climate.

Empathy plays an important role in the model. It is predicted by EC and has influence on academic achievement and perception of school climate. The relationships between EC and empathy have been observed in children (Valiente et al. 2004) and adolescents (Zorza et al. 2013). Different authors have stated that self-regulation and cognitive flexibility are core components of empathy (Decety and Lamm 2009; Eisenberg and Eggum 2009). Empathy requires ability to distinguish one's own emotions from others', emotional self-regulation, perspective taking, and dynamic adaptation of individual behaviour to the actions, intentions and responses of others (Decety and Svetlova 2012). The close relationship between empathy and perception of school climate underlines its relevance in students' everyday experiences. Children and adolescents with high levels of empathy are able to understand others' intentions, share their emotions and adapt their behaviour more efficiently to the normative and moral frameworks of their group (Eisenberg and Eggum 2009). Empathic resources facilitate adjustment to peer group demands and foster helpful behaviours and cooperation (Wentzel et al. 2007), shape positive attitudes towards adults and reduce the risk of violent behaviour (Ruiz et al. 2009). Further, it is likely that the capacity to regulate emotions stemming from interpersonal relationships in class, enhances student good relations with teachers and increases understanding of the information imparted by them (Immordino-Yang and Damasio 2007). These affective bonds with teachers are an essential part of the teaching-learning process (Hughes 2012; O'Connor 2010). Positive interpersonal experiences, which are facilitated by empathy, lead to a more positive perception of school climate.

Traditionally, empathy has been positively related to students' sociometric status. The capacity to understand others' emotions fosters positive peer assessment (Warden and MacKinnon 2003) and greater capacity for group work (Spinrad and Eisenberg 2009). In the first model, this relationship was confirmed. However, in the third model, the relationship

between empathy and sociometric status decreased. In this model, empathy had an indirect effect on sociometric status through academic achievement. Further, sociometric status was not a good predictor of academic achievement. Relationships between these three variables seem complex and require further studies, particularly longitudinal ones. At the start of secondary education, just like in primary education, good academic achievement is considered to be an attribute of popularity among peers (Juvonen and Murdock 1995), and the characteristics of students with a high level of academic achievement (greater academic motivation, class participation and teacher recognition) influence their choices of classmates. Perhaps, in subsequent secondary grades, academic achievement is not such a determining aspect of sociometric status, and empathy plays a more important and more direct role in sociometric preferences and in peer evaluation of prosocial behaviour.

The investigation has some limitations. EC and empathy measures have been evaluated only through self-reports provided by the students. In oncoming investigations other behavioural measures should be obtained and the information about students should be completed with that provided by their families and teachers. Moreover, although in the study the EC and Empathy measures are obtained approximately seven months previous to those of school climate and academic achievement, additional longitudinal studies are required to provide convergent evidence on the results provided by the SEM analysis of the models contrasted in the present study. Lastly, the generalization of these results requires investigations with samples from students from different socio-cultural contexts.

Overall, results suggest that the perception of a positive school climate (helpful classmates, good student-teacher relationships, school safety) at the start of secondary school depends significantly on individual capacities to self-regulate behaviour and to empathize with

other students. These results complement the findings from other studies on the relationship between certain individual characteristics and the perception of school climate (Thapa et al. 2012). What is more, it should be underlined that this relationship is not gender-moderated; neither was gender found to have modulated these relationships in other studies (Valiente et al. 2008; Valiente et al. 2012; Zorza et al. 2013). These results suggest that it is convenient to develop cognitive control activities that include interpersonal elements promoting empathy. In this way, academic performance and positive interpersonal relationships, as well as the perception of the school climate by the students, would be strengthened. Some educational programs are already including training on these skills (Rueda et al. 2010; Posner and Rothbart 2005), although they have not been linked to the perception of school climate.

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Capítulo 6

Social Status in Early Adolescence: Influence of Empathy, Effortful Control and Academic Performance

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ABSTRACT

The purpose of the present study was to prove whether empathy, emotional intelligence, cognitive control and academic achievement can characterize *popular-prosocial* and *rejected-non-prosocial* student groups, and to differentiate it from the other classical sociometric categories. A double procedure involving nominations (positive/negative) and classification (prosocial behavior) was used to assign 1,442 students aged 12-14 years to five sociometric status categories: Popular-Prosocial, Rejected-Non-prosocial, Controversial, Neglected, and Average. A descriptive discriminant analysis (DDA) was also performed to verify which of these variables differed among members of the groups. Results showed that academic performance, empathic concern, and impulsivity were the variables that significantly discriminated between groups. Students in the *popular-prosocial* group had the best academic performance, high scores in empathic concern, and low impulsivity. Those in the *rejected-non-prosocial* group had the worst academic performance and low levels of empathic concern and impulsivity. Members of the *controversial* group had average academic performance and empathic concern and very high impulsivity scores. The discriminatory power of the cognitive-emotional variables was different according to the students' gender. For girls, empathic concern was the most significant variable to differentiate belonging to each group, while for boys it was EC. The relevance of cognitive control and empathy to form students' social status is discussed.

Keywords: sociometric status, prosocial behavior, academic performance, cognitive control, empathy.

INTRODUCTION

Peer-acceptance or rejection has a significant influence on the development of boys and girls. Having a good social status and belonging to a steady social network foster personal maturity and prevent possible emotional and behavioral problems (Bukowski, Brendgen, & Vitaro, 2007). Therefore, identifying and characterizing students who form the different social status groups has been a challenge for researchers. Sociometric tradition proved that students highly chosen over their classmates (*popular students*) usually show higher academic achievement as opposed to those less chosen or with more negative nominations (*rejected students*) (Wentzel, 2003). On the other hand, it has been suggested that the ability some students have to relate successfully and in a prosocial way favors acceptance, while those students less socially competent and aggressive tend to be rejected. However, detailed studies of social-status subgroups have demonstrated that groups can be heterogeneous (Becker & Luthar, 2007; Gifford-Smith & Brownell, 2003; Lease, Musgrove, & Axelrod, 2002).

Rodkin, Farmer, Pearl and Van Acker (2000) identified two types of popular children: *popular-prosocial (model)* and *popular-antisocial (tough)*. The former are described by their peers and teachers as friendly, academically competent, and likely to exhibit prosocial behaviors, while the latter are described as more aggressive, less likely to exhibit prosocial behaviors and as academically poorer than the group average. Within this description, Leasen et al. (2002) identified two high status groups. The *chosen-dominant* usually exert social control through prosocial strategies and less through coercive means, and the *popular-dominant* students are perceived as more aggressive and are more rejected by their peers. Heterogeneity in group formation was also observed among low status students. A subgroup was defined by their aggressive behaviour and behavioural problems, while another was

rejected due to their lack of social competence and not due to their problematic behaviour (Farmer, Hall, Leung, Estell, & Brooks, 2011). In general, these students find it difficult to understand the appropriate way to behave with their peers and are seen as the “weird” and absent minded ones (Lease et al., 2002).

The characterization of *popular-prosocial* students suggests that prosociality allows them to exert long-lasting control and access social and material resources without causing peer-rejection, unlike popular students who use coercive and aggressive means for social control (Lease et al., 2002; Rodkin et al., 2000). On the other hand, it has been proved that in most social groups lack of prosociality is an invariant cause of peer rejection (Stormshak et al., 1999). Even in the absence of aggressive behaviour, a group of boys and girls are still rejected due to their lack of prosocial behaviours. Despite the relevance that prosocial behaviour seems to have in the acquisition of social status, there is little research characterizing popular students who use prosocial resources (*popular-prosocial*) and students rejected for their lack of prosociality (*rejected-non-prosocial*). Studies which have described similar categories have formed the a posteriori categories, through a cluster or similar analysis, once information from a wide number of behaviours was collected (LaFontana & Cillessen, 2002; Lease et al., 2002; Rodkin et al., 2000). Nevertheless, it is still unknown whether self-regulation skills and some emotional skills proven to be relevant for social and academic adjustment (Eisenberg, Valiente, & Eggum, 2010) are also relevant to differentiate between *popular-prosocial* and *rejected non-prosocial* students from the rest of the sociometric groups.

EC, impulsivity and status social

The skills boys and girls develop to regulate their emotions and behaviour in their early years become a key factor for their future social functioning (Hay, Payne, & Chadwick, 2004).

At present, different investigations consider emotional reactivity and 'effortful control' (EC) processes as two dimensions of temperament that affect social behaviour with some independence (Eisenberg, Spinrad, & Eggum, 2010). Within these proposals, impulsivity has been considered as one of the measures of reactive undercontrol, while EC represents the temperament self-regulation component.

Eisenberg et.al (2005) define impulsive behavior as part of a motivating, relatively involuntary system and responsible for avoidance and approximation responses, supported on subcortical systems, while EC may be mainly supported by some areas of the prefrontal cortex and, specially, by the anterior cingulate cortex (Posner, Rothbart, Sheese, & Tang, 2007; Rueda, Posner, & Rothbart, 2005). During adolescence, impulsivity has been associated with high levels of aggressiveness and behavioural problems, including internalization – anxiety, depression, etc.- as well as externalization – challenging behaviour, delinquency- (Martel et. al., 2007). It has been proved that students with high levels of impulsivity have difficulties in participating in class and in their relationships with teachers and peers (Valiente et. al. 2011), partly because they behave aggressively or get involved in aggressive behaviours. EC, voluntary self-regulation component, is defined as the efficacy of executive attention, consisting of the ability to inhibit a dominant response and/or to activate a subdominant response, detect mistakes and plan (Rothbart, Ellis, Rueda, & Posner, 2003). It has been observed that high levels of EC are related to a good adaptation to the school environment and boys' and girls' peer acceptance (Rothbart, Ellis, Rueda, & Posner, 2003). Specifically, Checha, Rodriguez-Bailón and Rueda (2008) have claimed that adolescents with better attentional control resources are preferred by their classmates in sociometric trials.

Empathy, emotional intelligence and social status

Apart from self-regulation processes, it has been proved that the ability to identify emotions, regulate them and understand other people's emotional states, are fundamental skills for social relationships. For this reason, the study of empathy and emotional intelligence deserve special attention in education. Empathy has some automatic and affective components, such as empathic concern, and others which are more controlled and cognitive, like perspective taking (Decety & Svetlova, 2012). Although empathy has been related to a higher frequency of prosocial behaviours and acceptance by most peers (Warden & MacKinnon, 2003; Wentzel, Filisetti, & Looney, 2007), there is great interest in identifying the similarities and differences that affective and cognitive processes have on social behaviour (Batanova & Loukas, 2011).

Even though the connections between empathy and sociometric status *popular prosocial* or *rejected non-prosocial* have not been investigated, some studies suggest that empathy's cognitive components might not necessarily be associated with prosocial behaviors and they could even be related to relational aggression behaviors (Jolliffe & Farrington, 2006) and subtle and interpersonal control strategies (Batanova & Loukas, 2011). However, the resulting emotional response when observing other people's emotional states would lead to compassion and willingness to help if necessary. Zorza et al. (2013) observed that empathic concern predicted social preference and prosocial behaviours assessed by peers, while perspective taking did not reach a significant prediction. Furthermore, it was observed that emotional intelligence, concerned with the ability to respond, know and regulate emotions, predicts positive interpersonal relationships and peer acceptance (Dougherty, 2006; Gross & John, 2003; Schultz, Izard, Stapleton, Buckingham-Howes, & Bear, 2009). Students with high

emotional intelligence are considered to be more cooperative, less aggressive and with more leadership skills by their peers (Petrides, Sangareau, Furnham, & Frederickson, 2006).

The present study

The aim of this paper is to observe whether academic achievement, self-regulation, empathy and emotional intelligence are key variables to differentiate *popular pro-social* students from *rejected non-prosocial* ones. Furthermore, we will try to specify which of these variables are more relevant to determine the possibilities a student has of belonging to a high or low social status group. Prosocial behaviour will be the group formation criterion, allowing the distinction between *popular-prosocial* groups (high status) and *rejected non-prosocial* (low status), and at the same time the differentiation of these subgroups from the rest of the classical sociometric categories (ignored, argumentative and average).

It is expected that those students within the *popular-prosocial* category are different from the rest due to their high academic achievement, high levels of EC and low impulsivity, good empathy resources (especially empathic concern) and emotional intelligence skills. It is expected that those students within the *rejected non-prosocial* group have low academic achievement and reduced EC resources. As regards impulsivity, as rejection is associated with low levels of prosociality and not to high levels of aggression, mean levels of impulsivity and low scores of empathy and emotional intelligence are expected. As regards the controverted group, comparable to the popular antisocial category according to theory, it is believed that medium-high levels of academic achievement, and medium skills of empathy and emotional intelligence will be observed, although their rejection may probably be associated with reduced cognitive control resources and high levels of impulsivity. It is thought that the

ignored and average groups might be very similar and might reach mean values in all the assessed variables.

Concerning each variable's discriminating power, there are antecedents that academic achievement will be a relevant variable to differentiate sociometric groups (Becker & Luthar, 2007; Wentzel, 2003). Yet, it is expected that the assessed socio-emotional variables could significantly differentiate between the low and high status groups. The comparison of these variables will help clarify whether self-regulation, empathy and emotional intelligence are equally important when favouring students' prosocial behaviours and peer preference. This comparison will allow the optimization of student-centred school intervention, suggesting a group of psychological variables relevant to prevent social exclusion and favour positive leadership.

METHOD

Participants

The sample consisted of 1,422 students (706 girls and 716 boys) attending four public secondary schools (school A = 314, school B = 378, school C = 322, school D = 408) in the city of Granada, Spain. Participants were aged 12-14 ($M = 13.05$, $SD = 1.12$). The families from the four different schools had a similar medium-low socioeconomic status. Most children were native Spanish Caucasian, with only an average 15% of Latin American immigrants. Participation was voluntary and authorized by parents and the school management team. One hundred forty two participants were excluded (8%) from the analysis because they did not complete all the questionnaires.

Questionnaires and measurements

Sociometric status. This variable was obtained by combining peer nomination with a prosocial behavior classification scale. From their class list (25-30 children on average), students selected the three classmates they would most like to carry out various school or leisure activities with and the three classmates they would least like to carry out these activities with. They also assessed the *prosocial behaviors* of their classmates on a Likert scale from 1 (Not helpful) to 5 (Very helpful), according to how helpful they were in school situations when another classmate was sad or worried or in circumstances of interpersonal conflict.

Mean of students' grades. The analysis considered the mean of each participant's final grade in the school year in which the assessments took place. This score was a consistent index of performance that did not fluctuate depending on the school students attended. Correlations between the direct scores mean used in the study and the grades mean obtained after transforming the direct scores in each subject to a z scale was .843.

Effortful control. This variable was assessed using the Spanish version of the Early Adolescence Temperament Questionnaire - Revised Self Report (EATQ-R self report; Ellis & Rothbart, 2001), translated by Checa, Rodríguez-Bailón, and Rueda (2008). This scale has been used in adolescents from 10 years of age. The EATQ-R assesses four factors of temperament: 'effortful control', 'extraversion/surgency', 'negative affect', and 'affiliation'. This study used the total score of the 16 items providing information about 'effortful control' (e.g., 'I can stick with my plans and goals'). Responses are given on a Likert scale from 1 (Almost always untrue for you) to 5 (Almost always true for you). The internal consistency obtained in this study ($\alpha = .73$) was similar to that of previous studies (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008).

Impulsivity. We used the Spanish adaptation (Cosi, Vigil-Colet, Canals, & Lorenzo-Seva, 2008) of the adolescent version of the Barratt Impulsivity Scale-11 (BAS-11; Patton & Stanford, 1995). The scale is composed of 30 items with a response format ranging from 0 (Never/almost never) to 4 (Almost always/ always). The questionnaire provides information on motor impulsivity (e.g., 'I am restless at the theater or lectures'), non-planning impulsivity (e.g., 'I plan tasks carefully') and cognitive impulsivity (e.g., 'I concentrate easily'). In adolescents, correlations among factors are high and the recommendation is to obtain scores for a single factor of general impulsivity (Fossati, Barratt, Acquarini, & Ceglie, 2002). This measure of total impulsivity (TI) showed adequate reliability ($\alpha = .70$), similarly to the value reported in the Spanish adaptation (Cosi et al., 2008).

Empathy. Participants completed the Spanish adaptation (Mestre Escrivá, Navarro, & García, 2004) of the Interpersonal Reactivity Index (IRI; Davis, 1983). The IRI includes 28 items that are grouped into four sub-factors: empathic concern, perspective taking, fantasy, and personal distress. This study only considered perspective taking and empathic concern scores, which provide the most accurate and direct assessment of empathy (Burkard & Knox, 2004). Empathic concern assesses whether individuals affectively respond to the emotional experience of others (e.g., 'I often have tender, concerned feelings for people less fortunate than me'). Perspective taking measures individuals' cognitive capacity to adopt the perspective of others in everyday situations (e.g., 'I try to look at everybody's side of a disagreement before I make a decision'). Participants were asked to respond on a scale from 1 (Does not describe me well) to 5 (Describes me very well). The internal consistency indices of these factors (empathic concern: $\alpha = .68$; perspective taking: $\alpha = .73$) were similar to those obtained in the original study (Davis, 1983) and later adaptation (Mestre Escrivá et al., 2004).

Emotional intelligence. This variable was assessed using the Trait Meta-Mood Scale-24 (TMMS-24; Fernandez-Berrocal, Extremera, & Ramos, 2004), a short version of the TMMS-48 (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The scale assesses meta-knowledge of emotional states using 24 items whose responses range from 1 (Strongly disagree) to 5 (Strongly agree). It provides information on 'attention to feelings' (e.g., 'I think about my mood constantly'), 'clarity of feelings' (e.g., 'I am usually confused about how I feel'), and 'mood repair' (e.g., 'Although I am sometimes sad, I have a mostly optimistic outlook'). The Cronbach's alpha values of the subscales were .81, .84, and .78, respectively.

Procedure

Participants were given a booklet of questionnaires that included the tests described above. The order of appearance was randomized in groups of 20 booklets. The booklets were completed during school hours in the first term of the school year in a group session that lasted approximately 30 minutes. Students were informed that the data would be treated confidentially and were given written and verbal instructions on how to complete each questionnaire. The school management team provided the list of final grades of each participant.

RESULTS

Preliminary analyses

First, the groups were formed and classified according to the data obtained from the nomination and classification procedure. Following the method proposed by Newcomb et al. (1993; also Maassen, van Boxtel, & Goossens, 2005), participants were assigned to the various status groups considering the two-dimensional distribution of positive and negative

nominations. Each participant's raw score in positive and negative nominations was divided by the number of students in his/her class (*Positive nominations/N students in class*; *Negative nominations/N students in class*). Next, the three quartiles (Q) of these adjusted scores were calculated and used as cut-off points to establish the sociometric groups. Five groups were obtained: *popular* (N= 199, participants with positive nomination scores over Q3 and negative nomination scores under Q1); *rejected* (N= 144, participants with negative nomination scores over Q3 and positive nomination scores under Q1), *controversial* (N=100, participants with total positive and negative nomination over Q3); *neglected* (N=119, participants with total positive and negative nomination scores under Q1); and *average* (N=278, participants with total positive and negative nomination scores between Q3 and Q1). A total of 836 participants were classified into the five groups.

Second, the distribution of the measure of prosocial behavior was obtained from all the participants classified in the previous analysis, computing the 20th, 40th, 60th, and 80th percentiles. Next, five groups were established: *very high* prosocial behavior, with scores over the 80th percentile (N= 192); *high* prosocial behavior, with scores between the 60th and 80th percentile (N= 180); *moderate* prosocial behavior, with scores between the 40th and 60th percentile (N= 170); *low* prosocial behavior, with scores between the 20th and 40th percentile (N= 166); and *very low* prosocial behavior, with scores under the 20th percentile (N= 128). We prefer to use the percentiles instead of the quartile as a criterion for the distribution of the prosocial behavior in order to have a smooth transition between the different sociometric groups.

Third, to establish the final groups (see Table 1) a contingency table was drawn up considering sociometric status (positive/negative nominations) and prosocial behavior as

categories. The *popular-prosocial* group (N = 172) included 88% of participants previously assigned to the *popular* group; all participants in this group had *moderate, high, or very high* prosocial behavior. The *rejected-non-prosocial* group (N = 128) included 89% of participants initially assigned to the *rejected* group; they all had *moderate, low, or very low* scores in prosocial behavior. In the *Controversial* (N = 100) and *N* (N = 119) groups, which included fewer participants, the percentage of students of each prosocial behavior category was more evenly distributed and matched the initial classification. The *average* group (N= 127) only included the 46% of participants.

Initially assigned to this group; participant closer to the mean. This reduction yielded more similar group sizes, a recommended condition to perform DDAs (Sherry, 2006). In similar size groups that include a broad sample, the DDA remains robust even if the assumption of homogeneity of variance-covariance matrices does not hold true (Tabachnick & Fidell, 2001).

Table 1. The left side shows the percentage of participants who were assigned to each category of sociometric status (positive/negative nominations) and prosocial behavior. The right side shows the final sample in each group. Further details are provided in the text.

<i>Sociometric status</i>	<i>Prosocial behavior</i>					<i>N final groups</i>			
	Very low (<i>n</i> = 128)	Low (<i>n</i> = 166)	Moderate (<i>n</i> = 170)	High (<i>n</i> = 180)	Very high (<i>n</i> = 192)		<i>Girls</i>	<i>Boys</i>	<i>Total</i>
Popular (<i>n</i> = 195)	3 (2%)	20 (10%)	20 (10%)	50 (26%)	102 (52%)	PP	99 (58%)	73 (42%)	172
Rejected (<i>n</i> = 144)	73 (51%)	33 (23%)	22 (15%)	13 (9%)	3 (2%)	RNP	77 (60%)	51 (40%)	128
Controversial (<i>n</i> = 100)	21 (21%)	21 (21%)	25 (25%)	21 (21%)	12 (12%)	C	47 (47%)	53 (53%)	100
Neglected (<i>n</i> = 119)	9 (8%)	22 (18%)	28 (24%)	33 (28%)	27 (23%)	N	63 (53%)	59 (47%)	119
Average (<i>n</i> = 278)	22 (8%)	70 (25%)	75 (27%)	63 (23%)	48 (17%)	A	57 (45%)	70 (55%)	127

Note. PP = Popular-Prosocial; RNP = Rejected-Non-prosocial; C = Controversial; N = Neglected; A = Average

Discriminant analysis between the five sociometric status groups

Given that our aim is to distinguish groups through the combination of the mean variables and to identify what function allow the classification of students in each group, a DDA (Descriptive Discriminant Analysis) was performed. Some studies have reported gender differences in academic performance (Valiente et al., 2008) and the other variables measured (Wentzel et al., 2007). For this reason, separate analyses for boys and girls were conducted.

Table 2. Mean and standard deviations of the variables included in the study according to the sociometric status groups

Variables	PP	RNP	C	N	A
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
AP	6.80 (1.78)	4.92(1.64)	5.38 (2.02)	5.66 (1.80)	5.73 (1.83)
EC	41.97 (6.71)	40.06 (6.54)	39.04(7.04)	40.07 (6.32)	39.97 (5.84)
T Imp	62.07 (11.09)	63.84 (12.89)	68.14 (12.83)	66.98 (12.66)	65.46 (10.76)
EC	26.28 (4.25)	23.29 (4.68)	23.92 (4.73)	24.74 (5.28)	24.23 (5.15)
PT	23.74 (4.65)	21.75(4.12)	21.74 (4.41)	22.48 (5.77)	22.92 (4.63)
E-Att	26.23 (5.91)	24.22(6.83)	24.22 (7.24)	26.17 (7.11)	25.76 (6.95)
E-Clar	26.26 (5.77)	25.68(6.91)	25.27 (6.61)	26.62 (6.70)	26.75 (7.08)
E-Rep	28.13 (5.86)	27.33(6.63)	27.21 (6.68)	27.25 (6.95)	26.72 (6.41)

Note. PP = Popular-Prosocial; RNP = Rejected-Non-prosocial; C = Controversial; N = Neglected; A = Average. AP = Academic Performance; EC = Effortful Control; T Imp = Total Impulsivity; PE = Empathic Concern; PT = Perspective Taking; E-Att = Emotional Attention; E-Clar = Emotional Clarity; E-Rep = Emotional Repair.

Descriptive statistics of the variables included in the descriptive discriminant analysis (DDA) are shown in Table 2. Two sets of DDAs were performed. The first included all

the variable levels (academic performance and cognitive-emotional variables). In the second DDA, only cognitive-emotional variables were analyzed (EC, impulsivity, empathy, and emotional intelligence). The literature suggests that academic performance is a variable closely related to sociometric status (Wentzel, 2003); one of the aims of this study was to verify whether the discrimination of the remaining variables was independent from academic performance. The DDA was performed in several steps, including or excluding variables in prediction equations according to their contribution to reducing Wilks' lambda. Box's M was used to test the homogeneity of the variance-covariance matrices. Results (Box's M = 37.46, $F = 1.54$, $p = .043$) of the first DDA showed that the analysis was possible, given that the alpha probability was greater than 0.01 (Sherry, 2006). Three discriminant functions were obtained. Their comparison showed that values were significant in the first two functions (see statistical comparison values in Table 3). The variables included in the functions were academic performance, empathic concern, and the measure of total impulsivity (see Table 3). In Function 1, academic performance and empathic concern were the variables that differentiated groups. Total impulsivity did so to a lower extent, with a negative relationship. In Function 2, total impulsivity differentiated groups. In Function 1 (see Fig. 1.a), the location of centroids shows that *popular-prosocial* students (.61) differed from the rest for their higher levels of academic performance and empathic concern. The *average* (-.04) and *neglected* (.05) groups are located in central positions. The *controversial* group (-.22) is located in a lower area. Finally, *rejected-non-prosocial* students (-.52) clearly differed from the remaining groups in their lower values. In Function 2, where impulsivity played a major role, students in the *controversial* (.20) and *neglected* (.17) groups differed from the rest in their high values, those in the *average* (.01) and *popular-prosocial* (-.08) groups had more central positions, and those in the *rejected-non-prosocial* (-.23) group had the lowest values.

Table 3. The left side shows Wilks' lambda, canonical correlation, standardized coefficients, and structural coefficients of the discriminant functions for the five sociometric status groups, including AP and not including AP. The left side shows the standardized coefficient and structural coefficients of the predictor variables in each function.

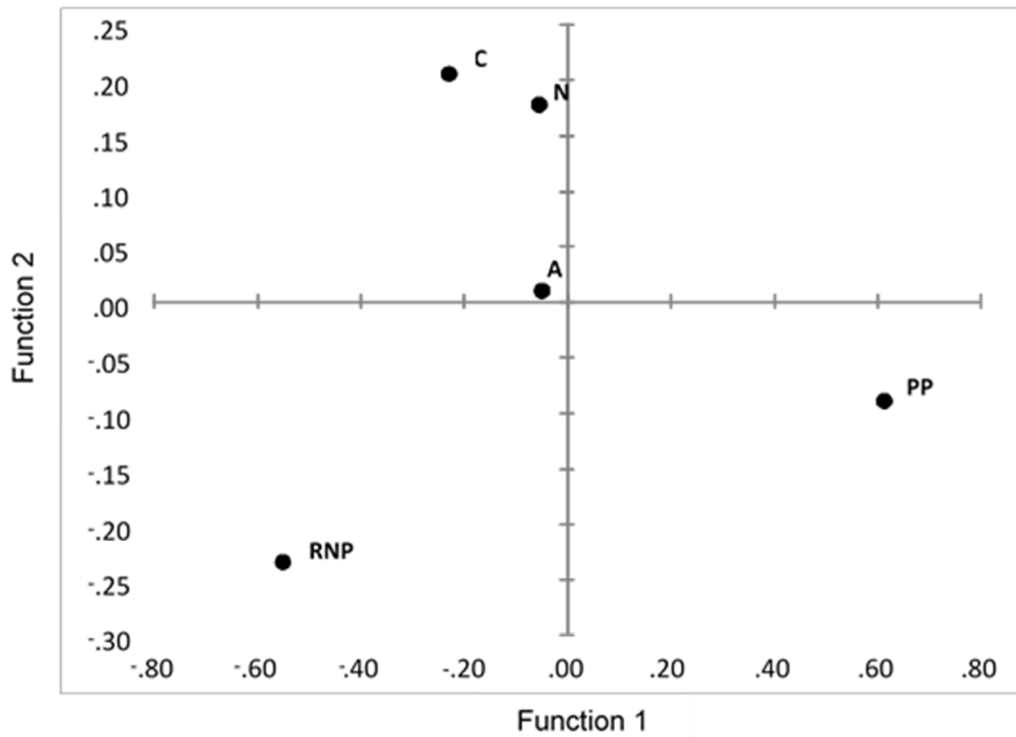
Function	Wilks' lambda	χ^2	df	p	eigenvalue	R _c	R _c ²	Variable	Coeff.	r	r _s ²
1° DDA (with AP)											
1-3	.83	116.33	12	.00	.16	.37	13.70%	AP	.83	.90	81%
								EC	.41	.55	16.81%
								TI	-.03	-.25	8.41%
2-3	.97	17.90	6	.00	.02	.15	2.22%	AP	.16	.01	0.00%
								EC	.20	.03	0.00%
								TI	1.02	.96	92.96%
3	.99	1.27	2	.53	.00	.04	00.1%				
2° DDA (no AP)											
1-2	.92	51.53	8	.00	.05	.23	5.29%	EC	.82	.90	81%
								TI	-.42	-.58	33.64%
2	.97	14.87	3	.00	.02	.15	2.25%	EC	.59	.41	16.81%
								TI	.92	.81	65.61%

Note. AP = Academic Performance; EC = Empathic Concern; TI = Total Impulsiveness

The DDA was performed separately for boys and girls, including all the variables as predictors. The homogeneity of the variance-covariance matrices persisted in both groups (girls, Box's $M = 4.97$, $F = 1.23$, $p = .29$; boys, Box's $M = 3.24$, $F = .80$, $p = .52$) as well as the discriminatory ability of variables (girls, $\lambda = .85$, $p < .001$; boys, $\lambda = .86$, $p < .001$). Only one discriminant function was generated in girls ($\chi^2(4) = 50.23$, $p < .001$), with a canonical correlation coefficient of .37, an eigenvalue of .16, and an effect size of $R^2_c = 13.70\%$, including academic performance in the predictor function. Considering the reduction in Wilks' lambda, empathic concern ($\lambda = .94$) and total impulsivity ($\lambda = .95$) reached levels that were close to those of academic performance, although not enough to include the function in the second step of the analysis.

In boys, only one function was significant as well ($\chi^2(4) = 46.88$, $p < .001$), with a canonical correlation coefficient of .36, an eigenvalue of .14, and an effect size of $R^2_c = 12.80\%$. Again, academic performance was the predictor variable included in the function. In addition, values of EC ($\lambda = .94$) and total impulsivity ($\lambda = .97$) were close to those required to be included in the function. The comparison between the centroids resulting from the functions in girls, *popular-prosocial* (.49), *controversial* (.10), *average* (-.04), *neglected* (-.24), and *rejected-non-prosocial* (-.71), and boys, *popular-prosocial* (.61), *neglected* (.11), *average* (.01), *rejected-non-prosocial* (-.32), and *controversial* (-.49) showed that sex-related differences were concentrated in the *controversial* and *rejected-non-prosocial* groups. Among girls, those in the *rejected-non-prosocial* group had the most different academic performance to those in the *popular-prosocial* group. In boys, the *controversial* group showed the greatest differences with the *popular-prosocial* group.

a)



b)

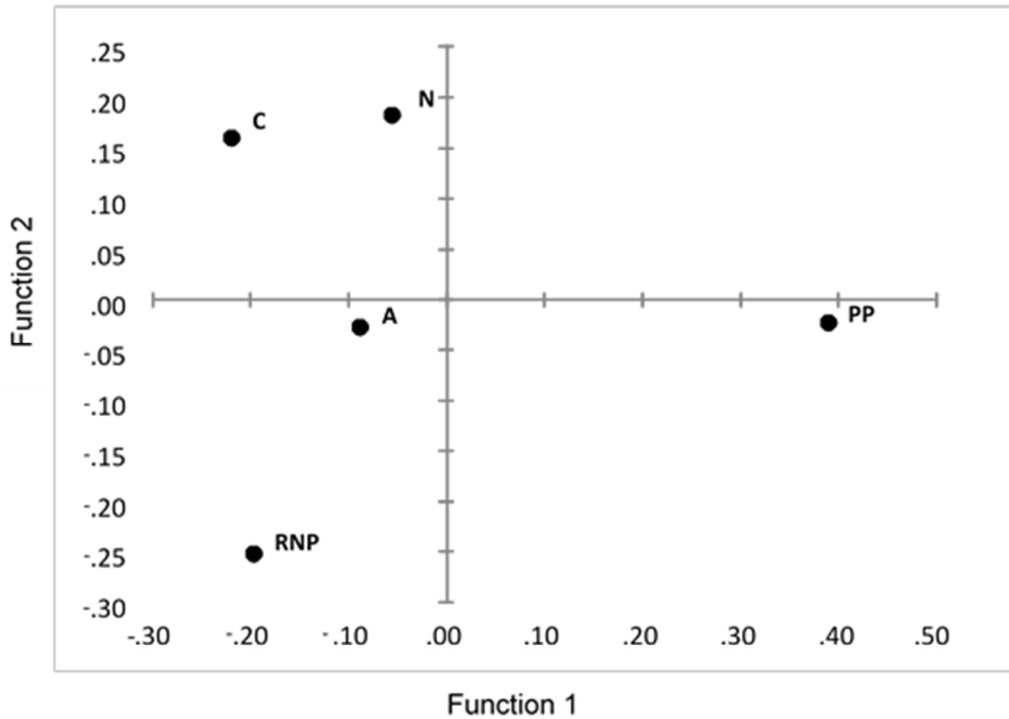


Figure 1. a) Location of the sociometric groups according to the functions resulting from the first DDA, which included the variables Academic Performance, Empathic Concern, and Impulsiveness. b) Location of the sociometric groups according to the functions resulting from the second DDA, which only included the variables Empathic Concern and Impulsiveness. The range of the scales of horizontal axis is different in each figure. PP = Popular-Prosocial; RNP = Rejected-Non-prosocial; C = Controversial; N = Neglected; A = Average.

The second DDA only included cognitive-emotional values and did not consider measures of academic performance. The result of Box's M test of homogeneity of the variance-covariance matrices was adequate (Box's M = 23.54, $F = 1.94$, $p = .025$) (Sherry, 2006). Again, two functions with significant values were obtained (see Table 3, columns 1 to 5). The structure matrix and standardized coefficients for both functions are shown in Table 3. Empathic concern made an important contribution in Function 1. Total impulsivity did so to a lesser extent, but in a negative way. In Function 2, the relative contribution of these variables was the opposite and total impulsivity was more relevant. As shown in Fig. 1.b, the analysis of the centroids indicated that Function 1 established a clear difference between the *popular-prosocial* group (.39) and the remaining groups. *Popular-prosocial* students had higher levels of empathic concern than the rest of participants. Additionally, groups *neglected* (-.05) and *average* (-.08) had similar scores to one another – close to zero – whereas the *rejected-non-prosocial* (-.19) and *controversial* (-.21) groups were separated from the central position due to their lower values in EC. In Function 2, defined by the measure of total impulsivity, the centroids of groups *popular-prosocial* (-.02) and *average* (-.02) were similar and close to mean values. The remaining groups were separated from this central position due to the low scores of the *rejected-non-prosocial* group (-.25) and the positive scores of the *controversial* (.16) and *neglected* (.18) groups, which were similar to one another.

The separate DDA analysis performed for boys and girls including only cognitive-emotional values confirmed the homogeneity of the variance-covariance matrices in both groups (girls, Box's M = 6.58, $F = 1.63$, $p = .16$; boys, Box's M = .76, $F = .19$, $p = .94$). In girls, only one statistically significant discriminant function was obtained, $\lambda = .94$, $\chi^2(4) = 19.11$, $p < .001$, with a canonical coefficient of .23, an eigenvalue of .06, and an effect size of $R^2_c = 5.3\%$. Empathic concern was the only variable included in the canonical function. Although total

impulsivity ($\lambda = .90$) was the variable with the closest values, it did not reach the level required for inclusion in the second step of the analysis. The comparison between the centroids shows that girls in the *popular-prosocial* group (.31) had the highest levels in empathic concern, whereas those in the *rejected-non-prosocial* group (-.40) had the lowest levels. Groups *neglected* (-.04), *controversial* (-.06), and *average* (-.14) were located in the medium area).

The DDA analysis performed for boys also yielded only one statistically significant function, $\lambda = .94$, $\chi^2(4) = 18.98$, $p < .001$, with a canonical correlation coefficient of .24, an eigenvalue of .06, and an effect size of $R^2_c = 5.8\%$. EC was the only variable included in the function. Although empathic concern ($\lambda = .96$) and total impulsivity ($\lambda = .97$) obtained similar values to that of EC in the lambda reduction, they were not sufficient to include the function in the second step of the analysis. The location of the centroids shows that boys in the *popular-prosocial* group (.43) had higher EC values than the remaining groups, whereas those in the *controversial* group had the lowest values (-.28). Boys in the groups *neglected* (-.10), *rejected-non-prosocial* (-.09), and *average* (-.04) were located closer to the mean.

DISCUSSION

The general aim of the present study was to know the characteristics of the *popular-prosocial* and *rejected non-prosocial* groups and to distinguish them from the rest of the classical sociometric categories. To form low and high status groups, prosocial behavioral measures combined with election and rejection ones were used. In this way, we identified a high status group valued for their prosocial behaviors and a low status group, mostly rejected by their peers, with little ability to cooperate and adapt to social dynamics. The results of the study confirmed the influence of academic performance, empathy, and cognitive control (impulsivity) in determining the social status of adolescents (Hay et al., 2004; Wentzel, 2003).

As expected, these values were particularly relevant to distinguish between *popular-prosocial*, *rejected-non-prosocial*, and *controversial* groups.

The *popular-prosocial* group differed in its better academic achievement, higher scores in empathic concern, and adequate cognitive control resources. Since their most distinctive feature was their high level of empathic concern, it is possible that these students find it easier to notice other people's emotions, coordinate their social actions and resolve interpersonal conflicts peacefully (Zorza, Marino, de Lemus, & Acosta Mesas, 2013). These characteristics are probably the reason why this group shows very low levels of aggressive and disruptive manifestations (see, for example, Newcomb et al., 1993). At the same time, they have been emphasized for high status students who are able to influence others using prosocial means and not coercive ones (Lease et al., 2002), being able to hold and assertive and healthy social leadership for the group. On the other hand, even though *controverted* students differ themselves from *popular prosocial* students for having less empathic resources and lower academic achievement, they are chosen over the *rejected non-prosocial* students and have scores slightly below the mean in almost all the measures. However, as it was expected, their high impulsivity considerably distinguishes them from other groups. Their impulsive responses might get them involved in aggressive actions (Eisenberg et al., 2009; Valiente et al., 2011), grouping them according to the strategies that other researchers have used to describe *popular-antisocial* or *popular dominant* (Lease et al., 2002; Rodkin et al., 2000), who are popular but rejected for their high levels of aggressiveness.

The most distinctive features of the *rejected-non-prosocial* group were its low levels of academic achievement and empathic concern. This group has also been characterized by Newcomb et al. (1993) and Wentzel (2003) as having low sociability and cooperativeness.

Furthermore, their impulsivity scores are low, which suggests that their rejection would not be caused for being aggressive or disruptive. Rather, their indifference and poor interaction with others can cause isolation or rejection as they lack values or attributes considered key by adolescents, for example, athletic, attractive, (Farmer et al., 2011; LaFontana & Cillessen, 2002; Lease et al., 2002). Their withdrawal, low empathy and academic difficulties may lead them to be considered as “weird” or indifferent by their classmates, two of the few behaviours identified as rejection predicting invariables (Stormshak et al., 1999).

Finally, the neglected and average groups had mean scores in all the values, although levels of prosocial behavior, empathic concern and impulsivity were slightly higher in the neglected group. The neglected group did not have any distinctive attributes. In future studies, it would be interesting to include measures of shyness and withdrawal as indices of reactive overcontrol and a few dispositional measures of positive and negative affect (Eisenberg, Spinrad et al., 2010) to make more specific distinctions in this classification.

When academic achievement was included in the discriminant analysis, this variable had the greatest differentiation power between the groups. A similar result was obtained by Wentzel (2003) and Wentzel, Baker, & Russell (2009). Boys and girls with high academic achievement have greater chances of being popular. By contrast, those with low achievement have a greater probability of being rejected. During childhood and early adolescence, good academic performance is an important differentiation attribute for both sexes (Becker & Luthar, 2007). Academic success can be valued in itself by students, although it is also possible that students with high academic achievement are more interested and motivated by school tasks and more committed to their interactions with peers and teachers, participating in the school environment more effectively (Eisenberg, Valiente & Egemus, 2010).

The affective aspects of empathy played an important discriminant role between sociometric groups. More specifically, empathic concern particularly distinguished between *popular-prosocial* and *rejected-non-prosocial* participants. Other studies (Caravita, Di Blasio, & Salmivalli, 2009) have also found this positive relationship between affective empathy and prosocial behaviors. However, perspective taking, the most cognitive component of empathy, varied among groups but did not reach enough relevance to be included in the discriminant function. On its own, perspective taking did not determine prosocial behavior. Empathic concern has been strongly linked to attachment, the acquisition of principles and moral emotions, and especially to compassion (Hoffman, 2008). Even though it has been proved that certain emotional regulation resources and contextual factors are necessary for empathy to give way to helpful behaviour (Decety & Svetlova, 2012; Wentzel et al., 2007), our results support the hypothesis that affective components prevail over cognitive ones when considering the preferred and prosocial teenagers' distinctive features. This variable showed greater relevance for girls than for boys. Such finding is consistent with some previous investigations which suggest that girls are more aware of emotions and are able to self-regulate better due to socialization (Carlson & Wang, 2007). It is possible that girls are more empathic or take into account their emotional responses more when relating to their classmates and that their empathic response is more valued by their classmates as such behaviour coincides with the social behaviour expected from women, being preferred those who meet such expectations.

Among the assessed cognitive control measures, impulsivity showed additional differences between the *rejected-non-prosocial* group – on one side – and the *neglected and controversial* group – on the other. *Neglected* and *controversial* participants had higher impulsivity values than those in the *rejected* group, although their prosocial behavior was

slightly higher. Eisenberg et al. (2010) proposed a conceptual model in which cognitive and emotional control was associated with good social adjustment of adolescents. The results of this study confirm the importance of control skills in sociometric status. At the same time, the results support the hypothesis held by some authors that EC and emotional reactivity affect social behavior with relative independence (Eisenberg et al., 2009). In the current study, the low levels of emotional reactivity (impulsivity) are the ones which generated differences between controverted students and the rest of the groups. Repeatedly exhibiting impulsive behaviors can have serious consequences in interpersonal relationships. Impulsivity has been shown to directly predict violent behavior in male adolescents and young people aged 13-26 (Klinterberg, Andersson, Magnusson, & Stattin, 1993) and has been associated with aggressiveness (Santisteban, Alvarado, & Recio, 2007). Moreover, both internalizing and externalizing behavioral problems have been associated with low reactive control in high-risk youth (Martel et al., 2008). Cognitive control ability is more relevant in boys than in girls. In boys, EC distinguished the *popular-prosocial* group – with the greatest control resources – from *controversial* students –with the lowest EC. It is possible that the ability to self-regulate is more valued in boys than in girls, probably because the socialization processes strengthen the idea of self-control and instrumental behaviours as male values.

Among all the cognitive-emotional values included in the DDA, self-reported measures of emotional intelligence (attention, clarity and repair) were not relevant to discriminate between sociometric groups. When these measures were included in the analysis along with those of performance, empathy, and cognitive control, they played a secondary role in differentiating sociometric status. This result differs from that of other studies that have found a relationship between emotional intelligence and peer interaction styles (Dougherty, 2006; Schultz et al., 2009). Such studies assessed social skills or degree of acceptance by peers but

did not include measures of empathy or cognitive control and did not distinguish between participants according to their sociometric status. The effect of emotional intelligence on interpersonal relationships may be indirect and due to its relationship with empathy. There is agreement among experts (Decety & Svetlova, 2012; Eisenberg & Eggum, 2009) that emotional intelligence includes processes related both to awareness of one's own and others' emotions and emotional regulation. Future studies with adolescents will confirm or refute this assumption.

In our study, we combined classification scales and nomination by peers and we could identify *popular-prosocial* and *rejected-non prosocial* groups formed by a high number of students. However, one limitation of our study is that the measures of empathy, emotional intelligence and cognitive control have only been assessed through self-assessment reports. Future investigations could improve our study by assessing these processes and abilities using behavioural measures and multiple information sources (e.g. teachers, parents, etc.). In the second place, by using a correlational design, the possibilities of making causal inferences of the found relations are reduced. Finally, the generalization of these results must be done cautiously. Our sample was mainly drawn from Spanish students from a middle socio-economic level at urban public schools. Other investigations have used samples from different nationalities or socio-economic levels for the characterization of the social status in adolescents (Farmer et al., 2011; Rodkin et al., 2000) although the assessed cognitive and affective variables do not coincide with those presented here. Upcoming investigations should be carried out with the same or similar variables in other contexts to prove the same relational pattern in different socio-cultural samples.

To conclude, the present results not only confirm the importance of academic achievement in sociometric classifications of adolescents, but they also highlight the clear

relevance of empathy – particularly its affective elements – and behavior control in sociometric status. Activities aimed at promoting such resources should be included in educational programs to foster a positive school climate and prevent peer rejection and social exclusion (Eisenberg, Valiente et al., 2010; Rueda, Checa, & Rothbart, 2010). Interventions that promote these resources at an individual level would make possible that potential victims of bullying could improve their social competences and integration possibilities. On the other hand, if favourite and leader students use prosocial means based on empathy, they can favour a positive social climate among peers, be willing to defend the students who fall victim of bullying and allow the inclusion of the rest of students. The intervention models that promote self-regulation in experimented emotions when relating to others seem to have an impact on boys and girls alike. Furthermore, they might prevent school failure due to their double influence on academic difficulties and the students' social adjustment.

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Sección 3

Modelo integral de las FEs y el EC en la predicción del rendimiento académico

Capítulo 7

Predictive Influence of Executive Functions, Effortful Control, Empathy, and Social Behavior on the Academic Performance in Early Adolescents

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ABSTRACT

In this study we explored the predictive role of behavioral measures of Executive Functions (EFs) and a self-report measure of Effortful Control (EC) on the academic performance of early adolescents. We also analyzed the mediating role of self-reported empathy and social behavior rated by peers (i.e. prosocial behavior and social preference) and by the lead teacher (i.e. social competence). A sample of 244 adolescents aged between 12 and 13 years participated in the study. The resulting structural equation model indicated that EFs and EC predict academic performance in a complementary and independent way. Results also confirmed the mediating role of empathy and social behavior. The final model explained 64% of academic performance. We discuss the appropriateness of obtaining complementary measures of EFs and EC in predictions of academic performance as well as the importance of introducing activities involving cognitive control, empathy, and socio-emotional skills in the school setting.

Key words: Executive Functions, Effortful Control, Empathy, Social Competence, Academic Performance.

INTRODUCTION

Cognitive control and behavior self-regulation have a positive influence on development and maturation. From birth to adult age, these skills gradually build individuals' personal autonomy and independence, affective regulation, and interpersonal relationships (Rueda, Posner, & Rothbart, 2005). These control skills have often been referred to as Executive Functions (EFs) and/or Effortful Control (EC). EF and EC play a major role in explaining the behavior and academic performance of children and adolescents (Blair & Diamond, 2008; Eisenberg, Valiente, & Eggum, 2010). They also have a great predictive power over empathy and social skills (Eisenberg, Valiente, et al., 2010). However, these two constructs have been explored separately in most studies (Zhou, Chen, & Main, 2012). One of the aims of the present research was to explore the relationship between EF and EC in the prediction of academic performance in early adolescents. We also intended to find out whether this relationship is mediated by students' empathy and social skills.

Executive Functions and Effortful Control

EFs allow individuals to target their behavior to specific goals and are generally related to planning and problem solving (Diamond, 2013). Some theorists argue that EFs are a unitary construct, a central executive system that establishes priorities in the information processed and controls behavior (Baddeley, 2000; Norman & Shallice, 1986). Others consider that EFs comprise a series of basic but interrelated components, the most important of which are working memory, inhibitory control, and cognitive flexibility (Best, Miller, & Jones, 2009; Miyake et al., 2000). In any case, it is accepted that EFs are required to exert control over the demands of the environment. By contrast, EC is understood to be a component of

temperament related to the voluntary control of behavioral approach and avoidance tendencies. It's activating and inhibitory control mechanisms enable individuals to regulate their behavior in situations of potential punishment or when an immediate reward is delayed in order to obtain a more important one later on (Rueda et al., 2005). There is clearly some degree of overlapping between both constructs (Zhou et al., 2012). Processes of inhibitory control, information selection, and cognitive flexibility are present in both (Blair & Razza, 2007a; Zhou et al., 2012). Moreover, although working memory has been associated with EFs to a greater extent (Zhou et al., 2012), it is also of great relevance in EC (Wolfe & Bell, 2007; Bridgett et al., 2013). The updating and monitoring processes that take place in working memory are closely linked to the executive attention network supported by EC (Rueda et al., 2011). In the brain, a considerable coincidence has been observed between the cortical regions of neural networks associated to EFs and EC, specifically the anterior cingulate cortex and the dorsolateral prefrontal cortex (Fan, McCandliss, Fossella, Flombaum, & Posner, 2005; Koechlin & Summerfield, 2007; Rueda, Posner, & Rothbart, 2011).

Despite this overlap, theoretical developments and research studies have led to distinctions between both constructs. As stated above, EFs have often been conceptualized as a set of basic cognitive processes that enable cognitive and behavioral control. They have traditionally been associated with basic executive processes that allow problem solving and abstract reasoning (Diamond, 2013). By contrast, EC has been understood instead as a unitary construct that explains overall behavior control (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013). Although some psychometric studies have divided EC into several subcomponents (Rothbart, 2007), it is generally considered as a construct that encompasses multiple skills.

From a more functional approach, another difference between both constructs is their predictive power over socio-emotional behaviors and affective states. Traditionally, research on EFs has focused on tasks and demands with no affective charge. It is only recently that EFs have been associated with emotional regulation and a difference has started to be made between 'cold' and 'hot' EFs on a continuum of affective activation (Hongwanishkul, Happaney, Lee, & Zelazo, 2005). By contrast, research on EC has attempted to make predictions of the socio-emotional behavior and affective states of children and adolescents, particularly in family or school settings (Zhou et al., 2012). This may have been instrumental in the fact that EFs are assessed with behavioral tasks in emotionally neutral situations, whereas information on EC has usually been obtained with questionnaires or self-reports in which everyday behaviors are described (Diamond, 2013).

Some researchers have recently included measures of EFs and EC in the same studies to explore their relationships. Studies conducted with children suggest that these measures are only moderately correlated with each other (Hongwanishkul et al., 2005; Rothbart, Ellis, Rueda, & Posner, 2003). In adults, Bridgett et al. (2013) found a moderate relationship between neuropsychological tests that require managing information in the working memory (Letter-Number Sequencing subtests of the WAIS-IV and verbal fluency tests) and self-report measures of EC (the Adult Temperament Questionnaire; Derryberry & Rothbart, 1988). Yet, in contrast with what has been observed in children, the study did not find any relationship between inhibitory control (assessed with the Stroop task) and EC scores. The relationship between measures of EFs and EC is likely to change with individuals' development. This relationship may also be modified when other socio-emotional processes such as empathy and emotional regulation start to play an important role in the social functioning of children and adolescents (Eisenberg et al., 2007).

Control, Empathy and Social Behavior Processes

Empathy is also closely related to control and interpersonal regulation processes (Barkley, 2001). It encompasses a series of processes that are particularly relevant in detecting and understanding the emotional states of other individuals but also in the affective regulation of individuals themselves (Decety & Lamm, 2009). These processes are partially supported by neural networks involving the prefrontal cortex, specifically the connections between the orbitofrontal cortex, the medial prefrontal cortex, and the dorsolateral prefrontal cortex (Decety, 2011). As has already been pointed out before, some of these areas are also associated with EFs and EC.

Cognitive control is involved in perspective taking and in the emotional regulation required to reduce the personal discomfort generated in a situation of empathy (Eisenberg & Eggum, 2009). These processes uphold the distinction between 'self' and 'other' and prevent emotional overflow (Decety & Lamm, 2009). Therefore, it is not surprising to note that EFs and EC have been positively associated with empathic abilities. et al. (2011) observed that cognitive flexibility, assessed with the Trail Making Test, and working memory, assessed with the Letter-Number Sequencing subtest of the WAIS-IV, were positively correlated with cognitive empathy, both in patients with depression and in a healthy control group. Spinella (2005) found that dysfunctions in the prefrontal cortex, assessed with the Frontal Systems Behavior Scale, not only interfered with attention and planning processes but also limited perspective taking. EC has been positively associated with dispositional empathy both in children and adolescents (Valiente et al., 2004; Zorza, Marino, de Lemus, & Acosta Mesas, 2013). Moreover, some longitudinal studies have found that high levels of EC during childhood predict empathic responses during early adolescence (Eisenberg et al., 2007). However, no

studies to date have differentially explored the predictive power of measures of EFs and EC over empathy.

Control and empathy processes are directly involved in the development of socialization and in socio-emotional regulation. They are closely related to the maintenance of positive relationships with peers and teachers. EFs have been positively associated with social skills, while their impairment can limit the development of theory of mind and the ability to think about the mental state of others (Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006). EC has been negatively associated with the incidence of externalizing behavior problems, characterized by high levels of aggression, impulsivity, and disruption both in children and early adolescents (Eisenberg et al., 2005; Eisenberg, Spinrad, & Eggum, 2010). Adolescents with better control resources are favored by their peers in sociometric tests (Checa, Rodríguez-Bailón, & Rueda, 2008). In addition, many studies have reported that empathy promotes prosocial behaviors (ver, Eisenberg, Eggum, & Di Giunta, 2010). In fact, students who show concern about the emotions of others and perform prosocial behaviors are more favored and accepted by their peers and have a more positive perception of the social climate than those who do not (LaFontana & Cillessen, 2002; Zorza, Marino, & Mesas, 2015).

Executive Functions, Effortful Control, and Academic Performance

There are many routes of influence of EFs and EC on the academic performance of children and adolescents. It has been reported that working memory, one of the components of EFs, is directly and positively related to grades in mathematics (Bull & Scerif, 2001). Cognitive flexibility, another basic aspect of EFs, has been found to moderately predict literacy ability (Van der Ven, Kroesbergen, Boom, & Leseman, 2012) and the average grades of

students aged 8 to 13 years (Best, Miller, & Naglieri, 2011; Zorza, Marino, Acosta, in press). By contrast, EC is considered important for the academic motivation of students (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). High levels of EC are associated with greater participation in class, a better relationship with teachers, and better academic performance (Liew, Chen, & Hughes, 2010; M. R. Rueda, Checa, & Rothbart, 2010; Valiente et al., 2013). Moreover, some aspects related to EC such as persistence in completing a task or in keeping one's goals are also associated with academic success in primary school (Blair & Razza, 2007).

Apart from this direct relationship, scholars have made theoretical proposals and obtained empirical results that confirm the mediating role of empathy and social skills between EFs/EC and academic performance (Eisenberg, Valiente, et al., 2010; C. Valiente et al., 2011). Zhou, Main, and Wang (2010) found that high levels of EC in preschool children facilitate school adaptation through the regulation of behavior and social skills. In a longitudinal study, Valiente et al. (2011) found that EC assessed at the age of 6 predicted the social functioning of children at the age of 8, which in turn significantly mediated the relationship between EC and academic performance at the age of 10. Zorza et al. (2013) also found that the social status of secondary education students partially mediated the influence of EC on academic performance. Moreover, empathy, which was closely related to EC, had a considerable predictive influence on social status and partially mediated this relationship.

It therefore seems that in order to explain academic performance it is necessary to consider not only the executive control resources of students and how they use such resources to respond to academic demands, but also how they use them in empathic and interpersonal situations. It is reasonable to think that a wide and stable social network of peers is likely to

facilitate learning experiences and responses to academic demands. There is broad empirical evidence of these relationships (Eisenberg, Eggum, et al., 2010).

The Present Study

The purpose of this study was to explore the interrelations between EFs, EC, and empathy in early adolescents – secondary education students – and determine their direct and indirect influence on academic performance. First, we intended to learn about the relationship between several behavioral tasks that assess EFs (Trail Making, Stroop, and verbal fluency tests) and a self-reported measure of EC (Early Adolescence Temperament Questionnaire-Revised; EATQ-R, Ellis & Rothbarth, 2001). Very few studies have obtained measures of both constructs. We used first-generation classic EF tasks (Gruber & Goschke, 2004) that require the involvement of several cognitive processes at the same time (i.e. working memory, cognitive flexibility, inhibitory control, verbal fluency) even if one of them predominates in each task. Our second objective was to explore the differential relationship between measures of EFs and EC on one side and self-reported dispositional empathy on the other. Control processes are present in empathic reactions and necessary for perspective taking and emotional regulation (Decety & Lamm, 2009). We wished to learn whether EF measures are related more or less closely to empathy than EC measures. Third, we intended to analyze the differential relationship between EFs and EC and social behavior and determine whether this relationship is mediated by empathy. Considering the results of previous studies (Zorza et al., 2013; Zorza et al., 2015), we hypothesized that control processes influence social behavior by improving the emotional regulation and perspective taking that lead to the empathic response. Finally, we intended to verify whether these relationships vary depending on the gender of students.

We planned to test our hypotheses on a predictive model of academic performance (see Figure 1) that would enable us to compare the direct and mediated relationship (through empathy and social behavior) between control processes and academic performance. We expected the results contribute to a better understanding of the constructs of EFs, EC, and empathy and be useful to design activities aimed at improving academic performance in early adolescent students.

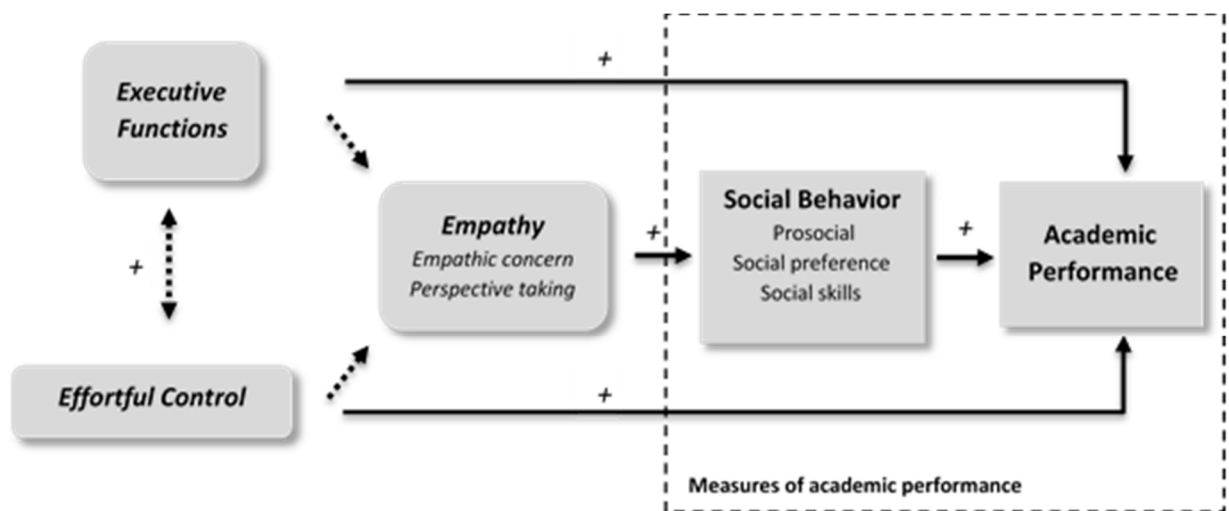


Figure 1. Proposed model of the relationships between executive functions, effortful control, empathy, social behavior, and academic performance.

METHOD

Participants

The sample was composed of 244 students (129 males) attending four public schools (58, 67, 62, and 57 participants from each school) in the city of Granada, Spain. All participants were in first year of secondary education and were aged between 12 and 13 years ($M= 12.30$, $SD= .46$ for females; and $M= 12.25$, $SD= .43$ for males). The families of participants from the four schools had similar medium-to-low socioeconomic status (i.e. education level and income). Most participants were Caucasian and had been born in Spain, and only 5.8% were

immigrants from Latin America. Participation was voluntary and informed consent was obtained from parents and the principals of the schools.

Measures of Executive Functions

Trail Making Test (TMT). We administered the classic pen and paper version of Reitan-Wolfson (Lezak, 1995). The TMT is composed of two parts: A and B; each part consists of 25 circles distributed over an A4 sheet of paper. The subject has to draw a line to connect the numbered circles in ascending order as quickly as possible without lifting the pen. In Part A, the circles are numbered 1-25; in Part B, the circles include both numbers (1-13) and letters (A-L). In Part B, the subject alternates between consecutive numbers and letters (that is, 1-A-2-B...). The tasks are completed when the subject reaches numbers 25 or 13 (indicated with the word "END"), respectively. Errors are immediately pointed out by the examiner and the score on each part is the amount of time (seconds) required to complete the task. In this study, we used the scores of Part B, which requires flexibility to shift between numbers and letters.

Stroop Test. Participants completed a version composed of two parts (Lezak, 1995). In the first (Part C), subjects were presented with an A4 sheet of paper with 112 words designating colors (blue, green, red, and black) printed in a color (blue, green, red, or black) that was different from that designated by the word. Subjects had to read the written word as fast as possible, not the color of the ink the word was printed in. In the second (Part CP), participants were handed another A4 sheet of paper with the same number of words and equivalent manipulations between the meaning of the words and the ink they were printed in. In this part, participants had to name the color of the printed ink as fast as possible. This task is usually more demanding because naming the color of the ink requires inhibiting the semantic processing of the word. The performance index is calculated by dividing the number

of correctly named words by the seconds required. Errors are infrequent and participants require less time to complete Part C than Part CP, since the latter requires more inhibitory control resources. In the study we considered the results of the second part (Part CP).

Verbal fluency test. Finally, we administered a verb naming test (Piatt, Fields, Paolo, & Tröster, 1999). Students were asked to name as many verbs as possible in one minute. They were instructed to name the verbs in the infinitive and not to repeat them. Students' production was digitally recorded. The performance index included in the study was the total number of valid verbs.

Measures of Effortful Control

This construct was evaluated with the (EATQ-R self report, Early Adolescence Temperament Questionnaire – Revised Self Report; Ellis & Rothbarth, 2001), translated into Spanish by Checa et al. (2008). The EATQ-R assesses four factors of temperament (effortful control, extraversion/surgency, negative affect, and affiliation) and can be administered to participants aged 10 years or older. In this study we used the total score of the 16 items that collect information about EC ($\alpha = .70$), comprising three subfactors: activation control (e.g. “If I have a hard assignment to do, I get started right away”), attention (e.g. “It is easy for me to really concentrate on homework problems”) and inhibitory control (e.g. “I can stick with my plans and goals”). Responses are provided on a Likert scale from 1 (“Almost always untrue for you”) to 5 (“Almost always true for you”). Prior studies (C. Valiente et al., 2008) have reported a similar internal consistency to that obtained in the present study ($\alpha = .73$).

Measures of Empathy

Empathy was assessed with the Spanish adaptation (Mestre Escrivá, Navarro, & García, 2004) of the *Interpersonal Reactivity Index* (Davis, 1983). This scale is one of those most widely

used in the literature to measure dispositional empathy. It includes 28 items distributed into four subfactors: empathic concern, perspective taking, fantasy, and personal distress. As in other studies (Batanova & Loukas, 2011), in our study we included scores on perspective taking and empathic concern, the two dimensions that provide the most accurate and direct assessment of empathic resources. The fantasy and personal distress factors have sometimes had ambiguous interpretations and have low correlations with measures of behavior and cerebral activation (Decety & Lamm, 2009). Perspective taking assesses whether individuals respond affectively to the emotional experience of others (e.g. “I often have tender, concerned feelings for people less fortunate than me”). Perspective taking provides information on individuals’ cognitive ability to adopt the perspective of another person in everyday situations (e.g. “I try to look at everybody’s side of a disagreement before I make a decision”). Participants responded on a scale ranging from 1 (“Does not describe me well”) to 5 (“Describes me very well”). Internal consistency indices (EC: $\alpha = .68$; PT: $\alpha = .72$) were similar to those obtained by Mestre Escrivá et al. (2004) in the Spanish version.

Measures of Social Behavior

Evaluations of peers. We used a nomination procedure and a prosocial behavior classification scale. In the former, we assessed *social preference* with a sociometric procedure (Rodríguez Pérez, 2005): from the class list, each student nominated the three classmates with whom he/she would like to perform several activities (i.e. school tasks or recreational activities) and three classmates he/she would not like to perform them with. Following the method proposed by Newcomb, Bukowski and Patte (1993), both the number of times each student was chosen and the number of times he/she was rejected was divided by the number of students in each class. The social preference index was obtained by subtracting the adjusted

score of rejections from that of choices. To assess prosocial behavior (López Sánchez, 2006), students were asked to rate each of their classmates according to the degree of help they provided in various situations (i.e. performing school tasks, when they were sad or worried, or in situations of conflict with other peers). They were handed a list with the name of all their classmates and asked to rate them on a Likert scale ranging from 1 (“Provides very little help”) to 5 (“Is very helpful”). Scores for each student were normalized for each class.

Evaluations of teachers. The lead teacher of each class completed the *Escala de Valoración del Profesor I-S* [Intelligence and socialization teacher assessment scale] (Carrión, Hernández, & Gregorio, 1999), which collects information about the Socialization, Respect for Authority, and Intelligence of each student. The scale is composed of 24 items that are rated from 1 (minimum) to 10 (maximum) according to the degree to which they describe a skill of the student. In this study we only considered the measures of the Socialization subfactor ($\alpha = .93$), which assesses the perception of teachers about students’ social skills (e.g. “their ability to cooperate positively with their peers settling disputes”).

Measures of Academic Performance

We included the mean of the final grades of each participant in the school year during which the assessments were made. The subjects used were mathematics, Spanish, English, social sciences (history), natural sciences (biology), physical education, and art/music. The rating scale ranged from 0 to 10. This score is a consistent index of performance that does not fluctuate depending on which school the students attend. Correlations between the mean of the final grades used in the study and the mean grades obtained after transforming the direct scores on each subject to a z scale was .843.

Procedure

EFs were assessed individually in a quiet room of each school. The self-reports and questionnaires of the other measures were presented in booklets in which the order of presentation was randomly arranged. Participants completed the questionnaires in their classrooms in the presence of one experimenter and the lead teacher of each class, who did not know the scores obtained by the students in EF tests. Before the booklets were distributed, the examiner informed participants that their data would be totally confidential and verbally repeated the instructions on how to complete the questionnaires included in the booklet. Students performed the EF tasks and completed the questionnaires in their regular school hours in November, two months after the start of the school year. The lead teacher assessed each student with the *Escala de Valoración del Profesor I-S* in March, seven months after the start of the school year. Each lead teacher assessed about 30 students. At the end of the school year, the school management provided the list of grades of each student.

RESULTS

Data Analysis

First, we conducted the descriptive analysis of each variable and explored its correlations in order to determine whether the pattern supported the proposed model, whether it was appropriate to create latent variables, and whether the mediation pathways hypothesized were plausible. Next, we tested the predictions of the models using structural equation modeling (SEM) with AMOS statistical software, version 18.0. To control the influence of the “school” variable, we transformed the direct academic performance and social behavior scores into a z scale, normalizing the measures before conducting the SEM analysis. In addition, given that it was logical to expect a covariance between the error terms

in the variables rated by the same evaluators, we introduced a covariance between measures of social preference and prosocial behaviors. Finally, we conducted a multi-group analysis to find out whether the model with the best fit was moderated by the gender of students.

Preliminary Analyses

The descriptive statistics of each variable and correlation analyses are shown on Table 1. EF measures were significantly correlated to one another, which indicates some relationship between them. However, only the measures of verbal fluency of verbs (FV-V) were significantly correlated with EC. It therefore seems that the EF and EC constructs are somewhat independent. These results justified the creation of a latent variable for EF measures that was independent of EC. Correlations between reports from peers and the lead teacher regarding Prosocial Behavior, Social Preference, and Social Behavior were high and significant. Because of this, we created the latent variable “Social Behavior” in the structural equation model. Finally, we also obtained significant and high correlations between Perspective Taking and Empathic Concern, which allowed us to create another latent variable for the Empathy construct.

In addition, the pattern of correlations suggested that there may be multiple mediations between variables. All the measures except those derived from the Stroop task were significantly and positively correlated with Academic Performance. Moreover, significant correlations were found between FV-V measures and EC, between the TMT-B and Empathy, and between both measures of EFs and Social Behavior; EC was also positively correlated with Empathy and Social Behavior; and

Table 1. Mean, standard deviation, and Pearson's correlations between the variables assessed in the study.

Variable	Mean (SD)		CI	FV	EC	PT	EC	PrP	PsB-T	SS-T	AP
	Girls	Boys									
TMT-B	96.15 (36.30)	100.01 (36.14)	.22**	.32**	.11	.15**	.18**	-.02	.27**	.38**	.28**
Stroop CP	1.13 (.60)	1.02 (0.47)		.21**	.08	-.05	.08	-.17	-.08	.17	-.02
FV-Verbs	15.41 (6.50)	15.61 (5.51)			.23**	.07	.11	.05	.25**	.34**	.59**
EC	10.14 (1.56)	10.10 (1.55)				.25**	.25**	.17*	.26**	.24**	.43**
PT	22.39 (4.57)	21.17 (4.75)					.56**	.14	.22**	.31**	.26**
EC	24.05(5.46)	22.77 (5.24)						.17**	.26**	.28**	.27**
PrP	.02 (.17)	-.04 (.18)							.70**	.45**	.28**
PsB-T	3.18 (0.54)	2.96 (0.61)								.54**	.49**
SS-T	6.12 (2.30)	5.93 (2.09)									.50**
AP	6 (1.57)	5.88 (1.62)									-

Note on table. TMT-B = Trail Making Test (Part B); VF = Verbal Fluency; EC = effortful control; PT = perspective taking; EC = empathic concern; PrP = social preference rated by peers; PsB-T = prosocial behaviors rated by teachers; SS-T = social skills rated by teachers; AP = academic performance.

Empathy was correlated with Social Behavior. This pattern of correlations was compatible with the predictive and mediation framework proposed in the model.

Structural Equation Models

We tested a first model with latent variables for EFs, Empathy, and Social Behavior. We included a direct pathway of influence of EFs and EC on academic performance and an indirect pathway mediated by Empathy and Social Behavior (see Figure 1). The model did not show adequate fit, $\chi^2 = 69.01$, $df = 29$, $p = .000$; $\chi^2/df = 2.38$; $RMSEA = .07$, $CFI = .93$, $NFI = .89$. To improve the fit, we eliminated the latent variable from EFs, since two of its three indicators did not show significant patterns of relationships, suggesting that the variables measured did not contribute to the latent construct. Moreover, the variance explained was very low (TMT-B, $R^2 = .17$; Stroop-CP, $R^2 = .01$). As suggested by many theorists, EFs are probably composed of independent but interrelated executive processes (Best et al., 2009; Miyake et al., 2000). In the new model, we included the scores on the TMT-B, the Stroop-CP and the FV-V tasks separately and found the same variables and relationships as in the first model. Results of indices were comparatively better, $\chi^2 = 56.91$, $df = 23$, $p = .000$; $\chi^2/df = 2.47$; $RMSEA = .07$, $CFI = .94$, $NFI = .91$. As shown on Figure 2, among the EF measures only the TMT-B showed a significant covariance with the FV-V, and only FV-V measures were significantly correlated with EC. In this model, the measures of the TMT-B and EC significantly predicted Empathy. However, the evaluation of the modification indices of the model suggested that it would be appropriate to include a direct relationship between the TMT-B, FV-V, and EC on one side and Social Behavior on the other. Modifications were introduced one by one in successive models.

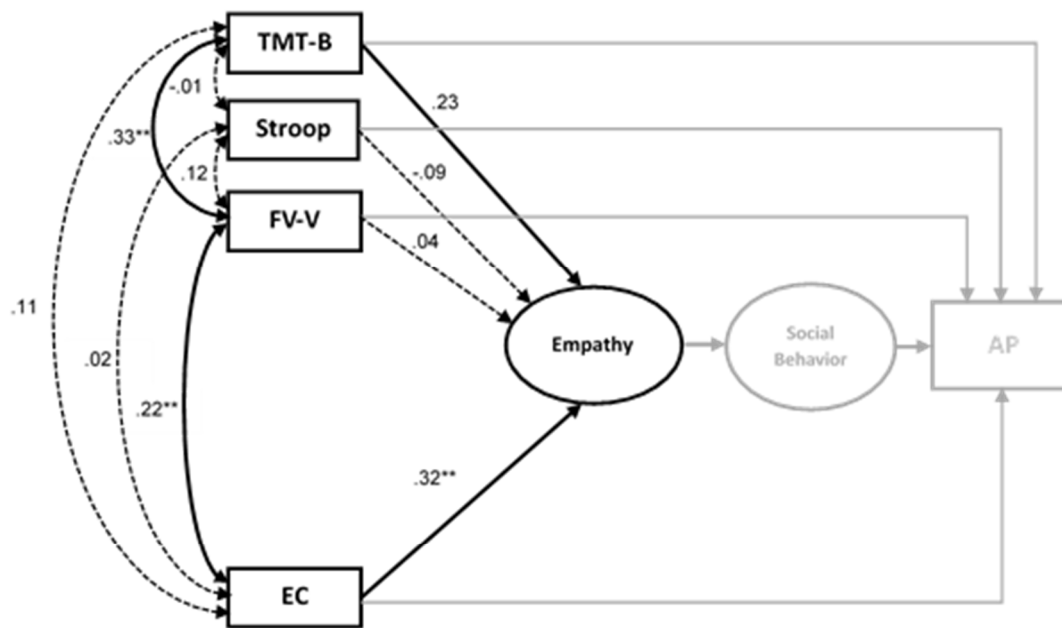


Figure 2. Initial structural equation model that showed significant fit (Model 2). Covariances between EFs and EC and relationships between them and empathy are highlighted.
Note on figure: TMT-B = Trail Making Test (Part B); FV-V = verbal fluency-verbs; EC = effortful control; AP = academic performance.

In Model 3, when we included the direct relationship between scores on the TMT-B and Social Behavior, we obtained a better fit than in Model 2, although it was still insufficient, $\chi^2 = 44.16$, $df = 22$, $p = .003$; $\chi^2/df = 2.00$; $RMSEA = .06$, $CFI = .96$, $NFI = .93$. In Model 4, when we included the direct relationship between scores on the FV-V task and Social Behavior, the model showed adequate fit, $\chi^2 = 34.22$, $df = 21$, $p = .034$; $\chi^2/df = 1.63$; $RMSEA = .05$, $CFI = .97$, $NFI = .94$, and results were significantly better than those of Model 1. In Model 4, the TMT-B (i.e. cognitive flexibility) showed a direct and significant influence on Empathy ($\beta = .21$, $p < .01$) and Social Behavior ($\beta = .23$, $p < .001$), while the FV-V only showed a significant effect on Social Behavior ($\beta = .26$, $p < .001$).

To improve the comparison of relationships between constructs, a direct relationship between EC and Social Behavior was added in Model 5. This model also showed good fit, $\chi^2 =$

30.48, $df = 20$, $p = .062$; $\chi^2/df = 1.52$; $RMSEA = .05$, $CFI = .98$, $NFI = .95$, with significantly better results than the other models⁵ (see Table 2). As shown on Figure 3, Model 5 explained 64% of the variance of Academic Performance. The TMT-B ($\beta = .20$, $p < .05$) and EC ($\beta = .32$, $p < .001$) predicted Empathy ($R^2 = .16$). Moreover, the TMT-B ($\beta = .22$, $p < .001$), the FV-V ($\beta = .22$, $p < .001$), EC ($\beta = .16$, $p < .05$) and particularly Empathy ($\beta = .36$, $p < .001$) predicted students' Social Behavior ($R^2 = .41$). In line with the hypotheses made, the FV-V ($\beta = .40$, $p < .001$) and EC to a lesser extent ($\beta = .18$, $p < .001$) were associated with Academic Performance. Social Behavior was also an excellent predictor ($\beta = .49$, $p < .001$) of Academic Performance. Yet, contrary to our expectations, when we considered the joint predictions of the FV-V, EC and Social Behavior regarding Academic Performance, neither the measures of the TMT-B ($\beta = .03$) nor those of the Stroop-CP task ($\beta = -.15$) directly predicted Performance.

To conclude the analysis, we decided to verify whether it was necessary to maintain the relationship between Empathy and Social Behavior in the model. In Model 6, we eliminated the direct relationship between these two constructs. Our rationale was that if the fit was adequate, EF and EC skills would be sufficient to predict Social Behavior and therefore Empathy would not be necessary. Model 6 showed poor fit, $\chi^2 = 37.50$, $df = 21$, $p = .015$; $\chi^2/df = 1.78$; $RMSEA = .05$, $CFI = .97$, $NFI = .94$, which was lower than that of Model 5. We were also interested in exploring whether the relationship between Social Behavior and Performance should be maintained in a final model. If the model showed better fit indices than those of

⁵ We also checked whether Model 5 exhibited better fit when the measures of EFs and EC were considered separately. We created a model that restricted the covariances between EFs and EC. Although this restricted model showed good fit, $\chi^2 = 34.22$, $df = 21$, $p = .034$; $\chi^2/df = 1.63$; $RMSEA = .05$, $CFI = .97$, $NFI = .94$, Model 5, in which relationships between EFs and ECs were not limited, showed significantly better fit, $\chi^2(3) = 12.8$, $p = .005$, compared to the restricted model. This result confirms that the measures of EFs and EC are not statistically independent and need to be linked to each other.

Model 5, it would mean that EF and EC measures only influence Academic Performance through a direct pathway. In Model 7, when we eliminated the direct relationship between Social Behavior and Academic Performance, the model showed poor fit, $\chi^2 = 37.50$, $df = 21$, $p = .015$; $\chi^2/df = 1.78$; $RMSEA = .05$, $CFI = .97$, $NFI = .94$, which was significantly lower than that of Model 5. Table 2 shows the fit indices of the proposed models.

Table 2. Summary of the comparative fit indices of each model analyzed.

SEM	χ^2	Df	CFI	NFI	RMSEA	AIC
Model 1	69.01	29	.93	.89	.07	141.01
Model 2	56.91	23	.94	.91	.07	140.91
Model 3	44.16	22	.96	.93	.06	130.16
Model 4	34.22	21	.97	.94	.05	122.22
Model 5	30.48	20	.98	.95	.04	120.48
Model 6	37.50	21	.97	.94	.04	125.50
Model 7	75.35	22	.90	.88	.10	161.35

Note. We compared Models 2 and 3 with each other and Models 3 and 5 with each other. Results of Chi-square tests confirmed that goodness-of-fit indices were better in Model 5. We obtained the same result when using the Akaike information criterion (Akaike, 1974). Model 5 had the lowest values, which indicates better fit.

Analysis of the Moderation According to Gender

Some studies have found that gender mediates the relationship between Empathy and Academic Performance (Jordan, Kaplan, Nabors Oláh, & Locuniak, 2006; C. Valiente et al., 2008). To verify whether this influence was present in our results, we performed a multi-group SEM analysis, exploring another “restricted” model in which we forced the loadings on each factor and regressions so that they would be the same in males and females. An equivalence between them would suggest a lack of moderation (Byrne, 2001). The model resulting from the analysis showed adequate fit, $\chi^2 = 64.97$, $df = 44$, $\chi^2/df = 1.49$; $RMSEA = .04$, $CFI = .96$, $NFI = .90$. The difference between the “free” model (with no parameter limitations) and the “restricted” χ^2 (23.34) model with 18 degrees of freedom was not significant ($p = .190$), indicating the fit of the proposed model for both girls and boys aged 12 to 13 years.

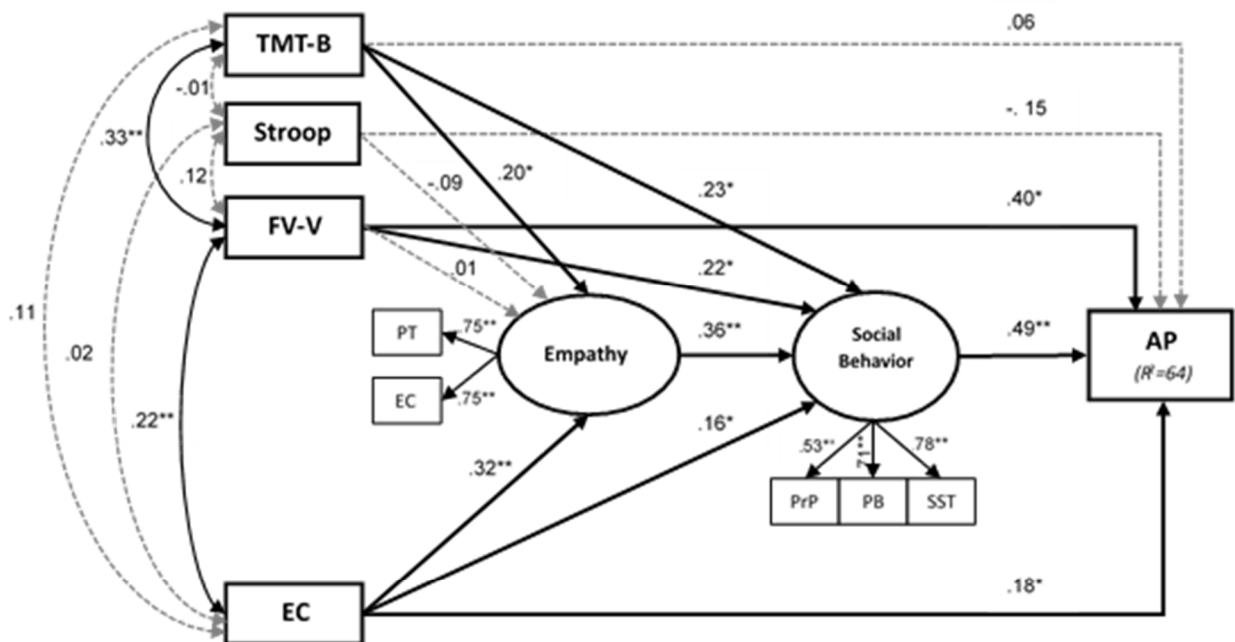


Figure 3. Final structural equation model (Model 5) that best predicted academic performance.

Note: TMT-B = Trail Making Test (Part B); FV-V = verbal fluency-verbs; EC = effortful control; PT = perspective taking; EC = empathic concern; PrP = social preference rated by peers; PB = prosocial behaviors; SS-T = social skills rated by teachers; AP = academic performance

DISCUSSION

There is abundant empirical evidence to prove that measures of control and self-regulation predict students' social and academic performance (Blair & Diamond, 2008; Eisenberg, Valiente, et al., 2010). Yet, our knowledge of the relationships between constructs related to control processes is limited. The overall objective of this research was to describe the relationships between EFs and EC, learn about their predictive power on academic performance, and analyze the mediating role of empathy and social behavior in early adolescence students. Results indicate that control and self-regulation influence academic performance directly and also indirectly through empathy and social behavior. The confirmed model also suggests that EFs and EC are complementary but independent control and self-regulation systems. This pattern of relationships is consistent with some theoretical proposals (Eisenberg, Valiente et al., 2010) and recent studies (Valiente et al., 2011; Zorza et al., 2013).

Relationships between EFs and EC

Results suggest that EFs and EC are moderately related to each other during early adolescence. In addition, not all EF measures were correlated with EC. This indicates that both constructs share some elements but do not completely overlap. Inhibitory control and measures of cognitive flexibility, assessed with the Stroop-CP task and the TMT-B, respectively, were not significantly correlated with the self-reported measure of EC. By contrast, the measures of FV-V showed such correlations. Other studies have yielded similar results (Bridgett et al., 2013). The reason for this may be that, during adolescence, unlike during childhood, inhibitory control is not the prevailing control and regulation strategy; working memory and the maintenance of goals and targets, along with language skills, may be more relevant to regulate behavior at this stage (Steinberg, 2005). Verbal fluency tests

require a considerable support from working memory, continuous monitoring of information processing, cognitive flexibility, and semantic executive control (Piatt et al., 1999). Additional studies are needed to obtain more information on the relationship between both constructs and to confirm that working memory is particularly involved in EC (Rueda et al., 2011).

Contribution of Control Processes to Empathy and Social Behavior

The model also clarified the relationship between EFs and EC on one side and socio-emotional processes on the other. To the best of our knowledge, no prior studies have explored the differential influence between EF and EC in the prediction of dispositional empathy. Results suggest that cognitive flexibility, assessed with the TMT-B, and especially EC are positively associated with dispositional empathy. These results are consistent with those of other studies (Eisenberg et al., 2007; Zorza et al., 2013) and support some recent conceptual proposals according to which empathy is a multidimensional concept that includes emotional regulation as one of its major components, as it facilitates prosocial behaviors (Decety & Lamm, 2009). In this regard, the model also revealed that students with high levels of empathy exhibit more prosocial behaviors and are favored by their peers. As in previous studies, we found close relationships between measures of the TMT-B and EC and empathy and between empathy and social behavior. This pattern of relationships has been found consistently in our studies (Zorza et al., 2013; Zorza et al., 2015).

Social behavior does not depend exclusively on the mediation of empathy. Measures of FV-V, the TMT-B and EC were directly related to social behavior. This confirms that, apart from the mediation of empathic socio-emotional processes, control and self-regulation executive skills in themselves enhance social skills and acceptance by peers. Previous studies have also shown this relationship (Zorza et al, 2013; Zorza et al., 2015). This seems to suggest

that control processes promote respect for group norms and decrease impulsive behaviors (Eisenberg, Spinrad, et al., 2010; Eisenberg, Valiente, et al., 2010; M. R. Rueda et al., 2010). These aspects are positively rated both by peers and teachers during childhood and early adolescence.

Again, inhibitory processes, assessed with the Stroop-CP task, did not predict empathy or social behavior. During early adolescence, by contrast with younger ages, social skills may be more associated with the ability to regulate emotions through more complex processes such as the reappraisal of a situation (Gross, 2008). If this is the case, language skills and cognitive flexibility, evaluated with verbal fluency tasks, are likely to play a greater part in emotional regulation than behavioral inhibition (Gross, 2008; Gyurak, Goodkind, Kramer, Miller, & Levenson, 2012). Additional studies are required to clarify the relationships between semantic executive control mechanisms and emotional regulation during childhood and adolescence, and the influence of both on social behavior.

Influence of EFs and EC on Academic Performance

The overall model enabled a better prediction of academic performance than that obtained using only measures of EC (in Blair & Razza, 2007, $R^2 = .23$; Checa et al., 2008, $R^2 = .47$) or EFs ($R^2 = .13$ en Zorza, Marino, Acosta, in press). The direct influence of the FV-V and EC on academic performance is consistent with the studies that attribute a considerable predictive power to EFs regarding performance in mathematics and literacy during childhood and adolescence (Best et al., 2011). Among the measures of EF included in the model, only the FV-V exhibited this significant direct relationship with academic performance. Inhibitory control and cognitive flexibility, assessed with the Stroop-CB task and the TMT-B, respectively, did not show a significant direct influence. Results confirm the relevance of working memory,

which already has a predictive influence on performance in mathematics in 7-year-old children (Bull & Scerif, 2001), along with other processes such as performance monitoring and semantic control, as evaluated by the FV-V task, in the prediction of academic performance in secondary education students. The reason for this may be that academic demands at this education level require a high level of abstraction and a more strategic approach. To the best of our knowledge, no prior studies have shown such a close relationship between the FV-V and academic performance. So far, most studies conducted with verbal fluency tests have had a clinical nature. Future studies should explore the predictive power of measures of verbal fluency at different ages.

In support of proposals on a double pathway of influence of EFs and self-regulation on academic performance (Eisenberg, Valiente, et al., 2010), it has been found that empathy and social skills also play a major mediating role over academic performance. The model had a similar predictive power to that found in other studies that also included the influence of social behavior, participation in class, or the relationship with teachers as independent and/or mediating variables (Valiente et al., 2011, $R^2=.50$; Valiente et al., 2008, $R^2=.57$) over academic performance. This finding suggests that, during adolescence, probably to a greater extent than during childhood, the ability to become integrated into the peer group and adapt to the social environment is key for academic success (Wentzel, 2003).

Conclusions and Educational Implications

In conclusion, the results of this study confirm that cognitive control and self-regulation, included in the EF and EC constructs, should be given special consideration in educational programs aimed at ensuring academic success in secondary education. In recent years, programs have been designed to enhance executive control skills in preschool and

primary education children (Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005). These are very promising initiatives that should be enriched by including empathic activities and adapting them to older student populations. EFs, EC, and empathy have been found to greatly predict the social behavior in early adolescence students. The enhancement of social skills and academic performance should be placed within this framework of relationships. Educational interventions should consider the complex set of factors (cognitive, emotional, and interpersonal) involved in socio-educational demands.

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Capítulo 8

Discusión General

La presente Tesis tuvo la finalidad de desarrollar un marco predictivo del desempeño escolar en preadolescentes, en el que tienen protagonismo especial las habilidades y procesos de control cognitivo y comportamental, así como la empatía. Los resultados obtenidos señalan cuáles son las vías de influencia de las FEs y el EC sobre el desempeño escolar. En primer lugar, en todos los estudios encontramos que, tanto para alumnas como para alumnos, las FEs y el EC se relacionan directamente con un incremento del rendimiento académico. Esta relación se confirmó en los modelos de regresión y en los de ecuaciones estructurales, donde obtuvimos que el rendimiento académico fue parcialmente explicado por algunas medidas complejas de FEs (Capítulos 3 y 7) y por el EC autoinformado (Capítulos 3, 4, 6 y 7).

En segundo lugar, los resultados indican que los estudiantes con mejores recursos de control poseen mayores niveles de empatía disposicional y que el control cognitivo se relaciona de modo directo con el comportamiento social, definido en términos de ayuda hacia los demás y la aceptación por los iguales (Capítulo 4, 5 y 7). Del mismo modo, el control cognitivo predijo de forma directa la percepción que los alumnos poseen sobre el clima social de su escuela (Capítulo 5), y fue una de las variables que permitió discriminar a los alumnos según su estatus social (Capítulo 6).

En tercer lugar, hemos obtenido evidencias de que la empatía media entre el control cognitivo y el comportamiento social. La empatía, además de ocupar un lugar central en la predicción del comportamiento social, logró caracterizar a los estudiantes populares y rechazados, y predecir la percepción del clima social (Capítulos 5 y 6).

Por último, los resultados indican que los alumnos que son propensos a ayudar a los demás y son más aceptados por sus iguales tienen un rendimiento académico mejor. Parece, por tanto, que existe una doble vía de influencia del control cognitivo sobre el rendimiento

académico, una directa y otra mediada por el comportamiento social. A continuación discutimos estos resultados.

Funciones Ejecutivas y Effortful Control: aportes del control cognitivo al rendimiento académico

Al comenzar nuestro trabajo nos preguntábamos si los alumnos con mejores recursos de FE y EC tendrían un mejor rendimiento académico. En los cuatro estudios que realizamos para responder a esta pregunta llegamos a la misma conclusión: los alumnos que regulan mejor su comportamiento, pensamiento y competencias socioemocionales tienen más posibilidades de obtener un mejor rendimiento. En los dos estudios (Capítulo 3 y 7) que incluimos medidas complejas de FE se obtuvieron correlaciones moderadas con el rendimiento académico, sugiriendo que estas habilidades son un componente importante para el éxito escolar, como también se ha encontrado en otras investigaciones (Best, Miller, & Jones, 2009; Best, Miller, & Naglieri, 2011; Blair & Diamond, 2008). Nuestros resultados indican también que estas relaciones son distintas en alumnos de primaria y secundaria (Capítulo 3). La fuerza de la correlación es mayor en el nivel de primaria. Best et al. (2011) también encontraron una mayor correlación entre medidas de FE y rendimiento académico en los niños de 8-9 años de edad que en alumnos con edades superiores. Algunos autores (Altemeier, Abbott, & Berninger, 2008; Best et al., 2011) han propuesto una explicación de esta variación considerando el progreso en la automatización de las habilidades académicas. En los niveles educativos de infantil y primaria, gran parte de ellas aún requieren mucho esfuerzo. Deben inhibirse distractores y la atención ha de mantenerse en la información relevante. En secundaria, el control cognitivo probablemente no se requiere para estas habilidades básicas sino para la resolución estratégica de problemas más complejos. Quizás,

la falta de correlación entre las medidas de la tarea *Stroop* y el rendimiento académico (Capítulos 3 y 7) que se ha encontrado en alumnos de secundaria pueda explicarse también de esta manera. Aunque se trate de una tarea compleja (requiere sostener la atención, inhibir una respuesta prepotente y dar otra alternativa), sus demandas de memoria de trabajo, monitoreo, planificación estratégica y flexibilidad cognitiva son mínimas en comparación con las necesarias para resolver las tareas del TMT-B y las pruebas de FV de acciones.

Otra cuestión que nos inquietaba al realizar los estudios es si tareas de FEs tan sencillas, de bajo costo y de fácil aplicación, podrían aportar información relevante para la comprensión del rendimiento escolar. Por ejemplo, en el caso de las pruebas de FV, su duración no supera el minuto y no se requiere ningún soporte material para la presentación de estímulo. Los resultados presentados en los Capítulos 3 y 7 sugieren que las pruebas de FEs utilizadas predicen de manera importante (por ej., $R^2 = .41$) el rendimiento académico. Es posible que esta se deba precisamente a su complejidad. Las pruebas de FV involucran, por un lado, procesos de búsqueda automática generados a partir de la propagación de la activación de elementos relacionados en la memoria semántica. Por otro, implican a procesos de búsqueda estratégica que requieren el control ejecutivo para anticipar de un nodo conceptual la posibilidad de emisión de otro nodo conceptual por rasgos compartidos, monitorear la evocación de palabras dentro de un misma subcategoría (*cluster*), inhibir palabras ya emitidas y cambiar de categorías (*shifting*) (Marino, Acosta Mesas, & Zorza, 2011). En este sentido, las tareas utilizadas permiten además de su economía y fácil aplicación, evaluar diferentes procesos ejecutivos básicos de forma simultánea como sucede en la realización de la mayoría de las actividades escolares. Del mismo modo, estas tareas presentan un conjunto de estímulos de una sola vez exigiendo la iniciación de la respuesta en cada estímulo sucesivo, con fuerte compromiso motivacional y de mantenimiento en la tarea. Esta exigencia es similar

a la demandada en las tareas escolares donde el alumno en muchos casos, debido a la falta de un contexto motivador, debe autorregularse iniciando y manteniendo las actividades independientemente de las señales contextuales. Creemos que la validez ecológica de las tareas complejas (Chan, Shum, Toulopoulou, & Chen, 2008) es la que asegura una alta relación con el rendimiento académico. Por otro lado, su bajo costo permite su aplicación en diversos contextos escolares más allá de las diferencias culturales y económicas.

Una tercera pregunta que nos hicimos al iniciar las investigaciones es si el poder predictivo del EC sobre el rendimiento académico sería semejante al de las medidas de FEs. En los tres estudios (Capítulo 4, 5, 7) en que se estudió esta relación, observamos que, a mayor nivel de EC, el rendimiento académico de los alumnos se incrementaba. Las correlaciones fueron moderadas, como en el caso de las medidas de FEs. Incluso, cuando se consideró el efecto de las variables mediadoras (empatía y comportamiento social, Capítulo 4, 5 y 7), los niveles de EC siempre predijeron el rendimiento académico. Este resultado coincide con la suposición de que el EC tiene un efecto directo sobre las competencias académicas (Eisenberg, Valiente, & Eggum, 2010; VanSchyndel, Eisenberg, Valiente, & Spinrad, 2015). En el sistema educativo tener éxito, en gran parte, significa ser capaz de dar respuestas a contextos estructurados. Esto requiere dirigir la atención y controlar el comportamiento según los horarios, los espacios y actividades académicas. Los alumnos con niveles elevados de EC logran con mayor facilidad no dispersarse y regular su reactividad (emocional y motora) inhibiendo respuestas no acordes a las metas escolares. Junto al control inhibitorio, el EC incorpora además el control de la activación, que permite la realización de una acción cuando hay una tendencia a evitarla. Al controlar su activación, los alumnos logran poner a disposición de la tarea educativa sus recursos cognitivos. Este aspecto es central en las competencias académicas. Si los alumnos logran dirigir su voluntad y su atención hacia el proceso de

aprendizaje, se asegura el funcionamiento de las capacidades cognitivas básicas. Una vez logrado esto, otros componentes más cognitivos del EC, como son el cambio atencional y la planificación, pueden estar directamente implicados en el aprendizajes de los contenidos impartidos (Valiente et al., 2008).

Otro aspecto que nos interesó conocer fue la relación entre las medidas de FEs y de EC. En el estudio descrito en el Capítulo 7, incluyendo medidas de FEs conjuntamente con las de EC, observamos que la ejecución en FV de acciones se relacionaba con el EC, mientras las tareas *Stroop* y TMT-B no lo hacían. La correlación moderada de las medidas de FV de acciones con el EC sugiere que a esta edad la autorregulación puede vincularse con capacidades del control ejecutivo semántico. Éste podría mejorar la autorregulación al favorecer la modulación de las emociones mediante la resignificación de los eventos emocionales (Gross, 2008; Gyurak, Goodkind, Kramer, Miller, & Levenson, 2012), como también es posible que las habilidades lingüístico-semánticas de los adolescentes y adultos mejoren los recursos de autorregulación, posiblemente por el uso del habla privada o la auto-conversación (Wolfe & Bell, 2007). Por otro lado, si se considera la demanda de control cognitivo de las tareas de FV, al compararse con las demás pruebas de FEs utilizadas, probablemente requieren un mayor esfuerzo. Tanto la tarea *Stroop* como la tarea del TMT brindan información sobre cómo continuar una vez superado cada estímulo presentado en la tarea, y tienen mayor posibilidad de automatizar las estrategias utilizadas para resolverlas. Las tareas de FV, al no presentar estímulos ni claves para realizar cambios, suponen un mayor control cognitivo en la iniciación, monitoreo y cambio de estrategias, procesos más vinculados con el EC. Sin embargo, y más allá de estas explicaciones, un dato que nos llamó la atención fue que la tarea *Stroop* no se relacionara significativamente con EC y el rendimiento académico. Estos resultados son difíciles de interpretar debido a que no encontramos investigaciones previas que relacionen

las FEs con el EC en la adolescencia temprana. En adultos, se han obtenido resultados similares (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013). Quizás, el control inhibitorio de la interferencia, como se presenta en la tarea *Stroop*, no sea un componente central del EC en la preadolescencia. Es posible que en esta edad sean más relevantes los procesos inhibitorios relacionados con el autocontrol del comportamiento, de los estados afectivos y de la impulsividad (Hofmann, Schmeichel, & Baddeley, 2012).

En general, si bien en todos los estudios se observó una relación entre las medidas de control cognitivo y el rendimiento académico, consideramos que inferir una relación directa exclusiva entre ambos es arriesgado. El rendimiento académico es un constructo multidimensional (Eisenberg, Valiente, et al., 2010). Es esperable que múltiples variables medien la relación entre control cognitivo y el rendimiento. Además de la ejecución en pruebas académicas y del juicio del profesorado, otros aspectos como la relación que el alumno tiene con sus profesores y con sus compañeros pueden ser de gran relevancia.

Control Cognitivo y Empatía

La capacidad de percibir, comprender y compartir el estado afectivo de otro individuo, y predecir o anticipar los acontecimientos interpersonales es un recurso importante para el desempeño social exitoso. La empatía puede entenderse como una respuesta mutidimensional en la que el control cognitivo permite pasar del contagio emocional a la comprensión de las emociones y las intenciones de los demás (Decety & Jackson, 2004; Decety & Svetlova, 2012). En este sentido, nos preguntábamos si los alumnos con mayores recursos de control tendrían también niveles superiores de empatía disposicional. Los antecedentes de investigaciones en niños y adultos sugieren una relación estrecha entre las capacidades de regulación y la empatía, sin embargo, en la adolescencia temprana esta

relación se ha investigado en menor medida. En los tres estudios (Capítulo 4, 5 y 7) que incluyeron medidas de FEs, EC y empatía, obtuvimos correlaciones moderadas entre estos constructos y los modelos predictivos demostraron que algunos procesos de las FEs y el EC predicen la empatía disposicional. Estos resultados son coincidentes y complementan los obtenidos en otras investigaciones (Decety & Michalska, 2010; Eisenberg, 2007; Eisenberg et al., 1989; Eslinger, Moore, Anderson, & Grossman, 2011). Apoyan las propuestas teóricas que incluyen el control cognitivo como un componente de la respuesta empática que facilita la regulación emocional y el cambio de perspectiva requerido para considerar el punto de vista de los demás. Decety y Michalska (2010) mencionan que la capacidad de diferenciar entre las representaciones propias y las generadas al empatizar es fundamental para lograr experimentar preocupación empática y una comprensión emocional orientada hacia los demás. En otras palabras, se requiere de cierta habilidad ejecutiva para considerar múltiples representaciones mentales (Carlson, Moses, & Breton, 2002; Razza & Blair, 2009; Stone & Gerrans, 2006), y esto es necesario para empatizar con otros y no solo contagiarse emocionalmente (Decety & Michalska, 2010; Lamm, Batson, & Decety, 2007).

Desde esta perspectiva, Eisenberg y Eggum (2009) comentan que las diferencias individuales de los niños en la tendencia para experimentar *simpatía* (preocupación empática) vs *pena personal* (estrés generado al empatizar) varía en función de las diferencias en las capacidades para regular sus emociones, las cuales pueden relacionarse con el EC y capacidades asociadas. Nuestros resultados son acordes a esta propuesta. Los modelos de ecuaciones estructurales, que contrastaron esta relación en tres muestras independientes, sugieren una influencia directa y positiva del EC sobre la empatía disposicional tanto para sus componentes emocionales como cognitivos. Es posible, como sugieren Eisenberg et al. (2007), que los niños que tienen control sobre sus capacidades de focalizar y cambiar la atención

logren que la emoción vicaria producida al empatizar se module como una respuesta orientada hacia los demás, lo que no es tan aversivo como para escapar de la situación o generar una respuesta centrada en ellos mismos. También es posible que el control inhibitorio, otra dimensión del EC, se asocie positivamente con la preocupación empática y las respuestas orientadas hacia los demás. Los niños y adolescentes que tienen niveles moderadamente altos de control inhibitorio, quizás, logran mantener una distancia óptima en la situación emocionalmente evocadora e inhibir las tendencias de auto-orientación afectiva. Algunos investigadores (Hoffman, 2002) piensan que este proceso básico de inhibición, que permite al niño separarse de su punto de vista, es un precursor de la capacidad de toma de perspectiva.

Es posible que los procesos de control cognitivo tengan una relevancia desigual en la toma de perspectiva. En el estudio descrito en el Capítulo 7, observamos que las medidas de TMT-B fueron las únicas, conjuntamente con el EC, que predecían la empatía disposicional de los alumnos. Resultados semejantes se han obtenido cuando se relacionan medidas de flexibilidad cognitiva con tareas que evaluaban dimensiones cognitivas de la empatía (Carlson, Claxton, & Moses, 2015). Esta evidencia sugiere que la flexibilidad cognitiva y la memoria de trabajo serían los procesos ejecutivos que permiten mantener activos los aspectos relevantes de una interacción social, e inhibir el propio conocimiento de la realidad para considerar el estado mental de las demás personas, cambiando de las propias representaciones a las ajenas según las demandas de la interacción (Stone & Gerrans, 2006).

En resumen, nuestros resultados sugieren que en la adolescencia temprana el control cognitivo puede favorecer las respuestas empáticas. Coinciden en este sentido con los modelos que definen la empatía como una construcción compleja, que se puede

descomponer en procesos ascendente de participación afectiva y en otros más estratégicos, de tipo *top-down*, en donde la motivación, las intenciones y la autorregulación tienen especial relevancia (Decety & Jackson, 2004; Decety & Lamm, 2009; Decety & Svetlova, 2012; Eisenberg & Eggum, 2009). Por otro lado, también observamos en nuestros estudios que la varianza explicada por la empatía disposicional fue baja, lo cual señala que existe un conjunto de procesos o características individuales que no han sido considerados. Durante la preadolescencia, la empatía también se ha relacionado con diferentes dimensiones de la personalidad (Barrio, Aluja, & García, 2004), que se cree reflejan en parte el EC (Rothbart, 2007), así como con la autoeficacia para la autorregulación de la conducta y el manejo de las emociones negativas (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003). En otro estudio no incluido en la Tesis (Zorza, 2008), observamos que la varianza explicada de la empatía disposicional aumentó al incluir en los modelos predictivos medidas directas de estrategias de regulación emocional como el *reappraisal*. Considerando estos resultados, si se quiere mejorar la predicción de la empatía disposicional en futuras investigaciones sería conveniente incluir diferentes medidas sobre estrategias de regulación emocional y características temperamentales en los modelos predictivos.

Control cognitivo y empatía: influencias sobre el comportamiento social

La vida escolar presenta una serie de desafíos que deben resolverse en el marco de la convivencia entre compañeros y profesores. En esta matriz de relaciones sociales los alumnos aprende a respetar las perspectivas de otros niños, incorporan normas y valores, y se involucran en distintas prácticas sociales que aseguran el aprendizaje social y académico. En la adolescencia, la importancia del grupo de iguales y la sensibilidad hacia las opiniones y conductas de los demás adquieren mayor relevancia, y tienen consecuencias importantes

sobre el desarrollo emocional, cognitivo y social (Collins & Steinberg, 2006). Por este motivo, uno de nuestros objetivos principales fue evaluar cómo el control cognitivo influye en las conductas sociales que promueven la aceptación entre iguales. El comportamiento social fue evaluado mediante las conductas prosociales y la valoración de aceptación que hacían los alumnos sobre sus compañeros. También, en dos estudios, a través de la opinión del tutor. En los diferentes estudios descritos, realizamos variaciones en la forma de analizar estas medidas: se utilizaron de forma separada, se crearon variables latentes, se conformaron grupos según el estatus social, y se combinaron con valoraciones de los docentes. En todos los estudios, e independientemente de las técnicas y los diseños utilizados, los resultados fueron concluyentes sobre la relación positiva que existe entre el control cognitivo, la empatía y el comportamiento social.

Una vez establecida la relación entre control cognitivo y desempeño social, nos interesaba saber cuáles eran los procesos o vías que permitían esta vinculación. Como presentamos en la introducción, algunos modelos (Beauchamp & Anderson, 2010; Eslinger et al., 2011; Yeates et al., 2007) sugieren que el control cognitivo se asocia con el desempeño social por una vía directa y otra mediada por la cognición social. En tres de nuestros estudios (Capítulos 4, 5 y 7), pusimos a prueba estas propuestas utilizando diferentes modelos de ecuaciones estructurales para evaluar tanto los efectos directos como mediados. Los resultados aportan evidencia sobre una relación directa entre el control cognitivo y el comportamiento social, y otra mediada por la empatía.

En relación a las medidas de FEs, nos preguntamos si todas tienen el mismo nivel de relevancia en la conducta social. Nuestro primer estudio, sugiere que para responder esta pregunta es necesario considerar el nivel educativo al que asisten los niños y los adolescentes.

Observamos que las medidas *Stroop* y TMT fueron más relevantes en primaria, mientras que en secundaria las medidas de FV y TMT fueron las que predijeron las conductas prosociales evaluadas por pares y profesores. En nuestro último estudio (Capítulo 7), donde participaron estudiantes de secundaria, también se observó este patrón de relación. Junto con el EC, las medidas de TMT y FV de acciones fueron predictores del comportamiento social, sin encontrarse un efecto significativo de las medidas *Stroop*. A diferencia del componente inhibitorio del EC que se ha relacionado más con el autocontrol de la conducta, las tareas *Stroop* evalúan la inhibición de la interferencia. Es posible que las medidas de EC, al estar más relacionadas con las capacidades de autorregulación de la impulsividad y las emociones, se vinculen en mayor medida con el desempeño social (Beauchamp & Anderson, 2010). Por otro lado, como explicamos para el rendimiento académico, los estilos de interacción social continúan su desarrollo durante la adolescencia y requiere de diferentes recursos cognitivos. A esta edad, se exigen mayores niveles de toma de perspectiva y de integración de la información social (Burnett, Sebastian, Kadosh, & Blakemore, 2011; Hoffman, 2008) y las comunicaciones sociales son más ricas en contenido y pragmática (Nilsen & Graham, 2009). Para todo ello, las capacidades ejecutivas requeridas para su autorregulación son más complejas que en la niñez, implican mayor flexibilidad cognitiva y posiblemente estrategias de regulación más elaboradas que la inhibición. En otro estudio que lleva adelante nuestro equipo de investigación, hemos observado que las tareas de FV de acciones posiblemente comprometan ciertos mecanismos de control ejecutivo semántico necesarios en la regulación de las emociones. Si esto se comprueba, es posible que la relación observada en el último modelo entre las medidas de FV y el desempeño social se explique por la relevancia del lenguaje en la autorregulación del comportamiento y de las emociones.

También, nos preguntamos si al considerar de forma conjunta las FEs y el EC en la predicción del comportamiento social, algunas de estas medidas tendrían mayor relevancia. Como no existían estudios previos al respecto, nuestras predicciones eran inciertas. El análisis de los datos sugirió que el EC conserva el poder predictivo sobre el desempeño social en todos los modelos de ecuaciones estructurales con independencia de las medidas de FEs utilizadas y la inclusión de la empatía. Un aspecto a destacar es que en el estudio (Capítulo 5) en que incluimos como variable dependiente la percepción del clima social escolar, el EC también posee un moderado efecto directo sobre la percepción que los alumnos tienen de la seguridad en el centro escolar y de la calidad de las relaciones con sus profesores. Esto sugiere, que las capacidades de autorregulación no solo mejoran las relaciones entre compañeros y las posibilidades de inclusión social, sino que también facilitan experiencias escolares de seguridad en el espacio escolar y de mejores relaciones con el profesorado. Posiblemente esto se debe a que los alumnos y alumnas con niveles elevados de EC tienen relaciones de mayor calidad con sus profesores, participan más en clase (Diaz et al., 2015; Silva et al., 2011; Valiente, Swanson, & Lemery-Chalfant, 2012), son menos disruptivos y presentan menos problemas de conducta (Eisenberg, Spinrad, & Eggum, 2010).

En relación con la vía indirecta que vincula el control cognitivo y el comportamiento social por intermedio de la empatía, nuestras investigaciones la confirmaron de manera consistente (Capítulos, 4, 5 y 7). Adicionalmente, respecto a la contribución diferencial de la empatía emocional (preocupación empática) y cognitiva (toma de perspectiva) sobre el comportamiento social (Batanova & Loukas, 2011; Decety & Yoder, 2015; Jolliffe & Farrington, 2006), los resultados del análisis de ecuaciones estructurales y las funciones discriminantes (Capítulo 4 y 6) sugieren que la preocupación empática es el componente de la empatía que

se relaciona en mayor medida con el comportamiento prosocial, la preferencia social, y logra diferenciar a los alumnos *populares-prosociales* de los alumnos *rechazados-no-prosociales*.

Los alumnos *populares-prosociales* obtuvieron los niveles más elevados de preocupación empática, mientras los pertenecientes al grupo de *rechazados-no-prosociales* tienen los más bajos. Como describimos en el Capítulo 5, es posible que la preocupación empática caracterice a los alumnos *populares-prosociales* por ciertos componentes que no solo tienen que ver con el conocimiento de las emociones y su regulación, dado que en el mismo estudio las medidas de inteligencia emocional no lograron discriminar a los grupos. Creemos que la preocupación empática es el factor que genera la fuerza motivacional y la tendencia de acción para el cuidado de los demás y las conductas prosociales. En este sentido, estudios recientes vinculan los circuitos neuronales que median la preocupación empática con la actividad de regiones críticas para la promoción de apego social y la prestación de cuidados (FeldmanHall, Dalgleish, Evans, & Mobbs, 2015). Por otro lado, en algunas teorías, la preocupación empática es una respuesta emocional precursora de emociones morales como la culpa y se relaciona de modo estrecho con el desarrollo moral de los niños (Hoffman, 2008). En futuras investigaciones puede ser interesante incluir medidas que combinen dimensiones emocionales y morales con las medidas de empatía y el comportamiento prosocial para comprender más estas relaciones.

En síntesis, cuatro estudios aportaron evidencia sobre una posible vía directa de influencia de las FEs y EC sobre el comportamiento social. Como sugieren los modelos presentados (Adolphs, 2009; Beauchamp & Anderson, 2010; Eslinger et al., 2011; Yeates et al., 2007), esta vía de control cognitivo influye en el comportamiento social sin la necesidad de un procesamiento de información específicamente social, refleja más bien que las

relaciones sociales requieren de una adecuada autorregulación emocional y comportamental en diferentes ámbitos. Por ejemplo, los alumnos que no logren controlar sus movimientos e impulsividad, aunque comprendan las intenciones de los demás sin dificultad, verán posiblemente obstaculizada su inclusión al grupo de pares por su comportamiento hiperactivo e impulsivo. Por otro lado, los modelos de ecuaciones estructurales sugieren que también existe una vía de influencia mediada por la empatía. Mediante esta vía, el control cognitivo participa en el procesamiento de información social como parte de la comprensión empática de los demás. Si consideramos lo discutido en el apartado anterior sobre cómo los procesos de control cognitivo pueden considerarse parte de una respuesta empática plena, los resultados obtenidos sobre el comportamiento social reafirman nuestra idea de que los recursos de control y la empatía se movilizan conjuntamente en las relaciones sociales (Barkley, 2001).

Control cognitivo y rendimiento académico: ¿una relación mediada por el comportamiento social?

Durante muchos años las investigaciones sobre el rendimiento académico se centraron en identificar las diferentes capacidades y procesos cognitivos que se vinculaban con el aprendizaje humano. Sólo en las últimas décadas los investigadores y teóricos han recuperado el estudio de las emociones y el contexto social para comprender el desempeño escolar. La apertura a nuevos campos de conocimiento y los avances en la neurociencia cognitiva y afectiva han configurado diferentes hipótesis sobre cómo los procesos de control cognitivo, las emociones y las relaciones interpersonales predicen el rendimiento académico. Eisenberg, Sadovsky y Spinra (2005), por ejemplo, propusieron que las relaciones sociales que los alumnos mantienen en su clase pueden mediar la relación entre el EC y el rendimiento

académico. Considerando estas propuestas, un objetivo de esta Tesis fue poner a prueba un modelo que integra los procesos de control con los dominios emocionales e interpersonales en la comprensión del rendimiento académico. En especial, considerábamos que, en la adolescencia temprana, la relevancia del grupo y la aceptación social podía influir en gran medida en las condiciones y posibilidad de aprendizaje a las que pueden acceder los alumnos (Wentzel, Baker, & Russell, 2009).

Los estudios presentados en los Capítulos 4 y 7 contrastaron el modelo heurístico de Eisenberg, Valiente y Eggum (2010) que sugiere dos vías de influencia del control cognitivo sobre el rendimiento académico, una directa y otra mediada por el desempeño social. Además, como se presentó en los apartados anteriores, también se comprobó si la influencia del control cognitivo sobre el comportamiento social estaba mediada por la empatía. En los dos estudios, los modelos de ecuaciones estructurales indicaron que las dos vías se relacionaron de forma significativa con el rendimiento académico. Los modelos lograron explicar una varianza del 39 al 61 % del rendimiento académico, alcanzando un poder predictivo mayor que los modelos que solo contemplan una vía de influencia, como el presentado en el Capítulo 3. Estos resultados sugieren que los adolescentes con adecuados recursos de control cognitivo y empatía no sólo ven favorecidas sus posibilidades de inclusión social en el grupo de pares, sino que también esto les permite aumentar su compromiso con el aprendizaje y obtener mejores resultados académicos. Por el contrario, alumnos que suelen ser rechazados en mayor medida por sus pares y tienen déficit en sus capacidades de autorregulación corren riesgo de perder oportunidades de aprendizaje y fracasar académicamente.

En una revisión reciente, Wentzel y Ramani (2016) sugieren que mantener relaciones positivas con los pares genera una serie de beneficios que favorecen el desarrollo emocional y académico. Uno de estos beneficios se refiere al apoyo social e instrumental que se produce en el contacto frecuente con los compañeros. Los alumnos reciben ayuda de sus iguales en las tareas académicas y en la resolución de problemas sociales generando mayor motivación y compromiso escolar. Por otro lado, la aceptación social genera un sentido de pertenencia grupal que puede favorecer el bienestar y prevenir estados emocionales negativos. También es posible que proteja a los alumnos de ser el blanco de situaciones de acoso y victimización. Esta podría ser la razón de que las medidas de comportamiento social, al compararse con el resto de medidas (EC, FEs y empatía), alcanzasen el mayor poder predictivo sobre el rendimiento académico en los modelos contrastados. No obstante, debe considerarse también la posible bidireccionalidad de estas relaciones. Algunos autores sugieren (Valiente et al., 2008) que los alumnos que logran responder a las demandas académicas y poseen un buen rendimiento también son más aceptados por sus pares y obtienen un mejor desempeño social. Es decir, que el rendimiento y el comportamiento social se pueden influir mutuamente. En el estudio presentado en el Capítulo 5, cuando pusimos a prueba la hipótesis de una relación bidireccional entre comportamiento social y rendimiento, observamos que también el rendimiento académico es un fuerte predictor del comportamiento social. Este resultado sugiere que el vínculo entre el desempeño social y el rendimiento académico es complejo, y se requieren estudios longitudinales para poder comprobar si un mejor rendimiento académico en los primeros cursos del nivel secundario también favorece ser aceptado y más incluido en el grupo de pares en cursos posteriores.

En resumen, la principal conclusión que obtuvimos de los modelos contrastados es que el control cognitivo se relaciona con el rendimiento académico por una vía directa y otra

mediada por el comportamiento social. Nuestros resultados demostraron el fuerte poder predictivo que las relaciones entre iguales poseen sobre el rendimiento académico, y apoyan las propuestas que destacan el valor de las relaciones sociales en la predicción del desempeño escolar (ver Wentzel & Ramani, 2016). Cuando los modelos predictivos incluyeron medidas de comportamiento social, la varianza explicada del rendimiento fue más elevada que al considerar sólo los efectos directos de medidas de control. Del mismo modo, cuando en los modelos se quitaron los efectos del comportamiento social sobre el rendimiento, el ajuste del modelo a los datos no fue adecuado. Mientras que en la mayoría de las investigaciones las relaciones entre procesos de control, empatía, comportamiento social y rendimiento académico se estudiaron de forma separada, la presente Tesis aporta a la literatura un modelo del desempeño escolar que contempla cómo el control cognitivo favorece el rendimiento académico por intermedio de su influencia en la empatía y las relaciones sociales entre pares.

Consideraciones Finales

Los estudios descritos en los diferentes capítulos demuestran que las FEs y el EC predicen el rendimiento académico tanto en el nivel de primaria como en el de secundaria. Del mismo modo, los resultados confirman que los procesos de control cognitivo también son relevantes en las relaciones sociales entre compañeros y en la percepción de los alumnos sobre la seguridad y apoyo social que brindan los centros escolares. Por otro lado, el análisis de los modelos de ecuaciones estructurales sugiere que la relación del control cognitivo con el rendimiento académico fue parcialmente mediada por el comportamiento social y, a su vez, que la empatía media la relación del control cognitivo con las medidas del comportamiento social. La empatía jugó un rol central en la predicción de las conductas prosociales y la caracterización de los alumnos que conformaron el grupo de alto estatus social. Estos resultados se suman a un amplio número de estudios que destacan la interacción de los dominios cognitivos, emocionales y sociales en la comprensión del desempeño escolar. A nivel de intervención, proporcionan una guía sólida, los diferentes programas deberían considerar en su diseño la estimulación de las FEs, el trabajo sobre la comprensión empática y, de manera especial, tomar en cuenta la relación entre iguales como un componente central de la convivencia pacífica y el éxito académico.

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